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VOLUME I.

TRANSCRIPT OF RECORD

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1941

No. 265

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, PETITIONERS

vs.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY

No. 268

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, PETITIONERS

vs.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT

Petitions for certiorari filed July 12, 1941, July 14, 1941.

Certiorari granted October 13, 1941

IN THE

United States Circuit Court of Appeals
For the Seventh Circuit

No. 7454

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND TEXOMA NATURAL GAS COMPANY,
Petitioners,
vs.
FEDERAL POWER COMMISSION AND ILLINOIS
COMMERCE COMMISSION,
Respondents.

Petition for Review of Interim Order of the Federal Power Commission.

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PROCEEDINGS.

Examiner Durrance: The hearing will be convened.

This hearing is in the matter of Illinois Commerce Commission, complainant, *vs.* Natural Gas Pipeline Company of America and Texoma Natural Gas Company, defendants; designated on Commission's docket as No. G-109; also In the Matter of Natural Gas Pipeline Company of America and Texoma Natural Gas Company, designated on Commission's docket as No. G-112.

The purpose of this hearing is to develop facts in order that the Commission might determine whether any transportation or sale of natural gas, subject to the jurisdiction of the Commission, any rates, charges or classifications demanded, observed, charged or collected, or any rules, regulations, practices, or contracts affecting such rates, charges, or classifications are unjust, unreasonable, unduly discriminatory, or preferential.

On September 23, 1938, the Illinois Commerce Commission of the State of Illinois filed its petition with the Federal Power Commission, which reads as follows: Filed Sept. 23, 1938.

"To The Federal Power Commission:

"Your petitioner, the Illinois Commerce Commission, respectfully represents as follows:

"1. That the Illinois Commerce Commission is a Commission organized and existing under the Public Utilities Act of the State of Illinois, and a State Commission within the meaning of Section 13 of the Natural Gas Act of 1938, and with its principal office in the city of Springfield, Illinois.

"2. That the Natural Gas Pipeline Company of America (hereinafter called Natural Gas Company) is a corporation organized and existing under the laws of the State of Delaware, with its principal office at 20 North Wacker Drive, City of Chicago, State of Illinois, owning a 24-inch pipeline extending from Gray, in the State of Oklahoma, to a point southwest of the City of Joliet, in the State of Illinois, and is a natural gas company engaged in the transportation of natural gas in interstate commerce, and the sale in interstate commerce of such gas for re-sale, within the meaning of Section 2(6) of the Natural Gas Act.

"3. That Texoma Natural Gas Company (hereinafter called Texoma) is a corporation organized and existing under the laws of the State of Delaware, with its principal office at 20 North Wacker Drive, City of Chicago, State of Illinois, owning and operating gas wells, field gathering lines, compressor stations and a gasoline extraction plant in the State of Texas, and a 24-inch main pipeline which extends from Fritch, in the State of Texas, to Gray, in the State of Oklahoma, and is a natural gas company within the meaning of the Natural Gas Act, engaged in the transportation of natural gas in interstate commerce, and the sale in interstate commerce of such gas for re-sale.

"4. That Natural Gas Company has outstanding 1,500,000 capital shares of which 399,435,465 shares (26.629%) are owned by Natural Gas Investment Company, an Illinois Corporation whose stock is owned by the Peoples Gas Light and Coke Company (79.54%), Public Service Company of Northern Illinois (16.185%) and Commonwealth Subsidiary Corporation (4.275%); that the balance of 73.371% of the shares of Natural Gas Company is owned in various percentages by Standard Oil Company of New Jersey, Southwestern Development Company, Cities Service Company, the Texas Company and Columbian Carbon Company; that 26.629% of the capital stock of Texoma is likewise owned by Natural Gas Investment Company and the balance of 73.371% by the other companies owning the stock of Natural Gas Company, with the exception of Standard Oil Company of New Jersey; that the owners of the common stock of Natural Gas Company and Texoma provided the funds for the purchase and construction of the properties in substantially the percentages represented by their ownership of the stocks of those companies.

"5. That natural gas, gathered in Texas and transported to Gray, Oklahoma, by Texoma, is transported through the pipeline of Natural Gas Company to a point southwest of the City of Joliet, in the State of Illinois, where it is delivered to the mains of Chicago District Pipeline Company, an Illinois corporation (hereinafter called Chicago District), a corporation organized and existing under the laws of the State of Illinois; that Chicago District is engaged as a public utility in the State of Illinois, in the business of conveying and transporting natural gas and selling it at wholesale to the Peoples Gas Light and Coke Company, Public Service Company of Northern Illinois, and Western United Gas and Electric Company, which latter companies are also public utilities engaged in the distribution of gas at retail to consumers in the State of Illinois.

"6. That all of the stock of Chicago District is owned by the Natural Gas Investment Company.

"7. That more than 92% of the total gas sold by Natural Gas Company is sold in the State of Illinois, and that substantially 90% of it is sold to Chicago District; that Chicago District and other utilities in Illinois buy such gas according to the terms of a series of contracts which were filed on August 22, 1938, with the Federal Power Commission by Natural Gas Company.

"8. That Chicago District sells substantially all of the gas which it purchases from Natural Gas Company to the Peoples Gas Light and Coke Company, Public Service Company of Northern Illinois, and Western United Gas and Electric Company, at rates filed with this Commission, which are based substantially upon the price paid by Chicago District to the Natural Gas Company; that the three above distributing companies have severally obligated themselves, in the event of default by Chicago District, to pay to Natural Gas Company, during the term of the principal contract under which Chicago District buys from Natural Gas Company, their respective proportions, as fixed in the contract, of Chicago District's obligation to Natural Gas Company.

"9. That the Peoples Gas Light and Coke Company renders gas service to over 800,000 domestic and other users of gas in the City of Chicago; that the rates charged by Peoples Gas Light and Coke Company in the City of Chicago are dependent in large measure, upon prices which it pays to Chicago District for natural gas, which price is in turn determined by the price paid by Chicago District to Natural Gas Company; that the Peoples Gas Light and Coke Company in June, 1936, filed with this Commission an application for an increase in its rates amounting to approximately $3,000,000 annually; that on May 21, 1937, this Commission entered a final order denying the application of Peoples Gas Light and Coke Company for the rate increase; that on February 5, 1938, a permanent injunction was entered by the Circuit Court of Cook County, against the enforcement of the Commission's order; that the appeal of the Commission from the decree of said Circuit Court granting a permanent injunction is pending in the October Term of the Supreme Court of Illinois.

"10. That this Commission on November 19, 1936, entered an order directing Chicago District Company to show cause why its wholesale rates for gas should not be reduced, and that case was pending before the Commission at the time of the passage of the Natural Gas Act.

"11. That the sales of natural gas by Natural Gas Company to Chicago District Company since the beginning of regular operation by that company (January 1, 1932) were as follows:

1932	$ 5,609,274.40.
1933	5,736,842.95.
1934	8,305,978.17.
1935	10,485,556.53.
1936	12,562,288.15.
1937	13,215,053.13.

"12. That the sales by Chicago District Company to the Peoples Gas Light and Coke Company for the same period were as follows:

1932	$ 5,707,963.91.
1933	5,731,112.74.
1934	7,846,057.68.
1935	9,397,900.13.
1936	10,894,941.98.
1937	10,978,093.49.

"13. That the operating arrangements between Natural Gas Company and Texoma are such that they may properly be considered as being operated as a single enterprise; that the total gross investment in property (i. e. gross expenditure to date with no deduction for property retired except for sales of property and any salvage realized) for Natural Gas Company and Texoma up to December 31, 1937, was $65,247,635.70.

"14. That the net earnings of Natural Gas Company and Texoma before amortization, depreciation, depletion or retirements, since the beginning of regular operations were as follows:

1932	$ 3,641,658.38.
1933	4,066,914.58.
1934	6,167,298.17.
1935	8,451,656.75.
1936	10,279,625.44.
1937	10,795,327.93.

"15. That the above earnings after an annual amortization allowance, based on an estimated life of twenty years for the property and found to be reasonable by this Commission in its Order of June 16, 1933, in Docket No. 21261, represent for the period of operation up to December 31, 1937, a return of approximately 8.2% upon the average gross investment in property plus an allowance of $1,000,000 substantially as found to be reasonable by this Commission in its order of June 16, 1933, for working capital; that the earnings computed on the same basis were 13.40% for the year 1937.

"16. That in the proceeding referred to in the next preceding paragraph the companies contended for amortization on a fifteen year basis; that the earnings, after amortization of approximately $3,000,000 per year on a fifteen year basis, corresponding to the $1,994,266 on a twenty year basis, were for the period 1932-1937 approximately 6.5% upon the average gross investment plus working capital; and that the earnings on the same basis for the year 1937 were approximately 11.7%.

"17. That Natural Gas Company has outstanding $3,000,000 of common stock on which it paid, up to December 31, 1937, the following dividends:

1936	$2,775,000.00.
1937	4,125,000.00.

"18. That the rates and charges for natural gas charged by Natural Gas Company to Chicago District and other public utilities in the State of Illinois are unjust and unreasonable and the fixing of fair, just and reasonable rates will materially aid this Commission in fixing fair, just and reasonable rates for gas sold to ultimate consumers in Illinois.

"Wherefore, your petitioners request:

"1. That a citation order be immediately entered by this Honorable Commission directing the Natural Gas Company and Texoma, to appear and show cause why the rates charged Chicago District and other utilities in Illinois, should not be reduced.

"2. That an order be entered setting fair, reasonable and just rates for natural gas sold by Natural Gas Company to Chicago District and other utilities in Illinois.

"Dated at Springfield, Illinois, this 21st day of September, A. D. 1938.

Illinois Commerce Commission,
By William W. Hart,
Secretary.

(Seal)

State of Illinois,
County of Sangamon. } ss.

William W. Hart, being first duly sworn on oath, deposes and says that he is the Secretary and the duly authorized representative of the Illinois Commerce Commission to subscribe and verify the foregoing petition; that he has read the same and knows the contents thereof and that the matters and things therein contained are true to the best of his knowledge, information and belief.

William W. Hart.

Subscribed and Sworn to before me this 21st day of September, A. D. 1938.

Rena Tomlins,
Notary Public."

Entered Oct. 14, 1938. Thereafter, on October 14, 1938, the Federal Power Commission initiated its own investigation as to conditions and circumstances alleged to prevail in the foregoing petition and, with reference thereto, adopted the following order:

"Order Instituting Investigation.

"It appearing to the Commission that:

"(a) The Natural Gas Pipeline Company of America, a corporation, organized and existing under the laws of the State of Delaware, owns and operates a main transmission natural gas pipe line extending from Gray, Oklahoma, through the states of Oklahoma, Kansas, Nebraska, Iowa and Illinois, to a point southwest of Joliet, Illinois;

"(b) The Texoma Natural Gas Company, a corporation organized and existing under the laws of the state of Delaware, owns and operates gas wells, gathering systems, and a main transmission natural gas pipe line extending from Fritch, Texas, to Gray, Oklahoma;

"(c) The Natural Gas Pipeline Company of America and the Texoma Natural Gas Company are under substantially similar common control and ownership, and are in all substantial respects operated as a single enterprise for the production, gathering, transportation and sale of natural gas;

"(d) The Natural Gas Pipeline Company of America and the Texoma Natural Gas Company are engaged in the transportation of natural gas in interstate commerce and the sale in interstate commerce of natural gas for resale for ultimate public consumption for domestic, commercial, industrial, or other uses, and are therefore natural-gas companies within the meaning of the Natural Gas Act;

"(e) Pursuant to Section 4(c) of the Natural Gas Act and the Commission's Order No. 53, the Texoma Natural Gas Company, on August 22, 1938, filed with the Commission its contract and agreement covering the sale of natural gas to the Natural Gas Pipeline Company of America, and the Natural Gas Pipeline Company of America, on August 22, 1938, filed with the Commission its contracts and agreements covering the sale of natural gas to the Chicago District Pipeline Company, the Central Power Company, the Central States Electric Company, the United Gas Service Company, the Iowa Power & Light Company, the Cedar Rapids Gas Company, the Iowa-Nebraska Light & Power Company, the Ottumwa Gas Company, the Peoples Power Company, the Peoples Light Company, the Iowa City Light and Power Company, and the Cities Service Gas Company;

"(f) On September 23, 1938, the Illinois Commerce Commission, a State Commission within the meaning of the Natural Gas Act, filed with the Commission a petition, reciting, among other things, that natural gas produced, gathered and transported by the Texoma Natural Gas Company and the Natural Gas Pipeline Company of America is delivered and sold by the latter company to the Chicago District Pipeline Company, a corporation, organized and existing under the laws of the State of Illinois; that such gas is sold at wholesale by the Chicago District Pipeline Company to the Peoples Gas Light and Coke Company, the Public Service Company of Northern Illinois, and the Western United Gas and Electric Company, which are public utilities engaged in the local distribution of gas at retail to consumers in the State of Illinois; that more than 92 per cent of the total gas sold by the Natural Gas Pipeline Company is sold in Illinois and that substantially 90 per cent of such gas is sold to the Chicago District Pipeline Company; that the Chicago District Pipeline Company sells substantially all of the gas which it purchases from the Natural Gas Pipeline Company of America to the Peoples Gas Light and Coke Company, the Public Service Company of Northern Illinois, and the Western United Gas and Electric Company, at rates filed with the Illinois Commerce Commission, which are based substantially upon the price paid by the Chicago District Pipeline Company to the Natural Gas Pipeline Company of America; that the Peoples Gas Light and Coke Company renders gas service to over 800,000 domestic and other users of gas in Chicago, and that the rates charged by said company in Chicago are dependent in large measure upon prices which it pays to Chicago District Pipeline Company for natural gas, which price is in turn determined by the price paid by Chicago District Pipeline Company to Natural Gas Pipeline Company of America;

"(g) The said petition of the Illinois Commerce Commission alleges that the rates and charges for natural gas charged by Natural Gas Pipeline Company of America to Chicago District Pipeline Company and other public utilities in the State of Illinois are unjust and unreasonable, and the fixing of fair, just and reasonable rates by this Commission will materially aid the Illinois Commerce Commission in fixing fair, just and reasonable rates for gas sold to ultimate consumers in Illinois.

"Wherefore, the Commission finds that:

"It is necessary and proper, in the public interest, and to aid in the enforcement of the provisions of the Natural Gas Act, that an investigation be instituted by the Commission, on its own motion, into and concerning all rates, charges, classifications, rules, regulations, practices or contracts of the Natural Gas Pipeline Company of America and the Texoma Natural Gas Company;

"The Commission, on its own motion, orders that:

"An investigation of the Natural Gas Pipeline Company of America and the Texoma Natural Gas Company be and is hereby instituted, for the purpose of enabling the Commission: (1) To determine, with respect to each of said companies, whether in connection with any transportation or sale of natural gas subject to the jurisdiction of the Commission, any rates, charges, or classifications demanded, observed, charged or collected, or any rules, regulations, practices, or contracts affecting such rates, charges, or classifications, are unjust, unreasonable, unduly discriminatory, or preferential; and (2) if the Commission shall find that any such rates, charges, classifications, rules, regulations, practices, or contracts are unjust, unreasonable, unduly discriminatory, or preferential, to determine and fix by appropriate order or orders just, reasonable and non-discriminatory rates, charges, classifications, rules, regulations, practices or contracts to be thereafter observed and in force.

By the Commission.

Leon M. Fuquay,
Secretary."

Subsequent thereto, on November 16, 1938, the defendants filed in reply its answer to the petition, which reads as follows: **Filed Nov. 16, 1938.**

"Natural Gas Pipeline Company of America, a corporation, hereinafter called defendant Pipeline Company when mentioned separately, and Texoma Natural Gas Company, a corporation, hereinafter called defendant Gas Company when mentioned separately, the two hereinafter called defendants when mentioned together, without waiving their plea set forth in paragraph numbered 7 hereof, but still insisting on same, and subject to the ruling of this Honorable Commission and of the courts on such plea, for their reply and answer to the petition of Illinois Commerce Commission, hereinafter called complainant, say:

"1. They admit the allegations contained in paragraphs numbered 1, 2, 3, 4 (if a decimal point be substituted for the second comma in line two thereof), the first seven lines of paragraph numbered 5, and all of paragraphs numbered 10, 11 and 17. In connection with paragraph numbered 17 they represent that while the outstanding stock was originally set up on the books at $3,000,000, its value now is greatly in excess of that amount. They point out, however, that the figures contained in paragraph numbered 17 are immaterial. They admit the allegations contained in paragraph numbered 7 thereof, with the qualification that the figures '92%' and '90%' vary from time to time, though they are approximately correct. They have no accurate knowledge except from hearsay concerning the facts alleged in the last seven lines of paragraph numbered 5 and paragraphs numbered 6, 8, 9, and 12 thereof, for which reason they neither admit nor deny such allegations.

"2. They admit that the figures set out in paragraph numbered 13 of said petition are substantially correct. In this connection, however, defendants represent that the expenditures heretofore made by defendants do not represent all of the investments heretofore made on their behalf or the investments which they will find it necessary to make during the remaining life of their enterprise. In addition to these expenditures the stockholders of defendants during the preliminary organization and construction period expended large sums of money and performed important services of substantial value, which, though not capitalized by defendants, represent substantial additional investments, which defendants are entitled to capitalize. As a result of changing physical conditions, defendants have been obliged, in the exercise of reasonable prudence and good judgment, to increase their original investment from time to time. They are now making substantial additions to their plant investment; and during the remaining life of their project they will be required from time to time to make other very substantial additions thereto, in order to produce, transport and market the natural gas from their reserves in the State of Texas.

"3. They admit that the figures set out in paragraph numbered 14 of said petition are substantially correct. In this connection, however, they represent that their net earnings during the year 1937 probably represent the highest level of earnings during the entire life of their project. During the year 1938 their net earnings have decreased by substantial amounts as compared with the earnings during the corresponding period of 1937 or 1936. The changing physical conditions obtaining in the field or reservoir in the State of Texas where their leases are situated and the deterioration from aging and wear and tear on their physical properties during the remaining years through which their enterprise will continue in operation will inevitably increase the expenses and cost to defendants of producing, transporting and marketing their commodity. It necessarily follows, therefore, that during such remaining years the net earnings of defendants from the operation of their business will be substantially and progressively reduced.

"4. They deny each allegation contained in paragraphs numbered 15 and 16 of said petition.

"5. They deny the allegation in paragraph numbered 18 of said petition that the rates or charges for natural gas charged by defendant Pipeline Company to Chicago District Pipeline Company and other public utilities in the State of Illinois are unjust and unreasonable; and they deny the allegations contained in the same paragraph to the effect that the fixing of other and different rates or charges for such commodity will materially aid the complainant, Illinois Commerce Commission, in fixing fair, just and reasonable rates for gas sold to ultimate consumers in the State of Illinois.

"6. Defendants deny the right of complainant to an order by this Honorable Commission directing defendants to appear and show cause why the prices charged Chicago District Pipeline Company and other utilities in Illinois should not be reduced; and in this connection they point out that this Honorable Commission is without jurisdiction, power or authority to promulgate or enforce against these defendants or either of them any order directing them to appear and show cause why their existing prices, fixed by private contracts on file with this Honorable Commission, should not be reduced.

"7. Defendants deny and challenge any jurisdiction, power or authority of this Honorable Commission to enter any order attempting to change, modify or set aside any charge or price at which defendant Pipeline Company is selling natural gas to Chicago District Pipeline Company or to other utilities in the State of Illinois or elsewhere, or to substitute and prescribe any different charges or prices for which defendant Pipeline Company shall sell such commodity in the State of Illinois or elsewhere, on the ground that defendants, in legal effect and in fact, constitute a single enterprise engaged in the business of owning natural gas leases or reserves in the State of Texas, developing such reserves through the drilling and equipping of wells thereon, producing their natural gas therefrom, transporting same through their own pipelines and facilities to points in the States of Kansas, Nebraska, Iowa and Illinois, and selling such commodity at wholesale to selected distributors and industrial consumers under private contracts. Such enterprise or business is of a strictly private character and is not affected with a public interest in the sense that the Congress would have jurisdiction, power or authority to enact legislation purporting to authorize this Honorable Commission to regulate the charges or prices for which such commodity is sold. The Natural Gas Act of 1938 enacted by the Congress, in so far as such act purports to confer on this Honorable Commission any jurisdiction, power or authority to regulate, change, modify or set aside the charges or prices at which defendant Pipeline Company is selling natural gas at wholesale to distributors or industrial consumers, or to authorize it to set up and prescribe different charges or prices for such commodity, and any rules, regulations or orders promulgated by this Honorable Commission with a view of attempting to exercise any such purported jurisdiction, power or authority, are, therefore, null and void and unenforcible as against these defendants because the inevitable operation and effect thereof will deprive defendants of their property and liberty of contract without due process of law, in violation of the Fifth Amendment to the Constitution of the United States.

Natural Gas Pipeline Company of America
Texoma Natural Gas Company
By J. J. Hedrick
20 North Wacker Drive, Chicago, Ill.
Geo. P. Garver
20 North Wacker Drive, Chicago, Ill.
S. A. L. Morgan
20 North Wacker Drive, Chicago, Ill.
Their Attorneys.

Morgan, Culton, Morgan & Britain
of Amarillo, Texas.
Of Counsel.

"State of Illinois, }
County of Cook. }

"Floyd C. Brown, being first duly sworn, says that he is Vice President and General Manager of Natural Gas Pipeline Company of America and Texoma Natural Gas Company, defendants herein; that he has read the pleas, admissions, denials and averments in the foregoing answer and that the same are true as he verily believes.

Floyd C. Brown.

"Sworn to before me and subscribed in my presence this 14th day of November, A. D. 1938.

Esther M. Wilson,
Notary Public
Cook County, Illinois.

"Certificate of Service of Defendants' Answer.

"I hereby certify that I have this day served the foregoing document upon all parties of record in this proceeding by mailing a copy thereof, properly addressed, to Illinois Commerce Commission at Springfield, Illinois.

"Dated at Chicago, Illinois, this 14th day of November, 1938.

J. J. Hedrick,
Of Counsel for Natural Gas Pipeline Company of America and Texoma Natural Gas Company."

On April 14, 1939, the Commission adopted an order fixing the date of hearing and consolidated the investigation instigated by it with the complaint filed by the Illinois Commerce Commission, which reads as follows: Entered Apr. 14, 1939.

"Order Fixing Date of Hearing.

"It appearing to the Commission that:

"(a) In Docket No. G-109, on September 23, 1938, the Illinois Commerce Commission, a State Commission within the meaning of the Natural Gas Act, filed with the Commission a complaint alleging that the rates and charges for natural gas charged by the Natural Gas Pipeline Company of America to Chicago District Pipeline Company and other public utilities in the State of Illinois are unjust and unreasonable, and the fixing of fair, just and reasonable rates by this Commission will materially aid the Illinois Commerce Commission in fixing fair, just and reasonable rates for gas sold to ultimate consumers in Illinois; in their answer to said complaint, filed with the Commission on November 16, 1938, the Natural Gas Pipeline Company of America and the Texoma Natural Gas Company deny that the rates and charges for natural gas charged by the Natural Gas Pipeline Company of America to the Chicago District Pipeline Company and other public utilities in Illinois are unjust and unreasonable, and deny that the fixing of other and different rates or charges will materially aid the Illinois Commerce Commission in fixing fair, just and reasonable rates for gas sold to ultimate consumers in Illinois;

"(b) In Docket No. G-112, on October 14, 1938, the Commission on its own motion, instituted an investigation of the Natural Gas Pipeline Company of America and the Texoma Natural Gas Company (1) to determine, with respect to each of said companies, whether, in connection with any transportation or sale of natural gas subject to the jurisdiction of the Commission, any rates, charges, or classification demanded, observed, charged or collected, or any rules, regulations, practices, or contracts affecting such rates, charges, or classifications, are unjust, unreasonable, unduly discriminatory, or preferential; and (2) if the Commission shall find that any such rates, charges, classifications, rules, regulations, practices, or contracts are unjust, unreasonable, unduly discriminatory, or preferential, to determine and fix by appropriate order or orders just, reasonable and non-discriminatory rates, charges, classifications, rules, regulations, practices or contracts to be thereafter observed and in force;

"The Commission orders that:

"(A) Dockets Nos. G-109 and G-112 be and they are hereby consolidated for purposes of hearing thereon;

"(B) A public hearing in these proceedings be held commencing on May 8, 1939, at 10 o'clock a. m., in Room 425, New Post Office, Canal and Van Buren Streets, Chicago, Illinois.

By the Commission.

Leon M. Fuquay,
Secretary."

On April 18th, the Honorable Clyde L. Seavey, Acting Chairman of the Commission, designated Frank M. Durrance to preside at said hearing. This hearing is held in pursuance of the foregoing orders and designations.

At this time in the record, we will see if the appearances have been noted.

(Appearances noted as shown on title page.)

Examiner Durrance: The Examiner inquires of Commission's counsel if notice of this hearing and the purpose thereof has been served upon those who might be perceived to be interested therein.

Mr. May: They have, Mr. Examiner. Notices have been sent to the state commissions, governors, and other interested parties.

Examiner Durrance: The purpose of this hearing having been clearly stated, the Examiner, without, in any manner, suggesting delineation or limitation of the proof to be offered by the applicant, suggests that the record be completely developed to show:

1. A complete description of the properties owned by the defendants and costs of all natural gas producing lands owned or controlled by either company, segregated by fields and between operative and non-operative acreage.
2. The volume of natural gas produced by each company from each field and the average rock pressures reported at the end of each year since January 1, 1934.
3. The volume of natural gas purchased from each source by each company and the amounts paid for same by years since January 1, 1934.
4. The volume of natural gas sold by each company, segregated between gas sold for resale and gas sold to industrials, by years since January 1, 1934.
5. A detailed analysis of all operating expenses of each company, including depreciation and depletion charges, by years since January 1, 1934. This showing will involve the determination of the reasonableness of each item, especially non-recurring or unusual expenditures, and whether or not charges to operating expenses have been made of items that properly belong in capital investment account or vice versa.
6. All operating revenues received by each company, segregated between classes, by years since January 1, 1934.
7. A compilation of the recorded investment in property of each company, segregated between major classes of property, such as production, transmission, etc., at the end of each year since January 1, 1934.
8. Factors bearing on determination of reasonable rate of return.

The procedure will be for the defense to first offer its direct testimony. That will be followed by cross-examination of defendants' witnesses by Illinois Commerce Commission's counsel, to be followed by cross-examination by the Federal Power Commission's counsel.

The next step will be for the Illinois Commerce Commission to offer such direct testimony as it may desire; their witnesses to be cross-examined by defendants' counsel.

The next step will be for the Federal Power Commission's counsel to offer such direct testimony as they may desire, which they may deem to be helpful to the Commission in reaching its final determination of the issues involved in this case.

We will now proceed to take the testimony.

Mr. Morgan: Mr. Examiner: In the first place, I desire to call the attention of the Examiner and the Commission to our plea denying and challenging any jurisdiction, power or authority of the Federal Power Commission to enter any order attempting to change, modify or set aside any charge or price at which respondent pipeline company is selling natural gas to Chicago District Pipeline Company or to other utilities in the State of Illinois or elsewhere, or to substitute and prescribe any different charges or prices for which respondent pipeline company shall sell such commodity, and invoking the due process clause of the Fifth Amendment to the Constitution of the United States, as set out in Paragraph 7 of our answer to the complaint of Illinois Commerce Commission in No. G-109. This appearance and all other appearances to be made by us in connection with this proceeding or the investigation instituted by the Commission under Docket G-112, which proceedings have been consolidated, are made and will be made under protest, without waiving said plea to the jurisdiction and without waiving our constitutional rights under the Fifth Amendment, and all that we shall do or say here or hereafter in these proceedings will be expressly subject to the final determinations of our rights under said plea. We are not insisting on the Commission's passing on the constitutional question raised, since we recognize that it is without authority to hold the Natural Gas Act, under which it is purporting to proceed in this cause, or any part of said Act unconstitutional, as the Commission itself has held in other recent proceedings; but it is our purpose to save the point and urge it, should this cause reach the courts on an appeal by either party.

We are here in response to a notice dated April 14, 1939, advising that a public hearing in the consolidated proceedings would be held on this date and at this place. We received in due course a letter from the Secretary of the Commission dated April 28, 1939, advising that, pursuant to the provisions of Section 50.63 of the Provisional Rules of Practice and Regulations under the Natural Gas Act, the respondent companies have been designated to open and close the hearing beginning on this date.

To say that we were surprised to receive this communication is to put it very mildly. We have no application pending before the Commission and are seeking no relief in either of the proceedings above referred to. We are here to meet a complaint of the Illinois Commerce Commission and any complaint that the Federal Power Commission shall see fit to urge as against us when it shall have completed its investigation. Naturally, we do not know at this time whether there will ever be a complaint lodged against us by the Federal Power Commission, for it has scarcely more than begun its investigation, if we are to judge by the time the Illinois Commerce Commission has occupied in covering a small part of the ground that the Federal Power Commission will doubtless see fit to cover before reaching any conclusion as to whether or not the proceedings shall go beyond the stage of an inquiry or investigation.

Beginning in December, 1937, auditors and other representatives of the Illinois Commerce Commission spent approximately fifteen months on the books and records of these companies. In all, twenty-three persons were engaged in this work for a total of 17,327 man hours. On the basis of a 40 hour week, it would have required one man 9½ years to do this work, or four men—the number from the Federal Power Commission now engaged in similar work—more than two years. The Illinois Commerce Commission did not go over the properties, but confined its investigation to the books and records in the Chicago office, and with the force now engaged in this work it will doubtless be several months at the earliest before the Federal Power Commission can complete its inquiry, unless it turns out that they are able to accomplish a great deal more per man hour than did the force of the Illinois Commerce Commission. Of course, we would not charge that the Illinois Commerce Commission did not work very diligently during that 17,327 man hours.

This litigation was started by the Illinois Commerce Commission, or perhaps I would be more accurate if I said by its counsel. If Mr. Booth is not ready, he certainly ought to be. This is his case, and he has certainly had time enough to search out any facts which he thinks would tend to sustain the charges he has made in his petition.

We are not ready. We have done a great deal of work among our records and in the matter of revaluing the properties belonging to these companies, which are located in the several States of Texas, Oklahoma, Kansas, Nebraska, Iowa and Illinois. Some of these studies were completed down to the first of January, 1938, during the period that we were engaged in litigation with the Illinois Commerce Commission before that body itself. We have not brought these studies down to date for the reason that we did not know, and do not now know, when the Federal Power Commission would complete its investigation, and we did not wish to incur the enormous expense involved in bringing these engineering studies down to a later date until we could know the date which the Federal Power Commission would select as the date when its figures would be closed. To do so, and then have the revised figures become out of date, would mean that they would have to be again revised at further heavy costs. The Federal Power Commission knows, of course, that the force of men regularly employed by these companies have daily and hourly duties to perform. They have been employed because these companies have need of them in the ordinary operations of the companies. They of necessity have to continue with their duties or the pipeline would have to be shut down. It is therefore impractical for these companies to take a large number of their regular employees off the job and assign them to the sole task of meeting Mr. Booth's allegations. It takes time, and a lot of time, to prepare the defense of a case like this, even after we know against what we are required to defend.

Mr. Booth has attacked our charges and prices to our distributing customers in the State of Illinois.

Mr. May: Just a minute. The complaint in this case was filed by the Illinois Commerce Commission. I do not understand counsel's tactics in attacking counsel for the Illinois Commerce Commission. As far as the Commission understands, this complaint was filed by the Illinois Commerce Commission; and I think we would prefer that Mr. Morgan confine his remarks to the Illinois Commerce Commission.

Mr. Morgan: I think I know what I want to say, but I will explain to the Commission and to the Examiner that when I mention Mr. Booth I mean the Illinois Commerce Commission.

We have two customers in the State of Illinois: the Chicago District Pipeline Company and Peoples Power Company. We have seven contracts fixing seven separate prices or charges for natural gas with Chicago District Pipeline Company, and six different contracts fixing six different prices or charges with Peoples Power Company. We do not know from Mr. Booth's complaint which contract or contracts, which charge or charges, he is attacking. He makes no specific charge against any price or contract, but is content to say that we are making more money than we ought to make. His pleading is wholly insufficient, even if he had offered proof to support it, to justify this Commission in holding that the charges or prices of these companies are unjust, unreasonable, unduly discriminatory or preferential; but even if his pleading were sufficient as a pleading, we are not required to come here with evidence to refute a mere pleading. It is the business of the moving party to bring evidence here, and when he brings it we have a constitutional right, of which the Commission could not deprive us if it desired to do so, and we do not think it desires to do so, to test, explain and refute such testimony if we can, and we can.

After the filing of the complaint by the Illinois Commerce Commission, the Federal Power Commission on its own motion instituted an investigation which, as the Examiner knows, covers a lot of territory. It is conducting this investigation, first, to determine with respect to each of the respondent companies whether in connection with any transportation or sale of natural gas subject to the jurisdiction of the Commission any rates, charges or classifications demanded, observed, charged or collected, or any rules, regulations, practices or contracts affecting such rates, charges or classifications, are unjust, unreasonable, unduly discriminatory or preferential; and, secondly, if it shall find that any of such are unjust, unreasonable, unduly discriminatory or preferential, to determine and fix by appropriate order or orders just, reasonable and nondiscriminatory rates, charges, classifications, rules, regulations, practices or contracts to be thereafter observed.

In addition to the two customers and thirteen contracts under which we are delivering gas in the State of Illinois, we have seven customers in the State of Iowa, with whom we have a total of thirty contracts involving thirty different charges or prices.

Examiner Durrance: Pardon me just a moment. Could not that all be developed in the record by witnesses?

Mr. Morgan: I want to make a statement to the Examiner, stating our position: That is exactly what I am trying to do. I am developing this in my statement.

Mr. May: Is this in lieu of evidence, Mr. Morgan?

Mr. Morgan: I am making a statement in which I am trying to make clear to the Examiner and the Commission our position in this case.

Mr. May: Do you want to make it clear this is not your evidence in the case on the points involved in this proceeding?

Mr. Morgan: I don't think it is necessary to make that clear, Mr. May. I haven't been sworn and examined, and I am not trying to testify in this case at all.

One customer in the State of Nebraska, with whom we have six contracts fixing six different charges or prices; and two customers in Kansas, with each of which we have one contract, each fixing a charge or price for natural gas. In all, therefore, we have eleven customers with a total of fifty-one contracts performed in four different states. Does the Commission propose to have us defend each and all of these contracts? If so, against what shall we defend them? Are we to defend them against the charge that they are unjust? Or that they are unreasonable? Or that they are unduly discriminatory? Or that they are preferential? Or is it charged that some of them are unjust, some of them unreasonable, some of them unduly discriminatory, and some of them preferential? If so, which of them are unjust, which of them are unreasonable, which are unduly discriminatory, and which are preferential? We haven't the slightest idea, and neither does the Federal Power Commission, for it has scarcely started its investigation, and neither does the Illinois Commerce Commission, for it makes no pretensions to have gone beyond the books and records of the Chicago office and has covered only a small portion of the ground that it will have to cover before it can make out a prima facie case against either of these companies in an attack on any of the charges or prices for which they are selling natural gas.

Mr. May: I think this line of argument should be reserved until argument before the Commission, if oral argument takes place, or in Mr. Morgan's brief. I don't see how he can possibly summarize evidence in advance of the time that the evidence is presented through witnesses in this proceeding. I think that is what he is attempting to do.

Mr. Morgan: No, no.

Mr. May: I don't think it has any purpose here.

Mr. Morgan: My purpose, if the Examiner please, is to state the basis for the position we are taking in this case, which I will be ready to state at the conclusion of this statement. This is stating our position, and I am merely stating the ground-work of our position, so the record will show that we are not here taking an arbitrary position; but we are here making our position clear to the Commission.

Examiner Durrance: In connection with this contract which you referred to, Mr. Morgan, it would be very helpful to the Commission if we might have those. The Commission is only seeking the truth and the facts under the circumstances.

Mr. Morgan: They are all filed with the Commission, every one of them.

There is nobody here this morning who is able to say which of these contracts we are required to defend, or against what charges we are to defend any one of them. So far as we know now, it is not any of our contracts or the prices or charges which we are expected to defend. Is it our classifications, or our rulings, our regulations, our practices, that we must take the burden of defending? Naturally, a business of the magnitude of that conducted by these companies must have many classifications, many rules, many regulations, and divers practices and policies. The Federal Power Commission is investigating all of them. It tells us practically at the beginning of the investigation that we shall start putting on proof, without telling us which, if any, of our fifty-one contracts or charges we are expected to defend, or which of our numerous classifications, rules, regulations and practices observed by us in the States of Texas, Oklahoma, Kansas, Nebraska, Iowa, and Illinois we are expected to defend. That it is wholly impracticable, indeed impossible, from our standpoint to assume any such burden is clear; and it is incomprehensible that the Commission would direct us to do so.

Our position in this litigation is that our rates, charges, contracts, classifications, rules, regulations and practices are all reasonable and proper, and we believe that when the Federal Power Commission has completed its inquiry, if it is searching for the facts, as we understand it is, and not merely for an answer, it will find that our claim on this point is supported by the facts, and it will direct that no further proceedings shall be had in this matter. But in any event, no burden rests upon these defendants in any of these proceedings. As already stated, we are asking nothing of the Commission. We have filed our contracts, and the charges and prices fixed thereby are prima facie reasonable, and this Commission is without authority or jurisdiction to disturb those prices and charges until such time as, after full hearing, it shall determine that they are unjust, unreasonable, unduly discriminatory or preferential; and the same is true of our classifications, rules, regulations and practices. The burden of proof is upon the moving parties on all these issues, and we are required to take no steps to defend them until we are confronted, not with allegations, not with orders, not with directions, but with proof, which we have the right to test, to explain and to refute. Until we are so confronted we have no duty to proceed. We are not here attacking a rule of the Federal Power Commission. Perhaps when properly applied the rule here sought to be invoked is valid. If the parties were here contending with each other as to who has the right to open and close, it would be the duty of the Commission to designate which should have the opening and closing; but we are claiming no such right. We claim only the right to cross-examine the witnesses, whom the moving parties may bring into this proceeding, concerning their testimony and the documents which shall be offered in connection with their testimony, to test the testimony that is offered against us, to explain it, and to refute it. There is nothing on which we can proceed at this time. We are not ready. We have not had time to get ready since the Federal Power Commission started this investigation; but I do not want to be understood merely as being here asking for time for the commencement of these hearings. If there is evidence on which the parties on whom the burden rests desire to go forward, we have no objection to their proceeding, beginning now; but we want to make it perfectly clear, while at the same time expressing our great respect for the Federal Power Commission, that we are not going to take the burden of proof in this case, nor are we going to take the laboring oar in developing the testimony here. When the moving parties have rested their case, we shall proceed with our testimony as soon as we can get it in readiness to proceed, if we find that those on whom the burden of proof rests have discharged that burden of proof and it then appears that it is in order for us to offer proof to explain or refute the testimony they shall have offered. It may be that we shall then conclude that the testimony offered does not suffice to sustain the findings necessary as a predicate to any order adversely affecting our contracts, prices, charges, classifications, rules, regulations or practices, and that we shall move to dismiss and stand on the record made by those carrying the laboring oar.

In taking this position, Mr. Examiner, we do not wish to be understood as assuming any attitude of defiance toward the Federal Power Commission. We recognize the Commission's right, subject to the serious question as to whether the Natural Gas Act is valid, to conduct the investigation it has ordered; and we have cooperated in every way possible with its representatives who are engaged in this work. We have rented an office and provided tables and chairs for their convenience. We have permitted them to examine our books and records and have furnished them with the information they have requested. At this very time we are engaged, at great expense, in opening our ditches at intervals of ten miles, and exposing our pipelines, in order that the Commission's representatives may view them. We shall continue to cooperate with them in every way that the law contemplates. But we just haven't anything to litigate with or before it at this time. We are perfectly happy with our contracts our charges and prices our classifications, rules, regulations and practices, and, so far as we know, all of our customers are as happy as we are about them. Indeed with the exception of the Illinois Commerce Commission, represented by Mr. Booth, we know of no one who is unhappy about them. We recognize that this is going to be a long drawn-out and very expensive litigation. So far as we are concerned, no litigation is in order or need be had. The fact is, Mr. Examiner, that we find ourselves very much in the attitude of the darky down South who found himself the center of interest in a criminal proceeding. After he had become utterly bewildered by listening to the arguments pro and con on a motion to quash the indictment, a motion to quash the jury panel, a motion for change of venue, a motion for continuance, on none of which the lawyers could agree and about which the court seemed bewildered, the darky turned to the presiding judge and said: "Mr. Jedge, it will be all right with me if ye just drap dis case!"

Examiner Durrance: Of course, counsel for the defense recognizes the fact that this is a consolidated hearing; consolidated by virtue of authority provided for in Rule 50.63 of the Commisison's Provisional Rules of Practice and Regulations under the Natural Gas Act.

Of course, the Examiner proceeds upon the theory that the rule vests the Commission with the authority which it has exercised in consolidating the hearing. That rule further provides that the Commission or the

Commission's representative, may designate the mode of procedure of developing the record. The Commission in this case has seen fit to designate that the defendants proceed to put on their testimony.

Now, in connection with your statement, as I understand it, if I have the picture clear in my mind, you are not prepared to put on any testimony at this time?

Mr. Morgan: No, we are not prepared.

Examiner Durrance: May I inquire if you have made any effort or what effort you have made to prepare yourself since you had notice of this hearing being set, Mr. Morgan?

Mr. Morgan: I have made no effort to prepare to start putting on proof at this time. We have done a great deal of work, Mr. Examiner, anticipating it might become necessary for us to put on proof. Much of that work was done while this same litigation was pending before the Illinois Commerce Commission, but we have made no preparation to start putting on proof at this time for the reason we did not think it was proper and until we got that notice never dreamed we would be asked to proceed with our proof before the other side had been heard.

Examiner Durrance: Are you familiar with the Commission's rule 50.63?

Mr. Morgan: Yes, sir, I am familiar with it.

Examiner Durrance: Under that rule don't you think you had the right or reason to anticipate you might be designated to put your case on at the opening?

Mr. Morgan: No, sir, I do not think so, for the simple reason I do not think the application being made to the rule is a valid application to the rule. I assume if Mr. Booth and Mr. Keegan representing the complainant in Case No. G-109 were contending for the right to open and close and I was contending for that right the Examiner would have to decide the dispute or the controversy. It was only to that sort of situation I applied that rule. I did not assume the Commission or the Examiner would make an application of it that would deprive us of our constitutional rights in a proceeding of this sort.

Mr. May: It is our understanding you contend the Commission has no right to designate the procedure or that the Examiner has no right to say who shall go forward first under Section 50.63 of the rules, regulations, and practices?

Mr. Morgan: If I have not made my position perfectly clear, that is exactly my position; they have no right to require us.

Mr. May: As I understand your statement you are not challenging the validity of Section 50.63 of the rules, is that correct?

Mr. Morgan: I am only challenging the application, not the validity. There might be circumstances under which the rule is perfectly valid, but not as being applied here.

Mr. May: What is the particular application here to which you object, if you will clear it up in my mind?

Mr. Morgan: I object to the application of a rule requiring us to take the laboring oar, the developing of proof, when the law contemplates we are only here to meet proof. We have our rates, they are prima facie reasonable, and until they are broken down by evidence, not by mere declaration of a party, there is nothing we are required to prove to defend them, except furnish the Commission such information as it is entitled to in conducting an investigation, which information we have not hesitated to give whenever they have asked for it, and it is our purpose to continue to do that.

Examiner Durrance: Gentlemen, there will be a recess for five minutes.

(Whereupon a recess was taken.)

Examiner Durrance: The record may show the hearing will be resumed.

In view of the circumstances that have developed with reference to the procedure I am going to ask that counsel for the Illinois Commerce Commission state his position in connection with that.

Mr. Booth: If the Examiner please, in view of the statement of counsel for the company I briefly would like first to state the interest of the State of Illinois and the Illinois Commerce Commission in this proceeding.

This company, Natural Gas Pipeline Company of America, was first organized either in 1930 or 1931. This line was built and the contracts were entered into with the Chicago District Pipeline Company in 1931. Following the execution of that contract the Chicago District Pipeline Company asked the Commission, the Illinois Commerce Commission, to approve its contract with the Peoples Gas Light and Coke Company and Public Service Company of Illinois, and in order to demonstrate that those contracts under which the Illinois distributing companies were to purchase natural gas were fair and reasonable submitted before the Illinois Commerce Commission testimony as to the estimated profits and earnings of Natural Gas Pipeline Company and the Texoma Company under its contract with the Chicago District Pipeline Company.

The contract between Natural Gas Pipeline Company and the Chicago District Company was not submitted to the Illinois Commerce Commission for its approval because the contract was of an interstate character and the Commission had no jurisdiction to approve an interstate contract, but the Chicago District Pipeline Company thought that the Illinois Commerce Commission ought to be in position to determine that Chicago District contract with the Peoples Gas Light and Coke Company was reasonable by submitting evidence as to the profits which Natural Gas Pipeline Company and the Texoma Company thought would be earned by them as a result of selling natural gas to the Chicago District Pipeline Company. There was an extended hearing at that time and considerable testimony was presented in part by officers and directors of Natural Gas Pipeline Company of America. They submitted evidence to the effect that it was their belief and they testified that they put their money into the enterprise upon the assumption that during the fifteen-year contract—

Mr. Morgan: Mr. Examiner—

Mr. Booth: Will you please allow me to state the position of the State of Illinois in this proceeding?

Mr. Morgan: I think I know what you are trying to do.

Examiner Durrance: What is your objection, Mr. Morgan?

Mr. Morgan: I wish to make objection to his going into a statement of what the evidence was in that case.

Mr. Booth: I want to state why—

Mr. Morgan: It should not be stated in this record by way of an informal statement. It is evidence. It is the best evidence of what it is.

Mr. Booth: In view of the attack by counsel for the company upon our petition, our position in this case, it is only fair I be given a brief opportunity to state—

Mr. Morgan: I have no objection to his stating the position of the Illinois Commerce Commission, but I object to his going into a detailed statement of what the record shows in a proceeding to which these companies neither were parties—

Mr. Booth: It is related, if the Examiner please, to the reason we are here today.

Examiner Durrance: The Examiner has not made, of course, a careful study of the Illinois Commerce Commission's complaint. I am assuming counsel is more or less defining the issues set forth in the complaint. Is that correct?

Mr. Booth: I am discussing the background of the filing of this complaint, and I will get to the complaint and petition in just a moment.

Examiner Durrance: You may proceed.

Mr. Booth: They stated that they thought they would earn about six per cent upon the investment—

Mr. Morgan: If the Examiner please, you see where he is going.

Mr. Booth: Of course I am going to state why we are here, Mr. Morgan, if you will be kind enough to sit down. I did not interrupt you during your argument. I am stating why we are here.

Mr. Morgan: You had a perfect right to make objection.

Mr. Booth: I had plenty of objection and I am going to state them now.

Mr. Morgan: He is going into a statement of something the Chicago District Pipeline Company proved back in a proceeding back in 1931.

Mr. Booth: It is the background.

Mr. Morgan: I want to object to his doing it.

Mr. May: If I may be permitted the observation, if the attorney for the Natural Gas Pipeline Company was permitted to state what may be proved in this record, I think Mr. Booth probably is entitled to show the background of this proceeding in view of the latitude that was given to counsel for the company.

Mr. Morgan: There is no relation or similarity between what I said and what he is doing. I merely stated my position and stated the basis for it. He is going back over hearsay and telling what was proved in another lawsuit either eight years ago or nine years ago.

Examiner Durrance: Mr. Morgan, he is not offering that as a matter of testimony, as a matter of evidence. Now, if his statement is going to clarify the record it might be helpful to the Commission in the determination of their final appraisal of all the evidence. I see no reason why it should not go into the record.

Mr. Morgan: It could not possibly help clear the position of the Illinois Commerce Commission. It is just his old song he sang before the Examiner, before the Commission proceedings and his own Commission would not permit him to prove what he is now stating happened in that proceeding.

Mr. Booth: I would like to go forward with this case. I will take only five or ten minutes to state our position in this case, if the Examiner please.

Examiner Durrance: You may proceed.

Mr. Booth: That in substance was the testimony of a Mr. Gallagher who was a director of the Natural Gas Pipeline Company. He stated they thought they would earn about six per cent upon their investment during the life of the contract. Subsequently, the Commission found it necessary, however, to disapprove certain provisions in the proposed contract between Chicago District and Peoples Gas Light and Coke Company. Chicago District then went into the federal courts and obtained a preliminary injunction against the enforcement of the Commission's order. Evidence was taken before a Special Master as to the life of the natural gas field. The evidence that was taken before the Commission was submitted in that case. Subsequently, the case was compromised and the Chicago District Pipeline Company was permitted to file a schedule of rates with the Illinois Commerce Commission which substantially embodied the provisions of its contract with Natural Gas Pipeline Company of America.

However, up to that time there was no information available as to the actual profits which Natural Gas Pipeline Company was earning out of the sale of gas to the Chicago District Pipeline Company. In 1936 the Peoples Gas Light and Coke Company filed a petition with the Illinois Commerce Commission, and that is set forth in our complaint, or our petition, asking for a substantial increase in its rates to its domestic users in the city of Chicago. Thereupon, hearings of an extended nature commenced before the Illinois Commerce Commission in connection with this application.

The Commission then, in order to determine whether or not the rates paid by Peoples Gas Light and Coke Company for natural gas were fair and reasonable instituted a proceeding against the Chicago District Pipeline Company to show cause why its wholesale rates for natural gas to the Peoples Gas Light and Coke Company should not be reduced. Information had been brought to the attention of the Commission through reports on file by this company with the Securities and Exchange Commission to the effect its earnings possibly were substantially larger than had been estimated in the earlier proceedings before the Commission. The Illinois Commerce Commission in the Chicago District Pipeline Company proceeding then entered an order against this company, asking it to make available its books and records to the Illinois Commerce Commission and to submit evidence as to its actual earnings and actual profits arising out of the sale of natural gas to the Chicago District Pipeline Company. Natural Gas Pipeline Company of America refused to comply with the Commission's order and brought suit in the federal courts. They were denied relief in the lower federal courts and appealed to the United States Supreme Court, which in November or December of 1937 held the Illinois Commerce Commission had a right to have access to the books and records of the Natural Gas Pipeline Company of America in the Chicago District Pipeline Company proceedings.

The Commission then, as Mr. Morgan indicated in his argument, for the first time had access to the actual profits of the Natural Gas Pipeline Company of America under its contract with the Chicago District Pipeline Company, and as we have set forth, some 90 per cent of the natural gas sold by this company is sold to the Chicago District Pipeline Company and then in turn to the Illinois distributing companies, principally Peoples Gas Light and Coke Company. The testimony as to the profits, the actual profits of Natural Gas Pipeline Company in the sale of natural gas to the Chicago District Pipeline Company was then submitted to the Illinois Commerce Commission. Natural Gas Pipeline Company intervened in that case. They began, as Mr. Morgan indicated, the preparation of extensive evidence dealing with the value of its property, dealing with the question as to what is a fair rate of return, dealing with the question as to the life of its natural gas field, as to its investment and many other factors.

However, about the same time Congress was considering House Bill 4008, and finally this bill, which is the basis of the Federal Power Commission's jurisdiction in this case, was enacted into law. Thereupon, the Natural Gas Pipeline Company of America contended before our Commission we had no right to give any consideration to the profits of Natural Gas Pipeline Company of America because of the fact Congress by the adoption of a natural gas act in 1938 had vested in your Commission direct complete and exclusive authority to determine the reasonableness of interstate wholesale contracts.

The Illinois Commerce Commission then filed its petition on the 21st day of September, 1938, setting forth that the earnings of this company from 1932 up to 1937 had increased annually from $3,641,000 to $10,795,327. In 1936 and 1937 the earnings of this company and the Texoma Company, before an allowance for depreciation and amortization as this petition sets forth, exceeded $10,000,000. It also set up that the investment in this company, the gross investment as of December 31, 1937, was approximately $65,000,000, that the dividends paid by Natural Gas Company on its capital stock in 1936 amounted to $2,775,000 on the $3,000,000 outstanding common stock and $4,125,000 in 1937, a dividend in excess of 100 per cent in 1937. It stated that based upon an amortization period of twenty years which had been originally found by the Commission that the Company had already earned 8.2 per cent (from 1931 through 1937) on its average gross investment, and that for 1937 the earnings were 13.4 per cent upon its total investment, taking amortization and depreciation on the 20-year basis.

The earnings as set forth in this petition were admitted by Natural Gas Pipeline Company of America in its answer. On its face our petition clearly establishes that the existing rates of Natural Gas Pipeline Company to the Chicago District Company are unfair and unreasonable because of the current excessive earnings of the Natural Gas and the Texoma companies.

Now, we say that the rule and regulation adopted by this Commission under Section 50.63 of its rules is eminently fair and reasonable in the situation. This contract and all the contracts between Natural Gas Company and the Chicago District and other companies were not approved by any regulatory authority. There is no prima facie showing of reasonableness of those contracts merely because they have been filed with this Commission. This company has been engaged for over a year and a half, as Mr. Morgan admitted in his opening argument, in the preparation of testimony bearing upon the reasonableness of its rates. It is in the best position to advise this Commission as to what its earnings are, as to what its investment is, as to what the value of its property is, as to the life of its fields; all that information, and a substantial part of it is in the books and records and is within the knowledge of the officers and directors or the experts employed by this company. We say under the circumstances it is absolutely appropriate that the company proceed and endeavor to convince this Commission that the contracts which it entered into with Chicago District Pipeline Company and these other companies are in fact fair and reasonable and that they have nothing to conceal, or nothing to hide. They ought to be eager and willing under these circumstances to place before your Commission the facts bearing upon its earnings and expenses upon its entire operations.

Furthermore, in view of the fact that this Commission has entered an order under its rules, of which this company has had notice, to open this case and present evidence bearing upon its operations, that unless the company does proceed we believe it will be quite proper for the Examiner and the Federal Power Commission to rule that the company has waived its opportunity, its right to make out a direct showing as to reasonableness of its earnings, investments, expenses and other factors bearing upon the reasonableness of its rates, and if it fails to go forward and if the Federal Power Commission and we are compelled to go forward first that the only testimony which Natural Gas Pipeline Company of America shall be permitted to present in this case would be testimony of a rebuttal character.

Examiner Durrance: Does the Commission's counsel have anything to say?

Mr. May: I would like to make a statement. As I understand it Mr. Morgan, among other things, implied his company had not been given adequate notice, did not know what was involved in the Commission's investigation, what particular rates were under consideration, and so forth. I want to clear up that point in the record. The ordering paragraph of the Commission's order of October 14, 1938, Docket No. G-112, instituting an investigation, reads as follows:

"An investigation of the Natural Gas Pipeline Company of America and the Texoma Natural Gas Company be and is hereby instituted, for the purpose of enabling the Commission: (1) to determine, with respect to each of said companies, whether, in connection with any transportation or sale of natural gas subject to the jurisdiction of the Commission, any rates, charges, or classifications demanded, observed, charged or collected, or any rules, regulations, practices, or contracts affecting such rates, charges, or classifications, are unjust, unreasonable, unduly discriminatory, or preferential; and (2) if the Commission shall find that any such rates, charges, classifications, rules, regulations, practices, or contracts are unjust, unreasonable, unduly discriminatory, or preferential, to determine and fix by appropriate order or orders just, reasonable, and non-discriminatory rates, charges, classifications, rules, regulations, practices, or contracts to be thereafter observed and in force."

Now, Mr. Examiner, it appears to the Commission counsel in view of the very broad provisions in the Commission's order that the company certainly had notice that all its rates and charges were under consideration in this investigation proceeding, and further that the Commission in this very proceeding would determine what were the just and reasonable rates to be charged by the company. I think nothing could be more explicit and the company should certainly not claim here they did not know what was involved in the investigation proceedings.

As I understand it, with respect to the order of procedure, Mr. Examiner, the company does not attack the validity of Rule 50.63, but its application in this proceeding. Personally I think—Mr. Morgan has stated he has been preparing for this proceeding and other proceedings for a long time, you will notice no application has been made to the Commission for continuance of this hearing in order to enable the company to present evidence, but instead the company relies upon their construction of the rule and the validity of its application—and I think that the company might have exerted some effort to get ready for this hearing rather than coming down to the very day of the hearing and taking the position that they have taken.

Of course, as it appears in this record, the company has chosen not to comply with a direction of this Commission they should open and close this proceeding. What action the Commission will take in view of that turn of events, personally, I don't know. I think, Mr. Examiner, that if the company insists upon that position, in order to expedite this case and get all of the facts the Commission is desirous of getting into this record as promptly as possible, and to avoid delay, that this proceeding should continue and the Federal Power Commission and the Illinois Commerce Commission, if it chooses to adopt that course, should begin the presentation of evidence, as I say, solely for the purpose of avoiding delay in this proceeding. The Commission is anxious to get all the facts just as soon as possible. I am sure if the company or the companies involved here will cooperate in that effort we will all be better off.

Mr. Morgan: Mr. Examiner, if I may be permitted to add just a word to what I said in reply to the statements of these gentlemen.

I have not said we have been engaged for a year and a half in preparing evidence for this proceeding or any similar proceeding. What I said was throughout last year we spent several months preparing proof concerning our valuations and other facts which we thought might become pertinent, bringing the figures, however, down to the first of January, 1938. We have not continued those figures on down to date for the reason we don't know to what date to continue them, and it is very expensive, as the Examiner doubtless knows, to employ valuation experts and others dealing with a vast problem of this kind, and we naturally want to avoid the necessity of employing them over and over again to do that.

Now, I have not said I do not know what the subject of the Power Commission's inquiry is. I took the pains to state in detail what the inquiry covers. I know what it covers but I do not know what complaint they will have against us when they have completed their inquiry. That is my position here. We are only required to meet the complaint of the Illinois Commerce Commission on the evidence that it brings here and such evidence as the Federal Power Commission sees fit to bring here and offer against us. We are not denying the Federal Power Commission all the information the law contemplates. As I have already said we are very willing to give it to them. I think if they will check with their representatives who have contacted us in an effort to conduct this investigation they will find we have cooperated completely with their representatives in every particular, to the extent of spending a very substantial sum of money already in an effort to cooperate with them. We are perfectly willing to give them the figures. Our only position is we are not required to make this lawsuit but required only to meet it and that is the position on which we stand.

Examiner Durrance: I understand, Mr. Morgan, you are in position at this time to rebut any testimony which either Commission might offer at this hearing?

Mr. Morgan: No, I am not in position to do that. I don't know what they will offer. When they have offered it I will then have to pass on that question. I anticipate if they cover the case as the law requires them to cover it we will have to have some time before we can proceed. However, it will not be mere rebuttal. It will be direct testimony going to the respondents' or defendants' defenses in this case and I am not waiving any right to defend ourselves on direct testimony, notwithstanding Mr. Booth's suggestion we ought not to be permitted to have that right.

Examiner Durrance: The Examiner is not in position at this time to state what position the Commission will take with reference to the defendants' failure or refusal to comply with its orders. However, we will proceed in accordance with the suggestion of Commission's counsel to take the testimony and the Examiner will determine before the proceedings are adjourned whether or not the defendant will be foreclosed from putting in direct testimony.

Mr. Booth: May the record show if we do proceed, and we want to take at least during the noon hour and possibly until tomorrow to determine when we can proceed, that it is not to be considered as assuming the burden in this case or waiving any right which the Federal Power Commission may have to take any steps against the company under the provisions of the Act for failure to comply with the direction and regulation and order of the Federal Power Commission?

Mr. May: Of course, the Commission's counsel understand if we proceed to take evidence there will be no waiver of any right of the Commission to take such action to enforce its directional order as it may deem advisable.

Examiner Durrance: That is correct. Are you ready to proceed with the Illinois Commerce Commission's testimony, Mr. Booth?

Mr. Booth: No, we are not ready at this time. As I stated, we would like to come back at the afternoon session and advise the Examiner when we will be ready to proceed. I think we will be ready to proceed some time during the week but, obviously, we assumed in view of the rule of the Power Commission that the company would put on its case first. Mr. Morgan's decision requires some changes in our plans. We have been engaged in the preparation of certain types of testimony and we will be ready, if we decide to go ahead, some time during the week, it may be Wednesday or it may be Thursday, and I believe I will be in better position to advise you fully on our return this afternoon. I understand, however, Mr. May has some jurisdictional testimony and other testimony to present.

1 ## ABSTRACT OF TESTIMONY.

CLAUDE C. BROWN testified on behalf of the Federal Power Commission as follows:

Direct Examination by Mr. May.

My name is Claude C. Brown. I have been employed since September 1, 1938, by the Federal Power Commission as principal gas engineer, in charge of the Natural Gas Section of the Bureau of Engineering. My duties involve the supervision and direction of all gas engineering work performed in connection with the regulation of the transportation and sale of natural gas in interstate commerce.

I graduated from the University of California in 1914, receiving the degree of Bachelor of Science in mechanical and electrical engineering. In the years 1928 and 1929 I studied petroleum geology in the University of Southern California.

From the year 1904 to the year 1922 I held engineering positions during various periods with the following agencies: Pacific Light & Power Company, Lewellyn Iron Works, Baker Iron Works, Southern California Edison Company, Southern Pacific Railroad Company, J. G. White Engineering Corporation, Northern California Power Company and Pacific Gas & Electric Company. The duties in these positions involved construction, operation, valuation and various other general engineering work.

During the years 1917 and 1918 I was in the engineering corps of the United States Army.

In November of 1922 I became connected with the California Railroad Commission, in the capacity of assistant valuation engineer, engaged in the appraisal of various gas and electric utilities.

During the years 1924 and 1925 I had the position of assistant engineer in the Gas and Electric Division of that Commission, performing engineering and rate work in connection with natural gas, manufactured gas, and electric matters.

During 1926 and 1927 I held the position of gas engineer with that Commission, handling all gas matters, involving both natural and manufactured gas, including engineering and rates. 2

During 1928 and 1929 I held the position of Gas Administrator for the State of California, being responsible for the allocation of the natural gas supply in that state.

From 1929 to 1933 I held the position of gas and electric engineer with the California Commission, in charge of the gas and electric division, and had supervision of all gas and electric engineering and rate matters that came before the Commission.

During the years 1929 and 1930 I also acted as consulting gas engineer for the Department of Natural Resources of the State of California. This work had to do with the administration of conservation legislation for the purpose of reducing the then existing wastage of natural gas in that state; also the estimation of natural gas reserves; and estimates and studies of the production, transmission, utilization and wastage of natural gas; and studies of the markets for natural gas.

From 1933 to 1937 I held the position of chief engineer for the California Railroad Commission, in charge of the engineering department, and was responsible for all engineering and rate work performed by that department, including all phases of state regulation of natural and manufactured gas, electric, telephone, water, and transportation utilities. This work included rate cases, cases involving the application for certificates of public convenience and necessity, and all other types of proceedings involving engineering phases.

From 1937 to September 1, 1938, I held the position of chief consulting engineer for the California Commission, handling all engineering matters and special problems during that period. I also performed general consulting engineering work, dealing largely with the production, transmission and distribution of natural gas.

On September 1, 1938, I accepted my present position with the Federal Power Commission.

I have had a rather wide experience in all phases of regulation of gas utilities, both natural and manufactured, including production, gathering, transmission, distribution, purchase and sale of gas, and the costs of same; also the construction, operation, valuation of gas properties and facilities, and the preparation and handling of rate cases, certificate cases, and other proceedings.

I have had experience in the estimation of natural gas reserves. I was retained by the Texas Company as one of a number of consulting engineers to determine the extent of their reserves in the Kettleman Hills field, California.

I also made estimates of the reserves of the Butte Oil Fields, Incorporated, which has holdings and operates in the same state.

3 I also made many estimates of reserves in connection with my work with the California Railroad Commission, and as consulting gas engineer for the Department of Natural Resources, and others.

I have tested gas wells at various times and in various fields in California.

I am familiar with the Hugoton gas field in southeastern Kansas and the Texas Panhandle field. I have been in those fields and was last there in March, 1939, at which time I conferred with Messrs. Dickinson, the manager of the Texoma company at Amarillo; Martin in the land department of the same office; Mr. Peterson, geologist for Texoma; Mr. Powers, in charge of the Fritch compressor station; and Mr. Williams, who has to do with the pipelines of the Texoma company.

I also conferred with Mr. Ford, manager of the Canadian River Gas Company at Amarillo; Mr. Walton, manager of the Republic Natural Gas Company at Hugoton; Mr. Batten, in charge of the Pampa station of Cities Service Gas Company; and Messrs. Harrington and Marsh, of Hagy, Harrington & Marsh, holders of acreage in those fields.

I visited the Fritch compressor station of Texoma, the Bivins compressor station of Canadian River, the Pampa compressor station of Cities Service, the Skellytown compressor station of Northern Natural Gas Company, Cabot carbon black plant, and various gas wells and leases in that area.

In March I conferred with the staff of the Texas Railroad Commission in Austin, Texas.

I am familiar with the operations and facilities of Texoma Natural Gas Company and Natural Gas Pipeline Company of America.

(Map entitled "Texoma Natural Gas Company—Panhandle Gas Field of Texas," marked Exhibit No. 1 for identification.)

Exhibit 1 was secured by me from Texoma Natural Gas Company. This map shows in red lines the gathering lines of Texoma in the Texas Panhandle field. Located in the center of the map, marked "Station No. 1," is located the Fritch compressor station of Texoma.

Into that station there is led two gathering trunk lines, one extending from what is known as the East field of the Texas Panhandle, down in the lower right-hand corner of this map, and extending in a northwesterly direction to the Fritch station, and the other extending from the main portion of the Texas Panhandle field, or what is known as the West field, in the upper left-hand corner of this map, and extending generally in a southeast direction to the same Fritch compressor station.

This map also shows a portion in green of the transmission line from Fritch compressor station, extending in a northeasterly direction, and going off this map, extending on up to what is known as Gray Junction in Oklahoma. This map shows the sizes of the various gathering lines of the company, the two main trunk lines being 24 inch and the laterals therefrom varying in size from 4 inches to 18 inches.

4 The total length of lines, as indicated on this map, is 220.497 miles, consisting of the following:

78.761 miles of 24 inch lines
.374 miles of 18 inch lines
5.105 miles of 16 inch lines
.107 miles of 12 inch lines
20.326 miles of 10 inch lines
34.114 miles of 8 inch lines
44.518 miles of 6 inch lines
37.192 miles of 4 inch lines

(Map entitled "Natural Gas Pipeline Company and Texoma Natural Gas Company — Communities Served by Natural Gas Pipeline Company," marked Exhibit 2 for identification.)

Exhibit 2 is a map obtained by me from Natural Gas Pipeline Company of America. This map shows a continuous 24 inch gas transmission line from the Fritch compressor station in the Texas Panhandle field to a point near Joliet, Illinois, with delivery taps therefrom.

Including the river crossings and laterals, this line is 988.976 miles in length. That portion of the line owned and operated by Texoma from Fritch compressor station in Texas to Gray Junction, Oklahoma, is shown in green. The Panhandle field is shown in the lower left-hand corner of this map, and marked. This portion of the line includes 73.598 miles in Texas and 4.818 miles in Oklahoma, or a total of 78.416 miles from the Fritch compressor station to Gray Junction, Oklahoma.

That portion of the line owned by Natural Gas Pipeline Company of America, from Gray Junction, Oklahoma, to Joliet, Illinois, is shown in red. The taps off that line are shown in yellow. That line includes 43.554 miles in the State of Oklahoma, 302.809 miles in the State of Kansas, 100.225 miles in the State of Nebraska, 285.336 miles in the State of Iowa, and 178.936 miles in the State of Illinois, or a total of 910.560 miles from Gray Junction, Oklahoma, to Joliet, Illinois.

Tap lines are the laterals, shown in yellow, extending laterally from the main lines. The two main transmission lines are shown, as explained; the one owned and operated by Texoma in green and that owned and operated by Natural Gas Pipeline Company of America in red. The tap lines, or the branch lines, extend from these main transmission lines and are indicated on this map in yellow. Those are what I referred to as tap lines.

Texoma Natural Gas Company and Natural Gas Pipeline Company of America maintain executive offices at 20 North Wacker Drive, Chicago, Illinois.

The Texoma company maintains an office in the Rule Building, Amarillo, Texas. The personnel in that office supervise and perform Texoma leasings, right of way, geological and well drilling operations. They also calculate all rates, measurement of gas and perform bookkeeping pertaining to royalty, rentals, gas production taxes, etc.

The pipeline personnel of the company is directed from its Fritch compressor station. Texoma controls approximately 153,795 acres of gas leases in the Texas Panhandle field. It produces natural gas from its wells on these leases and collects the same through its two main gathering systems, one extending from Gray County, Texas, through Carson and Hutchinson Counties, Texas, and the other from Moore County, Texas, to its compressor station located near Fritch, in southwestern Hutchinson County, Texas.

The Canadian River Gas Company delivers gas to the facilities of Texoma near Fritch for delivery to Natural Gas Pipeline Company of America and for sale to the latter company by Colorado Interstate Gas Company.

The Texoma company extracts gasoline from all the gas that passes through its Fritch plant.

From its Fritch compressor station Texoma delivers gas through its 24 inch transmission line to Natural Gas Pipeline Company of America at a point near Gray, Oklahoma, known as Gray Junction.

The Fritch compressor station of Texoma contains fifteen 1250 horsepower Worthington horizontal gas engine-driven compressor units, together with all necessary auxilliaries. At the time of my visit to that station in March, 1939, fourteen of these units were in operation, with one unit down for overhauling.

The intake pressure on one of the gathering lines leading into the Fritch station was 180 pounds per square inch gauge. On the other two gathering lines coming in it was 220 pounds. The discharge pressure from the compressor units was 745 pounds per square inch. The station at that time was handling approximately 230 million cubic feet per day.

Other equipment at the Fritch station includes a high-pressure gasoline extraction and fractionating plant, a calcium chloride dehydrating plant, an electric powerhouse, machine shop, warehouse, chemical laboratory, field office, garage, community hall, and employees' residences. It also has atmospheric cooling towers, heat exchangers; oil, gasoline, Butane, and water storage tanks; also scrubbers, circulating system, etc. Tools, repair equipment, transportation equipment, and stocks of pipe and other supplies are held at Fritch, in Hutchinson County; also at Kingsmill, in Moore County, and Dumas, in Moore County, Texas.

Texoma does not purchase any gas from others, but produces all of its own natural gas.

(Document entitled "Texoma Natural Gas Company—Production and B.T.U. by Fields for Year Ending June 30, 1938," marked Exhibit 3 for identification.)

Exhibit 3 is a tabulation, prepared under my direction, showing by months for the period from July, 1937, to June, 1938, the volumetric amount on a 16.4 pressure basis of natural gas produced by Texoma from its leases in the Texas Panhandle oil and gas field and the average heating value thereof. The source of this information was Texoma's response to Question 9-A of the Commission's Order No. 51.

6 This exhibit, consisting of one sheet, shows for each month from July, 1937, to June, 1938, inclusive, the production of natural gas by Texoma in the Texas Panhandle field, and the reported heating value in BTU's per cubic foot thereof. The total for the 12 months is 52,289,039 MCF for the total 12 months period, and the average heat-

ing value of that gas is reported as 1,082 British Thermal Units per cubic foot.

(Document entitled "Texoma Natural Gas Company—Gas Sold or Delivered by Companies for Year Ending June 30, 1938," marked Exhibit 4 for identification.)

Exhibit 4 is a tabulation, prepared under my direction, showing for the 12 months period ending June 30, 1938, the volumetric quantities of natural gas on a 16.4 pound pressure base sold by Texoma to each of its customers, the points of delivery, and the ultimate purposes for which such gas was used. The total volumetric sales for that period were 50,478,161 MCF. The source of this information was Texoma's response to Question 9-D of Order No. 51 of the Federal Power Commission.

(Document entitled "Texoma Natural Gas Company—Consolidated Operating Analysis—Gas Balance—M.C.F.—16.4# Pressure Basis," marked Exhibit 5 for identification.)

Exhibit 5, prepared under my direction, is a tabulation showing the volumetric natural gas receipts and disbursements on a 16.4 pound pressure base, by years, for the calendar years 1934 to 1938 inclusive by Texoma. The source of this information was the company's records.

(Document entitled "Texoma Natural Gas Company—Natural Gas Division—Earnings Analysis," marked Exhibit 6 for identification.)

Exhibit 6, prepared under my direction, is a tabulation showing, by years, for each of the calendar years 1934 to 1938, inclusive, the annual revenue received by Texoma from its customers. The source of this information was the records of Texoma.

Texoma has filed with the Federal Power Commission, in compliance with Commission Order No. 53, one natural gas sales agreement or contract, dated October 15, 1931, with Natural Gas Pipeline Company of America. This was filed on August 22, 1938. The term of the agreement is from October 15, 1931, until and including September 30, 1946, and so long thereafter as Texoma has available for delivery to Natural Gas Pipeline Company of America quantities of natural gas which, in the opinion of Natural Gas Pipeline Company of America, are profitable for it to purchase.

Under this agreement Texoma, seller, agrees to sell and deliver to Natural Gas Pipeline Company of America, buyer, and buyer agrees to purchase and receive from seller, at a point known as Gray Junction, located near Gray, Beaver County, Oklahoma, said point being the junction point between seller's 24 inch gas transmission line from its Fritch compressor station and buyer's 24 inch gas transmission line extending from said junction point to a point near Joliet, Illinois, all of the natural gas in excess of the quantity thereof purchased by buyer from Colorado Interstate Gas Company under an agreement between buyer and Colorado Interstate Gas Company dated October 15, 1931.

That latter quantity, namely the amount of gas purchased by Natural Gas Pipeline Company of America from Colorado Interstate Gas Company, approximates 25% of its requirements.

7 So that under this agreement the Natural Gas Pipeline Company of America agrees to buy from Texoma all the gas which is required by the buyer, with the exception of the amount stated, to supply its present or future customers supplied with natural gas through buyer's pipeline from Gray, Oklahoma, to Joliet, Illinois; and any additions thereto, any enlargements or extensions thereof, hereafter constructed for the transportation and delivery of gas to any point.

Under this agreement the buyer has first call at all times upon all of the natural gas produced by seller (I refer there to Texoma as seller) from seller's gas lands, gas leaseholds, gas rights, gas reserves or gas wells, presently held or thereafter acquired by seller; after deducting therefrom any quantity of natural gas which the seller may have supplied to any of its customers for consumption in Parmer, Castro, Swisher, Briscoe, Hall or Childress Counties, Texas, or any county north thereof in the State of Texas. Under this contract the title to the gas sold and delivered by seller to buyer passes from seller to buyer at Gray Junction.

Furthermore, under this contract seller agrees to develop, operate, extend and renew all of its present or future gas lands, leases, rights and properties in such manner as to produce sufficient natural gas for delivery under the agreement.

The agreement also provides that if necessary the buyer, that is, Natural Gas Pipeline Company of America, agrees to loan to seller at an interest rate of 6% per annum amounts of money required to drill additional wells or make such improvements and conduct such operations as are necessary to enable seller to produce and deliver to buyer the latter's natural gas requirements under the agreement.

It is specified in the agreement that the natural gas sold and delivered under said agreement shall be free from solids or liquids, shall not contain more than one grain of hydrogen sulphide nor more than 30 grains of total sulphur per 100 cubic feet, and shall have a heating value of not less than 1000 British Thermal Units per cubic foot.

The unit of volume of natural gas under the contract is one cubic foot at a base temperature of 60 degrees Fahrenheit, and at an absolute pressure of 16.4 pounds per square inch at Gray Junction, and that the delivered pressure at Gray Junction of this gas shall be up to 600 pounds per square inch gauge, as may be required by buyer.

The rate per 1000 cubic feet of gas delivered in any month to be paid for by buyer to seller is determined for said month as the sum of two components. These two components consist, first, of the total production cost per MCF for the particular month involved, and, second, the total gathering, compressing, transporting, and metering costs per MCF for that month.

The production cost for each month is determined by adding all rentals on leaseholds, gas rights, gas estates, royalties on gas wells and gas production, all operating and maintenance costs of producing equipment and operating wells, and two-thirds of the unallocated general, ad-
ministrative and office expenses, other than so much
8 thereof as are charged by the seller to the operation of
its gasoline extraction plant at Fritch; and adding further a pro rata on the basis of investment in production capital to the total investment of all payments by seller to the Chase National Bank of the City of New York, which bank is a trustee under a certain indenture dated October 15, 1931, and given by seller to that bank; and to the holders of bonds or coupons issued thereunder; also all amounts of capital and interest paid to buyer on loans which may have been made to seller by buyer that have been expended for production capital; and also all costs of metering gas at the wells, insurance, taxes covering the ownership and operation of production equipment, with the exception of taxes on net income or net profits; and after those total items have been added up, then dividing that total sum by the MCF of natural gas delivered by seller to all purchasers during such month. That then gives the estimated produc-

tion cost under this agreement and forms one component of the monthly price paid.

The second component is determined by adding the gathering, compressing, transporting and metering costs for each month; by adding all of the costs of maintaining and operating gathering lines, compressor stations, main lines, meters and other equipment used in the gathering, compressing, transporting and delivering of natural gas; and adding also one-third of the unallocated general, administrative and office expense, other than that portion charged to the gasoline plant; also a pro rata on the basis of investment in gathering, compressing, transporting and delivering equipment to total investment; also all payments by seller to the trustee that I mentioned a moment ago, and the holders of bonds or coupons issued under that indenture; also all amounts of capital and interest paid to buyer on loans made to seller that have been expended for gathering, compressing, transporting and delivering capital; also all insurance and taxes covering ownership and operation of such facilities, with the exception again of taxes on net income or net profits; and deducting from this total then all amounts received from Canadian River Gas Company on account of rent and expense of operation under a certain lease and operating agreement dated October 15, 1931, between seller and Canadian River Gas Company, wherein this seller assigned to the Canadian River Company a 25% interest in its facilities for mainline transmission; and ther dividing that difference by the MCF of natural gas transported through such gathering pipelines, main pipelines, and compressor stations, and sold by seller during the month.

Those two costs, those two components, are then added to form the cost per MCF for any particular month that Texoma charges Natural Gas Pipeline Company.

(Contract between Texoma Natural Gas Company and Natural Gas Pipeline Company of America dated October 15, 1931, incorporated in the record by reference without objection.)

I am able to give the total annual volumetric sales by Texoma to Natural Gas Pipeline Company on a 16.4 pound pressure base and the average rate received per MCF for each of the calendar years 1934 to 1938. For 1934 the total
MCF sales were 31,865,440 MCF, and the average an-
9 nual rate for those sales was 8.9453 cents per MCF.
For 1935 the sales were 39,360,284 MCF, and the aver-

age rate was 8.1517 cents per MCF. For 1936 the sales were 48,795,294 MCF, and the average rate was 7.8150 cents per MCF. For 1937 the sales were 52,742,027 MCF, and the average rate was 5.8852 cents per MCF. For 1938 the sales were 46,263,244 MCF, and the average rate was 7.5884 cents per MCF.

The source of the information I have just given is the records of Texoma.

With respect to the operations and facilities of Natural Gas Pipeline Company, I will state that Natural Gas Pipeline Company owns and operates a 24 inch natural gas transmission line extending from a point near Gray, Oklahoma, known as Gray Junction, the point of junction between said line and Texoma's 24 inch gas transmission line from Fritch, Texas, to a point near Joliet, Illinois.

Nine compressor stations are located on this main transmission line, approximately 90 miles apart. Sectionalizing valves are located on the line at approximately 10 mile intervals. Cross-tie connections and meter setups are installed for emergency use at points where the line crosses the Panhandle Eastern line near Fowler, Kansas; also where it crosses the Cities Service line near Lincoln, Kansas; and also where it crosses the Northern Natural line near Pacific Junction in Iowa. From this main transmission line gas is delivered to customers in Oklahoma, Kansas, Nebraska, Iowa and Illinois.

Natural Gas Pipeline Company produces no gas. It purchases all of its gas from two sources, Texoma and Colorado Interstate Gas Company. Natural Gas Pipeline Company's response to Question No. 9-B of Order 51 of the Federal Power Commission shows that during the 12 months period ending June 30, 1938, Natural Gas Pipeline Company purchased from Texoma 49,616,993 MCF, and from Colorado Interstate 17,227,770 MCF, or a total from the two companies of 66,844,763 MCF. These volumes are on a 16.4 pound pressure base.

(Document entitled "Natural Gas Pipeline Company of America—Gas Sold or Delivered—By Companies For Year Ending June 30, 1938," marked Exhibit 7 for identification.)

Exhibit 7, prepared under my direction from Natural Gas Pipeline Company's response to Question 9-A of Order No. 51 of the Federal Power Commission, is a tabulation showing for the 12 months period ending June 30, 1938, the volumetric quantities of natural gas on a 14.65 pound pressure base sold by Natural Gas Pipeline Company to its customer companies, the points of delivery, and the ultimate purposes for which such gas was used. The total volumetric sales for that period were 70,795,402 MCF on a 14.65 pressure base, which would be the equivalent of 63,241,016 MCF on a 16.4 pound pressure base.

(Document entitled "Natural Gas Pipeline Company of America—Purchased Gas," marked Exhibit 8 for identification.)

10 Exhibit 8, prepared under my direction from the records of Natural Gas Pipeline Company, is a tabulation showing by years for each of the calendar years 1934 to 1938, inclusive, the annual volumetric purchases of natural gas by Natural Gas Pipeline Company from each source, on a 16.4 pound pressure base, and the amounts of money paid for such purchases.

(Document entitled "Natural Gas Pipeline Company of America—Consolidated Operating Analysis—Gas Purchases and Sales—M.C.F.," marked Exhibit 9 for identification.)

Exhibit 9, prepared under my direction from the records of Natural Gas Pipeline Company, is a tabulation showing by years for each of the calendar years 1934 to 1938, inclusive, the natural gas receipts and disbursements, on a 14.65 pound pressure base, by Natural Gas Pipeline Company.

(Document entitled "Natural Gas Pipeline Company—Gas Sales—14.65 pound Pressure Base," marked Exhibit 10 for identification.)

Exhibit 10, prepared under my direction from the records of Natural Gas Pipeline Company, is a tabulation showing by years for each of the calendar years 1934 to 1938, inclusive, the annual volumetric sales of natural gas on a 14.65 pound pressure base by Natural Gas Pipeline Company, and the amounts of revenue received from such sales.

(Document entitled "Natural Gas Pipeline Company of America—Natural Gas Sales Agreements," marked Exhibit 11 for identification.)

Exhibit 11 is a list of the natural gas sales agreements or contracts filed by Natural Gas Pipeline Company with the Federal Power Commission in compliance with the Commission's order No. 53. This exhibit shows the name of the customer, the date of the agreement, the effective date of the agreement, the date of filing, and the designated

Federal Power Commission number of the tariff. This exhibit consists of three sheets. The agreements referred to therein are now on file with the Federal Power Commission.

(Contracts filed by Natural Gas Pipeline Company of America with the Federal Power Commission, listed in Exhibit 11, incorporated in the record by reference without objection.)

I am familiar with the location and structure of the Texas Panhandle oil and gas field, located in the Texas Panhandle, State of Texas. I have heretofore testified that I have been in that field. I have a map showing the location of that field and its generally accepted productive limits. This map was obtained by me from the Texas Railroad Commission.

(Map entitled "Pressure Contour Map Panhandle Gas Fields, July, 1938," marked Exhibit 12 for identification.)

11 Exhibit 12 is the map referred to. It is entitled "Pressure Contour Map Panhandle Gas Fields, July, 1938," and shows on its face that it was prepared by the Railroad Commission of Texas.

This map shows by heavy black lines the outside boundary of the oil and gas producing area of the Texas Panhandle field. That outside black line I mean is the one I am indicating now on the map. It is the heavy black line outside of all the coloring on the map. The oil producing area in this field is a strip extending along the northeatern boundary of the field where I am indicating at the present time—the northeastern flank of the field. The balance of the field included in the heavy black line, other than the oil producing area, is the natural gas producing area of the field. The uncolored island, you might call it, in the lower right-hand corner of the map, located about in the center of Gray County, Texas, is apparently a barren area, apparently barren of either oil or gas.

The gas area on this map is contoured and colored according to the 1938 gas pressure survey conducted by the Texas Railroad Commission, in which the shut-in wellhead pressures were found to be certain amounts as indicated on the map. That portion of the map that is colored with kind of a gray-black on the northeastern flank indicates an area in which the pressure was found to be below 150 pounds; that is, the shut-in wellhead pressure of the wells averaged below 150 pounds gauge.

The next band of color, namely, this orange color extending next to the black is a band wherein the well pressures were found to vary from 150 to 200 pounds per inch gauge.

The next one, which is a sort of a brown color, is one in which the pressures were found to be from 200 to 250.

Next to that is the red, in which the pressures vary from 250 to 300 pounds, and next to that is the blue which shows pressures from 300 to 350. Then next to that is the green area, which it will be noted covers a substantial portion of the field, where the pressure varies from 350 to 400, and finally the yellow, in which the pressures are 400 pounds and above.

12 Before I leave that point I would like to make a statement: The weighted average shut-in wellhead pressure of the gas areas of the field as of July 31, 1938, was found by the Texas Railroad Commission to be 337.66 pounds per square inch gauge.

This map also shows a dotted line extending from a point somewhere south of Pampa in Gray County in a northwesterly direction through the field and extending almost to the westerly boundary of the field and then cutting down into the southwest boundary. That line is a dividing line between what is known as the sweet gas and sour gas area, the area south of that line producing sweet gas and north of it the so-called sour gas, or gas containing substantial amounts of sulphur, hydrogen sulphide.

This Texas Panhandle field is divided into two fields by a line that extends in a north and south direction through about the middle of Gray County, Texas, that portion of the field to the east of it being known as the East field and the balance of the field to the west of it being known as the West field. The black triangles on this map, being quite numerous near the oil zone, indicate carbon black plants. The black squares also in that territory and in other territory indicate the location of gasoline extraction plants. The large black solid dots indicate refineries and the small dots on the map the locations of wells.

Both the Texas Panhandle field in Texas and the Hugoton gas field in southwest Kansas and in the Oklahoma Panhandle, which lies just north of the Texas Panhandle field, are located in what is known as the High Plains Province. The controlling structural features of this whole area are what is known as the Amarillo Arch or buried Amarillo Mountains, the Ancestral Rockies, the Anadarko Basin, the Dalhart Basin and the West Texas Permian Basin.

The Amarillo Mountains consisted of a high granite range and it is believed that those mountains were formed in early Pennsylvanian time and extending from the present Wichita Mountains in Oklahoma some 150 miles northwest into Moore and Hartley Counties, Texas. It appears that this presently buried mountain range has been uplifted and submerged a number of times since its original formation. That is evidenced partly by the existence of granite wash on certain slopes of the buried range and evidences of weathering on some of the buried peaks. Apparently during a later period, in late Pennsylvanian time, limestone and shale and dolomite sediments were deposited over this submerged area. Subsequently to that, probably in Permian time, this buried range was covered with deposits of dolomites and anhydrites. Following the depositions, the depositing of the dolomite and anhydrite, which is known in this section as "Big Lime" series, apparently another uplift or partial uplift occurred, which caused faulting, folding and arching of these sedimentary beds. A portion of these sediments were at that time apparently eroded off after one of those uplifts, which is evidenced by the occurrence of pieces of anhydrite and dolomite embedded in the lower part of the so-called "Red Cave" section or series, or "Red Beds," and on the higher portion of these buried mountain peaks.

13 The arching of the Permian and Triassic beds into the anti-clinal fold, which is superimposed above the buried Amarillo Mountains, was brought about, evidently, partly by uplift in that range and partly by subsidence of the neighboring basins, that is, the Anadarko Basin to the north and east and the West Texas Permian Basin to the south.

The Anadarko Basin which lies to the north of the Amarillo Arch is known to contain carbonaceous formations. That was thought to be of an age corresponding to about Pennsylvanian time, and it appears that most of the productive oil pools in this portion of Texas are located on the flank of this Amarillo Arch nearest that basin. For that reason it is felt by many geologists and others that those carbonaceous sediment deposits in the Anadarko Basin are probably the source beds from which the oil and gas that is produced in this region originally came or was formed, and that that oil and gas subsequently migrated and was deposited in the basins formed by the porous structures in the Amarillo Arch which now form the Texas Panhandle field.

It is interesting to note in this area the water level in the porous formations occurs very close to sea level. It is also interesting to note that the original and initial or virgin pressures in not only the Texas Panhandle field but in the Hugoton field were fairly uniform and were subnormal. The wells in these fields approximate 2600 feet in depth and a hydrostatic water head corresponding to wells of that depth would indicate the pressure should be around 1000 or 1100 pounds instead of 430, which was the initial pressure in this field.

In the Texas Panhandle field the basement rock consists of this granite peak of these buried Amarillo Mountains. At some portions of the slope of some of these peaks there occurs the granite wash I mentioned some time ago. It is a porous disintegrated granite. That granite wash overlies certain parts of those peaks, not all of them, and in certain parts of those areas of granite wash wells tapping it have produced oil and gas. However, the granite wash itself is not the principal producing horizon in this field. Overlying this granite wash, and in other places where the granite wash is absent, overlying directly the basement rock, is a series known as the Big Lime. This Big Lime series includes gray lime, gray dolomite and brown dolomite interbedded with what is known as anhydrite. That Big Lime series is the principal gas and oil producing formation in the field. The Big Lime is capped by beds of shale or dense limestone or impervious anhydrite, or all three. The dolomite, Big Lime and those other lime sediments are the porous structure in which the gas was trapped and that gas was kept in there by this overlapping, overlying impervious rock, cap rock.

Overlying the cap rock of the Big Lime in the order named occur a number of series that have been given the following names: Cave Series, Salt Series, Gypsum Series, and Sand Series, and between these various series there are interspersed beds of red clay known as the red beds. Above the last mentioned, from that point to the surface, occur beds of Permian, Cretaceous, Tertiary and Quarternary deposits, sand deposits, sediment deposits, sandstone and alluvium.

14 This field as it is presently outlined is somewhere around 124 miles long and averages about 20 miles in width. It extends, as shown on the map, in a northwest-

southeast direction and includes portions of Hartley, Moore, Potter, Hutchinson, Carson, Gray, Wheeler and Collingsworth Counties, in Texas.

The first gas well that was drilled in this field was completed in December of 1918 on what is known as the John Ray Dome in northern Potter County. In that well natural gas was encountered at 2605 feet and the shut-in wellhead pressure was 430 pounds.

The first oil well in the field was completed in May, 1921, by the Gulf Production Company, a well known as its Burnett well No. 2. That was completed in northern Carson County.

As of July 31, 1938, the field contained a total of 1498 gas wells and 3912 oil wells. The gas wells had a total daily potential open flow of 26,282,787 MCF of dry gas, and the potential oil production on that date was estimated to be 1,221,500 barrels of oil per day.

The Texas Railroad Commission estimates that the total dry gas acreage in this field includes 1,475,324 acres, of which 274,900 acres in the east field produce sweet gas, 801,400 acres in the west field produce sweet gas, and 398,900 odd acres in the west field produce sour gas.

The production of oil in the oil portion of this field is accompanied by the production of casinghead gas. This casinghead gas is sour gas and is used almost exclusively for the production of carbon black, being burned in the numerous carbon black plants located in the field.

The gas-oil ratio, or the ratio of the volume of casinghead gas produced with each barrel of oil, in this field is approximately 6 MCF. That is 6,000 cubic feet of gas produced with each barrel of oil.

The Railroad Commission of Texas estimates an ultimate probable recovery of oil of one billion barrels from this field. The production of oil to the end of July, 1938, was in excess of 318 million barrels.

The total withdrawals of dry and casinghead gas from this field through July 31, 1938, are estimated to be 6,939,957,820 MCF.

The present average daily production of dry and casinghead gas produced in this field approximates 1,520,000 MCF per day, and that production is segregated as follows: sweet dry gas, 640,000 MCF; sour dry gas, 540,000 MCF; casinghead gas, 340,000 MCF.

During the first seven months of 1938 the disposition of the gas produced in the field was as follows: for manufacture of carbon black, 45%; sales to pipeline companies, 37.4%; gasoline plant, lease and other fuel, 11.6%; gasoline extraction loss, 3.7%, and blown to the air, 2.3%, making a total of 100%.

15 The total withdrawals of all gas from this field during the twelve months ending July 31, 1938, and I use that figure because some of the information and data that is involved in this hearing is completely available to that point, the total withdrawals from this field of all gas for the twelve months ending July 31, 1938, amounted to 577,579,759 MCF, of which approximately 216,000,000 MCF were taken by pipeline companies leading out of the field. Those pipeline companies consist of a number of companies, including Texoma and Natural Gas Pipeline Company, as well as the Canadian River and Colorado Interstate line to Denver and Cheyenne, the Northern Natural Gas Company line, which also taps the Hugoton field and extends to the Twin Cities in Minnesota, the Panhandle Eastern Pipeline Company line to Detroit, the Cities Service Gas Company line to Kansas City and other cities, the Lone Star Gas Company and Consolidated Gas Company, Empire Gas & Fuel Company, United Gas Pipeline Company, South Plains Gas Company, and other smaller ones.

I have estimated the original and remaining gas reserves in the Texas Panhandle oil and gas field, using in that estimate two methods: the method known as the reservoir-porosity method and the method known as the pressure-decline method.

Using an average thickness of pay of 70 feet and an average porosity of 20%, the per acre reservoir pore space or voids is estimated at 609,840 cubic feet per acre. The figure of 70 for thickness of pay and 20% average porosity has been used by Natural Gas Pipeline Company and Texoma or their representatives. Those figures are used generally in the Texas field—not exclusively, but they are largely used.

Using an initial virgin wellhead pressure of 430 pounds gauge and an average well depth of 2618 feet, the initial reservoir pressure was 471 pounds absolute. Upon this basis the per acre dry gas initially in place upon a pressure base of 16.4 pounds per square inch absolute was estimated to be 17,514 MCF per acre. Under each acre of productive land there is estimated to have been in place initially at a pressure of 471 pounds absolute a total of 17,514 MCF of gas per acre.

Then, using a total productive dry gas acreage of 1,475,324 acres and a wellhead abandonment pressure of 25 pounds gauge at the wellhead, I estimated the initial volume of dry gas in place to be 23,645,017,700 MCF, and considering the same acreage in the same conditions but using instead of 25 pounds wellhead abandonment pressure a 100 pound abandonment pressure—that is, on a gauge basis at the wellhead, 100 pounds—I estimate the initial volume of dry gas in place to have been 19,255,928,800 MCF, both of these being on a pressure basis of 16.4 pounds absolute.

Those figures indicate an estimate of the dry gas under the dry gas acres and take nothing into account of the casinghead gas and in the oil area.

Using the Texas Railroad Commission's estimate of one billion barrels of oil, recoverable oil, and an average
16 gas-oil ratio of 6 MCF per barrel, I estimate that the total additional volume of casinghead gas in place was six billion MCF on a 16.4 pound absolute pressure basis.

The total withdrawals from this field on the same basis, that is, 16.4 pounds absolute, including both dry and casinghead gas, from the beginning of the field through July 31, 1938, is estimated to be 6,939,957,820 MCF. Deducting this amount of withdrawal from the original, rather, from the estimate of original dry and casinghead gas in place leaves a remaining total reserve of dry and casinghead gas on a 16.4 pounds absolute pressure basis of 22,705,059,900 MCF to a wellhead abandonment pressure of 25 pounds gauge, and 18,315,971,000 MCF to an abandonment pressure of 100 pounds gauge.

At the 1938 rate of withdrawal of gas from this field, including both dry and casinghead, on a pressure basis of 16.4 pounds absolute, which was 577,579,759 MCF, the estimated remaining reserve of dry and casinghead gas in this field would last 39.3 years to a wellhead abandonment pressure of 25 pounds, and 31.7 years to an abandonment wellhead pressure of 100 pounds gauge.

By the expression "1938 rate of withdrawal" I had in mind the twelve months period ending July 31, 1938.

My calculations and conclusions under the pressure decline method were arrived at in the following way:

Again using an initial virgin wellhead pressure of 430 pounds gauge and an initial reservoir pressure of 471 pounds absolute, and the Texas Railroad Commission's weighted average, so-called, wellhead pressure of 337.66 pounds gauge, determined by that Commission as of July 31, 1938, the weighted average reservoir pressure on that date would be 373 pounds absolute. The difference between 373 pounds absolute and the initial reservoir pressure of 471 pounds absolute represents a drop in reservoir pressure from the beginning of the production in that field up and through July 31, 1938, of 98 pounds absolute average.

The total dry gas withdrawals through July 31, 1938, were 5,031,957,820 MCF on a 16.4 pounds pressure basis, that is, absolute pressure, which represents an average of 51,346,508 MCF of dry gas produced per pound of reservoir pressure drop.

Using a wellhead abandonment pressure of 25 pounds gauge, which corresponds to a reservoir pressure of 40 pounds absolute, or an ultimate pressure drop in the reservoir of 431 pounds, that being the difference between the reservoir absolute pressure at time of abandonment and the reservoir absolute pressure initially, gives an initial volume of dry gas in place to an abandonment pressure of 25 pounds gauge at the wellhead of 22,130,344,900 MCF on a 16.4 pound absolute pressure basis.

Then, using an abandonment wellhead basis of 100 pounds gauge, which corresponds to a reservoir pressure of 120 pounds absolute, or an ultimate pressure drop in
17 the reservoir of 351 pounds, gives a calculated initial
volume of dry gas in place to an abandonment pressure of 100 pounds at the wellhead of 18,022,624,300 MCF on a 16.4 pound absolute pressure basis.

Then, again including the six billion MCF of original casinghead gas in place, and total dry and casinghead withdrawals the same as before of 6,939,957,820 MCF, the total estimated remaining reserves of both dry and casinghead to a wellhead abandonment pressure of 25 pounds gauge at the wellhead is estimated to be 21,190,387,100 MCF, and to an abandonment pressure of 100 pounds at the wellhead, 17,082,666,500 MCF, both on a 16.4 pound absolute pressure basis. At the 1938 rate of withdrawals, and there I mean the twelve months ending July 31, 1938, namely, 577,579,759 MCF, these remaining reserves would last, according to this method of calculation, for 36.7 years to an abandonment pressure of 25 pounds gauge, and 29.6 years to an abandonment pressure of 100 pounds gauge at the wellhead.

(Map entitled "Texas Panhandle Gas Fields" showing Texoma Natural Gas Company leases as of January 1, 1939, marked Exhibit 13 for identification.)

Exhibit 13, obtained by me from Mr. Dickinson, of Texoma, at Amarillo, Texas, is a map which shows again by a black line the outside boundaries of the Texas Panhandle oil and gas field. It also shows by a red line extending from a point south of Pampa in Gray County and extending in an irregular northwest direction up to the point near the west boundary of the field and cutting down to the southwest corner of the field in Hartley County, the sour gas line, so-called, or the line which purports to divide the sour gas area from the sweet gas area, the sweet gas area being south of the line and the sour gas area being north of the same line.

It also shows colored in yellow the leases of Texoma as of January 1, 1939. Those leases are somewhat scattered over the entire portion of the field, including the portion of the east field and portion of the west field, these leases largely lying in the so-called sweet gas area.

The total gas acreage of Texoma, as colored in yellow on this map, is 153,795.14 acres. It is my estimate that the initial natural gas reserves in this acreage, calculated on a 16.4 pound absolute pressure base to a wellhead abandonment pressure of 25 pounds gauge, were 2,464,872,465 MCF, and on the same pressure basis to a wellhead abandonment pressure of 100 pounds it was 2,007,332,340 MCF.

The total natural gas withdrawals from this acreage through December 31, 1938, were, on a 16.4 pound absolute pressure basis, 281,954,457 MCF. This information was obtained by me from Mr. W. F. Martin, through Mr. C. J. Peterson, both of Texoma.

The withdrawals during the year 1938 were 52,663,513 MCF on a 16.4 pound absolute pressure base. At that rate of withdrawal, the remaining reserves of Texoma as I have estimated them would last 41.45 years beyond December 31, 1938, to a wellhead abandonment pressure of 25 pounds gauge, and 32.76 years to a wellhead abandonment pressure of 100 pounds gauge.

18 Using the reservoir-porosity method, I have recently made an estimate of the initial and remaining gas reserves of the Hugoton gas field. Using an average thickness of pay in the Hugoton field of 45 feet and an average porosity of 15%, average well depth of 2600 feet, and a productive acreage of 2,200,000 acres, with an initial

wellhead pressure of 435 pounds gauge, I estimate the initial volume of natural gas in the Hugoton field, on a 16.4 pound absolute pressure base, to have been as follows: at a wellhead abandonment pressure of 25 pounds gauge, 17.3659 billion MCF; to a wellhead abandonment pressure of 100 pounds gauge, 14.1437 billion MCF.

The total natural gas withdrawals from the Hugoton field through December 31, 1938, was 153.5 million MCF. This left remaining reserves as of December 31, 1938, of 17.2124 billion MCF on a 25 pound abandonment pressure, or 13.9902 billion MCF on a 100 pound abandonment pressure. The 1938 rate of withdrawal was 29.494 million MCF. At that rate of withdrawal, the field would last from December 31, 1938, under present conditions, that is, the conditions obtaining during the year 1938, with the present pipelines as they are, approximately 583 years to a 25 pound abandonment pressure, or about 474 years to a 100 pound abandonment pressure. The amount of gas being taken out of there as compared to the reserve is very small.

The Natural Gas Pipeline Company line runs to the southeast of the Hugoton field and approaches the generally accepted border of that field within ten or eleven miles. However, it is about 36 or 38 miles, probably, from the center of that field as it exists today to the company line.

I believe 25 pounds is a reasonable figure to use as the abandonment pressure in connection with an estimate of reserves in the Texas Panhandle field. It is a figure that is used by the Cities Service Company and the Lone Star Gas Company. It is a figure used by the Texas Railroad Commission in its calculations, and Hagy, Harrington & Marsh have used it in a case before this Commission. The Panhandle Eastern Pipeline uses 30 pounds in their estimates. Northern Natural uses 50 pounds. I believe 25 pounds gauge at the wellhead is a reasonable figure to use because I know of no definite reasons why gas should not be removed from those formations down to at least 25 pounds. I understand there is at least one company that is contemplating putting a vacuum on its well.

By that statement I mean that as long as a well has pressure in it sufficient to force gas from the formations into the well bore and up and out through the casinghead of the well and into the gathering lines of a system the well flows. As the pressure in the sand falls, the pressure in the reservoir is depleted or decreased and is reduced. Of course, the pressure available at the wellhead is reduced and the well will flow only to a certain point. However, it is common practice in some fields in this country and in other countries to carry the production of gas on down beyond the point where it would normally flow of its own pressure and to withdraw the gas from the formation by suction or vacuum.

19 A map has been prepared under my direction, showing the location of the Texas Panhandle and Hugoton fields with relation to the line of Texoma Natural Gas Company and Natural Gas Pipeline Company of America.

(Map entitled "Natural Gas Transmission Lines of (A) Texoma Natural Gas Company, (B) Natural Gas Pipeline Company of America, (C) Chicago District Pipeline Company" marked Exhibit No. 14 for identification.) (May 9, 1939.)

Exhibit No. 14 shows the 24-inch transmission line of Texoma Natural Gas Company and Natural Gas Pipeline Company of America originating in the Texas Panhandle field, passing within approximately ten miles of the eastern boundary of the Hugoton field in Hansford County, Texas, and approximately thirty-six miles from the center of the Hugoton field in Stevens County, Kansas. The map also shows delivery points of gas which is delivered from this line.

(EXHIBITS NOS. 1 to 14, inclusive, for identification, offered and received in evidence without objection.)

Response of Natural Gas Pipeline Company of America and response of Texoma Natural Gas Company to the Federal Power Commission's Order No. 51 filed with said Commission on August 15, 1938, incorporated in the record by reference without objection.)

20 JOHN M. WOODFORD testified on behalf of the Illinois Commerce Commission as follows:

Direct Examination by Mr. Booth.

(May 9, 1939.)

My name is John M. Woodford. I live at 4715 Malden Street, Chicago, Illinois. I am an accountant with the Illinois Commerce Commission and have been in the employ of that Commission since May, 1934.

In 1913 I graduated from St. Bonaventure's College, St.

Johns, Newfoundland, and at the outbreak of the World War I enlisted with the Canadian Expeditionary Force in 1914, until my discharge in 1919.

From May, 1920, to May, 1921, I did general accounting work with Prest-O-Lite Company, Inc., New York City.

From June, 1921, to April, 1923, I worked on the accounting staff of Deloitte, Plender, Griffiths & Company, of Havana, Cuba, my work covering audits of sugar mills, insurance companies and public utilities.

From April, 1923, to April, 1925, I was traveling auditor for Electric Bond & Share Company, 2 Rector Street, New York City. My work there covered prepurchase investigations, installation of accounting systems, and audits of their domestic and foreign properties.

From April, 1925, to April, 1927, I was employed by National Public Service Corporation as accountant in charge of financial statements, investigations, consolidated statements and preparation of statements in connection with merger possibilities. I also worked on prepurchase investigations and closings of such purchases.

From April, 1927, to June, 1931, I was treasurer of Standard Public Service Company, which company owned and operated numerous water and telephone utilities in about one hundred communities.

From June, 1931, to May, 1934, I was employed for the most part on special investigations and audits with such companies as American Equities Reporting Company and Barrow, Wade, Guthrie & Company, public accountants and auditors, both firms being in New York City.

I joined the staff of the Illinois Commerce Commission in May, 1934, and have been working under Mr. Fred Kleinman, chief accountant, as accountant in charge of field work. I was in charge of the field work in the examination of the books and records of Commonwealth Edison Company, Illinois Bell Telephone Company, Peoples Gas Light & Coke Company, Chicago District Pipeline Company, all in the State of Illinois, and all of which work was in connection with rate cases for the Illinois Commerce Commission. I also worked on numerous other utilities throughout the State of Illinois.

I made an investigation of the books and records of Natural Gas Pipeline Company of America and Texoma Natural Gas Company for the purpose of determining the income and expenses of those companies per books by

21 calendar years from the commencement of operations of these companies to and including December 31, 1938. For the year 1938 our work has not been fully completed; but we have sufficient information to determine the net earnings of the company for the year 1938 as per the books.

(Document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Earnings Statements Per Books Calendar Years from Commencement of Operations to December 31, 1938," marked Exhibit 15 for identification.)

Exhibit 15 reflects the results of our investigation. This exhibit may be divided into three parts. Pages 1 to 7, inclusive, cover the operations of Natural Gas Pipeline Company. Pages 8 to 15, inclusive, cover the operations of Texoma. Pages 16 and 17 show the combined operations of both companies, merely eliminating from such combination intercompany transactions.

Both companies close out their accounts reflecting income and expenses each month to an account called "Profit and Loss," summarizing the result of the month's business in a statement called "Monthly Financial Statement." These monthly financial statements also show cumulative totals for the calendar years to date. The figures shown for the different years in the exhibit are the cumulative totals as shown on the monthly financial statements for the month of December of each year. These cumulative figures were checked against the figures as recorded on the books and are in agreement.

In all of the statements in the exehibit the first column of figures is the cumulative totals, and I ~~believe is No. 1.~~ Column A is for the period from October 15 to December 31, 1931, when the company started operations. October 15 is when the company started operations. The other columns B to H are for the respective calendar years of 1932, 1933, 1934, 1935, 1936, 1937, and 1938.

Page 1 of the exhibit is an earnings statement for Natural Gas Pipeline Company in condensed form. This is the final statement for this company. The other statements, pages 2 to 7, inclusive, are merely supporting schedules.

Page 2 of the exhibit presents on lines 3 to 9 a breakdown of the amounts included by the company in gross earnings from operations, shown on line 3 of page 1, in the amount of $75,312,431.94.

Lines 12 to 22 of page 2 represent the amount included by the company in operations and maintenance expense as shown in line 4 on page 1 in the amount of $39,891,416.91.

The lower half of page 2, lines 25 to 41, shows certain data as to the volumes of gas stated in MCF involved 22 in the company's operations. Line 27 shows the volumes of gas at 16.4 pounds pressure basis and line 30 represents the same quantities of gas converted to a 14.65 pound pressure basis, which is the selling basis of Natural Gas Pipeline Company and on which basis lines 32 to 41 are stated.

Page 3 presents a further breakdown of the sales of gas as shown in the total amount of $75,312,810.93 as shown in line 6 on page 2. In particular it shows the sales to the Chicago District Pipeline Company under existing contractual classifications in quantities stated in MCF, included in lines 2 to 12 inclusive, and the revenues derived from such sales in dollars are shown on lines 16 to 30, inclusive. There is a difference of 51,390 MCF in total gas sales to Chicago District Pipeline Company between the figures on page 3 and page 2. This difference appears in the company's monthly financial statement for the 1931 period and we have taken the figures as therein stated. Sales to others are shown separately in detail on page 5 of the company's monthly financial statements but have been consolidated into totals on page 3 of this exhibit, line 13, for volumes of gas in MCF, and in lines 32 to 36 for dollars.

Page 4 is entitled "Other Operating Income and Non-Operating Income." Lines 4 to 6 give the breakdown. The other operating income is shown in line 8 on page 4 in the amount of $274.92. On lines 12 to 18 there is given a breakdown of non-operating income, shown on line 6 of page 1, in the amount of $10,385,877.40.

Page 5 is entitled "Purchased Gas and Gas Used by the Company." Lines 3 to 14 present the details of the volume of gas purchased, shown on line 27, page 2, 350,997,237 MCF.

The next block of lines, 18 to 27, present the details of the cost of gas purchased, shown on line 12 of page 2, in the amount of $27,055,136.38. The last two lines, 30 to 32, present the quantity and dollar value of the gas used by the company in its operations.

The statements presented on pages 1 to 5 were taken, as before stated, from the company's monthly financial statements and agree with the books as recorded in the income accounts. However, adjustments are recorded on the books of the company which apply to the figures presented on page 1. These adjustments are summarized on page 6 of this exhibit entitled "Adjustments to Income Accounts."

In lines 2 to 23 of page 6 we present the net effect of all adjustments on the company's books which were made to surplus. In lines 25 to 33 we present the effect of adjustments which were recorded in the company's journal, but which were not reflected on the company's general ledgers. These adjustments were made in 1934 to record offsetting transfers between the years 1932 and 1933. While these adjustments change the profit as recorded on the statements for 1932 and 1933, they do not affect the total profit for the period. In lines 36 to 41 we present adjustments reflected in the fixed capital account No. 1019, entitled
23 "Preliminary Operations." This arises out of the fact
that for the period ended December 31, 1931, the company showed on its books a profit of $671,061.71 from its operations. In 1933 this amount was transferred to Account No. 1019, Preliminary Operations, reducing the recorded cost of the fixed capital by that amount. In 1934 certain adjustments were made to Account No. 1019, Preliminary Operations, the largest item being a charge for interest on notes for the period ended December 31, 1931, in the amount of $752,136.16. This item along with other adjustments changed the profit of $671,061.71 into a loss of $7,996.92, which amount consequently becomes an addition to the cost of fixed capital. The last line, line 43, presents the net adjustments applicable to the amounts transferred to profit and loss for each year, which are shown on line 22 of page 1 of this exhibit.

On page 7 we present the company's surplus account in two ways. Lines 2 to 13 present it as recorded on the books of the company. Line 2 presents the balance transferred from the profit and loss accounts and these are the amounts shown on line 22 of page 1. Line 7 presents the net effect of the adjustments made on the books related to the year in which made. On the other hand, lines 16 to 27 present the surplus account giving effect to the adjustments in the years to which they apply instead of the year in which they were made. Line 9 and line 24 is the income for the 1931 period transferred to Account 1019, Preliminary Operations, discussed above, and the amount on line 24, a loss of $7,996.92, is the balance as of December 31, 1938, in this sub-account of the property account. It will be noted that the final figure for surplus at the end of 1938 is the same in line 27 as in line 13, the amount of $918,791.50. The difference between the two sections of this table arises from transferring amounts from the year in which they were recorded to the year to which applicable and does not involve any change whatever in the surplus at the end of the period.

This ends the explanation of the statement covering pages 1 to 7. These cover the Natural Gas Pipeline Company of America.

The second part of the exhibit, being pages 8 to 15, deals with Texoma Natural Gas Company.

Page 8 is an earnings statement of Texoma Natural Gas Company in condensed form. The other pages, 9 to 15, inclusive, are supporting schedules.

On page 9 of the exhibit, entitled "Gross Earnings from Operations—Natural Gas Division and Gasoline Division and Non-Operating Income," lines 2 to 21 are a breakdown of the gross earnings from operation of the Natural Gas Division shown on line 4 of page 8, in the amount of $21,694,333.79.

Lines 24 to 31 are a breakdown of gross earnings from operations in the gasoline division shown on line 5 of page 8 in the amount of $3,315,513.07.

The third section, lines 36 to 40, is a breakdown of
24 non-operating income, shown on line 20 of page 8, in
the amount of $112,643.06.

Pages 10 is entitled "Earnings analysis, gas sales statistics." This shows in volume the sales of gas by Texoma during the period and the customers to whom the sales were made. It also shows the quantity of gasoline sold in each year.

Page 11 is a statistical table of the quantities of gas and gasoline involved in the companies' operations. It shows the various sources from which the gas was received and the disposition thereof, and also the net production and purchases of gasoline and the disposition thereof.

Page 12, entitled "Operation and Maintenance Expense, Natural Gas Division," presents a breakdown of the operation and maintenance expense of the natural gas division, as shown on line 10 of page 8, in the amount of $5,292,972.81.

Page 13 is a breakdown of the operation and maintenance expense of the gasoline division, as shown on line 11 of page 8, in the amount of $935,240.95.

The statements presented on pages 8 to 13 were taken, as before stated, from the company's monthly financial statements, and agree with the books as recorded in the income accounts.

However, adjustments are recorded on the books of the company which apply to the figures presented on page 8. These adjustments are summarized on page 14, entitled "Adjustments to Income Account."

On lines 2 to 16 of page 14, we present the net effect of all adjustments on the company's books which were made to the surplus account. On lines 18 to 30 we present the effect of adjustments which are recorded in the company's journal, but which are not reflected on the company's general ledger.

These adjustments were made in 1934, and record offsetting transfers between the years 1932 and 1933, and change the profit as recorded on the statements for the years 1932 and 1933, but they do not affect the total profit for the period.

On lines 33 to 41 we present adjustments which are not recorded on the books of Texoma but they are recorded on the books of Natural Gas Pipeline Company, in so far as they affect the purchased gas account of the Pipeline Company. They are reflected here because they arise out of adjustments to Texoma accounts, although the net effect on profit on the books of Texoma is zero.

Page 15 is a surplus account of Texoma presented in two ways. Lines 2 to 7 present it as recorded on the books of the company. Lines 10 to 16 present the surplus, taking all the adjustments from the years in which they were recorded and transferring them to the years to which they apply. It will be noted that the surplus at the end of the period, December 31, 1938, in both sections of the statement are the same, in the amount of $1,852,799.50.

Page 16, entitled "Combined surplus-net profits, Natural Gas Pipeline Company of America and Texoma Natural Gas Company," shows in combined form the surplus net profits; that is, the net profits after applying all surplus adjustments for both companies, and after eliminating offsetting inter-company transactions, consisting of purchases and sales of gas, and interest payments and receipts.

Included with the elimination of purchases and sales of gas is an amount paid Colorado Interstate Gas Company by the Natural Gas Pipeline Company of America, and received by Texoma Natural Gas Company from Canadian River Gas Company for leased facilities.

Line 23 shows the net earnings from operations of the combined companies before depreciation, depletion and retirements. The amount for the period is $54,110,738.66. This is the same amount which appears as the final figure on page 17, line 20.

Page 16 is subject to the footnotes as shown on page 16-A.

Page 17 shows for each company separately and for the two companies combined the net earnings from operations before depreciation, depletion and retirements per books after reflecting in the years to which applicable all adjustments affecting income recorded on the books of both companies.

Page 18 shows in condensed form the amount of moneys expended by Natural Gas Pipeline Company of America in connection with regulatory matters, and is included by the company in its general and miscellaneous expenses in an account entitled "Regulatory Commission Expense."

(EXHIBIT 15 for identification, offered and received in evidence without objection.)

Examiner Durrance: As I understand, you reserve the privilege of cross-examining the witnesses?

Mr. Morgan: Yes. With the Examiner's permission, we would like to have these figures checked by our accounting department. After that we would like the privilege of cross-examining the witness. He is right here in town and can be cross-examined at any time.

With reference to further proceedings, my suggestion, Mr. Examiner, is that we recess until the 22nd. That will enable us to get our geologists and other people up here from Texas to prepare for the cross-examination of Mr. Brown; and will enable us at the same time to go on with our preparation of our own testimony which, by that time, we ought to have in form to put on to a substantial extent. I think the cross-examination of Mr. Brown and the other testimony we will have ready at that time will consume a couple of weeks.

25-A Examiner Durrance: Is there any objection to the motion presented by Mr. Morgan?

Mr. Booth: We have some additional testimony that is not quite ready. We would have it ready perhaps by the first part of the week, but if the case is going over for cross-examination and for the presentation of testimony on behalf of the company, we would be satisfied to have the case go over to the 22nd, at which time we could present the additional testimony which we will have, which will then take only half a day or a day.

I say that with the understanding, however, that the company will proceed with both its cross-examination and presenting a substantial part of its case.

There is one further thing that would aid us materially in expediting the cross-examination of the company's witnesses; and that is if the company could conveniently furnish us with several copies of its exhibits, because there will be several of our people who will be working on their exhibits; and it would be a great convenience to us if the company can furnish us with several copies of their exhibits. We have furnished them today, whether they insist on having them or not, extra copies, ten extra copies of the exhibits that we have submitted in evidence this morning.

Examiner Durrance: What is the position of Commission's counsel with reference to the motion?

Mr. May: Mr. Examiner, in view of the statements made by Mr. Morgan and Mr. Booth, it is the opinion of Commission's counsel that in the interest of overall expedition of the proceedings, it probably would be desirable to adjourn the hearing to May 22nd, or to such convenient date as may be determined by the Examiner.

Examiner Durrance: The Examiner understands then, in the event we take a recess until an agreed date, we will reconvene for the purpose of allowing defendants' counsel the privilege of cross-examining the witnesses who have been presented at this hearing; and in addition thereto putting on your affirmative evidence; is that correct?

Mr. Morgan: We intend to do that and go as far as we can at the next session, yes, sir. It is my present thought, with what Mr. Booth has offered, and the cross-examination of these witnesses, that we will consume a couple of weeks, which the Examiner has stated he desires to spend here at that time.

Examiner Durrance: With that understanding, the hearing will be adjourned, to be reconvened on Monday, May 22, 1939, at 10 o'clock A. M., in this room.

Examiner Simpson: * * * It is the Examiner's understanding that counsel for the Natural Gas Company and Texoma is now prepared to cross-examine the previous witnesses and in addition thereto will also put on affirmative evidence. Is that true, Mr. Morgan?

25-B Mr. Morgan: That is true. We are not ready to put it all on. However, we have evidence ready that will take several days.

Examiner Simpson: It is understood the temporary adjustment in the order of presenting witnesses in nowise affects the Commission's designation that the defendants-respondents shall open and close * * *.)

26 CLAUDE C. BROWN further testified on behalf of the Federal Power Commission as follows:

Cross-Examination by Mr. Morgan.

(May 22, 1939.)

I testified that from 1904 to 1922 I held various engineering positions with certain companies named and enumerated the Pacific Light & Power Company and others.

The Pacific Light & Power Company was an electric generating and distributing company in Los Angeles. The Lewellyn Iron Works and the Baker Iron Works were iron works just as the name implies. The Southern California Edison Company was an electric utility. The Southern Pacific Railroad Company was engaged in railroad operation. The J. G. White Engineering Corporation was an engineering firm engaged at the time I was with them in valuations of various gas and electric utilities. That was artificial gas in those days. The Northern California Power Company was an electric company. The Pacific Gas & Electric Company was a gas and electric company (artificial gas, manufactured gas, at that time).

In 1917 I entered the army, and in November 1922 I became connected with the California Railroad Commission in the capacity of assistant valuation engineer engaged in the appraisal of various gas and electric utilities. Those were both natural gas utilities and artificial gas utilities, but mostly natural. My position was state-wide, and my duties carried me all over the State, but the headquarters of the California Railroad Commission were in San Francisco. I lived in San Francisco during a part of the time, but moved to Los Angeles in 1923 and lived there until about the beginning of 1930. The Railroad Commission of

California has a branch office in Los Angeles, but their main office is in San Francisco.

During the period from 1923 to 1930 I was working out of Los Angeles, but my duties took me all over the State. I occupied the position of assistant engineer in the gas and electric division, performing engineering and rate work in connection with natural gas, manufactured gas and electric matters, and in 1926 became gas engineer. In the latter position the duties involved were almost exclusively gas matters, being largely natural gas matters, but including also what manufactured gas matters came before the Commission at that time.

I finally became chief engineer of the California Railroad Commission in 1933. That position covered the whole field of the Railroad Commission's activities, including all engineering matters that came before the Commission involving gas, electricity, water, telephone and transportation. In other words, that position was the head of the engineering department of the Commission.

27 I was retained by the Texas Company as one of a number of consulting engineers to pass on reserves in the Kettleman Hills field. The Texas Company was in litigation with some other company involving the value of certain holdings they had in the Kettleman Hills area, and the purpose of the investigation was to determine ultimately the valuation of those properties, including gas and oil. This was around 1929 or 1930. I was employed at the same time by the California Railroad Commission.

My particular duties in connection with that appraisal were a determination of the reserves and the markets for natural gas in California. I worked with other engineers, including Professor Uren. In connection with that work plans were made to go ahead with the determination of the reserves of that company and the valuation thereof, but before these matters were consummated the matter was settled.

The Butte Oil Fields, Incorporated, are oil operators in Sutter County, California; but they handle some natural gas. They have leases on some 40,000 acres around what is known as the Buttes in Sutter County, in northern California. The work I did for them was testing wells, gas wells, and estimating the amount of reserves they had in that area. That information was used in the consummation of a contract with Pacific Gas & Electric Company to sell gas to the latter for distribution in northern California. This was in 1938 and at that time I was with the California Railroad Commission. At that time I was testing the potentials to see what the productivity of the wells was, and estimating the reserves. I based the estimates partly on the potentials. Four gas wells were involved in that matter, all on one tract of 40,000 acres.

I have been in Texas several times during the last ten years or so. I have been through Oklahoma but have never done any work there. When I was in the Texas Panhandle recently, in Amarillo, in March, I was there about a week. I stayed in the State about a week, most of the time being spent in the Panhandle field in and around Amarillo and between it and the Hugoton field. While in Amarillo I went to see Mr. Dickinson, Mr. Martin and Mr. Peterson, of the Texoma office there. I may have met others in that office that I did not note. I did talk to Mr. Williams, in charge of the Texoma pipelines, and Mr. Powers, of the compressor station at Fritch.

I also talked to Mr. Ford of the Canadian River Company and Mr. Waltin of the Republic Natural Gas Company at Hugoton. I was in Hugoton part of one day. I also talked to Mr. Batten, in charge of the Pampa station of Cities Service Gas Company. My purpose in talking to Mr. Ford and Mr. Batten was that I was going over the area in the field and desired to visit these various compressor plants and areas and in visiting them I contacted these people because I was desirous of securing information on the Canadian River properties. We have a case or investigation pending involving the Canadian River properties and also a complaint filed against the Cities Service.

I also talked to Messrs. Harrington and Marsh, of Amarillo, about three or four hours. To my knowledge, they are not interested in this matter in any way; but they were interested in a case we had before us at that
28 time involving a certificate, the building of a line by Kansas Pipeline & Gas Company from the Hugoton field to Minnesota. I was discussing it with them, and the general condition of the field and their holdings in the Hugoton field and the Texas field. That application is one for a pipeline out of Hugoton, but they do have acreage in the Texas Panhandle.

I went on a trip with Mr. Dickinson and we visited the Fritch station and necessarily went over some of the properties of the company on our way—some of the leases. We didn't make any effort to go to each producing well. We went past a number of them. They were pointed out to me and we just drove by.

I have never seen a gas well drilled in the Panhandle or personally made any microscopic examinations of the producing formations. I have seen samples of the formations but have never analyzed them myself. I have examined to some extent logs of wells in the Pnhandle. I examined logs of some of the wells of the Canadian River Company. I looked over analyses of the well data involved in those logs. I also had a long discussion with Mr. Peterson in which we looked over the records, samples, etc.

While in the Fritch station I examined the plant as to design and as to the machinery in use there. I examined the gasoline plant and the dehydrating plant. I observed the pressure at which the gas was being handled at the Fritch, compressor station. It was coming in from one of the lines at 180 pounds, and from the other two, as I remember it, at approximately 220 pounds. I would say that it was a specially designed arrangement, a very large compressor plant, and the gasoline extraction plant and dehydrating plant and so forth all tied in for unit operation. I would say that it was specially designed to meet the requirements of this company. The engines used there were larger than those in common use. The compressors were horizontal direct connected gas engine driven Worthington compressors of about 1250 horsepower capacity. It is my information that they were specially built for this 24-inch pipeline and the plant which handles the gas through that pipeline. We had quite a bit of discussion at the time I visited that plant, a rather interesting discussion with Mr. T. E. Powers.

Mr. Powers informed me at the time as to the history of the plant—that those engines were built especially for that plant. At the time they were built I believe he stated they were probably the largest units of the type that Worthington had built; also, the compressor, that is, the discharge compressor, was rather large as compared to many of the other plants in the country and that they were having trouble down there with those engines to some extent. I noted a number of cylinder heads outside along the wall of the plant there that had gone bad and also a section of one of the pistons from one of the engines that had snapped off. I understood from talking with Mr. Powers that Texoma was working with Worthington in an endeavor to develop an engine that would carry that load and those pressures.

29 It is my understanding that it was a matter that had to be developed especially for a station such as that of Texoma. There are other lines that are as large as 24 inches. There are other lines that are larger than that. There is a 26-inch line of Standard Oil Company in California which is about 200 miles long. The Northern Natural Gas Company has a 24-inch line. That line secures gas from the Texas Panhandle and also from the Hugoton field. It extends from there north to the Twin Cities, St. Paul and Minneapolis. I think that is the only 24-inch line coming out of there. The Panhandle Eastern is 22-inch; the Canadian River is 22-inch; the Cities Service is 20-inch; and the United Gas Pipeline Company's line is 16-inch. These are the only lines I have in mind as large as that of Texoma and Natural Gas Pipeline Company.

As to whether until I ran into this Panhandle pipeline I had ever heard of a pipeline transporting gas 900 miles to market, of course I knew of this line. I knew of the Northern Natural pipeline and of the Denver line; but the Denver line isn't as long.

There is a difference in the practical economics of operating a line over a distance of 900 miles and over a distance of two or three hundred miles. The principal economic difficulty confronting a line running over such a long distance as that is that in the first place a long line of this kind is apt to cross a number of rivers. There are always operating problems both as to initial design and as to the maintenance of service on a line that has river crossings on it. There is always a potential hazard that the line will go out under some extraordinary conditions.

Other things that affect the economic operation of the line are pressures. A long line such as the one we are talking about, carrying a substantial load, must be equipped and furnished with booster stations or compressor stations along the line to maintain the pressure. (Objection by commission counsel.) You can't carry as much gas through a line at 100 pounds pressure as you can at 200 pounds, and you can't put as much through at 400 as you can at 700. The ordinary pressures at which pipelines were operated in 1928 or 1930 were around 300 or 400 pounds. It was an unheard of thing in the natural gas business to transport gas under pressure of 700 pounds until about that time—it had not been done.

Generally speaking, the pipe that was used in those days was not adequate to maintain pressures of that character. The pipe that was laid at that time and prior to that time was not really designed to carry pressures higher than those commonly in use, namely, 300 or 400 pounds. Many of the lines had Dresser couplings, and the couplings themselves and the weights of the pipe were chosen to take care of those lower pressures.

I think there are nine compressor stations along the line beginning at Fritch and on to Joliet, or rather, there are nine belonging to the Pipeline Company and one to Texoma, making ten in all.

The town of Fritch is located approximately near the southwest corner of Hutchinson County. That is where that compressor station is located. At this station one
30 of the lines was bringing in gas at a discharge pressure of 180 pounds when I visited it. From my knowledge of the gas business, I would say that the prevailing pressure out in the line where the gas was coming into the line would have to be higher than 180 pounds because otherwise gas would not flow to the compressor station. It is the difference in pressure that causes gas to flow from one place to another. The gas flows from high pressure to low pressure exactly as water flows from a higher level to a lower level. If the pressure of the wells now discharging gas into the line gets down to 180 pounds, then the gas coming to the compressor station will be at a correspondingly lower pressure. It will then be necessary to raise that pressure to whatever pressure the gas is delivered from Fritch.

In other words, I would say this, if and when the gas pressure at the wellhead reduces and goes down, which it will, as that reduces, then the delivery pressure in the gathering system of the Texoma Company will be correspondingly reduced so that the gas gathered from those wells will be less in pressure at the time of delivery through the gathering system to the compressor station inlet.

It will be less in volume measured at 16.4 pounds per square inch when the discharge pressure is reduced, if you assume you drill no more wells. In other words, if the wells you are now pulling there constitute all at that time, and they are just let go ahead and produce, then the wellhead pressure will reduce the quantity, volume and pressure of gas delivered to Fritch from your delivering system. When the pressure in the field gets down to where it is the same as the intake or discharge pressure at the compressor station, then the volume of gas coming in there will be greatly reduced below what it is now from the individual wells, unless you want to drill additional wells and produce more gas. As a practical matter, it is inevitable that other wells will have to be drilled to keep up that volume.

It is commonly observed to be the fact that the open flow of the wells in the Panhandle field decreases at a more rapid rate than the wellhead shut-in pressure. This is due, I believe, to the character of the producing formation, there being a rather dense dolomitic formation.

Even if you have gathering lines enough to bring sufficient gas into the Fritch station at a lower pressure than that at which it is coming in now, you would have to add to your compressor station equipment in order to build the pressure up from a lower level to the level at which it is going out of Fritch. As to whether you could do it with the same machinery used in building the pressure from 180 or 220 pounds up to the discharge pressure would depend, of course, on the load. I presume if you increase the load there would be no question about it. The day I was there I think the station was handling approximately 230 million cubic feet per day. Whether or not that is the full capacity of that station, I don't know. I do know that out of fifteen compressors, fourteen were on the line. I presume it was pretty well loaded up.

31 As to building up the pressure in the field with the intake at the Fritch station remaining substantially what it is now, after the pressure of the wells goes down to 180 or the intake pressure at the gathering line goes down to 180, it will be necessary, of course, to maintain that quantity of gas, and as the wells become depleted, to secure additional gas—drill other wells or do something to the wells you have. One possibility is the treatment by acid. In the Panhandle field it has been done. Wells have been treated with acid to increase their open flow. The effect of that treatment and the method of that treatment is the introduction of certain quantities of hydrochloric acid into the wells and into the formation. That acid eats or dissolves this limestone or part of it around the well bore, thereby increasing the size of the bore, increasing the channels, the area of the channels, by which gas is taken from the formation into the well bore. That is one method.

As to whether it adds any gas to the area or simply creates a bigger bore at the bottom of the well and temporarily stimulates the potential, what it does is to increase the open flow due to the fact that it creates a larger area from which the gas can get into that well bore. It does not, of course, affect the total initial gas or the total remaining gas in reserve but it does act to allow that gas that is there to get to the well and come out. It would probably add something to the flowing pressure, for how long is undetermined. My information is that tests have been made there, wells have been treated, and after a year's time it was noted that this increased flow had continued. How long that would continue I don't know.

You inquire whether this means that the increased pressure is built up as a result of acidization and that this has been maintained over a period of a year. I do not wish to be misunderstood. I am not speaking of the static pressure, the formation pressure; I am speaking of the motivating force that forces the gas out of the formation and up through the casing. That motivating force comes from the reservoir.

You affect the reservoir pressure by the acidization. You don't increase the static pressure or the pressure in the sand but you do affect the pressure as to its effectiveness at the shoe of the well, the bottom of the bore. What is done is this: You have a reservoir of rather dense limestone. There is quite a resistance to gas passing through that porous medium. If you do anything to reduce that resistance, reduce that resistance of flow—friction, then you get more effective use of the reservoir pressure. Any such treatment would not increase the reservoir pressure, naturally, but it would allow a more effective use of the reservoir pressure to come through the wall and force the gas out.

The correction of the pressure for the few feet between the bottom of the well and the edge of the new void created by the acidization is a great difference. It can be measured. It varies. In the use of acid in wells in that field and also Hugoton the open flow of the wells has been increased materially, in some cases several hundred per cent. That
means, as we have said before, that the pressure is the
32 motivating force and forces it up. If you have higher
pressure you get more gas, the same thing in the well.

The acidization would not affect the shut-in pressure. I think it would affect the operating pressure—the flowing pressure, but I do not know to what extent in terms of pounds. I know that the open flows of wells that have been treated have been materially increased. Those open flows could not have been increased unless there was a change in pressure between the sand source and the source of the limestone and the wellhead. If you didn't increase your pressure you wouldn't get any more gas than you had before. It is the differential in pressure that causes the flow, and that differential is increased. The wellhead pressure would not be changed, that is, the shut-in head pressure, but the flowing pressure would.

In explaining how you would have an increase in differential and also an increase in pressure at the wellhead, and still have the same pressure conditions in the reservoir, I will state that the pressure in the reservoir is widespread. The pressure in the reservoir is a certain amount that is pretty well uniform. At each well bore that pressure is lowered because of the draft of gas out of that particular area drained by that particular well. Now, the amount of gas that that well can produce under any given condition, either under open flow or under production against back pressure, such as pressure in a gathering line, with no treatment at all, but simply the well bore into the formation is a certain amount. The amount of gas that that well will deliver into your gathering line is a function of the effective differential of pressure between the bottom of the well and the wellhead. Now, if in any way that differential in pressure between the bottom of the well and the wellhead can be increased, that well will deliver more gas under the same conditions.

Now, the effect of acid treatment is to increase the size of the bore around that area that the well is producing from. It is a chemical proposition that hydrochloric acid is inserted into the well; it spreads out from the casing, comes in contact with a limestone formation and there is a certain chemical reaction whereby and whereunder this calcareous and limestone formation, a portion of it, is dissolved by the acid or changed into carbon dioxide and water and voids created in there, or channels created in there, where this gas can come in. So it is just the same as if you took one of these little tea strainers and you could deliver through that so much fluid. If you take a strainer three or four times that size you can get several times the amount of fluid through it. Now the differential increased. I mean, the differential is in pressure between the bottom of the well and the wellhead, due to the fact that it is easier for this gas to get from the formation to the well bore.

It comes out of the wellhead at the same pressure it was coming out before and the differential is the increase in pressure at the bottom of the well. In getting gas from the well to the compressor station the acidization will maintain the pressure for a longer time for a given definite flow of gas.

33 With reference to how you are going to get the gas to flow from the wells to the Fritch station when the pressure of the wells has been reduced to the same level as the intake pressure at Fritch station, I believe I stated that if and when that time comes that the wellhead pressures of the wells you have now in operation on your leases in the Texas Panhandle field are reduced, after having done everything you can do—and, of course, we know that the amount of gas available in that field as well as any other field is limited and we do know that in fields the casinghead and the reservoir pressures all go down. We expect that. When that happens, then the pressure at which that gas from those particular wells you have now delivering into your gathering lines will be lower than it is now, naturally.

If you cannot get the volumes necessary to build up the load going out of the compressor station, there are several things to do to overcome the situation so that you can get enough gas into your compressor station to supply your pipeline with its requirements at, say, 200 million cubic feet of gas or more.

First of all, the question comes up as to whether or not you have drilled up your entire leases. If you have not, then one thing would be to drill additional wells. If you drill additional wells, those wells will then produce and will become additional sources of supply up to the limit of your reserves. Another method which has been used is to put boosters, pressure booster stations, in the field. In some places that has been done. Where the pressure of the well has been reduced in some cases down below atmosphere, the well has been put on a vacuum, and gas has been sucked out of the well. They don't get as much gas out that way as they do from a flowing well, but they get a good deal. Of course, that is more costly. You have to have your compressor stations and booster stations out in the field, and you do not have to have them when you have flowing wells.

The drilling of additional wells on the leases will not build up the pressure on the old wells, but it may further delay the time when that pressure will be reduced down to a point when you cannot use them. In other words, any new wells drilled would supplement the supply and hold up the rate of withdrawals from the wells already drilled. Whether if those wells are drilled on Texoma's leases there would be a higher pressure in the new wells than in the old ones would depend on the portion of the field and on how far the new well would be from present production. If there is a well now drilled in Fritch and you drill another a half mile away on the same section, you probably wouldn't find the pressure a great deal different in the new well than that existing in the old well which had been in operation a long time. It might be a little higher. It would have to be a little higher or there wouldn't be a flow of gas to the well. That is true of any two adjacent locations if they are close enough together. The closer you get them together, the nearer the pressures are to being the same.

Exhibit 12, which has been introduced in evidence, 34 shows the pressure conditions in the field. The greater bulk of Texoma's properties appear to lie in the West field, as shown on Exhibit 13. Those large patches of yellow in Moore County appear to be in an area that is from 350 pounds of pressure up. The original pressure was 430 pounds. I would say a good deal of that yellow there is in a territory that is indicated to have a pressure of 400 pounds gauge and over. The main productive property of Texoma is scattered over the whole field. There is a large area in Carson County that has no wells on it, and in that area the pressures appear to be from 200 to 300 pounds. The pressure has gone down 40% at the present time. I note from Exhibit 12 in the regions to the east and southeast of Dumas there is quite an area where the pressure is still above 400 pounds. I don't know offhand why the pressures would be so much lower to the southeast and to the north and northeast and to the east of that particular area. Part of that is sour gas area; that is, that portion of the area north of the dotted line shown on Exhibit 12 is sour gas. However, a substantial portion is in the sweet gas area.

I have stated that as the pressure goes down, the potential open flow of the wells is going down to where it will be necessary to drill other wells in order to keep up the requirements of the pipeline. It will be necessary either to drill other wells or treat the present wells with acid, or both; but it is the inevitable development because, after all, you have only a certain amount of gas in there.

I do not know how many more wells Texoma will have to drill in order to produce its requirements of gas down to 100 pounds pressure at the wellhead. I have made no study of that at all. In order to get the gas to the present gathering system, when you drill a new well you will have to tie that well in with the gathering system—you will have to build a pipeline and install a meter to measure the gas as it goes into the pipeline. When the pressure gets down in all of those wells to the point where they are substantially at the same level as the intake pressure at the Fritch station, you are going to have to put in booster stations in order to get the gas there in sufficient quantities to fill that pipeline, if you maintain your intake pressure what it is at Fritch. It is necessary to keep that discharge pressure into the Fritch station at substantially the present pressure in order to get a volume of gas into the station to load the pipeline under the conditions you have there. In other words, it appeared to me that those units were pretty well loaded up, and, of course, if you substantially reduce the intake pressure in that station you are going to cut down the volume of discharge. If you do maintain that volume, of course you will have to get the gas in there at that pressure.

You will have to build up the outside pressure in order to get the gas to flow in there at that pressure, which will require the building of additional compressor stations, or it will mean the installation of additional compressor units at Fritch so you can handle intake pressures lower than you are now handling them. It is a foregone conclusion that you have got to have the compression at one place or the other. You have got to have it in the field or you have to have it at Fritch.

As stated, I do not know how many additional wells you will have to drill and have made no estimate of that or given it any thought or consideration.

At the time I examined these properties in Texas, I talked with the operators about the properties and the operation of the system, and I have studied the answer of Texoma Natural Gas Company and Natural Gas Pipeline Company of America to the Commission's Orders Nos. 51 and 53. In the answers to Order 51 there purports to be a description of the operation and of the properties.

In my testimony I referred to delivery taps, but I didn't mention any special distance between them. A delivery tap is a lateral tap from the main line, as indicated on the map accompanying the companies' answer to General Order No. 51. That is a place where gas is carried away from the main line off to some place for delivery. I did not mean to infer by my testimoney given at first or that later given in connection with Exhibit 14 that these lateral lines running away from these delivery taps to the main line belonged to Natural Gas Pipeline Company. I have noted on Exhibit 14 a delivery tap at Beaver, Oklahoma. Beaver is shown on the map accompanying the answers to Commission's Order No. 51 by Natural Gas Pipeline Company; but I would have to check to see just where I got the information that there was a tap at Beaver. I mean that the map submitted shows the town of Beaver. Exhibit C attached to the answer to Order No. 51 shows that the delivery point was near Beaver, Oklahoma. It says it is in Section 16, Township 16 South, Range 12 West, Barton County, near Beaver, Oklahoma. What I referred to there when I put this tap on that map was this particular sale and the fact that the answer to 51 said that the delivery point was near Beaver, Oklahoma, so I used that point. Wherever that delivery was is what I referred to.

I stated the acreage belonging to Texoma to be 153,795 acres. That was given to me by the gentleman I talked to down in Amarillo, either Mr. Peterson or Mr. Dickinson. I think they gave me that total. I do not know how many wells are located on that acreage or how many wells are drilling on it.

I have referred to a number of exhibits, numbered 3 to 6 inclusive, which are tabulations of figures. Those are figures given me by Mr. Johaningsmeir, taken from the books of the companies. They were prepared by him and he reported to me. Mr. Johaningsmeir is the gas engineer in the employ of the Federal Power Commission stationed in the Chicago office, and he is working on the investigation of the operations of Texoma Natural Company and Natural Gas Pipeline Company of America under my supervision.

As to whether in our investigation we have treated the companies as constituting one project or two separate projects (objection by Commission Counsel), we have not gone on any hypothesis or premise. We are simply trying to find out the facts. We have here a company under the name of Texoma Natural Gas Company. We have a com-

pany under the name of Natural Gas Pipeline Company of America. Both of those companies filed answers to the orders of the Commission, and in our investigation and in any phase of the investigation that I am making or con-
ducting or that is being conducted under my supervi-
36 sion we are not going into it with an answer in mind.
I don't know. We are going in to find out what are the true facts.

There is no special significance in the fact that we have made the exhibits as we did. There is no significance in the fact that in our Exhibits 5, 6, 8, 9, and 10 we show figures for the years 1934, 1935, 1936, 1937 and 1938. It is generally our custom to go over a five year period. Since this company has just had a seven year span of life, we might just as well have gone over the seven year span. The fact that they did not make any money the first two years did not have anything to do with it. In fact, I think in fairness to the companies involved here, and due to the fact that the whole period is about two years more, we might well consider the whole period.

I spoke of sectionalizing valves in connection with the pipeline, and stated that there were nine compressor stations on the main line and one station at Fritch. A sectionalizing valve is simply a valve on the main line by which certain sections of the line can be cut off, particularly in the event of breaks or outages. In other words, the line can be sectionalized by closing these valves, which are valves on the main line. In case of trouble at a given point, the valves on each side of that point can be shut and minimize the wastage of gas as a result of that development. I think I stated in my testimony that those sectionalizing valves are placed at ten mile intervals up and down the line.

I referred to the fact that there were cross tie connections and meter setups installed for emergency use at points where the line crosses the Panhandle Eastern line near Fowler, Kansas, and also where it crosses the Cities Service line near Lincoln, Kansas, and also where it crosses the Northern Natural line near Pacific Junction in Iowa. By emergency use I mean that it is common practice among pipeline companies to have inter-connections with other lines that may be used in case of emergency, the idea being that those connections serve as a standby for both companies in case of emergency. In other words, if the crossing down on Canadian River were to go out, or at some other point between there and the cross connections here, the company would be able to supply its emergency requirements through courtesy from another pipeline, and they in turn would be able to obtain the same courtesy in case of a similar situation, assuming, of course, that at the time the event occurred, the furnishing company had available gas to furnish, which I believe they ordinarily would.

I used a figure of 153,795.14 as the total acreage of Texoma in this field. I believe Mr. Morgan made mention of the figure of 154,155.14 acres. I checked that up during the noon hour, and according to the records of the company there was an amount of 360 acres that is included in the figure mentioned on which the company has oil rights only and not gas rights, so the figure for the gas acreage then, the difference is the figure I used, or 153,795.14.

I know there is in Texas a statutory limitation with 37 respect to allowing 25% of the potential of the well as a maximum which may be produced. Whether or not that applies to both sweet gas and sour gas I do not know.

I do not know in inches or anything of that sort how far out into the formation acid operates or exercises its chemical effect of eating out the natural formation. It is probably not very far. I presume just a few feet, because the practice is to introduce the acid and then remove it shortly thereafter.

My information with respect to the location of the formations is that the basement rock first consists of the granite, solid granite, buried Amarillo Mountains, on certain slopes and on certain portions of those mountains there occurs this granite wash. Then after that occur the limestone deposits. Then above that the so-called red beds, gypsum, salt, and so on up.

I understand that the dolomite formation in the Panhandle varies in thickness. It may reach in certain places a thickness in excess of 100 feet and in other places very much less. There is some variation in porosity, and there is quite a difference in the porosity of granite wash and the dolomite.

I presume that the point of setting the casing in a Panhandle well drilled into the granite wash formation varies. The setting of the casing would vary, possibly, somewhere near the middle of the thickness of the wash. In some cases it would extend half way through the granite wash. It may vary. Providing a seat for the casing depends on the hole. I think they use a shoe in some cases. I don't think I can answer what the difference is in the method of providing a seat for casing in the dolomite and in the granite wash.

As to difference in depth or location of the casing seat in the brown dolomite and that in the granite wash with reference to the producing part of the formation, in the dolomite, or what is termed the big lime, I believe there is less tendency to cave than there is in the granite wash, so in most cases I believe the casing is set down toward the bottom of the producing horizon in the dolomite. As to the granite wash there is much less production from granite wash in speaking of gas than there is from the dolomite. I am not so familiar with that granite wash operation.

I think the bottom casing is further up in the dolomite than in the granite wash because there is less tendency to cave. As already stated, I have had nothing to do with the drilling of any wells or the setting of any casings in the Panhandle. My information is general geological information which I have picked up in my contacts down in Texas and in looking over well records and talking to people who have drilled wells there.

I talked with representatives of the Texas Railroad Commission at Austin, Texas. I did not talk to any other representatives of that Commission except in Austin.

38 Austin is located in the southern part of Texas as compared to the Panhandle, which is located in the northwestern section in the Panhandle area, I would say something like 600 miles away. My understanding is that the Railroad Commission makes pressure tests over the field, at least portions of the field, every six months. The members of the Commission with whom I conversed were Mr. Langford and Mr. Blair. I do not know who the predecessor of Mr. Langford was in the Texas Railroad Commission. I have heard of a man by the name of Cottingham. I can't say how long he was connected with the Commission; but I have seen a great many reports of the Commission pertaining to gas production and gas regulation in the State signed by him as chief engineer, and have consulted those reports in getting the information I have given in my testimony here.

(Map entitled "Ideal Cross Section—Portion of Texas Panhandle Field," marked Exhibit 16 for identification.)

Exhibit 16, with the caption "Ideal Cross Section—Portion of Texas Panhandle Field," is now submitted to me. I am familiar with what it delineates and with the legends which explain the coloring on the cross section.

I spoke of a buried granite mountain range in the Panhandle. That is an old mountain range that at one time in geologic ages was apparently above the surface and exposed to the air at the top. It was apparently flanked at that time by the Anadarko Basin to the north and the West Texas Permian Basin on the south. Evidently at some period it was submerged, and at some time it was flanked by water. In other words, it had its ups and downs in its history.

Back through the geological ages, one time it has been up above the water so that the weather was getting in its work, and another time it was submerged below the water so these deposits of other formations were laid alongside and over it.

In the lower portion of Exhibit 16 are two upright projections and across each one is written the word "granite." That probably fairly portrays, in my judgment, a cross section of the granite mountain in some portion of the Texas Panhandle. On the flank of the mountain I see the words "granite wash" and the coloring is just a little different from that of the granite. That deposit is probably eroded granite, disintegrated granite, probably from its peak, weathered off on the slope under the influence of wind and weather and finally water. At a time when this mountain range was submerged these various layers or strata of one formation and another were laid above that two or three thousand feet to the surface.

The irregular line running from the word "south" to the word "north" on the cross section is possibly fairly representative of a part of the surface of that gas field. There are arroyos and gullies. You can tell within limits from experience in other wells drilled in the vicinity how far it is to one of the formations; but the wells are not all of the same depth from the surface down to the producing formations. They vary.

The dolomite is that portion of the formation from the top of the granite wash up here to a line above on which
is written in two or three places the words "red bed."
39 That is the deposit of dolomite and anhydrite to which
I testified. It varies in thickness from one hundred to several hundred feet from the top of the granite wash up to the beginning of the red bed. Through that dolomite formation there are strata of varying porosity.

The green colored part of the formation is meant to represent oil deposits. Down below that is a heavy line marked "sea level." I don't think I stated that the formations laid on the flank of the granite mountains, whether granite wash or dolomite, dip off into water. I believe I stated that the depth of these wells or the average depth of the producing formation there corresponded roughly in many places in this field to sea level. Below sea level in the porous part of the formation that dips down into the region below sea level is probably found sea water or salt water. This may or may not mean that this water is directly connected with the ocean at this time. I believe I stated in my testimony that so far as I know it is a mere coincidental circumstance.

If you are up above sea level in a porous formation, either in the granite wash or in the dolomite, which is sufficiently porous, you are getting close to where oil may be found anywhere on those flanks of that mountain in that field, particularly on the north strip as shown in Exhibit 12 in that oil belt on the northeastern section of the field.

(Map entitled "Rock Pressure Map, Texas Panhandle, 1938," marked Exhibit 17 for identification.)

Exhibit 17, captioned "Rock Pressure Map, Texas Panhandle, 1938," is now exhibited to me. I can't say I have seen that exact map. I saw a map in Amarillo that Mr. Peterson had showing the various pressures in the field on either 20 or 50 pound contour. That may be the same map. I don't know. The map I saw was not colored. This looks substantially like the same map I saw in the hands of Mr. Peterson. Upon comparing this map with Exhibit 12 I find some difference in the pressure areas, that is, the areas for the different pressure bands. As I say, I am not just familiar with the map you have just marked for identification. I know that on the Railroad Commission map those pressure areas are shown on the basis of 50-pound contours.

I have said that oil was found mostly along the northeast flank of the field. I don't know what part of the field the ideal cross section traverses. Counsel informs me that the line is run in an irregular direction to strike the actual wells so that they can portray the actual well logs. An irregular line runs in a general direction from north to south to the points B and A. These are located just to the east of the line which marks the east boundary of Block 2 and Block 5 in the central part of Carson County. Assuming this statement to be correct, the green colored formation on the cross section would probably be found in the northeast flank. I don't think it is true that as you leave the northeast flank you go up the structure until you hit the top of that mountain, that buried mountain, and it slopes off in the other direction. You don't find oil all along that flank; but it is largely concentrated in that flank. That is where most of the oil wells are in that area.

40 The black spots shown on Exhibit 17 indicate oil wells.

There is a designation showing a difference between oil wells and gas wells. The gas wells are indicated by stars.

If you drill a well over in that area there that is portrayed in green on the cross section and go on through the red bed, you come to the so-called hard rock cap on top of the big lime which is called the anhydrite formation. You pass on through that and through the lime dolomite until you get down ultimately to the granite wash probably, if you happen to drill a well in the location in which granite wash is under lime. The granite wash is liable to be at various places either where there is no gas above the oil or next to the side of the mountain, but it is generally close to the peaks. It is washed off the side of the mountain and that is why they call it granite wash. It is alongside the mountain and extends out for a comparatively short distance from the core of the mountain and generally hugs the flanks.

If you drill a well over at the location of the first black line extending from the surface, the small picture of a derrick, down to the area colored green in the formation, which has been described as porous layers in the dolomite, you encounter an oil bearing formation, according to that chart. You might and might not encounter gas in that well. You might pass through some gas on the way down. When you got down to the oil, if you did succeed in securing and producing an oil well, you would produce gas probably with the oil. That is what I referred to the other day as casinghead gas. The way this first from the right is located, if the well were cased off above the oil you would get oil and casinghead gas.

The portion of those layers of dolomite which are painted red typify what might be termed lenses or strata containing dry gas in a free condition. If you drill on down through that to approximately 90 or 100 feet above sea level, you have a chance of encountering another porous layer or lens which will bear oil, depending on where it is located. It is often the case in the Panhandle that you get gas from the upper formations or upper layers of the formation and go on down and get oil in the same hole down in a layer of the same formation but at a lower level—you might term it a lower lens or lower layer of the formation. If you drill on down to sea level you might encounter water.

If the water were not successfully plugged up at the bottom of the well and you pull the well very hard, that is, produce something approximating the maximum possible production of that well, you very possibly would cone up that water in the hole up through the bore. There is this to be taken into consideration, that the oil and gas interface with the water. By that I mean the contact is approximately at sea level by coincidence, if you please, so there is no decided tendency of water drive into the bore.

There is no drive from any distance into the oil and gas.

41 If, when you drill into the water, the lower end of the well is left open and exposed to water, the reservoir pressure would cause the water to rise in the hole. The height to which it would rise depends on the condition of the hole and the pressure involved there—how much you are pulling on the well. I don't believe one could state that the water would rise a certain definite amount. It may be a commonly accepted fact in the field that the water table rises approximately 1000 feet in wells as the pressure goes down. As I stated in my direct testimony, the virgin pressure of 430 pounds at the well head is a subnormal pressure. In other words, it is less than half the pressure one would expect from the static head of water of 2600 feet. I think that is brought about partly due to the fact that the water level occurs at about sea level, and other factors. 430 pounds is just about the weight of a 1000 foot column of water. There would be a balance in there.

As the gas is extracted or produced from the formations above the water, the pressures naturally go down. I don't think the danger of water coming up necessarily increases in the same ratio as the pressures go down, for the reason that as the pressures in these formations go down your motivating force raising the water up also goes down. When you come to the time when you deplete it, the pressure in those formations there is enough to raise that water above sea level. The pressure in those formations is not still 430 pounds. No doubt there are areas in the whole field that have pretty close to virgin pressure.

There may be spots where the pressures have gone down as low as 50 or 60 pounds. I do not know of any such areas, but I would not be surprised. The pressure probably does not go down in the oil as quickly as it does in the gas. I don't think it is true that you have your reservoir pressure in the main body of water, after that pressure has been released, and gas formation above it. I think the pressure in that reservoir is due very probably to the entrapped gas that is there and held there by the cap rock and the top of the formation and by the basement rock. Possibly the water is itself resting on the basement rock. I think the granite is the bottom of the whole business. I don't think there is pressure in the granite. I believe that is the gas pressure itself, and whatever it was that exerted the original gas pressure there caused a pressure. That the pressure, after the arching of these formations, probably migrated up from source formation and that it was as it was when it first migrated there. I think the water followed it in under the Wichita Mountains, as I said in my direct testimony.

I don't know whether it is a fact that the water first came in there and is exerting a pressure equal to the weight of the column of water at the source. That is one theory; but I don't think it has been substantiated. I believe the very fact that the water level in that field is approximately at sea level would indicate the non-existence of a water drive or static water head. It may be as you point out that there is a static load which is exerted back from the Wichita Mountains, over a long period. That is a theory. I don't think it is substantiated. Another theory as I understand it, is that at the time these formations were arched over those mountains, either this oil and gas and possibly some of this water were in place, and it is not impossible in my opinion that the virgin pressure, subnormal as it is, of 430 pounds on the casinghead, is a pressure of oil, gas and water that was created there at the inception.

42 I believe that the gas and oil were probably formed in one of those basins, probably in the Anadarko Basin to the northwest, and that it migrated after the arching of this Amarillo arch up into the highest point it could go. The highest point it could go was immediately underneath the anhydrites. It was cut off by the anhydrites and could not go any higher. Natural migration from the

source beds made it come in there. It probably had some pressure at the source bed and moved because of the tendency for oil and gas to migrate.

I know this field is bounded by the lines shown on the map. There is probably a physical connection between the reservoir as now located and the source bed right through the middle area. North of the middle area along this dark heavy line the formation dips off into the Anadarko Basin and there is apparently water between it and its source bed. The reservoir is found at the beginning to have had 430 pounds pressure per square inch measured on the basis of 16.4. As to what caused it to move in there and accumulate any such pressure, if it wasn't for the water, I believe the natural tendency of the oil and gas, the relation between the oil and gas themselves is for the gas to seek higher levels and the oil generally is found in lower levels. Underneath that, then, further under that is water. I believe it is an actual separation. The thing that caused the gas to come in and seek its altitudinal higher level was simply the presence of a porous medium connecting the two and the tendency on the part of the gas to seek the higher level. When those substances are in the same container they separate—the water at the bottom, the oil above the water, and the gas above that. Thus in this container we find the gas in the upper porous part of the container.

Coming back to Exhibit 16 and considering the whole reservoir reflected in Exhibit 17 as a container, it is my idea that since the porous portion of the formation overlying the granite ridge painted in red is higher than the others, that is the natural place for the gas to be found in association with the oil and the water in the same container. Between that point and the water the oil would be found.

You have requested me to explain how it is that the gas comes off from some distance up to that formation which dips down into water and gets into this container and finds its place, coming from where the gas was formed in the Anadarko Basin, and whether it would find its way through the water in getting into the position in which we find it as portrayed on Exhibit 16. My answer is that it is probably impossible to say just exactly what the relationship was between the oil, gas and water at the time this migration took place. The very tendency, at least the very porous condition of this reservoir material, capillary action and other physical action, probably had its place in assisting the migration of these fluids. Just what relation the water was at the time this migration took place is impossible to tell. One thing, however, is sure, if you have a source material and a source area you also have a natural catchment basin formed by the arching of these sedimentary deposits over the granite mountains. Having those conditions and knowing the natural tendency of oil, gas and water to separate, with the gas on top and the water on the bottom, the porosity of the medium in between, to my mind, answers the question.

If I remember correctly, I made the statement that probably these buried Amarillo Mountains under the Texas Panhandle field were an extension of the present Wichita Mountains in Oklahoma. I wouldn't say that it is a
43 substantiated fact that those same Wichita Mountains formed the source of the water which underlies the great gas reservoir in the Texas Panhandle. I am not so sure of that. It is a theory that some people hold. I don't know that I can quote anyone who holds to a contrary theory; but I heard discussions—I have seen some papers and I have talked to people about the thing. I have made no independent researches on it myself. I have made no research except to refer to some literature that I found pertaining to the Panhandle written by other people who have made researches, and have talked to people as well. I have made no tests to determine where the water existing in the Panhandle field comes from. I do not know that water comes up past the well bores and gets into the gas bearing part of the formation and that there are wells down there producing water. I know a number of wells have been abandoned; but whether on account of water itself I could not say. I understand they were abandoned at pressures in excess of 100 or 150 pounds; but do not know how many there were.

There is always the possibility of water getting into a gas well in the Panhandle unless it is properly cemented off or sealed up. You encounter salt water bearing formation up above the hard cap rock known as anhydrite, and if the water is not properly cased off in this formation when it is encountered, it will go down the well bore to the gas bearing formation, and if it gets in there it will flood the formation and drown it out in many instances. The well will go dead even though it still has 100 to 150 pounds pressure; but I think you should also take into consideration that the intrusion of water into a well is one of the things that is guarded against, and every attempt is made to case off any water source that is encountered in the drilling of a well. So that won't happen. I do not know in how many wells they have failed to succeed in doing this. I think there are something like 300 wells making water.

I am familiar with the history of oil production in the Panhandle to some extent. It is a matter of common knowledge among the fraternity that in the early history of most of the fields the oil operators did not put any value on the gas. They were looking for oil and weren't very careful when they drilled the wells to case off the water so as to protect the gas.

You point to a rather heavy band of red at the location between the fifth and seventh of the wells portrayed on Exhibit 16. I do not know why that band is wider than the band traversing Nos. 3, 4, 5 and 6. I assume from your statement that the band has the thickness indicated and that the band near the green area which traverses the wells numbered 3, 4 and 5 is much more narrow and that those correctly reflect the thickness of the two producing formations producing gas. If the thickness of the red band that you have just called attention to indicates the thickness of the formation, which is what is generally known as pay, then I would assume that where the band is thicker, the pay is thicker, assuming the porosity to be the same.

Again discussing Exhibit 16, you point out some
44 short red bands at different portions of the formation.
I believe those portray small lenses—gas formation—and assume that the formation which yields gas is not uniform through the great territory covered by that reservoir. In other words, as I stated in my testimony, very probably the thickness of pay varies. The number of layers of strata of porous substance found within the limits of the three or four hundred feet of dolomite underlying the anhydrite probably varies, maybe 5 or 6 in any one spot, and it is not infrequent in the Panhandle to encounter a lens in a given well, such as No. 7, which is not encountered in No. 6 or No. 8.

In the light of the fact that in many of those wells local lenses are encountered, it would be my judgment that there are other lenses in between wells of the same character—small lenses not extending any great distance from the place where they are located. Those small lenses are in some way connected with the porous lenses, probably through the general medium of the structure. I would say if that exhibit, if its portraying of such lenses is representative of the conditions there, that there must be some reason that gas is held in those relatively small portions as lenses. There is bound to be some way for the gas to come in the upper formation, seeking the highest points to get into those little spots. I believe that almost over the whole field there must be some more or less general physical connection due to the fact that the original or virgin pressure was largely the same over the entire field.

If you find gas in one of those little places, or if you find it in the big band like the one between well No. 5 and well No. 7, or if you find it in a confined area like the last well over to the left-hand side, the pressure was all originally the same—approximately 430 pounds at the wellhead. That, with the exception of one area where it was higher, is true whether it was sweet gas or sour gas. No matter where it was found inside that reservoir, the pressure was substantially the same.

This indicates to me that there is a physical connection between the different layers or strata which produce gas. That connection may be a connection through which gas might be slow to percolate, but nevertheless it indicates to me there is a physical connection between the source of supply.

It is probably true that in the case of those small lenses the chances are it would take some time for gas to get from one of them down here to one of the other formations. First of all, you would have to have a pressure differential to have a motivating force to make it go down; otherwise it would not move. If there are lenses which still retain their pressure and the other measures are depleted and the reservoir pressure is reduced, there will be a greater chance for the gas in those lenses to move over to the lower pressure area, depending on the character of the formation between those lenses and the places of lower pressure.

Questions by the Examiner.

As Exhibit 16 does represent a cross section through the Texas Panhandle field approximately at the point indicated, it very probably does represent a fair cross section of the structures in that field along that particular line.

As I say, that is of the formations—the picture por-
45 traying the conditions as they exist there—which I
understood him to say was made up from logs of wells
as indicated on there. I do not know whether Texoma has
leases directly on that line. It could be determined by con-
sulting Exhibit 13. It depends on where in Carson County
this selected line exists. If it happened to be in the east-
ern portion of Carson County, there is, according to Ex-
hibit 13, a substantial acreage under lease to that company
in that area. The relationship between gas and oil in the
western end of the Panhandle may not be the same as that
shown along this cross section. As I understand it, all
Exhibit 16 purports to be is a typical cross section on a
given line.

Further Cross-Examination by Mr. Morgan.

If you were to go northwest and use a cross section of the field along the east line of Moore and Potter Counties from north to south, you would not get just exactly the same contour in the granite mountain range that you have in the middle crossing. It would be a coincidence if you did. These mountains are like all other mountains, irregular and situated with reference to each other in all kinds of ways. Throughout that reservoir you might find this granite peak much higher somewhere else than you would find it at that particular line. You might find it to be one cone instead of two. You might find it isn't on the same line. There is no uniformity about it; but the granite mountain would form the basement wherever it happened to be, because the sedimentary rocks that have been deposited and in which the oil and gas are found have been folded upward by reason of the presence of the range of granite mountains. If you take a row of wells across the field in any position, you will have the same comparable situation, though the number of formations bearing oil and gas may not be the same and may not be the same distance apart; but if they are there they will probably have the same relation to the oil bearing and to the water bearing part of the formation and to the granite basic foundation. Generally at the bottom will be the basement rock of the granite peaks and then probably some granite wash, depending on where you draw the line. On top of that is dolomite and anhydrite, and on top of that the red bed.

As shown on Exhibit 16, between wells Nos. 1, 2, 3, 4 and 5 from the left side there are probably many interconnections between the various gas lenses and the various strata. The same condition obtains, generally speaking, whether the well is located in the sweet gas area or in the sour gas area.

I pointed out the sour gas line on Exhibit 12. It is a broken line starting southwest of Pampa and running in a generally northwesterly direction up through the field and coming out of the producing formation near the west line of Potter County. That is supposed to be the division between the area that produces sweet gas and the area that produces sour gas. By sour gas I mean gas that contains an objectionable amount of hydrogen sulphide or sulphur. Sweet gas is made up of the other hydro-carbons and does not contain objectionable amounts of sulphur or hydrogen
sulphide. The division between sweet gas and sour
46 gas is not a fixed thing chemically. No certain standards
have been adopted as to what are objectionable amounts. I believe in the contract between Texoma Natural Gas Company and Natural Gas Pipeline Company of America it is clearly set forth as to the limits. It is often defined by contracts, and down in Texas has been defined by statute for certain reasons. Sour gas can be used for the manufacture of carbon black and sweet gas can not. I am familiar with that distinction down there. For the purpose of applying that distinction, the legislature of Texas has defined sour gas as containing 1½ grains of sulphur per hundred cubic feet; and the broken line shown on the map is the line that now divides the areas which produce gas containing a grain and a half or more per hundred cubic feet from those which contain less than that.

I have examined earlier maps showing the location of that line and found that it had been moved and its location has been conceived of as being differently situated at different times throughout the history of the field. Back in the earlier days they probably did not know as much about where the line was located as they do now. Additional drilling has probably more definitely located it, the same as anything else—additional information and later information. Then there is also the fact of the withdrawal of gas of different types—I mean by that sweet and sour gas. Back of the time when they had as many wells in the vicinity of that line as are now located there, they were less certain of where the line was situated, and the line has actually changed its physical location in the formation during the past several years from where its existence was known some eight years ago. It has moved to the northeast. The phenomenon of the moving of the line of demarcation is very probably due to the large amounts of sour gas and casinghead gas that have been produced in the field from the northeast flank. The tendency would be to reduce the pressures in that portion of the field and pull the sour gas line to the northeast—pulling sweet in to take the place of the sour which has been produced. There would be a tendency of the gas to move from the higher pressure portion of the field to the lower pressure portion, as shown on Exhibits 12 and 17. The lower pressure area is along the oil part. That is not just a tendency; it is an actual fact. It has actually happened.

There is nothing which separates the sweet from the sour gas in that formation. Both kinds of gas will lie in the same layer of porous strata up on the slope of the mountain. I can't give you an explanation of why it is that there is sour gas on one side of the line and sweet gas on the other with nothing to separate them; but that appears to be the situation.

Looking at Exhibit 12, I see a great many wells described as oil wells and indicated by black dots, most of which are along the northeast flank of the reservoir. Some of those wells are in a band having a gray color or the color next to it, and some of those wells are in an area which is not colored at all though within the black line that marks the boundary of the picture portrayed here. The uncolored portion of the oil producing area within the boundary of the field indicates an oil producing area with probably little or no gas production. The gas producing area is given some color. Above and to the northeast of that
47 producing area is quite a wide area that produces oil
but no gas to speak of. It may produce some casinghead gas; but the Texas Railroad Commission, who made this map, indicate that as the oil-gas line, or some such name. If we apply that line to Exhibit 16, it is probably the line marking the extremity of the bands colored red, beyond which there is no free gas but only casinghead gas. I have defined that term in my direct testimony.

It is true that while there are oil wells scattered over the entire area which is not colored on Exhibits 12 and 17, there are also many oil wells in the colored portion which bear gas. Those are the wells that are located in situations comparable to wells Nos. 2, 3, 4 and 5 of Exhibit 16, where they penetrate the gas as they go on down and then find the oil in the lower strata—either that or where they penetrate oil producing measures and produce oil and casinghead gas from those measures.

For example take well No. 1. That apparently goes down into the green and does not hit the red. That well would probably produce oil and casinghead gas. Take No. 2—apparently that well goes through the red band and goes down into the green, and so do Nos. 3, 4 and 5. I see nothing on that chart to indicate whether or not those wells are cased off through those gas measures. Assuming that they are cased off through the gas, they produce oil and casinghead gas from the oil measures colored green. It is true that in the same area which has free gas, such as that contained in the red formation pictured in Exhibit 16, we also have oil wells producing from the formations below the red—that is, producing from the green or oil measures.

By casinghead gas I mean gas that is produced from an oil well. A substantial portion of it is dissolved in the oil in the reservoir. As to whether there is a difference between dissolved gas and absorbed gas, I do not know just what you mean by absorbed gas. You might speak of a substance such as charcoal which absorbs and absorbs great quantities of gas. When I speak of dissolved gas in petroleum I mean gas made liquid under pressure. It has taken on a different nature while it is in association with the oil and is in the liquid phase. When the pressure is reduced it goes back to the gaseous stage, and that is what I was talking about when speaking of casinghead gas. I also included any gas that was produced from oil wells in conjunction with oil, even though it came out of the upper formation. I was not classifying it as to its source but as to the place where it was produced, if it was produced from an oil well; even if it came out of the upper red bands I still called it casinghead gas, but with the understanding that very probably most of the casinghead gas produced was produced from the oil and the other measures were very probably cased off.

It is my thought that most of the gas designated as casinghead gas may have been dissolved within the oil itself. A substantial portion of it may be there when the gas is

formed, but it is in those measures which are oil producing
as distinguished from dry gas producing measures. I
48 do not want to limit myself to say that all of the cas-
inghead gas produced is gas which has been dissolved
in oil, but that a substantial portion of the casinghead gas
that is produced with oil has been dissolved with it; but
there may be gas in those green measures. It did not go
up where the red is for the same reason the little lens I
pointed out a while ago had not gone over to the red band.

I think there is some free gas down there in those green measures, because I don't think those green measures are free from catchment basins. I think that both oil and gas are found down in those areas that are below what is commonly known as the line marking the division between the gas and the oil. I didn't get that information from any geologist. The people who told me those other facts about the Panhandle didn't tell me that. I know that generally has been the case in numbers of fields.

Over in the southwest portion of Exhibit 12 are some irregular oval lines. They look like contour lines to me. Those small almost circular areas inside each other apparently represent depth contours as distinguished from the contours bounding the colored portions of the map, which are pressure contours. Those particular contours appear to be a depression. It looks like the part in the middle is lower than the circular portion around it, unless the contours are numbered from a datum plane, which may be sea level. If the latter is the case, the third or larger circle indicates zero, the next one is 200, and the next is 400. If those represent altitudes above some datum plane, then they would represent a dome.

I heard about the helium dome while I was at Amarillo. I can't tell you exactly where it is located, but it is somewhere towards the southwest of the field. I was not at the helium plant northwest of Amarillo. I heard about it, but I was never there. That seems to be located southwest of the western portion of the field. I noticed the portion of the colored map portraying the reservoir seems to run almost in a straight line along that southwest side. I think there is a fault line there. A fault line is a slippage of the earth's crust along a clevage plane either horizontally or vertically.

(Document entitled "Southwest-Northeast Section from Southwest Potter County to Northwest Hutchinson County, Texas," marked Exhibit 18 for identification.)

Exhibit 18 is now exhibited to me. That exhibit is labeled at the bottom "Southwest-Northeast Section from Southwest Potter County to Northwest Hutchinson County, Texas." I mean by a fault the line on this map shown toward the left of the center of the exhibit, and extending from the top of the exhibit down through the vertical line to the bottom. That line is marked "Potter County Fault."

I mean by a fault line a cleavage plane or slippage plane along which the measures on one side or the other have either slipped vertically or horizontally or in any combination of the two. Now, from looking at this map it would appear that there has been a slippage along its cleavage plane or this fault line in which either the portion to the right has been elevated or the portion to the left has been dropped, because apparently to the left here is a part
49 of the formation which is designated as dolomite series. The dolomite series on the right hand side appears to be somewhat higher than the one on the left.

Then next is a line called the Red Cave, which intersects the fault line at this point, which is at a lower point than the Red Cave on the righthand side.

The next is the salt series, which is green, and generally on down to the yellow, and which is designated on the righthand side by the same color and same name, which is higher on the structure than the righthand side of the fault line.

No one can tell, of course, whether the main reservoir was lifted up by some force back in early geologic ages or whether the part to the south which is faulted off of it was dropped down. There is no way of knowing that; but something happened so the thing was broken in two along that fault line.

The geological formations, when you encounter them, are substantially the same in the helium fault as in the main field but at different levels. That is the substantial difference. However, gas over here contains a substantially larger quantity of helium than it does in the main reservoir. I don't know why the sulphur gas and the sweet gas stayed on opposite sides of that line there. I haven't heard any explanation of it. I would like to hear one.

In this particular instance the existence of the fault line and the elevation or submergence of those measures on either side have their effect in producing different conditions. The pressures are different. The pressure in the helium dome is around 744 pounds. One explanation of that may be the circumstance that you do not encounter the producing formation until you go down 700 feet deeper than you found the same formation on the other side of the fault line.

There is a little difference chemically in the gas in Moore County from that in Wheeler County. The gas in Moore County is nearly the true dry gas, having a larger percentage of methane. The gas down in Wheeler County has relatively lesser portions of methane and more ethane. So you frequently find differences in chemical constituents of the gaseous mixtures, the hydro-carbons, in any part of a large field.

I know what the total withdrawals from the field are estimated to be, including both dry gas and casinghead gas. I do not know where you could obtain the accurate figure on the total casinghead gas production from the time the field came in; but it has been estimated on various bases. The Railroad Commission of Texas indicated that over the Panhandle proper the gas-oil ratio is about 6 MCF of gas per barrel. By the Panhandle proper I mean the whole ~~field~~—the whole part that produces oil. You have no gas ratio in the part that produces no oil. The over-all producing parts of the field are called the Panhandle proper; but they are sometimes designated the East field and the West
50 field. That is probably a classification for proration purposes for both oil and gas.

You inquire if that part of the oil producing formation lying east of the east line of Moore County down through Hutchinson northeast to Carson and central Gray and Wheeler Counties, except for a little area down here right at the southeast end of the field, is not the Panhandle proper. I state that that corresponds with my definition of it. That is the oil producing portion of the field. They also produce oil up in the northeastern portion of Moore County to some extent; but that is a separate designation. That would not be included in what might be termed the Panhandle proper, and the area known as the Osborne pool is not included in the Panhandle proper. There are three designations—those three designations; but all are in the same field. They are included in what is termed the total field. They are portions of what is commonly termed the common reservoir, and they are probably all connected directly with the gas producing formations extending out along the flanks of this mountain buried underneath.

From the investigations I have made and from an examination of maps as to where the gas which came from oil wells during the past ten or twelve years was largely produced, I will say it was largely produced from the high portion of the field called the Panhandle proper. Some was produced from the Osborne area and some from Moore County; but the great majority was produced from the Panhandle proper. The majority of the gas has been produced from that portion of the Panhandle proper that we have been talking about, including the uncolored portion of the map within the exterior boundary and the colored portion of the map.

Separating the great reservoir into two classifications, the oil area and the dry gas area, I will state that there is bound to be some overlapping between the two the oil measures being very probably under the gas. A great deal of the oil is underneath formations which bear dry gas. I do not remember the figures as to the extent of the overlapping. I think the Texas Commission tell about that in their report. I quote the following from their 1938 report:

"The field is approximately 124 miles in length and has an average width of 20 miles. It is composed of 1,076,423 acres which produce sweet gas, 398,901 acres which produce sour gas, and a proven or semi-proven oil producing area of approximately 250,000 acres. Approximately 40% of the oil producing acreage is included in the gas area due to the stratigraphy of the producing horizons. Oil production is confined to a series of pools extending along the north flank of the field for a distance of about 90 miles."

40% of 250,000 is about 100,000, so there are about 100,000 acres of oil bearing land out in the colored portion of the map. You refer to the original resting place in the producing formation of the gas which has been produced, and inquire whether I think it came from the areas
51 where these oil wells are located, or whether I think it
has been drained in there largely from the gas bearing formations down the structure. I think both things have happened. I think there is a substantial amount of gas that was produced right from the oil measures.

You inquire what part of the six trillion I mentioned the other day was in the oil. In my opinion the total casinghead gas—that six trillion cubic feet on the basis of 6 MCF per barrel, is intended to indicate the total amount of gas that was produced from those oil wells, or I mean could be produced with one billion barrels of oil. Very probably that gas came from two sources, one from the oil itself and the gas entrained with the oil or dissolved in the oil, and possibly some of it came from the gas measures adjacent thereto.

I know that petroleum at 400 or 500 pounds pressure will dissolve a lot of gas. I don't know how much; but the amount of gas that would be produced—at least I figure this—that the amount of gas that could be produced by producing from that field one billion barrels of oil would be equivalent to six trillion cubic feet of casinghead gas.

You present for my examination "Annual Report on the Panhandle Oil and Gas Field, August, 1938; Oil and Gas Division, Engineering Department, V. E. Cottingham, Director of Production." I have examined this document and find it is just like the one I have. The gas-oil ratio of 6 MCF or 6.1 MCF is included in a number of places in that report. It occurs on page 34 of that report and in the summary, which is page VI, at the bottom of the page. According to page 34 of that report, 6.1 MCF per barrel was the average gas-oil ratio for the month of April, 1938. The highest gas-oil ratio for the same month in the Panhandle field proper, according to the report, was 1350 MCF and the lowest none at all. That means that the gas-oil ratio varied from nothing to 1350 MCF. The fact that some wells have no gas-oil ratio is because those wells that produce no gas at all probably tap measures that contain no gas, in solution or otherwise. There is nothing in the report that says whether or not the 1350 MCF of gas came out of the dry gas formations, and there is nothing which says it does not.

On page 35 of the report the average gas-oil ratio for the month of April is given as 29.9 MCF per barrel. The highest gas-oil ratio in Moore County for that month is shown as being 4782 MCF and the lowest is shown as no gas at all, so even up there where those high gas-oil ratios prevail other wells contain none at all.

On page 36 of the report for the same month of April, 1938, the average gas-oil ratio per well for the Osborne field was 3400 cubic feet. The highest was 15 MCF and the lowest none at all.

In the same month we find the entire field showing variations in the gas-oil ratio from 3.4 in the Osborne field to 29.9 in Moore County. Amplifying that answer, I point out that the average per well of 6.1 MCF per barrel is

taken from an average number of wells reported of
52 3,411 in the Panhandle proper. On page 35 the average per well of 29.9 MCF was taken from an average of 20 wells in the Moore County area as against 3,411 in the Panhandle proper. In the Osborne area the average of 3.4 MCF per well was taken from an average of total wells reported, of 18, as against 3,411.

Of the 3,411 wells in the Panhandle proper, two-thirds had gas-oil ratios less than 2 MCF, and those two-thirds produced 44,131 barrels out of a total of 67,000 barrels of oil; but they produced only 37,369 MCF of gas out of a total of 413,339 MCF.

These figures which I have been quoting are taken from my copy of the annual report of the Texas Railroad Commission on the Panhandle field, dated July, 1938. It is a published report.

There is now submitted to me a copy of the 1937 report of the Commission. On page 28 of that report the following statement, headed "Gas-Oil Ratio," is made:

"During the past year one field-wide gas-oil ratio survey was ordered, this being during the month of October, 1936. Each operator was requested to make a ratio determination on each individual well while the well was producing its daily oil allowable. The report included the total depth of the well, daily oil production, daily gas production, and the amount of salt water each well was making, if any. These reports were all tabulated into ratio brackets showing the amount of oil and gas produced within each bracket. The average ratio was found to be 6.6 MCF per barrel. Ratio summaries on the Panhandle field proper, the Moore County area, and the Osborne area follows."

This report shows that the average per well in the field was not the same in October, 1936, as it was in April, 1938, but there was about 500 cubic feet per barrel difference. In other words, the 1938 average ratio as 6.1 MCF per barrel and in 1936 it was 6.6. In October, 1936, according to this report, the highest gas-oil ratio was 806 MCF per barrel as against 1,350 M.C.F. in 1938. They still had wells with no gas-oil ratio in 1936.

At page 30 of the 1937 report we find that in Moore County for October, 1936, the average was 50 MCF per barrel as against 29.9 in April, 1938. The highest gas-oil ratio in Moore County in October, 1936, was 1,776 MCF per barrel, as against 4,782 MCF in April, 1938.

This report shows that in October, 1936, the average gas-oil ratio for the Osborne area was 26 MCF as against 3.4 in April, 1938—more than six times as much in 1936 as in 1938. The highest in October, 1936, was 245 MCF per barrel, as against 15 in 1938—more than fifteen times as much in 1936 as in 1938, and still there were wells in the Osborne area as well as in the other two areas which had no gas-oil ratio.

53 I do not know how much oil was produced from the wells which had no gas-oil ratio. I do not believe there is anything in that report that indicates the differentiation between the two. It gives the total gas produced, the total oil produced, and the ratio between the two. In arriving at my six trillion cubic feet to determine how much of the oil would be produced from wells having no gas-oil ratio, the only thing I can do is to use the average. I could not use the average in Moore County for the oil in Moore County because the amount of production in Moore County is comparatively small as compared with the total.

The average 6.1 or 6.6 was that way in 1937 or 1938 in the Panhandle proper, and in 1936 it was very little different from that. You ask if I do not know that it has been as high as 20,000 in the Panhandle proper in the past. It can vary over wide limits, there is no question about that; but the average remains pretty close for that period of time. I do not know it to be a fact that during the period of over 13 years that the field has been producing the average ratio has varied from 6,000 up to 20,000.

(May 23, 1939.)

In my former testimony I have referred to catchment basins. By catchment basin I mean a structure that is porous in nature, which is capped by an impervious layer of rock or limestone or anhydrites, that may serve as an area in which gas or oil may collect and not permeate vertically any further than that point. Applying this term, the entire vast reservoir is one catchment basin.

As I used that term, it is perfectly possible that down here in those little green bands which are shown on Exhibit 16 there are some small catchment basis in which free gas might have been trapped and which would produce with the oil when an oil well was producing from that area. I haven't any physical evidence of the fact that such free gas traps or catchment basins are in part of the formation that is below the level where this pink impinges

into the green on the going-down structure; but I think it would be a coincidence if there were none. As to whether those catchment basins are extensive in area or of comparatively small importance in dealing with the whole vast reservoir, I will say that in my opinion they would be small as compared to the total area of the dry gas area of the field. They might be, and probably are, of varying sizes or areas, but nothing to compare with the total area of this field. I would say that a portion of this casinghead gas about which I have been testifying, if not all of it, is in fact in solution in the oil. I would hesitate to say what portion is in the oil in absorption or solution. I would not say that 6,000 cubic feet is in solution per barrel of oil, and I would hesitate to say that 5,000 cubic feet is in solution. That is a question of the function of the pressure, probably, and other facts that would determine how much is there. It is a function of the pressure and of the quality of the oil and of the quality of the gas involved. I could not say whether there would be 5000, 4000, 3000, or 2000
absorbed in the oil. I would not say without making
54 a study of it. I think the proper way would be to
make a study or research of the particular gas in hand.

There are 42 gallons in a barrel. If we take an empty barrel and make a catchment basin out of it and fill it with gas at 16.4 pounds per square inch, it would be the equivalent of 42 gallons. A gallon contains 731 cubic inches. Figuring on that basis, a barrel would contain 5.61 cubic feet—that is, at atmospheric pressure. If you have a barrel full of gas at 471 pounds pressure, the absolute pressure in the reservoir in the beginning, you will find that the barrel would contain 183.65 cubic feet at a pressure of 16.4. A barrel full of oil would hold less gas than an empty barrel. Then the gas which could be contained in a barrel of oil at that pressure would be something less than 183.65 cubic feet.

You have exhibited to me a report of investigations by the Department of Commerce, Bureau of Mines, Serial No. 2732, dated February, 1926, by D. W. Dowe and L. P. Calkin. I do not know either of those gentlemen. Apparently one of them has the title of engineer in charge of the Laramie field office, and the other, assistant petroleum chemist, Bureau of Mines. The Bureau of Mines is a government bureau, in the Department of Commerce.

Inserted between pages 4 and 5 of that bulletin is a figure or drawing showing different oils on numbered curves. Curve 5, is indicated by the notation on the bottom of this curve, is noted as natural gas in kerosene, 41 degrees, A.P.I. The next one is termed Curve 6, natural gas in California crude, 25 degrees, A.P.I. That appears to be the fourth curve from the bottom. Curve 7 is denoted as natural gas in Oklahoma crude, 21 degrees, A.P.I. That looks like the third from the bottom. Curve 8, natural gas in Wyoming crude, 36 degrees, A.P.I., is the first one reading from the bottom up. The figures along the bottom of the sheet apparently represent cubic feet of air or gas absorbed per barrel of oil in thirty inches of mercury. The figures along the left-hand margin represent pressure pounds per square inch gauge. I don't think that would correspond to wellhead pressure in comparing that to the situation in the Panhandle rather than absolute pressure, because the wellhead pressure is not the same as the pressure in the reservoir.

Applying that to arrive at the comparative figures for the Panhandle, you would have to determine the equivalent gauge pressure in the formation. That pressure depends on whether you mean initial pressure or whether you mean present or remaining pressure. If talking about original pressure, then the initial pressure in the field at the wellhead was 430 pounds gauge, and that would be equivalent to 471 absolute. In determining the gauge pressure in the reservoir you would subtract 14.4 rather than 13 because 14.4 is the atmospheric generally accepted at that point. That would correspond to a gauge pressure in the formation of approximately 456.6.

The gauge pressure in the reservoir originally in the
Panhandle is just below the top of that checkered part
55 of the drawing there. Following that pressure of
456 across the drawing, we find that in the case of Curve 5, kerosene at 41 degrees A.P.I., that intersects the 460 line at approximately 94 cubic feet. Curve 6, representing California crude, intersects the line at approximately 89½ cubic feet per barrel, or probably closer to 90. Curve 7, which is natural gas in Oklahoma crude, intersects the 460 line at approximately 93 cubic feet per barrel; and the last one, Curve 8, which is Wyoming crude, if extended, would intersect the 460 line approximately at 102 cubic feet per barrel. With the under-

standing that you are taking parts of this report; that I am not familiar with the complete report; that I don't know whether the curves that you refer to represent the necessary saturation of gas in oil under those conditions; that you are asking me to interpret a portion of the report; and that it is your request, I will read from page 6 of this report the following:

"The oils used in this work consist of two refined oils and three characteristic crudes. The solubility of gas expressed in cubic feet per barrel for each oil is shown in Curves 4, 5, 6, 7 and 8 at the right of Figure 2. Curve 4 represents the solubility of the gas referred to previously as mineral seal oil, which has a gravity of 36 degrees, A.P.I. This determination, as well as all others shown in Figure 2, was made at a temperature of 70 degrees Fahrenheit, and gas volumes were calculated on the basis of 29.9 inches barometric pressure. The solubility increased with pressure, showing approximately 75 cubic feet per barrel at 460 pounds. Curve 5 represents solubility of the same gas in kerosene with a gravity of 41 degrees A.P.I. The solubility of the gas is much higher in kerosene than in mineral seal. At 396 pounds 80 cubic feet of gas is absorbed per barrel."

You inquire whether I noticed that the Bureau of Mines representatives referred to the oils shown in these figures as characteristic oils, and whether I know what they meant by characteristic oils. In the first place, they state definitely that the oil was from different locations, including California and Wyoming. Those are the two crudes. What was in their mind when they characterized that as characteristic oils, I can only guess. I think the best evidence would be the parties who prepared that. There are three crudes mentioned there: natural gas in California crude, natural gas in Oklahoma crude, and in Wyoming crude. Those three do not go up exactly together. Curve 6, which represents California crude, is the uppermost curve, which has the smallest quantity of gas absorbed of the crudes. No. 8, which is the Wyoming crude, is the lowest curve. Oklahoma crude, No. 7, is closer to the California crude than it is to the Wyoming crude.

I do not believe that crudes from the Texas Panhandle are identical with either one or the other. It would be a coincidence if it were; but I do not think it would vary very widely. I would expect an analysis of the Panhandle crude to take approximately the same point as these crudes reflect here as to their solubility. I don't think it would vary a great deal. It would probably be within 56 a reasonable range. Where it would be, I don't think one could say without conducting comparable and similar experiments with crudes from that field to have the thing exact. I don't know. You haven't anything in that paper that I can see on Texas crude.

I could only guess as to whether I would expect an analysis of Texas crude to show the figures to be somewhere between the range of 89 to 102, and I am not guessing on the record. I don't know that I have ever seen the results of experiments or tests on the Panhandle crude so as to see whether it is of lower solubility than ordinary crude oils. I think that it is a paraffine oil. (Objection by Commission Counsel.)

You ask if in this 6,000 cubic feet per barrel which I have defined as being casinghead gas I would expect not to exceed 100 cubic feet of that in each barrel in absorption. I would not expect that because the chart just referred to referred to 102 in one place. If the Texas crude corresponds in solubility of gas with the particular crude that shows the degree of absorption in that curve, it may be 102, but it will not be much above 100, but if it turns out that this is a crude of lower solubility than the others, then the quantity of gas absorbed in the Panhandle crude would obviously be less.

If the oil had a higher temperature than 70 degrees Fahrenheit, you would probably have less gas absorbed. This is due to the effect on the solubility of an increase in temperature. I would say that if it turned out that the Panhandle crude has a higher temperature than 70 degrees, I would not say that the quantity of gas absorbed in a barrel of oil to be less than that shown by these curves. I would say that any increase in temperature would have the effect of reducing to a certain extent the solubility of natural gas in crude. I would not make the statement that it would be less than anything shown on those curves. If it be assumed that the solubility of the Panhandle crude as compared with the three crudes portrayed by those curves is comparable or less and that the temperature in the Panhandle reservoir is more than 70 degrees Fahrenheit, then I would say that the quantity of gas absorbed in a barrel of oil would be comparable or less than those shown in those curves the same way as referred to in each of the curves.

My information is that the temperature of the reservoir in the Panhandle is about 90 degrees. I would have to study the report in order to correct a figure based on 70 degrees to one based on 90 degrees.

You assume for the purposes of a few questions that there is at least 100 cubic feet of gas in each barrel of oil in the large reservoir in the Panhandle, and inquire how much of the 6,000 feet average casinghead gas production would be found in the catchment basins about which I was talking. Before I answer that question I will state that while I haven't had an opportunity to study that report from which you have been quoting, I do not know that the gas in cubic feet per barrel is listed at 30 inches of mercury. When you are talking about gas in the
reservoir of the Panhandle field, you are talking
57 about gas in something different than 30 inches of
mercury. It is the difference between 14 pounds and
471 pounds. As to whether the difference would be to reduce the absorption and whether the conditions in the Panhandle as compared with the 30 inches of mercury would give a result showing less absorption in the Panhandle reservoir than the 30 inches of mercury, I would have to study and experiment and find out. (Objection by Commission Counsel overruled.)

You assume for the purposes of your question that the absorption of Panhandle oil is 100 cubic feet per barrel, and ask me where the remaining 5,900 cubic feet of the 6,000 cubic feet included in my estimates of the reserves in the oil producing formations is or was. My reply is that the figures used in my estimates took cognizance of the fact that in its annual report the Railroad Commission of Texas had a gas-oil ratio approximately 6,000 cubic feet per barrel of casing head gas for each barrel of oil produced. But yesterday on cross-examination I believe that you brought out the point that in the 1936 or 1937 report the average amount showed 6.6 MCF per barrel. Now, on that basis I estimated—and I took the figure at face value as reported in the official report of the Railroad Commission's document—that the average barrel of oil produced also produced approximately 6MCF of gas. In my cross-examination by you yesterday I testified, and again this morning, that a portion of that 6 MCF of gas undoubtedly was gas produced that had been dissolved in the oil. Now, a portion of it I believe comes from that source. I believe that another portion of it very probably comes from gas in the gaseous stage or vapor stage that occurs in the catchment basin with the oil. I think also that probably some of that gas enters into the well bore from other portions of the porous producing formation; but where that gas comes from that enters the well bore and is produced up through the stream with the oil I question very much whether there is anybody that can say. It comes from the formation. This we know, that it comes out of the casinghead well. We know that it traverses the casing and comes up; but what portion of the formation it comes from, I don't know and I question whether anyone else does.

As to whether it came out of those bands or producing formations colored in pink or red or whether it came out of the catchment basins down here in the green, all I know is that it came out of the well with the oil. I cannot testify at this time that I know that it is commonly accepted in the Panhandle, by the Railroad Commission of Texas, and by the geologists with whom I have talked, and the producers with whom I have talked, that practically all of the gas cames out of these red bands or dry gas producing formations, or free gas producing formations. I cannot sit here and testify to the fact that I know it is a matter of common knowledge in Texas among the Railroad Commission authorities as well as those who are engaged in the business in the field that the gas, substantially all of it, comes out of formations which are productive of free gas and that it does not come out of the area which is colored in green just below the free gas producing formation, because I don't know that.

58 In all my estimates of the reserves down there I have assumed that the gas produced with the oil came out from somewhere in the formation and was produced with the oil, and it is characterized as casinghead gas; also a portion of the casinghead gas came from the gas absorbed in oil. I think that is a reasonable assumption. I also assumed that a portion of that gas was in there with the oil, very probably at the start, at least, in the vapor phase here as gas.

When I got through estimating the original content of gas in the formations which produce free gas, I added six trillion cubic feet to my total. As to whether I assumed that all of that six trillion cubic feet was originally down there, either in solution or in the catchment basins within the portion which did not produce free gas and was not included in my estimate of free gas in the Panhandle, I will state that I made my estimates on a per acre basis. I used the area of the field which is known as "gas acres," and spoken of in the Commission report as "gas acres." I read yesterday a portion of that report that indicated that some 250,000 acres in that field were characterized as oil acreage; that there was an overlapping of approximately 40%, as I remember—an overlapping between the gas acreage and the oil acreage.

It is my understanding that there is a portion of that field which produces oil and possibly some gas, casinghead, that is included in the gas acreage. So that, unless in any estimate that oil acreage, or at least that part of it which produces casinghead gas, is included—in other words, if that is disregarded and an estimate made of the gas content in this field of the gas acreage alone, it is my opinion in arriving at any estimate of the life of this field one must either include all of the gas source if you include all of the gas withdrawals or if you exclude certain portions of the source, the casinghead, let us say, you exclude the casinghead altogether, then it is only consistent to exclude the casinghead withdrawals as well as the casinghead reserves. Now, where that gas comes from, whether it is possible to draw a fine and definite distinction between either the casinghead in place or the casinghead withdrawals, is a question.

In estimating the reserves underlying the Panhandle gas field I first estimated the per acre reserves in what is termed the gas acres. It might not be strictly true that this area is all given some color in Exhibit 12. That exhibit is a pressure map that indicates for all portions of the field that are shown in color the results of the pressure surveys of the Texas Commission. Some of those areas close to the northwest flank, some of which are colored and some of which are not colored, contain substantial portions of the area of the field that is known, or at least designated in the Railroad Commission's report, as oil acreage. The part, according to their designation, which is underlaid with free gas is, in round numbers, 1,475,000 acres. You ask if of this 1,475,000 acres which the Railroad Commission has classified as gas bearing land, approximately 100,000 acres

also produce oil—approximately 40% of the entire oil producing area. I answer that by quoting from the annual report of the Railroad Commission dated July, 1938,
59 in which, referring to the Panhandle oil and gas field, it is said:

"It is composed of 1,076,423 acres which produce sweet gas; 398,901 acres which produce sour gas."

Now, the sum of those two is 1,475,324 acres, which produce sweet and sour gas. Then they go on to say:

"And a proven or semi-proven oil producing area of approximately 250,000 acres."

Then they say, "approximately 40% of the oil producing acreage is included in the gas area," so that, as you state, approximately 100,000 acres of the proven or semi-proven oil producing area underlies or is within the 1,475,000 acres of gas.

I first made an estimate of the gas in the gas bearing formations underlying that 1,475,000 acres and then added to that figure six trillion cubic feet, which I said was casinghead gas and gas in the oil area. You state that you are trying to find out where that six trillion cubic feet was in the formation. I think I stated that a portion of it was undoubtedly dissolved in the oil itself. I don't know how much of that is dissolved in the oil. I would hesitate to say whether it is approximately 100 cubic feet per barrel or more or less than that until I had an opportunity, either by research or survey or experiment or test, to determine the solubility of Panhandle crude.

You state that it would have to be less than 183 cubic feet. If you will pardon me, let us not get confused on this thing. When you refer to 183 cubic feet you refer to the volumetric content of a barrel at 471 pounds pressure, filled with gas, and of course that would be far more than 183 cubic feet on the basis of 16.4. I was willing to accept your statement that a barrel contains 5.61 cubic feet. Using my slide rule, taking 42 gallons in a barrel and multiplying that by 231 cubic inches per gallon, and dividing the product by 1,782 cubic inches per cubic foot, I get 5.61 cubic feet per barrel. Adjusting that to the number of cubic feet contained in a barrel at 471 pounds pressure absolute, on a pressure base of 16.4, I get about 161 cubic feet. I have testified earlier that if you fill that barrel with oil you get less gas in the barrel than you would if you didn't have any oil in there. It would unquestionably be less.

You assume that there could not be more than 161 cubic feet in absorption and ask me where the remaining 5,839 cubic feet of gas, which comes out with each barrel of oil according to the figures I have used, was in the formation at the time the reservoir wis discovered when it had an initial pressure of 471 pounds. My answer is that it was in the formation and undoubtedly was in that section of the formation from which the oil came.

60 You ask if I think it could have been drained off there from these areas out to the southwest and gotten into the oil bearing area through drainage from areas that originally bore gas only. There undoubtedly is drainage in that field, due to the fact that there is a porous formation practically throughout, and due to this fact that the initial pressure in that field was so uniform, being approximately 430 pounds. Now where that gas came from, how it gets in there, or how it got in there, I do not know, but in any event the record in the Commission's report indicated that the average is the production of 6 MCF per barrel of oil. Now, as to where that gas came from and how it got in those oil measures, I am not prepared to say. One could speculate many things or one could say that that gas did drain in there from the dry gas area, all of it. That would be one hypothesis and one theory, but it is my opinion that a substantial amount of gas must have been in those oil measures from which the oil was produced at the inception.

I was talking about original reserves at the time I used the six trillion estimate. I did not go into the gas-oil ratios, but for the one month of April, 1938, when I figured out that six trillion, which I added to the figures that I brought in as my estimate of the content of the gas bearing formation itself. I had only the figure for the month of April, 1938. That figure applied as an average figure in the greater portion of the reservoir in what is known as the Panhandle proper—in the largest zone designated by the Railroad Commission. I do not know what I would have found the average gas-oil ratio throughout the history of the field to be had I gone into it; but I assume very probably the gas-oil ratio during the earlier years of the field might have been substantially higher than the present average. I assume that because it has been so in other fields.

After I had figured the reserves of gas contained in the formations, typified on Exhibit 16 by bands or ribbons painted red throughout that field, where situations were comparable, though the contours of the granite mountain and the other things flanked on it would have been different had I made my cross section somewhere else. There would also have been red bands or porous bands bearing dry gas only throughout the reservoir, and I made my estimates of the gas which was contained in the gas bearing part of the formation and arrived at a figure of 23 trillion cubic feet. I don't know how the gas got there and I do not think anybody does.

You state that you want me to tell where it was resting in the formation—that six trillion cubic feet which I added to the 23 trillion—at the time the field was discovered. In answer to your question, which I understand, the reason I included that figure for casinghead gas was because I did not want to leave out entirely and disregard that portion of the natural gas reserves in this field. The natural gas reserves in this field, in my opinion, consist of two things: first of all gas includes dry gas or, well, let us call it dry gas and casinghead gas. In my opinion, if we take the total
61 withdrawals from the field and include in the total withdrawals both dry gas and casinghead gas we must, to be consistent, give whatever is a reasonable consideration of the original casinghead gas reserve. In my opinion, there is no question but what some of the original gas in place in this field was of that nature, namely, casinghead gas. In that case it was in close proximity to the oil, and in answer to your question I will say that I took the position that the gas that is produced as casinghead gas there is that gas, and was in place in proximity with the oil, some of it dissolved in the oil and some of it in the oil measures. I do not say that there is no migration of gas in this field, because in my opinion that would not be so.

I do not think that I counted twice that part of the six trillion cubic feet which has migrated from the gas producing formations which did not produce oil over to the oil wells and was produced and called casinghead gas, because there is a counterbalancing factor in that thing. The area that we call gas-acres, this area that I have used as gas acres, does not include certain of the producing area in that field which is not colored on the map, and in estimating the total dry gas reserves I have not included the other area. I have included all of it that bears free gas, the whole 1,475,324 acres that is in the dry gas producing area, and I put the 23 trillion that I estimated in the dry gas area in the dry gas bearing formations.

You state that if six trillion is added to that, I necessarily must place that six trillion somewhere else, and ask where I put it. Let us say we put it in the oil measures. What I mean by that is those formations, portions of those formations that are producing oil. That part of the formation that is producing oil I call an oil measure, and in making my estimate I necessarily put that gas in the oil formations.

You refer to little bumps or cones or raised places in the fold itself which I referred to as catchment basins. Of course those formations are irregular and you would expect to find gas in them. You ask whether I have ever seen the log of a single well drilled in the Panhandle that ran into one of those catchment basins in the oil producing formations. I do not know where you would find it in the log. I have seen well logs in the Panhandle and have seen references to as many as eight or ten gas bearing ribbons or bands or formations before they reach the oil level. The logs include many things, including the types of formations passed through, water encountered, gas streaks, shale bodies, lime, dolomite, and indications of oil. Everything they pass through is supposed to be indicated on that log. I doubt very much that any catchment basin of free gas below the top of the oil level would be recorded in there. I think perhaps it would be easy to pass through such a thing and not record it in a log; but I cannot conceive that it is impossible that these conditions do exist. In other words, the formations are irregular, and in the very nature of occurrences of oil and gas it seems to me reasonable that there would be oil or at least gas entrapped with the oil at
62 certain places. As to how much of a gas bearing formation would ordinarily be encountered before it was reflected in a log, it depends upon who makes up the log, whether it is a driller's log, whether it is an electrical survey, or what it is. You would note it in an electrical survey or Schlumberger log.

I say that a part of the gas in the Panhandle is in these little pockets and catchment basins. I say it is in the formation, part of it in solution with the oil, part of it in these catchment basins. Nevertheless, it is in those formations.

The Commission's report uses 250,000 acres as being in the oil field. A great deal of the 250,000 acres is, as shown by the map, blank, indicating that it did not produce oil. Wide areas are found between the pools of oil—the oil producing wells being located in clusters and out over the

250,000 acres. I do not know what is down deeper than they have gone in those intervening areas. Some logs indicate salt water is down below those areas. If they are drilled to sea level they indicate one of two things: either that they hit the top of that granite mountain or that they hit salt water.

I have estimated the production of oil from the 250,000 acres to be one billion barrels. I obtained that estimate of one billion barrels from the July, 1938, report of the Railroad Commission of Texas. On page 31 of that report I find the following:

"Oil production under proration has steadily increased in the field and has now reached a level of over two million barrels per month. Over one million barrels of this oil is being refined monthly by the eight refineries located in the immediate area. All remaining oil is transported by pipeline to distant points in Texas and Oklahoma. To date the field has produced in excess of 318,000,000 barrels of oil. Table 9 has been prepared showing the cumulative production prior to August, 1935, as a total, and all subsequent production is shown by months. Some geologists predict an ultimate recovery of one billion barrels for the Panhandle. On this basis there still remains 680,000,000 barrels of recoverable oil in the reservoir."

You inquire whether the presence of gas pressure, the pressure exerted by gas in the formation in the oil and in the vicinity of the oil, has anything to do with the production of oil to the well and from the well. It is generally conceded that in the reservoirs that contain both gas and oil under pressure that the gas pressure or the pressure existing in the gas and thence transferred to the oil is very probably the motivating force that moves the oil through the formation to the well bore and up out of the well. That, of course, is true in connection with the flowing of wells by their own pressure. It does have largely to do with the total amount of production.

63 The report referred to does not say when the prediction was made or what those same geologists thought about it at any later time. It just simply states that some geologists have predicted that there were a billion barrels of recoverable oil, and that on this basis there still remains 680,000,000 barrels of recoverable oil in this reservoir.

According to my original estimates there were in that 250,000 acres six trillion cubic feet of natural gas, either in absorption in the oil or in catchment basins in the oil producing part of the formation. If it is assumed that 161 cubic feet of that gas was in absorption in each barrel of oil, that would represent 161 billion cubic feet of gas. Subtracting that from six trillion leaves 5,839,000,000,000 which was in the formation. I would not say it was in the catchment basins. It was both in absorption with the oil and in catchment basins. You state that we took off 161 billion for absorption in the oil. The rest of it, 5,839,000,000,000 cubic feet, would have to be in the oil bearing part of the formation.

You ask me to figure what sand thickness would be required in that 250,000 acres to include 5,839,000,000,000 cubic feet of gas, at 16.4 pounds. The first thing we have to do is to get that back into a figure at the original pressure, 471 pounds absolute. We have got 250,000 acres. The total amount of gas, 5,839,000,000,000, at 16.4 pounds would be 250,000 acres times some assumed porosity. You have got to assume some porosity. You state that we are going to talk about porosity a little later and ask me to tell you what the average distribution of that 5,839,000,000,000 cubic feet of gas is down there under the 250,000 acres. It is about 21,500,000 cubic feet of gas under each acre on the average.

In arriving at my 23 trillion estimate of the gas where there was no oil in the way of it, I used an average per acre of 16 million. I used a very conservative thickness of formation in my estimate of dry gas. I used a 70-foot thickness, as I recall. I used 16 million cubic feet per acre as an average over the entire 1,475,000 acres, and it is very probable that in certain acres there is very much more than 16 million cubic feet under any individual acre. There would have to be if 16 million is an average.

We are also talking about averages over the 250,000 acres; but there we are talking about 250,000 acres as against nearly a million and a half.

You state that you want to know how much sand thickness we would have to have making up those catchment basins in the oil field areas in order to get that much gas. Let us not assume that those are all in those catchment basins. Those gases may be somewhere in those measures, and I have made no statement here to the effect that all of the gas was inside catchment basins. I did not put it there the other day in making out my estimate. I said that the gas I estimated was in the oil as casinghead gas, was in the oil measures. Part of it was dissolved in the oil, part of it in those catchment basins, and part of it in the producing measures.

64 You state that after deducting the 161 billion, which is the maximum that could be in absorption, we have 5,839,000,000,000 down there in catchment basins or in oil measures, and ask me what would have to be the average sand thickness of that part of the oil producing formation which I call catchment basins plus that part where the free gas is in the oil measures, whether in catchment basins or not. We will take it on a per acre basis, using the figure of 23.3 million cubic feet per acre and using a porosity of 20%. The average thickness per acre of the sand at that porosity would be 93 feet. I used the figure of 20% porosity for the reason that that is the figure I used in the estimate of the dry gas area and that is the figure which we have been talking about.

I have already testified that I used 70 feet as the average thickness of all the gas pays that are found throughout the gas area. According to the computations I have made, there is a greater thickness of pay formation yielding dry gas down here where the oil is than there is up where there is no oil, assuming, of course, that it has the same porosity. The porosity figure enters into it very directly. If you use a different porosity—let us say you used a figure of twice the porosity in that particular part of the formation, you would then halve that thickness. It is directly proportional. I have no reason to use twice the porosity. By the same token it may not be consistent to use the same porosity. In other words, it might be different. As to whether it is as apt to be a lower porosity as a higher, that would depend on the type of formation which you are considering. It might be higher or it might be lower, and I have no information on which to say that it might be different, except perhaps that some of the oil, probably a substantial portion of it, is in the granite wash, as you have shown on your chart.

Some of the gas is also in the granite wash, and you have both granite wash and dolomite formation yielding oil and also yielding gas, but probably the greater portion of the gas comes from the dolomite. A great deal of the oil now being produced comes also from the dolomite. The East field is producing gas almost exclusively from the granite wash. By East field is meant that portion lying east of a line running approximately through Gray County, north and south, and pictured on Exhibit 17 by a heavy red line. The area east of that line is known as the East field.

It is true that nearly all of the production in the East field of gas is from the granite wash. Of course the quantity of gas produced there is substantially less than is produced in the West field. As shown by the figures read into the record yesterday, it is a fact that over where the granite wash is, the gas-oil ratio is lower than it is in the dolomite. Osborne is over in the East field and has a lower gas-oil ratio. Up in Moore County where the production is exclusively from the dolomite, we find a very high gas-oil ratio as compared with the central part of the field commonly called the Panhandle proper.

I do not know the span between the lower part of the
65 oil bearing formation and the upper part of that formation from the standpoint of altitude. I do not know what distance it is perpendicularly between the place where free gas plays out and the oil is encountered and the bottom of the oil producing formation. I presume that varies with the field.

Taking the field as a whole, I do not know what the distance is between the water level and the level at which the gas comes out of the formation in a free state. In other words, I am not informed as to the distance between the water level or sea level as portrayed on Exhibit 16 and the point where oil is no longer found but where free gas is found in the various formations.

As stated, I used two methods of computing the reserves of dry gas in the reservoir. One is called the reservoir porosity method and the other the pressure decline method. The pressure decline method is commonly used in cases where a reservoir has been developed for a sufficient period of time to have experienced a reduction in pressure which can be compared with a certain withdrawal. In other words, where you have a certain volumetric withdrawal and a corresponding reduction in pressure in the reservoir. In applying this formula you determine first the amount of withdrawal and the pounds drop in pressure, and then using the original or virgin pressures and abandonment pressures, determine on that basis what would be the amount of the original reserve. In my computation of the original reserve I used both gauge pressure and absolute pressure. I started with an original virgin wellhead gauge pressure of 430 pounds per square inch. From that I computed what the original or virgin pressure would be on an absolute basis and arrived at 471 pounds. The gauge pressure corresponding to that would be the difference between 471 and 14.4, or approximately 457.

I then obtained a figure furnished by the Railroad Commission of Texas which it defines as the weighted average pressure in that field, which, as I remember it, was approximately 337 pounds per square inch wellhead pressure. I reduced that to reservoir pressure, and arrived at 373 pounds, which I subtracted from 471 pounds, and got an answer of 98.

I then assumed that all the gas that has been produced from that reservoir, seven trillion and some billion cubic feet, has pulled the weighted average pressure down by 98 pounds from what it was to begin with. I determined the withdrawals per pound drop by dividing the total amount of estimated dry gas produced by 98. That gave me a figure of 51 billion and some odd million cubic feet per pound drop. I then multiplied that by 431, which is the difference between the original absolute pressure in the reservoir and the ultimate remaining pressure in the reservoir to 25 pound abandonment pressure gauge at the wellhead, and arrived at my estimate of the gas contained in the dry gas producing part of the formation as being approximately 22,130,000,000 M. C. F. I added to that as casinghead gas six trillion cubic feet just as I did in the method of computation based on reservoir porosity.

66 The figure I used as the amount of gas produced from the field in the past was that furnished to me by Mr. Peterson. It included all the gas which had been produced from the field to the date of his then computation, which I believe was July 31, 1938. Mr. Peterson is geologist for Texoma. At that time I understood that that was his best estimate of the total withdrawals from the field to date. I also found that it was commonly accepted among the geological fraternity and others interested in the field down there. They usually talk about seven trillion cubic feet. That is very close.

Referring to Exhibit 13, you have called to my attention several purple or reddish looking lines which run around the general border of the field, from a mile to several miles inside the heavy black lines that mark the boundary of the field, and have pointed out that in the eastern portion those reddish or purple lines enclose similar areas, and one, apparently a large area, is in what is commonly referred to as the East Panhandle field. I know what those red lines purport to set out. They purport to enclose that portion of the whole field which in Mr. Peterson's judgment was the best portion of the field. He stated that his judgment was based on the fact that that was the portion of the field in which wells have potentials of five million cubic feet or more. He stated that the areas outside those reddish lines were those in which the wells had less than five million cubic feet potential. I know how large the wells through the more productive portions of the field were as shown in the Railroad Commission's report for the year 1938. They ranged from five million cubic feet per day to about 78 million. As a matter of fact I know that originally when all of the pressure was there, wells were drilled in this area which made more than 100 million cubic feet of gas per day; but I am talking now of the tests that were made in 1938.

You ask me if Mr. Peterson told me that in the area outside of these reddish lines, but still within the reservoir, no well made as much originally or was capable of making as much while at its virgin pressure as five million cubic feet. I don't know that that statement was made in just that way. I understood from Mr. Peterson, in talking with him about his estimates and about this line, that that portion of the area outside of that purple line did not contain wells whose potential was in excess of five million cubic feet per day. I presume that he meant initially, I don't know. I don't remember that he so stated. I believe he told me that he based his judgment on actual production figures of those wells that had been drilled within that area. I was convinced that he had made a very careful study of it, and I have no reason to doubt that the well in its initial stage—without treatment—we discussed this treatment of acidization and the use of explosives in the well—and I believe Mr. Peterson said that in combing over the records in that field he tried to get and tried to base his conclusion upon the original conditions there prior to any treatment; so that as I understood it, all of his conclusions were reached or attempted to be reached on the natural conditions in the wells. It is very possible, however, that many of those wells could be treated so as to increase their flow.

I think Mr. Peterson, in stating that the wells inside the reddish line made in excess of 5 million cubic feet a day, was talking about all wells in their natural condition before they were treated or acidized. For purposes of simple comparison, therefore, between the areas and the wells in their natural condition, it does not matter whether you think of it as treated or not treated. But it does not limit those wells in the outer area from producing more than 5 million cubic feet per day after treatment.

67 The wells producing not more than five million ranged downward as to productivity. They ranged all the way from a little show of gas to five million. It does not put any more gas in the area to acidize it or apply explosives.

There is no doubt in my mind but that the greater portion of the gas originally in place was included within those reddish colored lines, and I believe as you get away from these reddish colored lines toward the area running in the northwesterly direction, approximately along the gathering lines of Texoma, you get in the heavier production and the better class of production.

You inquire whether the greater portion of gas has been from the more productive areas in the field or from the field as a whole. Of course, all of the production has naturally come from producing wells and that production has come from those areas in which the wells have been successfully completed, so that as far as production is concerned, the greater portion has come from this portion of the field where there are existing wells, and those wells are included in the reddish lines. They are largely up through the central portion of the area enclosed within the reddish lines and to the north of that within the West field.

Getting down to the East field, we find there has also been production there. The area is smaller and the production has not been so large. More wells have been drilled per 100 acres out over that area which is enclosed within the reddish lines than you find in the western portion of the field—a more general distribution. The total area of the field is substantially less than the west field, and it is probably true that the wells per acre, taking the whole area of the field, is greater than it is on the west field.

On the map I see little stars scattered over the areas, grouped closely in places and in other places appearing infrequently. They represent gas wells where they are represented with little diameters extending out from a circle. Where they are solid black dots I understand they are supposed to represent oil wells. I believe it is correct that in the east field the areas enclosed within the reddish lines have been more drilled up as a whole than the areas in the west field.

I don't know for sure that the locations where the wells have been drilled may or may not prove to be the most productive portion of the field. There are many very productive wells, other wells of high potentials.

You inquire whether the wells get smaller or larger as you leave the area in the central portion the field enclosed within red lines and go southward or southwest. I think it is natural to expect that the wells which have been brought in are of a lower potential as you leave the central axis and go toward the southwest. The wells are pretty well included in what is in my opinion the more productive part of the field. Of course, there is a great deal of land and area to the south of that axis that is very productive—for instance, the leases of Canadian River and others.

68 You inquire whether they have produced their requirements from the more productive wells to the exclusion of those which are down in the less productive areas. I think it is perfectly natural that a producing company should attempt to produce gas from its properties where the production will cost less per MCF than in other parts. I think that is just ordinary economy; and furthermore, in those portions of the field which can be reached by a trunk line.

You inquire whether it necessarily follows that all of the gas which is produced from an existing well was produced from the immediate vicinity of that well, as I find conditions down in the Panhandle. All the gas that is produced from a well is produced from the immediate vicinity of it. There may be some migration through the measures. My whole theory in connection with that field is that it is interconnected, and due to the fact that the original virgin pressure was pretty uniform over the field generally speaking, the producing horizons underlying the field must be connected. How much, or rather what rate of migration would take place, had taken place, or will take place, depends on the resistance to that migration and the differential in pressures, and these maps which you have, Exhibits 12 and 17, both being rock pressure maps, and so designated, indicate a lower rock pressure in the northeast slope or north flank of this field, with gradually increasing pressures as you approach the southwest flank of the field. In that northwest area I know that there are substantial amounts of gas being produced, sour gas largely, that had to be used for the manufacture of carbon black; but it is apparent to me that it is having its effect on the field.

I have already stated that the main production from gas wells has been through the central portion of the area enclosed within the reddish lines in the western part of the field, commonly called the West Panhandle field. It is my idea that the pressures reflected in the areas where these walls have been producing as gas wells was largely attributable to the production from those wells alone.

You inquire whether I think most of the gas which has come out of the formations in the vicinity of dry gas wells has been produced from the dry gas wells. I don't know as I just get your question there. Of course, all of the gas which has been produced has been produced from those wells. In the production of gas from the reservoir that production has had a very material effect in reducing the original pressure.

You call my attention to an area shown on Exhibit 17 colored in dark brown, which the legend says indicates pressures from 360 to 380 as against the original 430. You point out a number of sections thus colored on which no wells appear but where wells are shown around it. It is my thought that that area has had its pressures reduced as a result of the withdrawal of gas through those wells right around it to whatever extent production has come from those wells. Other wells more distant from any particular point would also pull down those pressures, to my way of thinking. I would not make the statement that I would not expect any of the gas to have moved over to where
69 there are both gas and oil wells and where the oil wells have been producing for the past twelve or thirteen years. In other words, I would not say that no gas has moved in there. I realize the fact that gas might migrate in a porous structure that is inter-connected. That is common sense.

My views are these: in that low pressure area that we referred to there are wells which are producing oil, there are wells in there which are producing gas, there are wells which are producing casinghead gas with oil, and there are wells which are producing just gas. However, all of the gas that is produced in that low pressure area, including dry gas and casinghead gas, is what is known as sour gas. That sour gas cannot be used in large quantity for pipeline purposes. Hence in this field it is used largely for burning under carbon black burners in the production of carbon black. The amount thus used is, according to the Texas Railroad Commission's 1938 report, approximately 45% of it, if I remember correctly—that is, of the total gas produced in this field for that one purpose; so there is a use and withdrawal of sour gas from the northwest flank of the field which is used for carbon black. That withdrawal, which is very substantial and is greater than for any other one purpose for which gas is withdrawn at the present time from that field, is bound to have its effect upon the pressures in the field. In my opinion, that use and that withdrawal of the sour gas is what is causing these changes in pressure in these pressure areas. In this discussion I have been referring to Exhibit 17.

Of the gas which I said had been produced as sour gas from the oil fields, the greater portion is in the West field.

On page 2 of the annual report of the Railroad Commission of Texas, dated July, 1938, under the caption "Development," I read the following:

"The oil wells in the various pools in the field were as a general rule drilled through one or more gas containing strata before entering the oil horizon. In many instances the wells were completed in such a manner that gas from the gas strata was produced along with the oil and gas from the lower oil strata. As a result, a quantity estimated to be in excess of two trillion cubic feet, a large part of which came from the upper gas strata and was produced with the oil, has been wasted into the air."

I think it is true that the production from the wells in the
highly productive area up through the central portion of
the area enclosed in the reddish lines in the West field is
not all of the gas which has been depleted from the forma-
tions originally under that portion of the field. In other
words, all of the gas that is missing from the better
portions of this field has not come through the wells in
70 those portions, but part has gone over and been pro-
duced in the northeast in the low gas producing area,
including sour gas and low producing areas.

The higher pressures are indicated on Exhibits 12 and 15 by the yellow color. Those are pressures which are still in excess of 400 pounds.

I think the first gas production in the Texas Panhandle was from what is known as the John Ray Dome over in northern Potter County. It is my impression that it was there that gas was first produced and carried away through a pipeline for fuel purposes to the city of Amarillo, and that area has been producing gas and supplying the city of Amarillo since, I believe about 1919. The well was completed in December, 1918, and the pipeline was built the following year. After twenty years of production for pipeline purposes, the pressure from which that gas is being produced to supply the city of Amarillo has gone down to where it is around 380 pounds in that little area.

You ask me whether with the pressures in that area being so near what they were to begin with—the pressures of the three wells in that little area being 388, 395 and 396—indicates that the heavy depletion of gas in those areas where you have found the pressures have gone down materially must be attributed to something other than gas line purposes. I would say if there were any more such areas in the field the pressure would depend entirely on the withdrawals. There may be a uniform pressure over the entire field and a sudden reduction must be due to the withdrawal of gas. The fact that the gas pressures in and around the John Ray Dome in northern Potter County have been reduced only slightly from the original pressure is due in my opinion to the fact that the amounts of gas withdrawn to serve the city of Amarillo and vicinity have been relatively small. Up in the area where the pipelines are producing heavily, you will find a greater pressure reduction than that which obtains down here where they have not produced for gas line purposes for twenty years. The area has certainly experienced a withdrawal.

In northwestern Hutchinson County we find from Exhibits 12 and 17 that a very substantial portion of the initial average pressure still exists. Another yellow or high pressure area is in southwestern Moore County and extends northeasterly with the west line of the field up toward the town of Dumas. That group is partly included and partly excluded by the red lines on the particular map at which you are pointing. It has a red line which indicates sweet and sour, and you mean the purplish line. All of this area from a point immediately west of Dumas, where the field plays out, on around through the southeastern part of Hartley County, across the south line of this little field, across Potter County, we find an area of small productivity, a high pressure area. That pressure area also extends over into the more desirable acreage or more productive area.

Coming to a place south of Pampa and a little to its
71 west, we find that in that portion of the field generally south of Pampa, which might be termed a peninsula, the pressure is 400 pounds or better, according to these maps. The contour of these reddish lines indicates that a large portion of that is in the area of low productivity. Going to the eastward, the area right south of the irregularly shaped area surrounded by dark lines near the middle of Gray County, we find a pressure condition indicating 350 to 400 pounds and part of it 400 pounds or better.

My understanding is that the area within the white on all of the three exhibits Nos. 12, 13 and 17 represents a territory that is apparently barren of either oil or gas, due to some reason. Those areas immediately to the southwest connecting up with this peninsula have pressures running from 350 up to original pressure. I assume they are areas of small productivity. They are outside the red lines with the exception of the small area in the middle of the peninsula. Going to the east we find one more small area near the eastern tip of the field which has a pressure of 400 pounds and above. My understanding is that the wells in that area near the town of Shamrock are wells with lower potentials rather than the higher ones.

In averaging pressures in the field for the purpose of arriving at the weighted average pressure in the field, which the Railroad Commission has declared to be 337 pounds per square inch, there is no doubt but that there are averaged into that figure all of these low productive areas. I think I have Mr. Peterson's figure as to the extent of those areas which have wells producing five million cubic feet per day or less. I think he divided it between the so-called preferential area and the area not so preferential. The acreage in what he termed the marginal gas area in the entire field is in his judgment 432,967 acres, and the area included in what he terms the best commercial gas area amounts to 1,033,970 acres. His total, however, does not exactly correspond to the total area set forth as the producing area by the Texas Railroad Commission. It is a little bit less. The total area or the sum of his best commercial gas and marginal areas amounts to 1,466,937 acres.

It is largely true that a large proportion of that marginal acreage or acreage of low productivity is found in areas of the highest present existing pressures, except in the

East field. The main part of that area where there is low productivity is in pressure areas between 300 and 400 pounds.

In making my computation of reserves based on declines in pressure I included all of the acreage set forth as productive acreage by the Texas Commission, namely 1,475,324 acres, and accepted their figures showing the weighted average over the whole field instead of just that part that is included within the read area.

You asked whether I get a distorted picture of the pres-
sures over the field in relation to the productive quali-
72 ties of the field if I average that 432,000 acres, with its
prevailing higher pressures, into the average for the
whole field. In my opinion what you get is a weighted average pressure over the whole acreage in the field, and if you consider the whole field as one reservoir, that is, the gas portion of it, I think that in order to secure or determine the present weighted average pressure in that field one would have to proceed in the manner in which the Commission proceeded. I believe that the answer there, the 337.66, or whatever the average wellhead pressure was that they determined, is just that, the weighted average over the total gas acres in the field, regardless of whether or not some of those acres included are of high potential productivity.

You ask me if, when I applied that figure which includes the area of high pressure but low productivity, that would not give me a distorted picture of the pressures in their relation to the productive areas in the field or areas of most productivity, and my answer is no.

There is no doubt but what the pressures set forth in Exhibit 17 are lower in the central portion of the field where the greater number of wells exist today, and the pressures in the central axis are lower than they are on the western edge. I don't subscribe entirely to your observation that those areas are where the heavy production has always been and where the original reserves were heavy. I think you are assuming that the locations where the wells are now are the locations of the most productive area. In other words, my point is that there may be and probably are areas that have yet to be drilled up in that field that were very probably as productive as areas that have been drilled. Those areas are between the outer edges of the field and the central axis. I can't spot a particular section in a particular township, but most certainly that field is not entirely drilled up. I don't think anybody contends that. I probably cannot show you any large area in that field which has not had a gas well drilled on it, but I believe there are many tracts which have not been fully developed by having gas wells placed upon them.

I presume that the area enclosed in the red or purplish line in the west field undoubtedly is the most prolific productive portion of the west field. There is no question about that; but I do not state and I have not stated, to my recollection, that that has been entirely drilled up or that the locations of the gas wells in that west field cover all of the productive area. I think there are some yet that have not been drilled up.

I think I stated in answer to a question that the area of highest productivity was in the region up through the central portion of the area enclosed in red and that the less productive acreage was to the southwest. I think it is true that you find the less productive acreage on the whole down toward the southwest and getting better as you go toward the northwest.

That central area of the west field, that axis along which many of the wells are located, and the area covered
73 generally by the gathering lines of Texoma show substantial reductions in pressure, as indicated by Exhibits 12 and 17, and it is true that in figuring the weighted average pressure of the field, the low pressures in the areas where the greatest productivity originally laid are averaged in with the higher pressures of the relatively less productive areas.

I don't think it makes any difference whether you take the production out of the areas of greatest production in a great field like that in the application of Boyle's law or the pressure decline method of computing reserves, if you have a closed structure with interconnections between practically all parts of that structure. You started out with a given volume and a given pressure, you have certain withdrawals and you experience a certain drop in pressure. That drop in pressure represents the effect of the withdrawals that you are considering. Now, all of these estimates of reserves are necessarily approximate in a certain degree, because in order to have an absolutely scientifically correct estimate it would be necessary to know what the present shut-in simultaneous pressures were in all parts of the reservoir, and that is a physical impossibility without shutting down the field, and it is one you cannot arrive at without shutting down the field.

The point I am making is that the operation of a field of this size naturally precludes the possibility of getting simultaneous pressures and other simultaneous conditions to make a very scientifically correct estimate, so what you do is do the best you can with the most reliable data that you can get. That field is not in equilibrium unless it was shut in and it is true that there is some effect of the withdrawal and the large withdrawals of gas from the reservoir which may have some effect in distorting the picture, but from the best information that you can get, the greatest number of simultaneous or nearly simultaneous readings, is the data that you have to use in considering what is the average pressure.

I know what Boyle's law is. It is a formula of physics that a perfect gas, that is, the volume of a given weight of perfect gas, varies inversely with the absolute pressure. You have got to have absolute pressure. You have got to have absolutely ideal conditions within the container, and you have got to have a perfect gas in order to apply Boyle's law. I considered the deviation from Boyle's law and I considered the effect of temperature, namely, Charles' law. They offset each other in the field to a large extent. The net result is that estimates made according to Boyle's law, with no consideration being given to the deviations from Boyle's law and no consideration being given to the effect of temperature on volumes under the conditions as they exist in this particular field, make the ultimate result a little less than what you would get if you applied those corrections. I later made those adjustments, but the difference was small.

If you had a perfect gas in an air-tight glass container or metallic container that would permit pressure inside and you were to turn a cock at one side of that container, the
pressure would equalize immediately within a reason-
74 able area and size. In an area 125 miles long and 35
miles wide at places and at an average of 15 miles in
width, the areas of high porosity and areas of low porosity alternating with spots that contain no gas at all in different portions of the field as reflected by Exhibit 17, the equilibrium would not be restored instantaneously even though you shut down all the wells in the field. It would take some time to reach equilibrium pressure.

You assume that, the pressures having gone down in the areas of greatest original reserve and therefore the areas of greater porosity, gas moves in from those areas of higher pressure or lower productivity to equalize with that pressure over a long period of time, and inquire whether the pressures will be built up higher in the same proportion that they are pulled down at other places. You inquire whether the pressure will be built up in the central or more productive area where the pressure has been depleted at the same rate that it will be pulled down in outlying less productive areas of higher pressures. I don't know just what you mean by the same rate. Let me see if I can answer your question. If you were to shut that field in, then the pressures in the lower pressure areas of the field would be built up by the migration of gas from the higher pressure areas. The rate at which the pressure would be built up would depend upon the rate of migration of the gas—the amount of migration. After a certain length of time, depending on the rate of migration, equilibrium would again be restored throughout the entire field. Those areas that are now portrayed upon Exhibit 17 as being relatively low pressure areas, the ones you have referred to as being along the central axis, the pressures in those areas would be materially increased above what they are as indicated on Exhibit 17.

You inquire whether if the pressures are built up along the central axis or areas of greater productivity by having gas move in from the less productive areas, the rise in pressure along the central axis will be the same in pounds as the drop in pressure in the outlying areas. That question cannot be answered without giving serious consideration to the relative areas involved and the thickness of the reservoir in the two areas.

You assume that the field is shut down and we wait a hundred years and let the pressure equalize. You inquire whether the weighted average pressure will then be 337 pounds. I could not tell you that without making an estimate and knowing the relative areas and thicknesses of producing formations in any portion of the field that you have in mind. In other words, the resultant equilibrium pressure would be determined by the amount of gas that would be moved from the higher to the lower pressure areas, and in order to determine even approximately what that would be from that standpoint, it would be necessary to know first of all how much gas there is in each section of the area involved, how much was there, and the area of the reservoir voids or the pore spaces over the entire area involved. My estimate of reserves is based on the assumption that if the pressure were equalized it would be 337 pounds, because that is the nearest figure we have to what is the average pressure over the field.

You state that there was a great deal more gas to
75 begin with along the central axis than out in those
outlying marginal areas where the higher pressures still prevail, and state that the reason there was more gas in there is due to the circumstance that there was more porosity in that area than in the outlying areas, and ask if I agree that that statement is true. It is partially true, but not altogether true. It is not true in the respect that you may have identically the same porosity and you might have a wide variation in thickness. The pore spaces you have under the axis might be substantially different than the pore spaces in an acre out on the edge. There is no doubt that the reservoir void or pore space out where the great volume of gas along the central axis was originally located greatly exceeded that in these outlying areas of relatively small productivity. The reason more gas was there was because there was more room for it—more pore space.

If you take enough gas out of this area which is still above 400 pounds but which is thin in productivity and pull the pressure down 100 pounds and put the gas over in this area, it would build up the pressure in proportion to the pore space or reservoir voids. If the reservoir voids are twice as much per acre in the central portion as they are in the edge, it will not build up as fast or up to such a high point.

Going back to Exhibit 13 and assuming for the purpose of the question that instead of producing the greatest volume of gas along the central axis or to the northeast of the central axis there has been produced the same quantity of gas from the areas to the south and west of the central axis, you inquire whether I would say that the same pressure conditions would exist. My answer is that you would have a reduction in pressure at the point where the gas was produced. I think that if that large production were to have taken place along the south flank of that field rather than along the north flank, you would have something akin to what you have there except in reverse. I think you would have pressure along that southern flank corresponding to the pressure you now have along the northern flank, namely, below 150 pounds. Whether you would have those pressures sooner than arrived at up where there was a very much larger quantity of gas in place would all depend upon the reservoir space and on the productivity of the area involved. When I said a while ago that if this production had been transferred to the southwest flank instead of the northeast flank that you would have the same pressure conditions that you have now, except in reverse, I meant the low pressure would be on the southwest and the high pressure on the northeast.

(Drawing of two gas cylinders marked Exhibit 19 for identification.)

Exhibit 19 is now exhibited to me. Counsel states that it is a drawing of two cylinders denominated A and B. Below the longer cylinder is written the words "10,000 CF," that is, cubic feet, and under the shorter one is "2,000 Cubic Feet." To each of these cylinders is attached a pressure gauge and between each there is a common outlet to which is attached a valve, called Valve A and Valve B, and these two containers are connected to a common outlet marked G, and there is a meter marked X. Counsel assumes that these two containers are filled with gas, one containing 10,000 cubic feet and the other containing 2,000 cubic feet, and suggests that we see how the operation of Boyle's law to that kind of a situation works out and whether it makes any difference whether you produce your gas from the larger container or the smaller. He assumes the absolute pressure to be 100 pounds in each case, and states that a condition is assumed similar to that which obtained in the Pan-
76 handle gas field in the beginning except that 100 pounds is used for the purpose of this illustration instead of 471 pounds absolute in the reservoir. He assumes that we wish to produce from these two containers containing 12,000 cubic feet 3,000 cubic feet of gas and, since there is only 2,000 cubic feet in the smaller container, suggests that the connection be made into the larger container.

He suggests that in producing 3,000 cubic feet of gas from the larger container the valve of container B be left closed, and inquires what effect it will have on the pressure of container A if 3000 cubic feet be taken out of the container having 10,000 cubic feet in it to begin with, at 100 pounds pressure. My answer is that the pressure will be reduced to about 70 pounds. The average of the two, one being 70 and the other 100, would be 85. The proportion of the total gas which has been taken is one-fourth, but the average pressures indicate only 15%. That is on the supposition or assumption that the amount varies directly with the pressure. The fly in the ointment is that counsel did not open both vales and let them equalize.

You assume that equalization had not taken place in the Panhandle at the time I made my computation. That is what I started to say when I was describing the necessity of using the practical data that you have and not waiting for equilibrium in the field. The difference in the problem that you have in Exhibit 19, with two tanks, is that those two tanks, according to your hypotheses and premises, have no interconnection whatever. At no time did you open the valve in B tank. In my opinion, your problem in Exhibit 19 would be synonymous to a condition where you were considering the Monroe field on the one hand and the Texas Panhandle on the other, with no interconnection.

If there were a connection, equilibrium would happen before very long were the containers, say, only 12 inches apart. With an ordinary pipe connection in it, it would take place practically at once. (Objection by Commission Counsel.) If 3000 cubic feet be taken out of cylinder No. 1, reducing its pressure to 70 pounds, and take no part of it out of No. 2, we would have an average in the two of 85 pounds; but that average means nothing because they are not connected at all. If you allow those pressures to equalize, giving them the time that is necessary, they will equalize at 75 pounds, which is a different figure from the 85 at which they started out to equalize.

Counsel states that at a particular time we find pressures in the Panhandle field of 400 pounds, then 380, 360, 340, 320, 300, 280, 260, 240, 220, 200 and on below that. He inquires whether it is not going to take a long time for those pressures to equalize if every well in the Panhandle is shut down. My answer is that I presume it would take quite a while to equalize; but the difference there between that practical situation and this problem is that you do have an interconnection between the two reservoirs. (Objection by Commission Counsel overruled.)

Counsel refers to the Borger field, which is one of the
lowest areas designated in Exhibit 17, and suggests that
we go across to a point just below the letters H & G N in
the northwestern part of Carson County. He says that
we find at Borger 200, 180 and 160 pounds and less
77 than that, while up at Obstruction, near the south end
of the field, at a point near the letters H & G N, we still
have 400 pounds. He inquires whether, although there is
interconnection, there has been any equalization there. ~~My~~
answer is that there has been some equalization but probably not much. The process of equalization is going on but it is not completed, as it would be if you opened this valve and let the gas flow over here and equalize those two tubes. I wouldn't say that the yellow high pressure part and Borger were just as far apart at the time the weighted average was arrived at as are these two cylinders with no connections between them. There is a physical connection there but the distance is great and the amount of gas that would pass from one place to the other is evidently small; otherwise the pressures would be more nearly equalized than they are. They would equalize quickly through the tubes if it were not for the resistance offered by the formation.

I don't think it is the case that until equalization takes place you will have the same inaccurate figures when you go to averaging pressures over areas of different productivity in the field that you have when you go to averaging the figures shown on Exhibit 19. I explain the distinction in this way. Take, for example, Exhibit 19 showing the two tanks. I gather that A represents the Borger area of the Texas Panhandle field and Tank B represents a point on the southern flank of the field in northwestern Carson County. You have there definite volumetric quantities representing the most widely separated sections of the field on that cross line. In Exhibit 17, showing the rock pressure map of the Panhandle, we have about 20 bands of pressure areas in between those two widely separated extremes; so that on the one hand counsel has taken an average of the pressures in Tank A and Tank B, which would be an equivalent of taking an arithmetical average of the pressures at Borger and the pressures down in northwestern Carson County. That is not the method, as I understand it, that was used by the Texas Railroad Commission in getting a weighted average pressure of this area. They have these bands in between, which they planimetered for the various gradients of pressure and then weighted them in.

If we applied Exhibit 19 to Exhibit 16, I presume that Tank A would fall on Exhibit 16 along the east flank of the buried granite mountain where the central axis is, and the area of small production would be over on the south edge of the field. I have said that at the time the weighted average pressure of 337 pounds was obtained they were in a state of partial equilibrium, but not entire equilibrium. It was in the process of equalizing. At that particular moment there was a wide divergence of pressure between the maximum and the minimum, and a gradient from one to the other—not an abrupt change as appears in Exhibit 19.

Counsel assumes that since there are 15 pressure bands, 13 cylinders will be placed in between and that production is taken from cylinder A, which is the one of heaviest productivity. He inquires whether we will get the same average pressure that will obtain when the cocks are all open and we have a state of equilibrium as between the cylinders. My answer is that I don't think so. The comparison is quite different, in my opinion, from the facts, because
78 in determining the average weighted pressure in the
field by the methods used by the Texas Commission full weight was given to each of these greatly reduced pressure bands on an acreage basis.

In my opinion, the method used by the Texas Railroad Commission in determining an average weighted pressure of the gas in that field is more nearly correct than taking the average from the pressures in the two tanks that you have set forth there in Exhibit 19, for the reason that the method used takes into consideration the gradient of pressure from the high pressure of 400 pounds on the south to the low pressure of 150 and less on the north, and gives effect to a weighing which has been determined, as I understand it, by surveys of the actual observed shut-in pressures in these various bands, and that those bands are determined by contours in the case of the Commission's survey on 50 pound intervals, in the case of your Exhibit 17 on 20 pound intervals.

I believe that those varying pressures and bands and the weighting of them gives an effect of the weighting of pressures and takes into consideration the fact that there is existing at all times an interconnection between these and an effect of equilibrium or attempting to arrive at equilibrium; but, as I stated earlier in answer to one of your questions, it is of course only a means to an end and cannot be scientifically perfect, undess one did wait until you got equilibrium.

(May 24, 1939.)

Counsel has now caused a tube to be put between the two containers shown on Exhibit 19 and assumes that the tube has an average porosity of 20%. He assumes that the tube opens into each of the tanks; that both are filled with gas and have a pressure of 100 pounds. When the pressure is 100 pounds in the two containers, the intervening space would likewise have the same pressure. In other words, if the pressure in A is 100 pounds and the pressure in B 100 pounds, the pressure in the tube would also be 100 pounds. That was the condition which obtained in the Panhandle when it was first discovered—471 absolute in the formation or 430 well gauge at the top of the ground.

Counsel assumes that a valve is opened on A, and B is closed; that the wells produce 4000 cubic feet from A; and inquires what the pressure will be in container A. My answer is that it would reduce the pressure in container A to 60 pounds if there were no connection between the two; but during the withdrawal and immediately subsequent to the beginning of the withdrawal there would be some migration of gas from B through the interconnection.

If 4000 feet is withdrawn and the pressure is immediately measured it will be found at 60 pounds plus the effect of the gas which goes through the interconnection. It is suggested that one of the containers be put across the street from the other where it would take some time for the pressure to start any movement of gas out of B; but it would start some movement immediately. The quantity of migration would be dependent, of course, upon the resistance through the tube; but if the pressure be
taken immediately upon withdrawal it would be ap-
79 proximately 60 pounds, while the pressure in B would
be approximately 100. The arithmetical average of the two figures, not giving consideration to a weighting by volume, is 80 pounds. (Objection by Commission Counsel.) There has been an arithmetical average pressure drop as between the two of 20 pounds as a result of taking the 4,000 cubic feet out of container A. That represents

a drop of 200 cubic feet per pound. (Objection by Commission Counsel.) On the basis on which you have presented it, if that is multiplied by the original pressure, you get 20,000 cubic feet as the original reserve of the containers, when as a matter of fact they had only 12,000.

In the meantime there has been some migration between container A and container B. If we wait until 100 feet has been moved out of container B in the direction of container A, 100 feet will obviously have entered container A, and if the pressure is again taken, we will find 95 pounds pressure in container B. Adding 100 cubic feet to container A, which had 6,000 feet before it came over there, would raise its pressure approximately one pound. Then there would be five times the pressure drop in container B as the pressure rise in container A where we have produced the gas.

The arithmetical average pressure between 95 and 61 would be 78 pounds. That represents a pressure drop of 22 pounds. On that basis dividing that into the withdrawal of 4,000 cubic feet and multiplying the result by 100 would give an indication of an original reserve of 18,200, instead of 20,000 as the first indication, and instead of the actual content of 12,000.

In discussing these examples I have used the assumptions made by counsel and the arithmetical averages are on the basis of those assumptions. I am not subscribing to the method.

You state now that we will go on until an additional 200 feet has moved out of B in the direction of A, making a total of 300 feet. That will necessarily mean that 200 additional feet has entered container A. With the total removal of 400 cubic feet from B into A, that would leave 1,700 cubic feet in B and a pressure of 85 pounds, while there would be 6,300 cubic feet in A at a pressure of 63 pounds. The arithmetical average between 63 pounds and 85 pounds would be 74 pounds—a pressure decline of 26 pounds. Dividing that into the withdrawal of 4,000 cubic feet and computing the original reserve therefrom on the basis of the indicated drop of 154 cubic feet per pound, we get 15,400 cubic feet as the original reserve, which is different from the second result of 18,200, and different from the first result of 20,000, and still different from the actual original reserve of 12,000 on that basis. On the basis of arithmetical averages, no matter where the pressure is taken before equilibrium is restored, you will get a distorted result indicating more gas than was actually there.

If you go down until 666⅔ cubic feet has moved out of container B over to container A, there would be left in container B 1333⅓ cubic feet and the pressure would be 66⅔ pounds. In the meantime 666⅔ cubic feet have entered container A, from which the 4,000 cubic feet had been withdrawn, and this would have raised that container to 6666⅔ cubic feet, and the resulting pressure 66⅔. They have equalized then. The pressure for B is 66⅔ and
80 the pressure for A is 66⅔, and that is the average for each of them. The pressure loss has been 33⅓ pounds average loss between the two. If the 4,000 is divided by 33⅓, the result is 120. Multiply that by 100 and the result is 12,000, the exact amount which we started out with; so when equilibrium has been established, applying the method as it has been applied, whether right or wrong, we get the original volume.

I would like to give you my idea of the difference between the application as made by me in estimating the reserves in the Panhandle field and the problem you have set forth, and the manner you have set it forth in Exhibit 19. When we get to any pressure that is equivalent—that is, the same pressure in both your containers, whether it be the initial pressure of 100 pounds or whether it be the final pressure of 66⅔—at those two points, call them end points if you like, they represent both the weighted average and the arithmetical average.

You suggest that you might meet the objection I have made by assuming that the top capacity of container A, the acreage in container A, is just twice as much as it is, and leave B shown as it is. By having container A double its width so that there would still be 10,000 cubic feet but twice the surface area—twice as much contour as we started with, it would meet my objection if you weighted the various factors in this in accordance with volume.

What the Railroad Commission did was to weight the average of pressures in the field on an acreage basis. You ask whether the Railroad Commission paid any attention to content or only considered pressure and acreage in determining their averages. As far as they went, it was to determine on an acreage basis the weighted average pressure of the field without regard to where the gas was in its distribution over the field. In my estimate I included the factor of thickness of pay, which in fact took into consideration volume. You state that I didn't say anything about sand thickness or pay thickness or volume in my pressure decline computation. I must of necessity assume a certain thickness. I assumed that every acre in the field had as much gas under it as any other acre. I assumed an average thickness over the field. I know it would not be constant in the Panhandle, but there most certainly is an average, just the same as we had an average by taking these two dissimilar containers. There is always an arithmetical average.

You next state that you are going to weight it on the basis of acreage by making container A twice as big along the top as container B, but it has the same quantity of gas in it; that there is twice as much acreage in A but still the same quantity of gas, and that B has the same quantity of gas. You refer to Exhibit 13 in this connection, where the production is around five million and below but which has 430,000 acres of land, and comment that there is about twice as much acreage where the production is better and the original reserves were higher—about 2½ times as much in productivity. You suggest that we make the area twice as big and withdraw 4,000 cubic feet as was done in the other problems. The pressure would be 60 pounds, but it will be 60 pounds over twice as big an area.

If I remember problem No. 1, it involved the with-
81 drawal of 4,000 cubic feet out of cylinder A with an
immediate, or very close to an immediate, reduction in pressure from 100 pounds to 60 pounds and then the determination of the arithmetical average between 60 pounds and 100 pounds, or 80 pounds. It is now 60 pounds in A, over an area which is twice as large as it was before. You ask me to weight the average pressure produced in A with that of B, and then solve the same problem indicating the original reserve.

Now, on an arithmetical average basis we arrive at the figure of 80 pounds. In weighting it on the basis of the area in the top of the cylinders, which you say would be an acreage basis, the top of cylinder A being twice the area of the top of cylinder B, we would have a pressure in cylinder A, which is 60 pounds, being given twice the weight of the pressure in cylinder B, which is 100 pounds, so that we would have a figure of 120 pounds weighted average for A and 100 pounds for B, the sum of which would be 220 pounds, which, divided by three, would be 73⅓. The pressure drop was 26⅔. Dividing that into the withdrawal of 4000 cubic feet, we get 149.5, and multiplying that by the original pressure we get an indicated original reserve of 14,950.

When we weight the average on the acreage basis we still get 25% more gas than was originally there on this particular set up and basis where you have twice the area in the one as in the other. You inquire if having an area 2½ times as great there would still be a distorted picture, as in the case of the Panhandle field; but I state that the situation is different. The nearer you come in any problem of this sort to weighting your pressure on the basis of total volume, the nearer you come to accuracy.

You state that the Railroad Commission paid no attention to volume but weighted it according to pressure and acreage. They did; but they did not take the two ultimate extremes. The other determination was isobar contours and gradient of pressure; and theoretically the closer those contours are calculated and the greater number of those isobar contours, the truer becomes the gradient of pressure, so the more nearly correct you get an answer as to the average pressure over the area. The difference between what was done by the Texas Railroad Commission in their determination of average pressures over the field and the problem that you have set forth here with your Exhibit 19 is that you have used terminal pressures and terminal conditions and taken an average directly and arithmetically between those two; and they, in their determination of the average pressure, have used these bands, or, in other words, they took into consideration the pressure gradient.

You suggest that we move these cylinders and put one over in the area in the middle of the north part of Potter County and the other one in the middle of the south part of Moore County, and calculate from band to band, where we won't cross any intermediate bands at all, and ask what would be wrong with the application of the principle which has been demonstrated. The principal thing is that you have used an arithmetical average instead

of a weighted average and personally weighted it on
82 the basis of the change in area of the top of the tube.
(Objection by Commission counsel.)

You next suggest that the Texas Railroad Commission, in arriving at its so-called weighted average of 337.66 pounds per square inch, disregarded everything except pressure and area. They based it principally upon area—perhaps entirely on area and pressure. (Objection by Commission counsel.) I want to say that they did determine, as near as I can interpret from their report and methods, what in their minds was an average pressure over that entire field by the determination of certain pressure contours and isobars and then giving each pressure band a weight in the amount of pressure included in each pressure band. So that they got the pressure by determining weighted pressure bands covering the entire area, and the number of those bands, each band having its weight, that is true—that would be a weight in accordance with the area in which they found certain pressure brackets.

Questions by the Examiner.

The Examiner inquires whether the Commission has any subsidiary breakdown of that map which they used in their calculations. On page 12 of their report, marked IV, "Pressure analysis of the Panhandle area, July, 1938," they set forth the pressure classification of those brackets at the left hand side. Then they show successively the West field, the East field, the South field, and beneath that the total Panhandle field. They have brackets from zero to 150, 150 to 200, and so on up to 400 and over, and the total of wells in each case, and in each field, a total of acres in each field, and each bracket, and apparently a total potential production. Those potentials of production are open flows. They are based on tests of the wells.

The Examiner inquires whether this number of wells works into the calculation at all or any part of the weighting. They state here the total number of wells in each pressure bracket, the percentage of the total, the MCF potential, and percentage of the total; and the acres in the bands, and the percentage of the total. I doubt whether anywhere in this report the Commission states what its weighting process was; but I do note that these potential open flows and the number of wells and areas are here. I stated in answer to one of Mr. Morgan's questions that it was my thought that the Commission determined its weighted average pressure upon area and pressure, but I note these wells and potentials which may be weighted in on this thing, which may reflect volume. That may be a factor which would enter into my answers on further cross-examination.

Cross-Examination Resumed by Mr. Morgan.

You ask if the Commission, in arriving at the so-called weighted average rock pressure of 337.66, did not go into the area colored yellow on Exhibit 12 and examine the pressures of all the wells in the yellow band. I think inasmuch as Mr. Cottingham, who made up this report, is here, the best evidence should come from him as to what the Railroad Commission did. He is better informed as to what they did than I would be.

I have examined that report and satisfied myself enough about the 337 that I am willing to come here and testify
83 to that vital issue in this case and use 337.66 as the
weighted average pressure of the field. There is no evidence in the report that the Commission took the pressure of every well in the yellow area and arrived at the arithmetical average by adding up the pressure and dividing by the number of wells. As to whether there is any evidence that they considered anything except acreage, they set forth in there, potentials and the number of wells, and they come out with an answer which purports to be and which is stated to be the weighted average pressure of the whole field. There is nothing in the report that indicates the calculations that were followed.

You ask me to explain how they could use potentials in arriving at the weighted average pressure, and what potentials have to do with pressure when we are talking about the weighted average pressure. The potentials are the estimated amounts of flow, or rate of flow, of the wells and have something to do with the volume of the wells. Ordinarily speaking, the potential of a well is the amount that that well is capable of producing, ascertained either by calculation or test.

Down in Texas they have what they call proration production among the producers in all of the oil fields in that state, and in prorating the production, or allocating the production among the different producers, they are required under the regulations to give effect to the potential producing capacity of the wells. As to whether that is the reason they are talking about potentials on the same page that they are talking about the weighted average pressure, that I think the best evidence as to that is the person who prepared that page. I think Mr. Cottingham can furnish the best evidence in connection with that.

You inquire what I assumed the weighted average included when I adopted the figure and made it the basis of my computation. I assumed that the weighted average was as it is set forth on that page, namely, 337.66. I assumed that it was the best estimate the Commission could make of the weighted average pressure of that field. I made no assumption at all as to whether it was based on pressures and acreage alone. I took their figures as they reported, that is, 337.66. When you asked me this morning if that is not what they did, I thought at that time it was. When I adopted the figure, I accepted it as their best judgment of the weighted average pressure in that field, and at the time I adopted it I thought that figure was a result arrived at by considering acreage and pressure alone.

The way of doing that would have been to go to the yellow bands or yellow patches and count the number of wells there and take the pressure of each well and divide the sum of the pressures by the number of wells and thus arrive at the average pressure of the wells in the yellow areas, and then multiply that by the number of acres in the yellow patches, and you would get a product. Leaving the yellow band and going over into the green, you would count the number of wells in the green area and observe the pressures of each one of them, and then you would divide the sum of the pressures by the number of wells to get the average pressure of the wells, but it would not give you the average pressure per acre.

We would do the same thing in all the seven bands,
84 and then add all the products and get a total. In order to get the weighted average pressure of the field we would divide that total by the total acreage.

When you take all of the wells, test them for pressure, add the aggregate pressures together and divide by the number of wells you get a result that is weighted by the number of wells. The thing that the Commission did in multiplying the number of acres in the yellow patches by the average pressure of all the wells was the element of weighing that got into their calculation, if that is what they did. If we assume that is what they did, and they added all these totals up and got a total and divided it by the whole number of acres, this is the kind of weighting they did, on the assumption on which we are proceeding here. The way you set it forth it would be a weighting as to pressure bands or on an area basis.

In order to apply that sort of a weighted average—a weighted average based on area and pressure alone—in estimating reserves of gas in a reservoir, you do not necessarily have to assume that every acre in the field has exactly the same content of gas as every other acre in the field, or had in the beginning.

Coming back to Exhibit 19 and to the two original cylinders of the same size at the top, and extending container B down to where it will also contain 10,000 cubic feet in the beginning, let us draw 4000 cubic feet of gas from container A as we did in the beginning. The arithmetical average pressure of the two containers would represent a pressure drop of 40 pounds in A and nothing in B, or an arithmetical average drop of 20 pounds. The arithmetical average between 60 pounds remaining in A and 100 pounds remaining in B would be 80 pounds. This represents a withdrawal of 200 cubic feet per pound drop, and multiplying that by 100 we would get 20,000 as the original content. We are starting out with two identical cylinders representing the same size areas and having the same content per unit of area. In applying that formula, every acre having exactly the same content as every other acre, you get the right results because those are weighted for volume when you start out and end up in the same identical cylinders. If you assume that every acre in the Panhandle has just as much gas under it as every other acre in the Panhandle, you can apply that formula and know you will get the right result, regardless of what the weighted average is.

Of course, in the Panhandle you do not have the situation of having the exact amount of gas under each acre that there is under each other acre. It would be a very great coincidence if that were true; but there is an average amount of gas under each acre. There is an average between 2,000 and 10,000, and if we weighted it according to area, as we did when we doubled the area of container A, and considered nothing but area, we still get the wrong result, although we arrive at the proper averages; but we get the right result if we weight it as to volume. I am waiting to hear what the Railroad Commission did in that respect. If we assume that they did not—if they considered nothing but acres and gave no effect to volume as distributed out through the field, then when I adopted their weighted average and made my calculations on that basis I did not get the right result.

85 You ask us to suppose that, instead of producing that 4000 cubic feet out of cylinder A, we produce it from both of them in such a manner and at such a rate as that the pressures would go down in each cylinder at the same rate, and that if we produce this 4000 cubic feet from these two cylinders we would have to produce 3333⅓ cubic feet from A and 666⅔ cubic feet from B, if we wish to have our pressures go down together instead of having the weight equalized through the tube. Then the pressure in container A and container B would be exactly the same, and, working the problem, it would come out 12,000 cubic feet. That would be the same rate of withdrawal based on weighting by volume of each cylinder.

If there had been a well drilled on every 640 acres in the Panhandle and enough gas withdrawn from each of those wells so that the pressures would have come down together, you could apply my formula in computing estimates and get the right answer. I think it approximates it the way it was done, the greater portion of the production coming from the most prolific area.

You ask me to take a look at Exhibit 17 and tell whether that is what has been done in the Panhandle and whether that is true as reflected by that pressure map. My answer is that, of course, that pressure map indicates that there has been by far the greater amount of production in the most prolific area and to the northeast, and that the effect of those withdrawals, as they have been made, has resulted in a lowering of the pressures in the central or axial area and in the northeast area to a greater extent than in other parts of the field on a pound basis; that is true. You certainly have not uniform pressures throughout the field; that is obvious. It does not necessarily follow that the same content per acre does not prevail throughout the field. I did not state that I think every acre in the field has the same quantity of gas under it as every other acre in the field. I think it is perfectly reasonable to assume that each acre within that reservoir does not contain the same quantity of gas as every other acre in the field. I would say that it would be an extreme coincidence if there were identically the same quantity of gas under any acre in the field.

That is true of the Panhandle as in other fields. It is characteristic of gas fields.

You ask me the reason for fencing off about 1,033,000 acres inside a reddish line on Exhibit 13 from the rest of the field, which you state I admitted yesterday was much leaner and less productive of gas than that which was included within the reddish lines. My answer to that is for the simple reason that the characteristics of this field, in the same manner as in other fields that are formed by synclines or domes, are that the area that is productive is included in the top of the dome or the top of the syncline and pinches out toward the edges of the productive area. In this particular field, on Exhibit 13, the productive area or potentially productive area is delineated by the black line which forms the outside boundary of the field. Now, if that is the boundary and the limits of production, obviously as you approach closely to that outer boundary from any point inside, it could be assumed that the area is approaching the non-productive state, and, therefore, it is very
86 probable that the most productive or, as your Mr.
Peterson stated, the best commercial area of the field is somewhere on the inside.

There is a variation in this field in both porosity and permeability of the structure that produces gas; that may have something to do with it. We find, for example, in eastern Gray County areas of relatively small productivity running clear across the field.

I agree with your suggestion that if you assume the same content under a given area as obtains in every other area of the same size throughout the field, the formula will work, regardless of whether the pressure is equalized or not.

(Objection by Commission counsel to form of question on hypothetical basis with ruling first reserved and then overruled.)

(At this point the following questions and answers appear:)

By Mr. Morgan:

Q. (All right. Let us pursue this same method of computing that you have used and assume—and this is hypothetical and not tentative—we will assume that it turns out that this field does not stop where this black line is at all, but that it is just twice as big as it is and that there is an extension off down here to the south containing 1,475,000 acres. Let us assume for the purpose of the hypothetical question that I am going to ask you that that vast area of 1,475,000 has an average of 1,000,000 cubic feet per acre under it. It is over here where the production has not pulled the pressure down. It is over here adjacent to this area colored yellow and the band of green on Exhibit No. 12, and it has not been producing. There are 1,475,000 acres all in this field directly connected with the rest of the field, the pressures of which have not been disturbed at all, but it is lean, it has a million cubic feet per acre. Now, I want you to apply your formula to that situation and see how you come out.)

A. "You want to me estimate—"

Q. (I want you to apply your formula to that situation and tell what the indicated reserve based on the same weighted average pressure that we have been talking about would be. I want you to weight this acreage in.)

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(Objection by Commission counsel noted.)

(Mr. Morgan: All I am doing is to point out the fallacy of his formula by extending this yellow patch so as to make it include another area, assumed area, the exact acreage of the area being the area I selected up here in order to make it easier to figure. I could have said or supposed the extension to come down here (pointing on map) and bring in another hundred thousand, but it would not be so easy to figure. What I want to bring out is that when he applies his formula to this area, which has not been hurt by production, over here on the northeast flank, the present area, that the result is wholly out of line with what the assumed facts are.)

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(Mr. Morgan: Here is my position, Mr. Examiner: I am merely trying to get this witness to use an illustration that I have advanced here. He has said that the weighted average here of 337 pounds, which he assumed at the time he adopted it, gave no effect to anything except area and pressure, and no effect, so far as weighting was concerned, except to area, and that he has gotten the right result, and he still stands pat on that, in a question I asked him just a moment ago. Now, I want to show how this formula would apply to a situation such as I have described here where there is a connected area extending this field down here (indicating on map) so as to include another 1,475,000 acres with the original pressure of 430 pounds, but containing only 1,000,000 cubic feet of gas per acre. I want to show just what highly distorted result is reached by applying the same formula he has used here and weighting in that 1,475,000 acres along with the other acreage already weighted in.)

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(Examiner Simpson: Give me those field figures again.)

(Mr. Morgan: You see this field contained within the colored area which is productive of gas, 1,475,000 acres.)

(Examiner Simpson: Yes.)

(Mr. Morgan: Approximately. Now, in order to double the acreage I just assumed an extension down here on the south where the pressures are still high of another area containing exactly the same number of acres.)

(Examiner Simpson: Yes.)

(Mr. Morgan: That would be an additional 1,475,000 acres, and for the purpose of showing that his formula will not work, I am assuming that in that extension that it contains only 1,000,000 cubic feet per acre, leaving the other part of the field exactly what it has now, with the same pressure it has now, so that instead of having to weight into the picture, the patches that are colored in yellow on Exhibit No. 12, I weight in those patches plus the 1,475,000 acres. I have only added the 1,475,000 acres to the total reserve, said acres containing one million cubic feet of gas an acre or a total of 1,475,000,000,000 cubic feet.)

* * * * * *

(By Mr. Morgan:)

Q. (Mr. Brown, I want to direct some questions that are based on the following assumptions: Over here in the area which is still yellow and where the pressure is still indicated to be about 400 pounds, substantially its original pressure, on Exhibit No. 12, we assume an extension of this field in a westerly and southerly direction, extending over to where this area of high pressure plays out, and containing 1,475,324 acres, just exactly the number of acres which the records shows are contained in this field, here and assume that that pressure is still 430 pounds as it was in the beginning, and assume that it has a content of natural gas of one million cubic feet per acre. Now, I want you by the same method which we have assumed was used by the Railroad Commission, to weight in that additional acreage and give me the result of that weighting in from the standpoint of indicated reserves contained within the whole great reservoir containing all that is here and what would be added to it by the extension of the field. Do you understand my question?)

A. "I understand your question, but it will be necessary to know what the Railroad Commission of Texas would consider under those conditions as the average pressure of that field."

Q. (That is what I want you to find out for me.)

A. "I am waiting to hear how they did it."

Q. (I want you to assume they got it just exactly like it was stated here this morning, for the purpose of this question, and I will connect this up. I want to use the same yellow patches, covering 1,475,324 acres, assuming their weighted average for the present field, but add the assumed extension of 1,475,324 acres with the original pressure and weight that acreage in at the same pressure, and bring that back to the hearing I should say immediately after recess. It is going to take a little while to do this. Bring in the result of that computation.)

* * * * * *

(The Witness:) "I would like to state this: It will be necessary to know what method was used by the Commission and what weights were given to that by the Commission in their pressure readings in arriving at 337.66 as an average pressure. What Mr. Morgan is actually asking me to do is to assume there is an area additional and immediately adjacent to this field which has in it one million cubic feet per acre, and in which the pressure is 400 pounds or better at the wellhead of any wells in that area. Further, that there has been apparently, as I understand it, no withdrawal from that area."

(Mr. Morgan: Correct.)

(The Witness:) "And it has its virgin pressure."

(Mr. Morgan: 430.)

(The Witness:) "430 pounds, and it is entirely a virgin area added to this particular field. Now, he is asking me to weight that in in the manner that the Railroad Commission of Texas would do if that area were included in this field, and I submit that it will be essential for me to know how they arrived at their figure and what methods they used in order to give this the proper weight and in order give the weight for this field."

(Examiner Simpson: Judge Morgan, would it be possible to employ that example with your own witness; would you get the same result?)

(Mr. Morgan: I can do that with my own witness, but I was trying to shorten the matter, because I am doing my best to show the Examiner that the formula that he used, which is an appalication of Boyle's law, cannot be used in the Panhandle of Texas with the conditions that obtain in the reservoir without getting a grossly distorted result, and this is simply an illustration of it. All he has to do, and there isn't any trouble about it—it is perfectly simple, a perfectly simple problem that I had worked out in 30 minutes, in which instead of having this area here with the average pressure of the wells, as the Railroad Commission found them to be and weighted them in at some figure above 400, we do not know what, all I ask is that he weights in another band of 1,475,324 acres of virgin pressure at 430 pounds.)

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(The Witness:) "May I make a statement?"

(Examiner Simpson: You may.)

(The Witness:) "What Judge Morgan is asking me to do is to change the conditions hypothetically in that field and calculate an average, weighted average pressure for the field different than was arrived at by the Railroad Commission of Texas."

(Examiner Simpson: Mr. Brown, suppose we take this whole matter under advisement and you consult with anyone you deem it necessary to consult with to get the question clearly.)

(The Witness:) "I submit this: As I stated in connection with my direct testimony and in answer on cross-examination, that for the purpose of using one method, which I used to determine the original reserves in this field, I accepted a figure in a published report by the Railroad Commission of Texas which is stated and purports to be the weighted average pressure of this field in question. Now, counsel for defendant is asking me to assume conditions that are entirely different than exist in this field, and to use the same method as used by the Railroad Commission when they determined their published average weighted pressure of 337.66. Now, my point is this: I am perfectly willing to do anything that should be done; I am glad to accommodate Mr. Morgan, but I first must know the method used by the Railroad Commission in determining the figure that they published before I can arrive at another figure under hypothetically different conditions, and I submit that the best evidence as to the method that they used should be given by the man that used it in his report."

(Examiner Simpson: Judge Morgan, can you tell the witness the method they used?)

(Mr. Morgan: I have no objection to telling him. I was just going to suggest that I would be glad to tell the method, and I will connect it up later on. The method they used, Mr. Brown, is the method used when we were considering Exhibit 12 earlier in the day. They counted the wells in every one of those areas and they took the pressure of each one of those wells, divided the sum of those pressures by the number of wells and got at the arithmetical average of the wells in each band separately. They then multiplied the average for each band by the number of acres in that band and added the seven products together and divided by the total number of acres in the field and called that the weighted average of the field.)

(Examiner Simpson: Mr. Brown, whether the Commission used that formula or not, is that a formula you can use in getting some kind of a result?)

(The Witness:) "I do not think that counsel is interested in me getting some kind of a result. I think he wants me to arrive at a result that is comparable to the result secured by the Texas Railroad Commission when they got that figure of 337.66."

(Mr. Morgan: No, that is not my point at all, Mr. Examiner. I am simply testing his own formula. He has come in here with a formula by which he undertakes vitally to affect the rights of a great concern here that has money invested in a property extending all the way from the Panhandle of Texas to Chicago. I am simply asking the privilege of testing by asking him to add another band with 430 pounds of pressure to that area and to apply his formula to that and see what it will indicate. That is all I am asking him to do.)

* * * * * *

(Mr. Morgan: I am asking him to assume an extension of that field containing another area exactly the same size at the virgin pressure of 430. Now, you add 337 and 430 and divide them by two, and you have got the weighted average of the whole area. That is how complicated it is.)

* * * * * *

(By Mr. Morgan:)

Q. (I have asked the witness to assume an extension of this field pictured on Exhibit No. 12, at the high pressure southwest portion of the field, so as to add to it another band or zone, such as these seven that are pictured in the colored portion of the map, except to assume that it has the same area as the entire field. The only reason I picked out that particular area was to simplify the problem that I wanted to submit to the witness as a test of his formula. I asked him to assume also that that area had pressure comparable to that of the outside of this yellow area here, which we know is somewhere between 400 and 430, by the legend of the exhibit.)

(I have asked him to assume also that that was a lean area for the purpose of testing his formula, and for that purpose only, that is, an area of small productivity, and that its pressure is still above 400 pounds, somewhat above, perhaps, but approximately 430, its original pressure; and then to weight the pressure and average of that area into the pressure and acreage of the area which he has used as the basis of his formula here, and to then apply the same method that he used in his own computations to the enlarged area, with the eight bands, applying it across eight bands instead of seven, on the theory that if it is good across seven it ought to be good across eight. That is the problem, and I wanted to see what would be the indicated reserves in the enlarged field.)

* * * * * *

(By Mr. Morgan:)

Q. (I won't assume any content at all, Mr. Brown. Now can you give us the indicated content?)

A. "I can figure it out, but first, in order to figure it out, I may state that any additional acreage or extension in this field, such as you have assumed, will constitute an additional source of gas by migration to those portions of the field wherein the pressure has been substantially lowered due to large withdrawals and, the addition of this field of the magnitude that you have assumed, might well change the location of the bands, as shown in both Exhibit No. 12 and Exhibit No. 17."

(Examiner Simpson: I think that is a fair comment.)

(By the Witness:)

A. (Continuing.) "Therefore, if it is true, as you say, that the weighted average pressure of this field is 337.66, as determined by the Texas Commission and as used by me in my calculation of the content of this field in one method that I use, then it would be necessary, if those bands are changed in area or location, to determine that fact, in order to arrive at a new weighted average pressure of the entire area that you assume."

(By Mr. Morgan:)

Q. (All right. Now, let us go over here to your Exhibit No. 12. What is it that causes the pressure in this green area here, which runs almost the full length of the field, immediately outside of the blue and inside of the yellow,—what is it that causes that pressure situation to obtain?)

A. "The withdrawals of substantial quantities of gas from the field."

Q. (From what part of the field?)

A. "From the northeast flank."

Q. (The northeast flank of the field?)

A. "Yes."

Q. (In other words, by reason of a pressure differential between the northeast flank of the field, where the pressures were pulled down very rapidly in the early history of the field, we have had a migration of gas to the northeastward from the field as a whole?)

A. "That is right."

Q. (It has affected the pressures out across that field, except to the yellow area, to the extent that they have now been pulled down below 400 pounds?)

A. "Why do you except the yellow area? I don't understand your hypothesis."

Q. (I say to the extent, except to the yellow area, that they have pulled down to where they are now below 400 pounds.)

A. "I see."

Q. (That is correct, is it not?)

A. "Yes."

Q. (And in the yellow area they have been pulled down some also?)

A. "That is correct."

Q. (By the same influences?)

A. "Yes."

Q. (But they have not been pulled down to 400 yet?)

A. "That is right."

Q. (They are still above 400, somewhere between 400 and 430—the exhibit does not disclose just what the figure is—that was reached by taking the pressure of all of the wells in that area and arriving at their average?)

A. "That is right."

Q. (Now, what influence on these bands could it have if there was still a large area out here that had not been reached by the influence of this low pressure area, which has not been sufficient to get out to the edge of the field as yet?)

(Examiner Simpson: Where is "here" Judge?)

(Mr. Morgan: In the southwest corner, southwestern portion of the field.)

(By Mr. Morgan:)

Q. (Those pressure differentials resulting from the heavy production of gas along the northeast flank have not yet been sufficiently influential on the pressure near the southwest projection of the field and the southwest flank of the field over to a point well within Carson County, to the extent that the pressures have been pulled down as much as 30 pounds, as yet; that is true, is it not?)

A. "It is true that those areas marked yellow have been affected less, as far as pressure is concerned, than the other intervening bands. Now, they have been affected some."

Q. (Correct. But, now, why would the assumption of an area out here beyond the yellow and the assumption that it had not been affected substantially by this production over on the northeast flank in any sense change the location of these bands that have been located by the actual pressure tests that have been made out there in the field?)

A. "It is simply this, that in my opinion it would be impossible, if an area existed adjacent to and connected with this field in the location that you indicate, for some gas not to have migrated from that additional extension, if you please, into the present yellow area, and thence on into the area of greatest drainage or greatest withdrawal."

Q. (You could not say how much, of course?)

A. "I would not attempt to."

Q. (I would not expect you to.)

A. "No."

Q. (Let us then assume that that pressure had been pulled down to the same pressure as this yellow area and just treat it as an extension of this yellow area which we have here now.)

A. "All right, when we do that we introduce an error right away, because you are assuming a substantial area here as an extension of the present given area. And let me say this; that whatever the amount of gas is that has been withdrawn from the actual yellow area as it exists, it has had its effect in the determination of the location of the isobar lines which form the border of these bands, and if there had been three or four times the area in that yellow area that there is actually, a difference in the amount of withdrawal and migration of that gas would most certainly have had its effect upon the pressures in the field as a whole."

"Now, the reason that the green area extends as far west as it does is due to the limitation of the amount of gas that has migrated from that yellow area. If, let us say, twice the gas—"

(Mr. Morgan: If the Examiner please, in view of the manifest reluctance of the witness to answer the question, I withdraw it. I will bring in my own witnesses to prove it. He is telling about a matter I did not call for at all, and I just withdraw the question, in order to stop his speech.)

(By Mr. Morgan:)

Q. (This morning, we were talking about the effect of applying the pressure decline method of computing reserves to a situation where we had exactly the same content of gas under every acre of the field, and it was developed that if you assume the same content under a given area as obtains in every other area of the same size throughout the field, that the formula will work regardless of whether the pressure is equalized as yet or not. It also works out that if you so produce from the field as a whole so that your pressures come down uniformly, and any time you take the pressure you will find the pressure of every well in the field just the same as the pressure of every other well in the field, you have got your weighted average there when you go in to test those wells. They are the same all over, and there is no difference in the pressure in the various parts of the field.)

You can take the withdrawal per pound drop and use the formula referred to and, calculating back, arrive at the correct result under those conditions.

You inquire where you do not have those conditions, as is the case in the Panhandle where the pressures vary greatly and where the productivity is highly variable, if that formula can be applied to the whole situation by taking the weighted average of the field, weighting in the pressure and the acreage or area only, with no consideration given to content per unit of area. My answer is that you can by that method secure an approximately result, that is, an approximation as to the amount of gas in that area. As I stated this morning, I believe under cross-examination, this method of determining isobar pressure bands, contours, and weighting the pressure within those bands on the basis of area, is probably the nearest approximation that one can arrive at.

(The Witness:) "You ask if when I use the figures that I used in my assumption, if it be true, as we have assumed it is for the purpose of my cross-examination, that they did not weigh in the content per unit of acreage but that they weighted in the average, some of which was highly productive and some of which was comparatively non-productive, I get a distorted and erroneous answer if I apply that formula. The volumetric content is the thing that we are trying to find by the application of that formula. Now if you had the volumetric content of the reservoir prior to the application of that formula, there would be no necessity to apply the formula. My point is this: What we are trying to get when we make an estimate of the natural gas in the field is the volumetric content."

(Witness interrupted by Company counsel because answer was not responsive. Question withdrawn and restated.)

You ask if I can apply the pressure decline method of computing reserves in a great area like the Panhandle, 124 miles long and an average of 15 or 20 miles wide, where the conditions are as this record shows them to be in the Panhandle with which I am now somewhat familiar, with the formula based on weighted average pressures, which are weighted as to area and pressures only, without regard to the content. My answer is that I can do that and that is what I have done.

(Objection by Commission counsel.)

87 You ask whether if I took the field by small areas and applied my principle to those small areas, where I have greater knowledge of local conditions as to pressure and productivity and things of that sort, I might arrive at a more accurate result in that particular local area than I would over the whole field. I doubt if that is true, because any area that we would pick out of the field would be a part of the whole, and there would undoubtedly be factors of the pressure drop in that particular area by migration of the gas elsewhere. The trouble would be the migration, and you couldn't tell how much had been produced down to the weighted average pressures as taken in that small area. That is the principal difference between treating a small local area and the whole structure.

If I knew the withdrawal from a local area, I don't think I could arrive at the original reserve of that area by applying the pressure decline method in that local area. If it was surrounded so that the migration factor was eliminated, either out or in, then you might determine your original pressure and withdrawals and the reduction due to those withdrawals. Then I could do it.

Under the operation of Boyle's law, where pressure declines directly with the volume of gas under pressure, in confinement, the same withdrawal in terms of gas ought to result in exactly the same pressure drop, regardless of whether it was done early in the process of exhausting the gas out of the container or later on, assuming that no gas goes in or goes out during the withdrawals that you use.

Going back to Exhibit 19 and taking container A and assuming that it has 10,000 cubic feet of gas and we withdraw 1000 cubic feet from that container, the pressure will go down to 90 immediately. If we average it with B we get an arithmetical average of 95. Now, considering just container A and assuming no connection between A and B, and starting out with 10,000 cubic feet and withdrawing 1000, we have a remaining pressure in A of 90 pounds. If we withdraw another 1000 it would leave a pressure of 80 pounds, a ten pound drop. I assume the withdrawals are on the same pressure basis. If we take out half the volume we will have left half the pressure. In taking out the first 1000 feet we get a drop of 10 pounds, or one pound per hundred of withdrawal, no matter at what stage of the proceeding you do that. That is strictly in accordance with Boyle's law.

I have not studied the pressure drops from year to year during the past several years in the Texas Panhandle to ascertain whether or not there has been a uniform per pound drop in proportion to withdrawals from year to year. I don't know that it would be a very simple way to check my formula. It would be a simple way, assuming that conditions were identical throughout that whole period of time; but I didn't do it.

I presume that the Railroad Commission's report for 1937 has a weighted average just like it does for 1938. I
can figure out the production from July, 1937, to July,
88 1938. Those figures were available to me just like the
others were. I think I could have gotten the withdrawals from 1936 to 1937 by the same means and from the same source that I obtained the figures which I used. I presume that the weighted average pressures in 1936 and 1937 are in the Railroad Commission's report; but I didn't

see them. Assuming that they are in the reports for 1937, 1936 and 1935, and I could get from the same source I got my other information the withdrawals from 1935 to 1936, 1936 to 1937, and 1937 to 1938, it would be a very simple matter to see whether or not there has been the same per pound loss based on each unit of production from year to year during those four years by following through the process used in 1938, and when that is done I would say that there should be an approximately comparable per pound loss per billion feet of withdrawals, same withdrawal of production per pound drop from year to year. There are probably some factors that would enter in which would make them not comparable; but I should say that they should be pretty close.

I don't know whether if there is any wide variance in that pressure, that would be something that would indicate there was something wrong with the formula. I would have to make the computations and check the conditions there during each of those years to see if there were any substantial differences and changes which occurred in the field.

I used the 1938 information and data when I brought in my figure of 23 trillion cubic feet. The same information and data could be used for 1937 and for the interval between 1937 and 1938 and for the interval between 1936 and 1937 and the interval between 1935 and 1936. I think it would be a way of checking what I have shown here to see whether or not the pressure drop has been uniform on the basis of withdrawals during that period of four years, granting that the data is available.

I computed these reserves by another means which I described as the reservoir-porosity method. By that method I proceeded as follows: using the area in an acre of 43,560 square feet, multiplying that by an average assumed thickness of pay of 70 feet, and also having a porosity of 20%, I arrived at a figure of reservoir pore space per acre of 609,840 cubic feet. By that I mean that there is one-fifth in total volume of pore space in these porous substances, of the total volume of this porous substance. Then using the initial wellhead pressure of 430 pounds, which corresponds to an initial reservoir pressure of 471 pounds absolute, and changing that over to a pressure base of 16.4 pounds absolute, I arrive at a figure for the initial gas in place per acre in the reserve of 17,514 MCF.

After determining 17,514 MCF per acre as the total gas in place on a pressure base of 16.4 absolute, I used the fraction 431/471 of that to determine the amount of gas available for production reduced to a wellhead pressure of 25 pounds gauge, which was 16,027 MCF per acre.

I have known of 20% porosity being used before in estimates of reserves in this area. I also discussed the question of porosity with Mr. Peterson, the geologist of the Texoma Company, and I understood that he agreed with
that figure and used it. I don't remember that I dis-
89 cussed it with anyone else. I had seen the figure used
and had seen results of estimates made with that figure. I never made a study or determination of the porosity of that formation down there. I looked at samples of the formation, and discussed it with Mr. Peterson, and found that he had used that figure, and I knew that others had used that figure.

Seventy feet of porous pay production is an average figure. I obtained that figure from Mr. Peterson and discussed with him his opinion of the average thickness of pay in the field. He did not tell me that in his judgment the pay formations in that field had an average thickness throughout the field. He told me that in his judgment what he considered the best commercial producing areas of the field would probably average that in feet. That is the area enclosed within the reddish lines on Exhibit 13 and aggregating some 1,033,000 acres. He didn't tell me that it was his judgment that this area outside the reddish lines had pay thicknesses averaging 70 feet. I don't think he stated what his opinion was as to the thickness there; but when I applied that 70 foot thickness I applied it to the whole 1,475,000 acres. Mr. Peterson informed me that in the total field, and I assume that by total field he meant all of the area included within the red lines; in other words, what he terms the best commercial portion of the field—that according to his estimate the figure in the total area of the field was 70.01 and he used 70 feet. But in the west field, which constitutes by far the greater acreage of the whole field, according to his estimates and calculations the average thickness per acre was 72.98 within that commercially productive area and not including I would say the small area outside of those reddish lines shown on Exhibit 13. I think that the 432,000 acres would be a small area as compared with 1,475,000 acres. It is a smaller area than that which is included inside, aggregating 1,031,000 acres.

Notwithstanding the fact that Mr. Peterson did not inform me that in his judgment the average pay thickness outside the reddish lines was 70 feet, I used that figure as applied to the outside areas as well as the inside areas where he applied it. I used for the whole area an average of 70 feet. I did not use the 70 feet for the major portion of the field which is located within those red lines in the west field. Mr. Peterson told me how he got this 70 foot pay thickness in the area enclosed within the red lines. He showed me a little map which he had colored, in which he set out the areas included in the reddish lines and the other areas, one in yellow and one in gray.

(Map entitled "Texas Panhandle" showing best commercial gas area and marginal gas area, marked Exhibit 20 for identification.)

Exhibit 20 appears to be the same map which Mr. Peterson gave me, in which he set out in colors the area which in his judgment should be classified as best commercial gas area and the area which he classifies as marginal area. The portion colored in yellow on this small map I believe is the same portion as that included within reddish lines on Exhibit 13, and that portion which falls outside those reddish lines on Exhibit 13 is shown on Exhibit 20 in a gray color.

Mr. Peterson told me that the average sand thickness of the yellow, wherever found in the reservoir, was 70 feet. That was my understanding of his statement. The figure of 72 feet referred to by me was the weighted average thickness in the West field alone; but in arriving at his figure of 70 I assume he took into account all of the acreage including that in the East part of the field. If his average was 70, and the average was 72 in the west field, the average in the east field was substantially less than that, taking into account the size of the area.

90 Mr. Peterson told me that in determining that the sand thickness would average 70 feet throughout that area colored in yellow on Exhibit 20, he had combed over all the available information that he could get that indicated thickness of pay in the various wells that had been drilled in the field and by that method he got his basic information from which he computed this average. The way I understood it, this included logs and whatever other information he could get that he thought was reliable and authentic. I was sufficiently impressed with it that I adopted it as the basis of my own computation, after talk-

ing with him and finding out how he got the information. I was convinced that he had made a good job of it.

You inquire if it is not true that I did not apply it where he applied it in making computations. In the first place, I think his total acreage did not coincide exactly with the total acreage as set forth in the report of the Texas Commission. There is some difference there. As I understand the method used by Mr. Peterson, he applied in his calculation a certain thickness of pay as applicable to the area that he called the best commercial producing area; but how he determined the estimated amount of gas under the marginal acreage I didn't have time to go into, so I never found out. He had figures on this area marked "Best Commercial Acreage" varying from 33½ feet up to something over 92 feet in thickness, an average in the west field of about 73 feet and over the whole field about 70 feet. I have used his average of 70 feet. As stated, I didn't know just what he applied as the figure in the so-called marginal acreage. I knew that he had arrived at an average figure of 70 feet in the yellow part of the west field and the east field also. I took them both into account and arrived at an average of 70 feet. I assumed that at the time he gave me these figures he was not including the 432,000 acres which he has classified as marginal acreage on Exhibit 20. In my computation I used 70 feet as my judgment of the thickness for the whole business.

You inquire upon what I based that judgment. My answer is that I had these figures Mr. Peterson had used in determining his averages and I noted the variation between the various thicknesses he had found, and I noted the fact that he had arrived at an average of approximately 73 feet thickness in the west field, which is by far the largest area of the whole field, and I simply assumed that over the whole field area the 70 foot figure would be a fair average figure. When I say 73 feet in the west field, I mean in the yellow part of the west field. I have no information on the rest of it.

I stated yesterday I think that it was perfectly natural for the producing formations to pinch out around the edges and get thinner and less productive. I wouldn't say that it is just as natural as could be where you have an elevation or dome condition, with slopes off from this apex in different directions, with the water level down there coming in contact with that slope, for the producing part of the formation to be pinched out and thinned out as it

spreads away from that dome. There are conditions where the thickness of the formation might be less on the axis and the apex of the dome and be bigger along the
91 edges. As to whether that is the situation in the Panhandle, I could not answer that question. I have noted the cross section, Exhibit 16, from which one might draw the conclusion that it is true. However, a definite determination of that could only be made by a study of such well information as is available around the whole circumference of the area.

I don't know how long Mr. Peterson has been down in that field working on the problems that go with his profession as a geologist. He might have told me, but I don't recall. It is my impression he has been there a long time.

It would appear if the ideal cross section, Exhibit 16, were based on well logs showing the formation thickness of the porous portions of the traversed formations, then that some of the heaviest or thickest pay formations are right over the top of one of those granite domes. I did not mean to say that it would appear that the pay formation was thinner on top of the apex. What I meant to say was that from Exhibit 16 it would appear the reverse. I think I used the words "pinch out."

If the average of this yellow area was 70 feet, including all those yellow areas in the aggregate, under the conditions prevailing in the Panhandle some of it must have been thicker than 70 in order to have an average of 70, and there must have been areas even in the yellow where the thickness was less than 70 feet, if the average was 70. I don't believe that the figure of 73 or the figure of 70 is closely accurate enough to determine any reason why 70 should not be used over the whole area. In my opinion, the reason for that is that the west field, which includes the greater portion of the area of the entire Panhandle field and in which the area marked yellow constitutes a substantial portion of the total area of the west field, contains wells in which, from Mr. Peterson's data, the pay thickness varies approximately from 30 to 100 feet. There may be areas in the yellow area where the thickness is 150 feet. I haven't examined all of the logs of the wells in the field. I have examined a number of them and have well data taken from logs of a substantial number, largely in the west field. Many of them do not give conclusive evidence as to the thickness of the producing pay formations. Those that do show varying thickness.

You take the information that I went over in connection with Mr. Peterson's work and his results. He gave me information to the effect that he had gone over the relatively large number of wells in both the east and the west fields. For instance, in Carson County he noted 103 wells covering a gas acreage of 195,300 acres in which the average thickness of the producing formation per well was 85.82 feet. Another item was 16 wells in Potter County where the average thickness of the producing formation per well was 92.19 feet. A total of 87 wells in Moore County, where the average thickness of the producing formation per well was 78.21 feet. Also a total of 24 wells in Hutchinson County, where the average thickness of the producing formation per well was 61.67 feet. All of those that I have mentioned were in the sweet gas area of the west Panhandle field.

92 Mr. Peterson told me that when he got through with all of it the walls in that yellow area averaged 70 feet in thickness. That was the summation of what he told me, and I am just giving a breakdown of what I said a little while ago he told me. That is the source of my information concerning sand thickness in the Panhandle. I don't remember that he told me he had logs showing that some of the wells out in the marginal area had sand thickness as low as seven feet. He told me he had information on wells throughout these yellow areas sufficient to average all of these yellow areas together and in that way he had arrived at this 70 feet, based on well information and other information which he considered reliable. I cannot state with yes or not whether he told me that he did not have a sufficient number of wells with a sufficiently even distribution around the marginal area to average that area as he had the yellow area, but that he had broken it up into small areas where there was sufficient control by actual well information that he could classify it, and in his judgment it was properly classified as marginal, based on localities rather than an average all around because we discussed the question of sand thickness rather fully, and I gathered the information from Mr. Peterson that in his opinion he felt he had secured sufficient information on the wells drilled in what he termed the best commercial acreage to warrant his using, in his judgment, the figure of 70 feet and a figure for the west field of approximately 73 feet. As to the marginal area, it was my impression that Mr. Peterson indicated in his conversation with me that

he did not have enough data to make a similar conclusion as to that marginal area, but that he had used what he thought was a reasonable figure for the contents per acre of gas in that marginal area.

I don't remember that he told me how he got that reasonable figure. If he did so, I do not remember what his explanation was; but I got a very definite impression that there was some reason why Mr. Peterson was not willing to include this marginal area in the area where in his judgment the thickness was 70 feet. I gathered the impression that he thought the yellow area was the best. He also said that the yellow area was determined by him by including the area in which the open flow of wells was greater than five million cubic feet, and that the marginal area, as I remember him stating, was an area in which the open flow of wells was less than five million cubic feet.

In reply to the Examiner's question of whether Mr. Peterson used the 70 foot figure at all for marginal acreage, as I stated a moment ago, I do not know just how he arrived at the estimate of the gas under the marginal area. He may have modified it. I don't know how he used the 70 foot pay thickness there. I don't know just how he arrived at his per acre amounts.

I do not know that he told me there was any difference in the porosity and permeability in the marginal acreage and in the yellow or commercially better acreage other than as that would be indicated by open flow. I think what he actually told me was that from his research he believed that area included wells that produced less than five million cubic feet open flow. As to whether he told me that many of them produced down to a million or some of them even less than that, I do not remember that we had any definite figures on that.

93 I do not remember all of our discussion. The principal thing I remember was the differentiation between open flows. In other words, the wells included within the yellow area had open flows of five million and over, and those in the marginal area less than five million cubic feet. I think Mr. Peterson gave me the figures as to the quantity of gas he thought was contained in the marginal area. How he arrived at them I do not know. We did not have time to go into it. He gave me his estimate of the quantity of gas contained in the 432,000 acres, and his totals would indicate that he did not use an average pay thickness of

70 feet and a porosity of 20%. I disregarded those estimates and applied his factor of pay thickness and porosity over here in the yellow area clear out around the entire field, including the marginal acreage where he had rejected it. I would not know what the thickness and porosity are of the area immediately south of the barren spot crossing the line dividing the east field from the west field on Exhibit 20 in comparison with the rest of the field. I did not give it any specific thickness in making my computation, but averaged it in with the rest of it. I averaged it in with the yellow in which Mr. Peterson's judgment indicated to him and he told me that he thought it was 70 feet average.

Mr. Peterson gave me figures, which I used, showing the average thickness of the yellow area was 70 in his opinion, and I averaged those figures in with the marginal figures and got 70, which I applied as my result. I used 70 feet over the whole area. He did not say, as far as I know, that the porosity was not an average of 20% over the whole area. He used 20% for his yellow area and I used it for all of it.

I reached the result of gas in place in the gas acres to a 25 pound gauge abandonment pressure of 23,645,017,748 MCF—in round numbers this would be 23,645,000,000,000 cubic feet. By that I mean the original content down to 25 pounds gauge in pressure. By a 25 pound gauge I mean the amount of gas that would be in reserve which if moved will leave the average wellhead pressure at 25 pounds gauge. In other words, I am assuming that all of the wells could be produced down to an average of 25 pounds wellhead gauge in order to determine what gas there would be on that basis. By gas acres I mean the 1,475,324 acres designated as gas acres in the report of the Texas Commission. I mean the free gas or dry gas producing part of the reservoir, and that would include all of the colored area on Exhibit 12. Under that colored area there are some 100,000 acres that also produce oil from formations belows those producing gas.

I also gave the figure of 19,255,928,848 MCF at what I termed 100 pounds abandonment pressure. In that computation I used the 100 just like I did the 25 in the other computation, and figured the amount that would be recovered down to the point where the average pressure of all the wells would be 100 pounds at the wellhead gauge. I put in that second computation because in the discussion with Mr. Peterson he indicated to me that it was his opinion that

the company might have to go to 100 pounds abandonment pressure, by which I presume he meant that he had doubts about whether the company could economically produce gas in the Texas Panhandle and bring it to markets principally in Chicago when the pressures had gotten down below
94 100 pounds at the wellhead on the average. On that
basis I put in the computation at 100 pounds abandonment pressure. By saying "I presume that that was true," I mean I presume that that was what Mr. Peterson meant rather than that the ultimate facts were true. I gathered that impression from him. I have no way of knowing exactly what was in his mind, but in our discussion I thought that I scented that thought.

In applying my estimates of the reserves I used a 100% recovery factor. I assumed that the gas in the well would be withdrawn down to a point where the wellhead pressure was 25 pounds gauge, and that the 25 pound pressure would then prevail throughout the field if you abandoned each well at that pressure and drilled up the acreage entirely. In other words, what I figured was the amount of gas in place between the initial virgin pressure and an ultimate abandonment wellhead pressure of 25 pound gauge, and I arrived at a certain amount which I stated. As to whether I made any allowance for gas that might be left in the reservoir in areas having higher than 25 pounds pressure when the average wellhead pressure gauged 25 pounds over the field, I assumed that the formation being porous, as it is, when the wellhead pressure got down to 25 pounds there very probably would be an equalization in the reservoir. I mean there would probably be equalization between the time of first production and the time these wells were abandoned. I am assuming that there would approximately be a reservoir pressure equivalent to a pressure of 25 pounds at the wellhead.

It does not follow that it is my idea that as time goes on these pressures will begin to equalize and that by the time they all get down to 25 pounds, if that be assumed to be the abandonment pressure as you have stated, that the pressures in the field will have equalized. They would equalize if they were abandoned and let stand; but at the time the well was abandoned there would probably be a differential in pressure. I am not assuming that every individual well that you own and operate will stand at 25 pounds exactly when you abandon it. My estimate is made upon that as a general abandonment pressure at the wellhead. It is probable that when the general abandonment pressure at the wellhead for all the wells in the field at the time of abandonment reached 25 pounds the pressure out in the reservoir away from the wells would be temporarily higher than 25 pounds, but it would probably ultimately equalize.

I presume every company does not produce every well at all times, and in the actual practical operation of the production of gas in that field you could probably pull the well down to something less than 25 pounds and quit pulling from it and continue to pull from other wells as a practical thing. Practical business economics get into all of these things. During the latter part of this company's history it will have a great deal of difficulty in getting gas to fill its requirements from its present wells. If it is assumed that they drill twice as many wells, a well to every half section of the land they own down there, the time will come when they will not be able to get enough gas from those wells to fill the pipeline, which transports from 205 to 220
million cubic feet of gas per day. They are going to be
95 very reluctant to operate a pipeline with any less gas
than they now get out of the ground as a practical
proposition. Other operators in the field will all be trying to get as much as they can, so it is very probable that everyone will be pulling as much gas from every well as possible in order to get as much gas in the line as they can.

When they get to the point where they cannot get enough to justify going on, and abandon these wells, if they are 100 pounds or if they are 75 or 55 pounds, the pressure away from the wells at the time they quit is going to be higher for a time than it is at the bottom of the well. If you want to bring in economic factors and things of that sort, I presume business judgment would probably seek other sources of supply prior to the time they were abandoned.

The thing that makes gas flow to the bottom of the well is difference in pressure between the pressure at the bottom of the well and the pressure out in the sand or the limestone. It is pressure differential. That is a very common term in my profession. It is the pressure differential that causes the gas to flow from the area out away from the well to the bottom of the well, and if the pressure is not higher out there than it is at the bottom of the well, there would not be any flow.

There is no question but that if you abandon a well at a given pressure, the pressures all around that well throughout the area from which it has been producing its gas will be higher than at the bottom of the well. If the pressure at the wellhead is 25 pounds, the pressure at the bottom of the well would be about 40 pounds absolute, and the pressure out away from the well would have to be something more than 40 pounds.

(May 25, 1939.)

I stated that when the pressures at the wellhead reach a given or assumed abandonment pressure, the pressure at the bottom of the well is somewhat higher. The pressure at the bottom of the well is always higher than at the top. The difference between the pressure gauge at the wellhead and that at the bottom of the hole is the weight of the column of gas in the casing when the well is static or shut in.

I also stated that the pressure out in the reservoir away from the well is during the time of flow necessarily higher than at the bottom of the well. There has to be a difference so that the gas will move from the sand or limestone to the well bore.

You ask me to look at Exhibit 19 and visualize that part of the exhibit called A as the well bore of the well and assume that the pressure at the top of the well is 50 pounds gauge. If the well were shut in, the pressure at the bottom of the well would be the difference due to the weight of the gas column.

You assume that the pressure is 50 pounds at the top of
the well and inquire if it is not true that the pressure
96 out away from the well radiates from the higher pres-
sure due to the weight of the column of gas, which you
assume as X pounds, or 50 plus X. You inquire if the pressure will not get higher as it gets away from the bottom of the well. It would during the flowing period. After the well is abandoned the bottom well pressure would probably equalize with the sand pressure. If X is the static head or if X is the static head less friction head, it would probably equalize and become higher than 50 plus X at the bottom of the well. If the wellhead pressure was 25 pounds, the bottom hole pressure would be more in any event in a static condition. If it was 50 pounds at the wellhead, it would be something more than 50 plus 15 because the gas would weigh more at 50 pounds than at 25. If X equals the difference between the pressure at the wellhead and the bottom of the well, then the pressure at the bottom of the well would be 50 plus X, if 50 is the wellhead pressure.

If it is assumed that 50 pounds is the abandonment pressure, the pressure along the reservoir will graduate from the bottom of the well at a higher pressure—higher pressure levels as you get away from the bottom of the well. As it stands shut in, it will equalize at some higher level than 50 plus X, depending on how much you pull the well. If you abandon the well at 50 pounds, when equilibrium is reached the bottom of the well pressure will be higher than 50 pounds, and the gauge pressure will rise to a point that would be equivalent to the bottom hole pressure, as well as the static column of gas between the bottom of the hole and the wellhead. When it equalizes you add the weight of the column of gas in the static condition to arrive at the pressure at the wellhead after equalization, and that would be more than 50 pounds, if you had started out with 50 pounds.

If the well is abandoned at 50 pounds and the owner goes off and leaves it, then the difference between that pressure of 50 pounds and that it has when equalized becomes lost so far as the operator is concerned, if he does not pull it again.

As to whether under the conditions in the Panhandle he can't shut his wells down and wait until the next month or the month after next and then go out and pull his well, as a practical proposition, I can only say that depends. Another thing, he would not have to stop, in my opinion, producing from the well at exactly 50 pounds there. He would stop at some abandonment pressure, but he might not stop at 50. He might pull it down to 35 and then maybe it will settle at 50.

Abandonment pressure is the pressure at which you abandon the well. It may or may no be the lowest pressure the wellhead shows when you stop pulling. In my opinion, it is perfectly feasible to assume that the abandonment pressure of a well, if it is 50 pounds, would be the pressure that would result on that well after it had been abandoned and had stood there.

I know that you can't produce gas from a well and at the same time have it shut down for the purpose of building
up its pressure. I am not assuming that is done at all.
97 I assume that every operator in the field will produce
just as much as he can—as much as the law will permit
him to produce—in order to keep his outlet going and see
that his carbon black plant is supplied. If it is possible

for him to produce to 50 pounds or to 35 pounds, in my opinion that is what he is going to do.

When the pressure at the wellhead is down to 35 pounds, the pressure at the bottom of the well will be something more than 35 plus 15. The figure of 15 pounds is the difference between the gauge pressure at the wellhead and the absolute pressure at the bottom of the well. I am not assuming or saying that the weight of that column of gas is 15 pounds. The figure of 15 pounds is the difference between the 25 pounds gauge pressure at the wellhead and the 40 pounds absolute at the bottom of the well. If you take 35 pounds gauge instead of 25, the difference will necessarily be more than 15 pounds.

If the figure of 35 wellhead pressure is taken, the figure at the bottom of the hole is more than 50 under static conditions. The pressure away from the well is then more than 50, gradating, as you leave the well, out toward some other well or toward the edge of the field. At the time you stop pulling it gets higher as it gets away from the well, and the high pressure curve as you leave the well depends on several things, one of which is the distance between this well and the next one. That is one factor. If the formation is tight or of low permeability, that also has a lot to do with how high the pressures are out between the wells. If the permeability is low, you have a higher pressure out away from the well than if it is high—the less permeability, the higher the pressure.

Another factor which enters into it in addition to the distance between the wells and the difference in permeability is the rate at which the well has been pulled. If you have pulled it at a rapid rate the gradient is steeper than it would be if you had been pulling it along at a very low rate. If everybody is pulling as hard as he can we will have steep gradients.

I question very much whether anybody can tell absolutely in a great area like that how much gas is going to be left between the wells under those circumstances. It is a matter of judgment, experience and conditions.

I have seen Exhibit 20, about which some questions have heretofore been asked me. I have seen the other larger maps on which the wells throughout the field are spotted. It is true that in the area colored yellow on Exhibit 20 a great many more wells have been drilled than out in the outlying gray area. I made the statement the other day that it is perfectly natural that wells are going to be drilled where the production is highest in the development of the field; but that depends entirely upon policies of management of those who are operating the property. I had not intended by that statement to mean that there is anything to prevent the management of an operating utility or property from drilling wells anywhere he wants to on his 98 property. In my opinion that is entirely a question of judgment and management. An operator may drill some wells out where there is little gas to find out what he is going to get; but he is going to use his own judgment in drilling.

You inquire whether in the exercise of ordinary prudence and reasonable business judgment there will be many wells drilled out in the thinly supplied area colored in gray, or the area of low productivity, and whether there will be as many wells drilled out there per acre or per hundred acres or per thousand acres as in the yellow area where the production is heavier. Let me answer that question in this way. There are more wells drilled in the yellow area. The edge area that you refer to, the thinly supplied area, the area of low productivity—I am not so sure that it is an area of low productivity or that it is an area thinly supplied. It is true there are fewer wells in the perimeter around that field, but I don't subscribe to the statement that that is a thinly supplied area.

You ask how I account for the fact that there is not a well in the gray area which has as much as five million cubic feet a day, whereas there are wells in the central portion which have from one hundred million or more. My answer is that there may be a difference in the permeability of the structure. I did not the other day use the expression that it was perfectly natural for the field to feather out. The record will show the expression I used. I remember having used the phrase "pinched out," which in my opinion is quite different from feathered out. From the various information that I have and that I have seen and literature that I have seen, and statements that I have seen as to this field by geologists who should know what they were talking about, it is reflected that the thickness of this lime and dolomite increases as it dips basinward. It does not necessarily come to a point as it dips basinward where it is not one-half inch wide.

You ask if there is not a thin area so far as production of oil or gas is concerned between the portion on the producing flank of the mountain and the formation where it gets to the water at the edge. My answer is that the thinness of it is relative. It would depend on the pitch or the angle at which that formation dipped, and it would further depend upon the thickness of that formation as it entered the water. If the formation increases in thickness as it dips basinward, then there is no thin measure for a very long way, particularly if the pitch is steep. The slope varies down through that structure at different places. From the cross sections I have seen it appears to have a varying slope at varying points. In some places the slope is less than in others. I don't know whether the logs in various places show that there is a sand thickness down to seven feet.

(Objection by Commission; Counsel overruled.)

You ask me the name of some geologist who told me that the sands are thicker at the perimeter of that field than they are in the center of the field. I mean I read it in a paper by Cotner & Crum. It is No. 8, Bulletin of Petroleum Geologists. I didn't say that they said the pay thickness is thicker out on the perimeter than it is in the middle. The statement on which I relied in answering the question is in there. I will find it if you want me to.

99 As to whether the wells out in the gray area have not been large producers, whether that fact is due to the thinness of the pay or to poor permeability, or whatever it is due to I will state that that is Mr. Peterson's hypothesis. I don't know of any wells that have been drilled in the gray portion that have potentials over five million cubic feet; but there are wells in the yellow, pretty near to the gray, which have very high potentials. Those wells are included in the averages made by the average of 73 feet in the west field. I used 70 feet over the entire field.

You ask whether it makes any difference to an operator who is going to spend his money in drilling a well that his failure to get a commercial quantity of gas is due to permeability or low pay thickness. My answer is, generally speaking, no.

You ask me if it is my judgment, as a man who has been connected with a regulatory body for a good many years, that there will be as many wells drilled on an acreage basis in this gray portion of the field as up through the yellow territory shown on Exhibit 20. (Objection by counsel for Illinois Commerce Commission overruled.) As I understand the question you are asking me whether or not in my opinion there would be as many wells drilled, or there will be as many wells drilled, per acre in the gray portion of that map on Exhibit 20 as in the yellow. I don't know. Certainly at this time there are less wells over on the marginal area than there are in the central area. What will be done in the future I don't know. I just don't have any judgment about the future.

I have thought of all the factors I could which are calculated to cause gas to be left in the formations at the time the abandonment of the field is reached. You say I said something about wells having gone dead at pressures around 150 pounds. The record will speak for itself as to what I said. If I may be permitted to try to repeat what I said, I asked Mr. Peterson of your company whether or not any wells had been abandoned by Texoma, and he said yes. I don't remember how many he said. I remember there were several. I know I got that impression. I asked him whether or not those wells had been abandoned due to the depletion of pressure, and my impression is that his answer to me was to the effect that that was not the factor that caused abandonment, but that abandonment was necessary due to some other factor, which I gathered was some mechanical or physical condition. I don't think he told me that the pressures averaged around 150 pounds the last time they were taken before the wells were abandoned. I don't believe I made a definite statement that they were abandoned at 150; but my impression is that the pressures were substantially over 100 pounds.

You now refer to Exhibit 16 and point out perpendicular black lines extending along the irregular part of the drawing called the surface, down through the various formations where you assume to be oil wells. You also suppose that well No. 5, reading from the right, had been drilled and instead of stopping at the bottom of the oil pay it had been drilled on further and encountered water. You ask whether there is any possibility of that water getting up into the gas pays. The only possibility that I can see
100 would be if the bottom of the hole were open to the water and the pressure on the casing string was reduced to such an extent that the pressure at the bottom of the hole would allow the water to rise up. Then if the casing is perforated or leaky, or was not properly cased off or cemented off where it passes through the gas measures, it could.

You also assume that the casing is up above the gas pay so as to produce gas from the well, and that the hole is open from that point down to the water, and ask whether the water will get up there. My answer is it would not because I assume that you have pressure there in the gas producing horizon. There would be some gradient to it.

You ask if I know whether the water does rise when the well is drilled down to water and the casing set above the gas pay. My answer is that I have never seen one do it. You are taking well No. 5. You have assumed the casing is set out above this red line, which I understand represents the gas producing measures, and that the hole is drilled down through the water at approximately sea level. This water at approximately sea level will rise in the casing up to the point where there is a pressure balance between the column of water and the pressure in the casing. Now, if the casinghead were wide open so that the differential in pressure between the water and the top of the hole were high, the water column would rise to some point at equilibrium. If that well were shut in absolutely, it is probable that the water would not rise up there very far, if at all. You do not keep oil wells or gas wells shut in, as a practical proposition, nor do you leave them open to the water. You should plug them off. It is possible that the reason for plugging them off is that if they do not plug them the water will rise and seriously damage the oil formation and the productive gas formations above.

I neither agree nor disagree with your statement that there was a great deal of careless plugging of wells in the early history of that field due to the fact that nobody thought anything particularly of the gas that was down there. I do not know whether that occurred or not. If it should turn out that there was a lot of careless plugging or that the plugs, due to the physical reactions down in the formations where the plugging was placed, had become leaky, I would expect some water to get in the well bores and come up. It is also possible that water might leak in from some water formations which were drilled through and cased off up between the dolomite and the surface. If it were not properly cased off at the place where they went through it, it would run down the well bore and get into the producing formation. I don't know whether that has occurred in the Panhandle.

At your request I read from page 43 of the 1938 report of the Railroad Commission of Texas, under the caption "Gas Wells Producing Water," the following:

"The following information was obtained by Commis-

sion engineers and field men during the potential and rock pressure survey of June, July and August, 1938. All wells that were producing water at the end of twenty minutes
101 potential test period were considered to be producing intruded water and not accumulated water condensate on the theory that any condensate in the casing would be dissipated before the expiration of a twenty minute period.

"During the March, 1936, survey, samples were taken from eighteen wells and them analyzed for salt concentrations. Of the eighteen samples analyzed, only one was diluted with fresh water, the remaining seventeen being bottom or edge water."

On pages 44, 45, 46, 47 and 48 appear listings under the caption "Gas Wells Producing Water. The Entire Panhandle." There are five pages, closely written, with different captions for different counties. There are 46 wells on the first page. There are different numbers on different pages.

I cannot say definitely whether Mr. Peterson told me the reason the wells went dead was that water came through from the top or the bottom and drowned out the producing formations. It is possible that he did. We didn't discuss it very much, but I gathered the impression that there was some reason, either mechanical or water or some other reason than a depletion of pressure, that caused the abandonment of those wells. That is as far as I went.

As to whether the pressure in the formation would tend to keep the water back so that it would come up against the resistance offered by the pressure of the gas, I will say that would be true as regards bottom hole water, if and when the wells were shut in. If the wells were producing, the pressure would be less. I don't think the danger of water coming up from the bottom would be increased as the general pressures of the field go down. I think the reason for bottom hole water getting in is the failure of the seal at the bottom of the well. That plug may be made of different things. It may be made of cement or wood. I never saw any plugs in the Panhandle.

It is true that these cement plugs or wood plugs are subject to deterioration as a result of the lapse of time due to the chemical elements that are in contact with them down there in the formation two or three thousand feet below the ground. They are subject to the same forces and conditions of nature as anything else down there. Even though the water was successfully plugged off for a time, it is entirely possible that the plug will be so corroded or so affected by chemical reaction that it would begin to leak water later on. There might be corrosion of the casing. That corrosion continues to take place as long as the well is there, and the degree of danger or hazard of the corrosion permitting water to enter the gas bearing formation depends on the conditions as to the chemical reaction between the casing and the elements.

The damage resulting from the intrusion of water into the formation would not be confined to the particular well through which it comes up the formation, but it
102 may spread out to where other wells are. Thus if you take the group of wells 3, 4 and 5, reading from the right, the water coming up through No. 5 and getting into the formation, if it is sufficient, might spread down the formation and destroy wells Nos. 3 and 4, even though they were not drilled into water at all. It is not impossible to flood a formation.

I doubt whether there is any great probability of the trapping off of gas under the physical conditions that exist in the Panhandle if that kind of flooding takes place to any considerable extent. I have heard of the hazard of water encroachment or edge water. I don't think the wells in the Panhandle are any worse or any better than they are in many other fields in the country. I don't think the hazard is any greater or any less than it is in the average field.

You ask whether in estimating reserves of gas down to a given or assumed abandonment pressure it is the common practice of men who do that sort of thing to apply a recovery factor to compensate for gas that will be lost by reason of a differential of pressure out through the field when the wells reach their abandonment point, and for the gas that is going to be left in the field due to lower permeability, and gas that is going to be left in the field due to entrapment or for any other cause. My answer is that some engineers and geologists use such a factor. As to whether the Bureau of Mines use this practice, I can only say that from the estimates which they have made and which I have seen they have used no recovery factor. I have not seen them all. I have seen some of their estimates covering the Panhandle of Texas. I am not at liberty to divulge what report that is. It is not a public document. I have seen figures from the Bureau of Mines that I am not at liberty to divulge into this record on this occasion. The Bureau of Mines have published reports; but this is not a published report.

I do not remember having seen a report of the Bureau of Mines dated July, 1936, R. I. 3313, Department of the Interior, United States Bureau of Mines, dealing with the horizon of central Michigan. You have now exhibited that document to me. I glanced at it but have not examined it carefully. I didn't see where they applied a recovery factor in making their estimates of gas in the Michigan field. You have asked me to read the last paragraph on page 9 of that report. (Objection by Commission counsel and counsel for the Illinois Commerce Commission overruled.)

I am reading now at the request of Mr. Morgan, company counsel, from a publication marked R. I. 3313, dated July, 1936, by the Department of the Interior, United States Bureau of Mines, John W. Finch, Director, entitled "Report of Investigations. Extent and Availability of Natural Gas Reserves in Michigan 'Stray' Sandstone Horizon of Central Michigan," by E. L. Rawlins and M. A. Schellhardt. I have been directed to read a paragraph on page 9 of that report, which is as follows:

"Correction Factor.

"An analysis of different factors as applied to the Michigan stray sandstone horizon in relation to the histories of gas production from fields of other states 103 indicates that possibly 90% of the total volume of gas calculated from the gas-reserve formula can be produced from the reservoir space if the wells are completed properly and gas is not withdrawn from them at an excessive rate of flow." (Objection by Counsel for the Illinois Commerce Commission on ground that reading unidentified report on cross-examination not proper was overruled.)

You ask me to turn to page 17 of that same report and look at the tabulation beginning near the top of the page and extending down to about the middle of the page, showing that in computing these reserves they computed both the quantity before applying a correction factor and then the correction factor at four different pressures, 15, 50, 125 and 200 pounds. (Objections by Commission Counsel and Counsel for Illinois Commerce Commission overruled.)

I think in reading from this page it might be proper to read the entire table or paragraph there so that the record will show really what it is.

On page 17 of the publication marked R. I. 3313, dated July 1936, by the Department of the Interior, United States Bureau of Mines, from which I just read another paragraph from page 9, appears a table marked "Table V.—Summary of Gas Reserves, Clare Field."

"Producing area, acres 710.

Average thickness of pay member, feet, 4.

Porosity, per cent, 20.

Initial wellhead pressure, pounds per square inch gauge, 600.

Initial reservoir pressure, pounds per square inch absolute, 635.

Temperature in reservoir, Fahrenheit 64.

Deviation from Boyle's law at reservoir pressure, per cent 10."

Then appears a tabulation which consists of 11 columns. The first column is headed "Abandonment pressure at wellhead, pounds per square inch absolute." In that column there appear four figures. The first one, or rather the first, includes abandonment pressure at the wellhead on an absolute pressure basis, 15 pounds. The next is 50 pounds. The next 125. And the fourth is 200 pounds.

The next column is entitled "Reservoir Abandonment Pressure, pounds per square inch absolute." That column likewise contains four entries. Opposite the four entries in the first column the figures in the second column are as follows: 15 pounds abandonment pressure absolute in the reservoir; the next figure is 52 pounds absolute; the next, 128 pounds absolute; and the fourth one 206 pounds absolute.

The third column is headed "Deviation from Boyle's Law, per cent." It also contains four entries which are opposite the four entries in each of the other two columns. The first figure in this column is zero; the next figure is 0.5; the next figure is 1.6; and the fourth figure is 2.6.

104 The next two columns have a common heading as follows: "Initial reserves per acre foot thousand cubic feet." That caption covers the next two columns. The first of the next two columns, or the fourth column from the left, has an individual caption of "Correction factor not applied." The four figures entered in that column are as follows, reading from the top to the bottom: 410.7; 388.0; 341.3; 292.5. The fifth column with an individual caption as follows, "Recoverable," likewise has four entries, reading from the top to the bottom, as follows: 369.6; 349.2; 307.2; 292.5.

That covers the first five columns of the tabulation. The next two columns, namely, the sixth and seventh columns, have across their top a common caption as follows: "Reserves initially underlying total 40 acre gas producing tracts, thousand cubic feet." The sixth column, or the first of the two columns, which have the common caption that I just read, has an individual caption reading as follows: "Correction factor not applied." This column likewise has four entries, reading as follows, from the top to the bottom: 378,000; 357,000; 314,000; 269,000. The second of the two columns covered by the common caption, which column is the seventh column from the left and which has individual caption at the head of it as follows: "Recoverable," likewise contains four entries: 340,000; 321,000; 283,000; 269,000.

The next two columns, or the eighth and ninth columns, reading from the left, have likewise a common caption over both of them, reading as follows: "Initial proved and semi-proved reserves, thousand cubic feet." The first of these two columns, namely, the eighth column from the left, has an individual caption reading "Correction factor not applied." The figures entered in that column are as follows: 1,166,000; 1,102,000; 969,000; 831,000. The second column in that group, namely, the ninth column in the tabulation reading from the left, has an individual caption over the top, reading "Recoverable." The four figures as ~~set~~ forth in that column are as follows: 1,049,000; 992,000; 872,000; 831,000.

The tenth column of this tabulation, reading from the left, has the following caption at the head: "Withdrawals, thousand cubic feet." All four of the entries in that column are 70,000.

The eleventh, or last column, of that tabulation has the following caption: "Net proved and semi-proved reserves, thousand cubic feet." It likewise contains four figures which, reading from the top to the bottom, are as follows: 979,000; 922,000; 802,000; 761,000.

There appears at the bottom of that tabulation the following notations: "Recoverable gas reserve estimates for abandonment pressure of 15 and 50 and 125 pounds per square inch based on a correction factor of 90 per cent." The second is "Withdrawals to February 1, 1936." The third is "Gas volumes expressed on pressure base of 14.4 pounds per square inch at temperature base of 60 degrees Fahrenheit.

The Examiner having inquired of counsel whether the table contains a note specifying what the correction factor is from the standpoint of definition, and counsel hav-
ing replied "90%," and requested me to define what
105 is meant by recovery factor. I will say I am not in
a position to say what is meant in that bulletin by
that term. I would say that in my opinion generally a recovery factor is a percentage which when applied to a certain estimated quantity of gas or fluid in place would represent, in the judgment of the person who used it, the percentage of such fluid or gas that might be recoverable.

Counsel has requested me to read the following from said document.—(Objections by Commission Counsel and Counsel for Illinois Commerce Commission overruled.) I am now reading from page 9 of the document marked R. I. 3313, and dated July 19, 1936, the same being a publication of the Department of the Interior, the United States Bureau of Mines, the caption of which I read some minutes ago and from which I read a tabulation and a part of a paragraph at the request of Mr. Morgan, company counsel. I now read from page 9 of the same report, as directed by said counsel and the Examiner sitting in this case:

"The writers believe that commercial production of gas from most of the central Michigan fields will not be feasible at less than an average field abandonment pressure at the wellhead of 125 pounds per square inch absolute if the delivered capacities of gas wells continue to decrease with depletion of the gas reserves as indicated by back pressure tests that have been conducted at different times in the productive lives of representative wells, and, therefore, reserve estimates are given in this report based on this abandonment pressure."

I note that that is an abandonment pressure of 125 pounds absolute.

I am not familiar with the publication captioned "United States Bureau of Mines. Oklahoma City Gas Reserves." "No. R. I. 3217, dated June, 1933," and further styled "Department of Commerce, United States Bureau of Mines, Scott Turner, Director. Report of Investigations. Estimate of the Gas Reserves of the Oklahoma City Oil Field, Oklahoma County, Oklahoma." (Objections by Commission counsel and counsel for Illinois Commerce Commission overruled.) I am not acquainted with the Oklahoma field as a matter of general information. I understand that it is a field which produces both oil and gas; but I am not familiar with its features or its conditions. It is my understanding that it is one of the largest oil fields and that it is also an important gas field. I have no direct knowledge. You have asked me to read from pages 3, 4 and 5 of that document. (Objections by Commission counsel and counsel for Illinois Commerce Commission and after colloquy between counsel and Examiner, the Examiner ruled he had a right to take judicial notice of the unidentified report.)

I am about to read some paragraphs under the instructions of the Examiner and company counsel and over objection of Commission's counsel from pages in the report numbered R. I. 3217, dated June, 1933, entitled as above set out:

"An estimate of the gas reserves in a field involves consideration of a number of variable and unknown quantities. To reach a solution, it is necessary to assume correction factors that depend largely upon the amount and
character of the information available for analysis,
106 probably reservoir conditions, and a knowledge of re-
covery values in other fields that are nearing exhaustion. The formula given does not include such factors as variation in sand porosities and permeabilities, water encroachment, possible development of oil in formations that contain free gas higher on the structure, methods of development, and specific information on different gas horizons obtained by the detailed analyses of individual wells and the field as a whole."

The paragraph that I just completed reading is on page 3 of this report. Starting at the bottom of page 4 of this same document, I read from the document as follows:

"This report presents gas volumes determined from the study of the gas reserves of the Oklahoma City field as follows:

"1. The total original volumes of gas in the reservoir space that would be available above abandonment pressures of 100 and 400 pounds per square inch gauge at the wellhead, if it were possible to recover all of this gas.

"2. The original recoverable volume of gas, using a recovery of 50%, at abandonment pressures of 100 and 400 pounds per square inch gauge at the wellhead.

"3. The volume of gas withdrawn from this reservoir space previous to October 1, 1932.

"4. The net recoverable volumes of gas, using a recovery of 50% at abandonment pressures of 100 and 400 pounds per square inch gauge at the wellhead available after October 1, 1932."

You ask me if it is not the ordinary thing in computing gas reserves to allow some recovery factor. My answer is that some people who estimate reserves set out as a percentage or figure a recovery factor. Other people in estimating gas reserves may probably consider that the accuracy or limits of accuracy of certain factors used in the estimates probably include factors comparable and similar to recovery factors as such. (Objection by Commission counsel and question unanswered.)

In referring to some contours shown on Exhibit 12 just south of that portion of the gas field lying in Potter County, I have referred to the helium dome in the Texas Panhandle. I referred to a fault, by which I meant that it would appear the formations were at different levels. My understanding is that the helium dome, or Bush Dome, as I believe it is called, is under the control of the United States Government. I wouldn't say for certain that it owns it. It appears to be a comparatively small area as compared with the great Panhandle gas field proper.

107 I do not know what branch of the United States Government operates the helium property. I don't know if to be a fact that it is operated by the Bureau of Mines, of the Department of the Interior. I have heard that. I am not familiar with what took place when the Government acquired that reserve of gas. I do not know whether they resorted to condemnation proceedings or not. (Objections by Commission counsel and counsel for Illinois Commerce Commission overruled.) You state that condemnation proceedings involve taking by legal proceedings a property for public use and a payment to the owner

of just compensation for the property as the consideration for the taking. That coincides with my understanding of the term. I am not familiar whether the Bureau of Mines in condemning the helium dome which faulted off from the Panhandle gas field used a recovery factor of 60%. (Objection by Commission counsel overruled.)

You refer to the bulletin of the American Association of Petroleum Geologists, dated August, 1933, which was by Victor Cotner and H. E. Crum, and ask me to read the paragraph under the caption "Acknowledgment". (Objection by Commission counsel overruled.)

I find that the note at the bottom of the first page of this article contained in a publication entitled "Geology of Natural Gas," edited by Henry A. Ley, and dated 1935, according to page 385 under Note 1, reads as follows:

"Presented before the Association at the Oklahoma City meeting, March 24, 1932. Manuscript received March 10, 1932. Reprinted from bulletin of the American Association of Petroleum Geologists, Volume 17, No. 8 (August, 1933). (Paragraphs 877 to 906 in slightly revised form 1935.) The following geologists have contributed material or criticism in the preparation of this paper, to all of whom the writers express appreciation: L. M. Oles of the Prairie Oil & Gas Company; J. D. Thompson, Jr., consulting geologist; W. E. Hubbard of the Humble Oil & Refining Company; T. F. Newman of the Skelly Oil Company; Frank T. Clark of the Empire Gas & Fuel Company; and Richard W. Camp of the Consolidated Gas Utilities Company."

There are drawings in that document. (Objection by Commission counsel overruled.) At your request I read from about the middle of page 401 of this volume from which I quoted, as follows:

"The producing area of the Texas Panhandle field is estimated at approximately 1,300,000 acres. (3) Of this amount 100,000 acres have been drilled for oil production, although this has not been fully drilled up and may not all be productive of oil in paying quantities. Of the total gas area that part of which initial volume of 10,000,000 open flow per acre or larger may be expected consists of approximately 896,500 acres. Initial volume contours of the field would show that a belt of small volume extends around the outer edge of the producing area. Some small areas of less than 10,000,000 volume exist within the larger open flow areas, being due to porosity factors previously mentioned." (Objection by Commission counsel and question unanswered.)

108 In my direct examination I computed the original reserves of the area colored in yellow on Exhibit 13, which I described as the gas reserves of Texoma. In computing those reserves I took the average per acre content which I used as the basis for my computation of the whole reserves. That figure was 16,027 MCF per acre, to a 25 pound assumed abandonment pressure. I multiplied that number by the number of acres contained in Texoma's reserves and tagged that as my estimate of Texoma's original reserve. I then arrived at an estimate of Texoma's present reserves on the basis of a 25 pound abandonment withdrawal pressure. I arrived at that by deducting the total withdrawals from those acres—the total quantity of gas produced from those acres by Texoma. I took the figure furnished me in response to a request that I made while in Amarillo for the withdrawals from the wells now existing on the present acreage of Texoma in making my request. I didn't use the word "production"; I used the word "withdrawals." The difference between the total withdrawals from the wells and the production by Texoma is substantial. I assume that the figures furnished me were in response to my request and that they constitute the withdrawals from the wells on the present acreage.

In computing the original reserves of Texoma I used the average sand thickness of 70 feet which I applied to the field as a whole. I thought that would be more fair and consistent than to use the figure of 73 feet developed by Mr. Peterson because I had used an average of 70 feet over the whole area. My understanding is that Mr. Peterson's 70 foot thickness was an average thickness of all the producing territory included in the yellow portion of a map that he showed me and which is now marked Exhibit 20. I used the 70 foot thickness as applying to Texoma's properties which for the most part are through the area I have described as the central axis of the field, although they do encompass some properties nearer the edges of the field itself. My reference to that portion of the field as being the most productive is that portion where the greater number of gas wells are located along the line and connected to the lines of Texoma and other companies operating therein.

In view of the fact that I am of the opinion that this lime and dolomite thickens as it plunges basinward, I am not of the opinion, and I want definitely so to state, that the greater portion of the gas is located along the central axis.

As to whether I have heretofore said that the portion of the field along the central axis originally contained a very much larger volume of gas than the outlying portions of the field, I would like to see the record on it. (Objection by Commission counsel.) I don't remember my statement exactly. I would rather have the record speak for itself, because it is not my present conviction that that is a fact, and I stated my conviction just now. I quoted Cotner and Crum in substantiation of it. I didn't read everything they said when you instructed me to read certain paragraphs. There is not at this time anything else in that report that I would like to read in connection with my statement based on Cotner & Crum. (Objection by Commission counsel overruled.)

In computing the original reserves of Texoma and deducting the production from the wells of Texoma and thus
arriving at my estimate of the present reserves, I did
109 not take into account any drainage from Texoma's
properties in the northeast over in the direction of
the low pressure area portrayed on Exhibits 12 and 17. I did not assume that all the gas that was ever under those properties is still there except what has been drawn from the wells on those properties. As to how I could arrive at the estimate of the present reserves by that process unless I did so assume, I will say that my reasoning was that if there had been drainage from the reserves of Texoma toward the northeast flank of the field, there had also been drainage to Texoma's reserves from contiguous areas. I would not say in identically the same quantities, but substantially in the same quantities. It is on that assumption that I arrived at that figure.

I do not know the initial pressure of the wells which Texoma has drilled. I used the same figure that Mr. Peterson used in his estimates of the natural gas reserves in the best commercial areas, as he designates them. I used an initial pressure of 430 pounds gauge wellhead to determine the original reserves under the presently owned acreage of Texoma.

I made no statement as to the number of wells which Texoma has drilled on its property, and do not know the approximate number. If Texoma's wells first came in at a pressure less than 430 pounds at the wellhead, that would indicate nothing to me. I presume that those wells would have some drainage effect on that property. There is bound to be. I am not assuming that there will not be drainage. What I am assuming is a virgin pressure of 430 pounds at the wellhead. (Objection by Commission counsel.)

I stated in answer to a former question that I assumed that substantially all the gas that was drained out from Texoma's properties was very probably replaced by gas drained in from adjoining properties.

You are quoting me right in stating that in my opinion 25 pounds gauge pressure at the wellhead is a reasonable abandonment pressure for the purpose of computing Texoma's reserves. I stated that I was basing that partly on statements made to me by certain pipeline companies who owned properties in the Panhandle. I asked them for the information. This is a sample request: "Please advise by wire collect wellhead abandonment pressures you use in calculating gas reserves of your leases in the Texas Panhandle field." As to whether they were talking about abandonment pressures at which it would become uneconomical to operate the wells or whether they were talking about it from the standpoint of physical impossibility of producing gas when they answered that question, I assume they replied to that question by giving me their best judgment as to what they would consider an abandonment pressure in any connection.

I know as a matter of fact that the establishment of or the arrival at an abandonment pressure for gas wells in the Panhandle involves more engineering than geology. The actual abandonment pressure of a well would be a pressure below which the operator or the owner would
110 not feel justified in going. That abandonment pressure might depend upon a great many things. As has been mentioned in the record in this case, for instance, mechanical difficulty and other factors. The abandonment pressure cannot of necessity be a definite, common, uniform pressure, due to those things. It is just a common sense business proposition; but in the estimation of reserves it is necessary to assume some abandonment pressure. In assuming an abandonment pressure it is not my opinion that I am assuming that every well will be brought down to that pressure and then locked up. Some of them may be brought down below that, some of them higher than that; but for purposes of estimating the recoverable gas in gas reserves, such as we are talking about here, we

have to reach some conclusion. In my estimates I have used two figures: a figure of 25 pounds and a figure of 100 pounds. I did that for the purpose of trying to have the record contain some range or some difference to make up for the fact that any company operating in this field, or any other field, may, and probably will, encounter difficulties in numbers of wells.

The evidence might disclose facts which would place the figure entirely one way or another clear outside that range of 25 to 100 pounds. I am not trying to testify here that the abandonment pressure of the wells of Texoma will ultimately prove to be a certain definite thing. I am only trying to use reasonable judgment. In my former statement when I said that I believed 25 pounds is a reasonable figure to use, I was talking about the reserves of everyone in the field. It is perfectly possible that the abandonment pressure of Texoma might be entirely different from the abandonment pressure of some other operator operating under entirely different conditions. My information from the Texas Railroad Commission is that at least one operator is contemplating pressures down to vacuum. (Objection by Commission counsel sustained.)

You ask me if it is not conceivable that the gas company which is producing gas in the north end of Potter County and taking it 40 or 50 miles to the town of Amarillo would have an entirely different abandonment pressure at which it will cease to produce gas and withdraw from the field than Texoma would have, in view of the fact that Texoma produces gas in the Panhandle of Texas and delivers it 900 or 1000 miles away. The difference between the two operations consists largely of one of pressures. I believe there is a difference in that regard, for the reason that the gas produced and delivered to the Fritch station of Texoma, under the present method of operation by that company, must be raised from the suction pressure to a delivery pressure approximating 700 to 750 pounds, let us say, whereas the gas produced at the point you indicated on Exhibit 17 may be produced and delivered at lower pressures, due to the fact that it has much less distance to travel. There is a good deal more friction between delivering gas from the field to Chicago than there is in transferring it from the field to Amarillo.

As to whether I gave any consideration to the number of wells Texoma would have to drill, the expense of operating those wells, the number of compressor stations which would have to be built in the field, the expense of operating those compressor stations, or any of the economic factors 111 entering into it before making my estimate of the abandonment pressure for Texoma's properties, I will say that I did not make any economic studies or attempt to make any estimate of the necessary expenditures to be made by Texoma in the future, at this time. I assumed that very probably the same type of expenses and expenditures and development would have to be made by other pipeline companies that deliver gas for long distances, and it was indicated to me that in their opinion 25 pounds was a reasonable abandonment pressure. Some of them gave 50 pounds as an abandonment pressure, and I so stated on direct testimony. I included both 25 and 100 in my estimate; but I said that in my opinion 25 pounds was a reasonable figure.

As to how much gas a twenty million cubic foot well, coming in at a pressure of 430 pounds at the wellhead, would make when its pressure is reduced to 25 pounds gauge at the wellhead, that would depend a great deal upon the formation. It would depend entirely upon the open flow. It would depend upon the condition of the well. It would depend on the back pressure which the well is producing against. I can figure it out. I can't tell you offhand, but it is a thing which can be done by calculation. I certainly think that the quantity of gas that Texoma can produce from its wells has something to do with the point at which they will abandon the operation of those wells.

I testified that I graduated in mechanical and electrical engineering from the University of California, and studied petroleum geology in the University of Southern California. I was a student in the field of petroleum geology a few months in an extension course extending over a period of about three months. As to whether we met once a week, I don't remember how often we met. It might have been that and it might have been oftener, I don't remember; nor do I remember how many lectures I attended in the aggregate in that course.

(Colloquy of Examiner and counsel on subject of previous rulings allowing reading of unidentified document into the record.)

112 **V. E. COTTINGHAM**, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(May 25, 1939.)

My name is V. E. Cottingham. My legal residence is San Angelo, Texas. My profession is that of petroleum geologist, in which profession I have been engaged since 1920.

I have a degree from the University of Oklahoma School of Petroleum Geology, and did postgraduate work in that school for a year and a half after I obtained my degree. My major work was in the field of geology, and my postgraduate work was in the same field.

I have been continuously employed in the oil and gas industry since the spring of 1921. I was first employed by Mr. William Cheney, in Oklahoma. I worked for him approximately sixteen months, and then went with the Empire Gas & Fuel Company. I worked in the valuation department of that company in Bartlesville, Oklahoma, later going to Eldorado, Arkansas, as district geologist, having charge of the geological work in Arkansas and Louisiana for the Empire. I then went to the central part of Texas, along the Balcones Fault area, and later established an office for the company at San Angelo, Texas, in the summer of 1924. In the fall of 1924 I left the Empire and went with the Shell Petroleum Company, establishing an office for them at Carlsbad, New Mexico. I had a district comprising southeast New Mexico and extreme West Texas. Later that district was consolidated with the San Angelo district, and I took charge of their office and remained there for approximately a year, after which I went with the Exploration Company, a local company. I stayed with them approximately 18 months as chief geologist. I resigned from that position and established the firm of Cottingham & Bristoe, consulting geologists, and I was in that type of work until I started with the Railroad Commission of Texas September 1, 1931, when proration became a function of the State of Texas.

I started with the Commission as deputy commissioner. At that time they had no engineering department. I continued as deputy supervisor until June, 1935, at which time I was appointed chief petroleum engineer for the Railroad

Commission of Texas. I held that position until October, 1935, and from that time to March 1 of this year I carried the title of director of production in charge of engineering.

While serving as deputy supervisor for the Commission, my duties were for nine months in the East Texas field, principally as a conservation agent. I came in contact with general operating problems during that particular nine months period. I was not supervising the railroad end of the Railroad Commission's activities. My experience
113 was all in the oil and gas division. In speaking of the
East Texas field, I do not mean the East Panhandle field. The Panhandle field is divided into East and West fields. I refer to the oil field located in the northeast portion of Texas, in Gregg, Upshur, Smith and Cherokee Counties, as being the East Texas field. This is approximately 500 miles from the Texas Panhandle field. For the last three and a half years with the Commission my duties embraced the entire State of Texas. I have been in the Texas Panhandle and out in the field there many times. I have studied the logs of wells in the Panhandle.

(Request by Commission counsel to make preliminary examination of witness on qualifications denied.)

You state that there has come into this record the expression "weighted average pressure in the Texas Panhandle field." That pressure is referred to on page 7 of the annual report on the Panhandle oil and gas field, July, 1938. I am the V. E. Cottingham whose name appears on that report, and that report was prepared under my direction. At that time I was director of production for the Railroad Commission of Texas. You will note the report was written by T. G. Post, F. M. Blair and K. I. Dunn, as appears on the first page. Mr. Post did most of the compilation and the writing of this report. He was in charge of the engineering of the Panhandle field. He is a graduate petroleum engineer from Texas A. & M. College, and is now in my employ as a petroleum engineer, doing petroleum engineering at some West Texas field.

You have referred to page 7 of that report and asked me to state just how the weighted average pressure of 337.66 pounds was arrived at by my department under my direction.

Just before leaving Texas I went over the entire report so as to refresh my memory as to the contents with Mr. Post, and I asked him to tell me just how he arrived at the weighted average of the Texas Panhandle field, and this report I have in my hand is Mr. Post's explanation of it. I understand it that way, but I wanted to be sure because I thought it would come up that there would be more than one way of weighting, and this is his notation on my report. This is my judgment, but I am telling you how I checked myself, because a great deal of the report came through my hands while I was with the Texas Railroad Commission.

I went over this report thoroughly at the time it was prepared, and this weighted average for the Texas Panhandle field was arrived at in the following manner: It is the arithmetical average of pressure on all wells in each zone, multiplied by the total acres in each zone, and then the sum of the acre pounds of all zones is divided by the total acres in the field, which gives the weighted average pressure for the field. The weighted average pressures shown in all of these tables in that report as of July, 1938, was calculated that way for the East field, for the West sweet and the West sour, and for the total field as a whole.

When I spoke of each zone, I referred to the Railroad Commission's pressure map of 1938, a copy of which is before us as Exhibit 12. A small copy of that map is incorporated in the report. The pressure map was pre-
114 pared prior to the report. The reference to the zones
in the notation on page 11 of the report was to the colored bands on that map.

The factors considered in that weighting were the average or arithmetical average pressures of the wells in each zone multiplied by the acres. It is the average pressure of the well multiplied by the acres. This gives the acre pounds, and I added those products all together and divided by the total number of acres in the field to get the weighted average pressure. I gave no consideration to potentials or to sand thickness or to anything else except pressure and area.

These pressure maps were not made for the purpose of estimating reserves, but were made primarily for the purpose of prorating gas under the statutes of Texas, more specifically called House Bill 266 and Senate Bill 407. They are different statutes.

Cross-Examination by Mr. Slaff.

One of the most important cases in which I have testified was State of Texas vs. Texoma and Consolidated. The

Railroad Commission, pursuant to House Bill 266, promulgated and adopted an order to prorate gas in the Panhandle field, and suit was against the enforcement of the Railroad Commission's order. I testified on behalf of the State of Texas. This proceeding took place in January, 1936. I do not have a copy of my testimony. A copy of it would be available in the abstract of the record in the United States Supreme Court. The case is reported in 300 U. S. 55, 81 L. E. 510. The lower court's decision is in 14 Fed. Supp. 318. In that case I testified on the subject of geology, water conditions, gas-oil ratios, and the effect of the formula as applied to these companies. I did not testify with respect to reserves. I don't believe that subject came up. The State was represented by the assistance of the Attorney General.

Another case in which I testified was the Henderson case, touching on this particular field again. I believe it was tried in 1938. That was another proration case. They attacked the Commission's order prorating sour gas. That order, however, was promulgated under the authority of Senate Bill 407 and that case was tried before a three-judge court in Austin, Texas, and they sustained the Commission's order. It was the first proration that has been sustained in the courts. The title of that case was Railroad Commission of Texas vs. F. C. Henderson, and it is reported in the official reports. My testimony was with reference to drainage, water problems and geology. I was the only technical witness representing the State in that particular suit. No appeal was taken in that case.

The last important case in which I appeared was a case styled Rowan & Nichols vs. Railroad Commission of Texas. It was a suit attacking the proration formula obtaining in the Texas oil field. That case was heard during the first week of February, and the decision has not been handed down. It was before one Federal judge in February, 1939.

It was a suit against the State in which the Attorney
115 General represented the State.

There are other cases where I testified in some of the District Courts at Austin involving spacing rules. Generally the testimony hinges around the drainage of a well. Of course, I appeared each month before the Railroad Commission. The statute requires the Commission to hold a hearing each month with reference to gas and oil statutes, and I appeared before the Commission each time, giving more particularly information with reference to the Panhandle field and to the East Texas field.

I do not remember offhand the names of the different cases in the District Court. At the time proration first became a function of the State I appeared in the courts at Tyler and Longview quite a number of times; but I couldn't tell you the names of those cases. They concerned violations of the Commission's order with reference to the production of oil surreptitiously.

I have not appeared before the Texas Legislature or any committee of the Texas Legislature within the last five years, or submitted any reports to the Texas Legislature or to any of its committees. This is the first time I have testified since leaving the Railroad Commission.

Redirect Examination by Mr. Morgan.

I have never appeared as a witness for Texoma Natural Gas Company or Natural Gas Pipeline Company of America before today. I have never appeared as a witness for any client represented by counsel or his firm until today. I have always been on the opposite side of the table.

(At this point appears the following discussion:)

(Mr. Booth: I think we ought to have an understanding with Mr. Morgan on this point: The Commission ruled that you were to proceed first with the presentation of your testimony at the initial hearing and you declined for various reasons to proceed. You have now called Mr. Cottingham and you are proceeding with other witnesses. Do I understand that you are now presenting the testimony by these geologists as the beginning of the presentation of your entire case in defense of your present rates?)

(Mr. Morgan: I had not stopped to think about it. I have had so much else to think about, but it is our purpose to put on our geological testimony covering the ground covered by Mr. Brown's testimony on direct and at that time I will know, when I have completed this stage of the case, whether I am going to have some more testimony. The Examiner can see by this time that this is no merry pastime, getting ready to put on testimony of this character, and I have no objection to counsel for the Commission and for the Illinois Commerce Commission putting on proof in the meantime, or I can put on mine following this geological testimony, just as rapidly as I can get it ready.)

(Examiner Simpson: I think the time to raise that question, Mr. Booth, is after the time the testimony has proceeded just a little bit farther.)

(Mr. Booth: But I thought it might be helpful in working out our future plans in reference to the case if we knew Mr. Morgan's intention, and I think his statement clears it up, and the only question that comes up next week, then, will be the amount of time that he will request to present the remainder of his case.)

116 **C. J. PETERSON, a witness for defendants, testified as follows:**

Direct Examination by Mr. Morgan.

(May 26, 1939)

My name is C. J. Peterson. I am a resident of Amarillo, Texas. I was born in the Hawaiian Islands in 1885. I received my high school education in the Islands, and took the degree of Bachelor of Arts in the Department of Geology and Mining at Leland Stanford University, in 1910. My studies at Stanford University were entirely geological and engineering as relating to mining, specializing in economic applications of geology.

Since leaving Stanford University in 1910 my entire career has been devoted to economic work in the application of geology. In 1910 I took a position with the Tonopah Mining Company of Nevada as assistant mining engineer. During that time my duties were ground surveying, sampling of ore bodies, estimation of reserve of ore bodies, and reports of examinations on mining properties. I continued with that company until 1912, and later went back to work for them.

In 1912 I went down to Venezuela as geologist for the New York and Bermubez Company, which was a subsidiary of the Barber Asphalt Company. At that time the Barber Asphalt Company and its subsidiaries had concessions of approximately five-sevenths of the whole of Venezuela for oil exploration purposes. However, they had to make a choice of the best part of that territory within a certain time limit, and my duties in Venezuela consisted, with a number of other geologists, in segregating from the concessions held by the company the properties which were of greatest value for oil or gas exploration.

Returning from Venezuela I again went to work for the Tonopah Mining Company of Nevada. I stayed in Venezuela about one year. This time the Tonopah Mining Company employed me as an examining mining engineer in exploration work for the company. This work embraced examinations of mining properties in practically all of the mining states of the United States, and also in Nicaraugua. After my work in Nicaraugua I returned to Tonopah and was for a year their acting chief engineer for the company in charge of all its mining operations.

In 1917 I took a position with the Empire Gas & Fuel Company as petroleum geologist, with my work mainly confined to surface geology in the Osage field, Oklahoma. I left their employ in 1917 to go with a company which was known as the Hamilton Oil Corporation. This company did geological exploration work in several states, and while in their employ I had to make examinations of and purchases for them of properties in Oklahoma, Texas, Kansas and Kentucky. My work then embraced surface and
117 sub-surface geology, estimates of oil and gas reserves, and detailed surface examinations of properties.

In 1921 this company sold out their properties to what is now Continental Oil Company, and for a year I worked as a consulting geologist in Tulsa, Oklahoma, in association with Mr. C. L. Severing.

In 1923 I again went to work for the Empire Gas & Fuel Company, this time as a petroleum geologist for that company in the Rocky Mountain Division, with offices at Denver, Colorado. During my work for what was called the Rocky Mountain Division I had to make surface geological examinations and determinations of the value of properties in the States of Colorado, Utah, New Mexico, Wyoming and California.

At the end of 1926, I left the Rocky Mountain Division and took a position at the head offices of the Empire at Bartlesville, Oklahoma, as geologist in charge of exploration work for the Cities Service Gas Company. My work for this company embraced sub-surface geological work, geological work involved in estimating gas reserves, and was largely connected with the determination and recommendation to the company of pipeline projects. In other words, when it became apparent that gas was occurring in certain sections of the state, it was part of my work to tell the company whether or not gas pipelines were justified to those places. This, of course, involved estimates of what reserves might be available and whether or not these pipeline projects would be economical.

In the course of my work in this connection, the Cities Service Gas Company built its gas pipeline from the Panhandle field to Wichita and from there to Kansas City, which now furnishes Kansas City with some of its gas. Also in my work with the Cities Service Gas Company, through a study of the geological conditions in certain abandoned fields owned by that company, I instituted a storage of gas in these abandoned gas fields and these gas storage projects are now working on a commercial basis. They had certain gas fields which had been abandoned, that were near the market of the Cities Service and they took the gas during the summer, when they haven't a peak load on their line, and stored it in the old gas fields, and when the winter peak load is on they have this storage to draw on when they have a peak load.

This pipeline out of the Panhandle to Wichita and then to Kansas City was built in 1928. I did some work in the Panhandle prior to the building of that pipeline. Before any recommendation could be made for a pipeline out of the Panhandle field, it was necessary to estimate the reserves in the field to determine whether or not such a line was justified. That was my work. It was work in connection with that that enabled me to recommend the building of this pipeline. That was the pipeline extending from their main compressor station near Pampa, in Gray County, situated at the point I indicate on Exhibit 13, in a northeasterly direction through Roberts and Hemphill Counties. It gets its gas for that line from leases situated in the western part of Gray County and scattered leases in the eastern part of Carson County, and from an immense lease which covers
118 the greater portion of what is known as the Burnett ranch, involving an area over ten miles square, just west of the central portion of Carson County.

I continued to work for the Cities Service Gas Company until 1930, when I took a position as chief geologist for the Continental Construction Corporation which initiated the organization of Texoma Natural Gas Company and Natural Gas Pipeline Company of America. My duties were confined entirely to studies in the Panhandle gas field. These studies had to do with preliminary work which was used in the organization of Texoma Natural Gas Company and Natural Gas Pipeline Company of America. It was in August, 1930, that I began my work with Continental Construction

Corporation, and since that time I have devoted my entire time to the study of geological and production conditions in the Panhandle field.

I have an organization under my direction as chief geologist of Texoma Natural Gas Company. That organization, known as the geological department, consists of a stenographer, a draftsman, a man who is employed to collect, wash, dry and file samples of well cuttings from the wells in the field. These cuttings are filed in detail so that we can pick out any footage in a well and tell just what occurred at that footage in the well in the way of formation. They are samples of cuttings made when the wells are drilled, and from these samples I can tell at any point what was encountered in the well when it was drilled. I also have an assistant, a graduate geologist, Mr. W. F. Brainard. He is a graduate of Syracuse University in the department of geology. He took his Master of Science degree in that university in 1922. He has been employed in economic geological work ever since 1922. His duties are as assistant to me and we work together a great deal of the time. He is very experienced in microscopic work in the examination of samples and he has done a great deal of that work under my direction. We work together on that but he is perfectly able and competent to do it by himself.

This microscopic work involves equipment like microscopes etc. and we have some of the best microscopic equipment which is known, consisting of a Spencer microscope with special lenses, special lighting equipment to light the stage. This microscope was made especially for the examination of well cuttings. We have examined with the microscope well cuttings from 591 wells in the Panhandle field. In the course of doing this we examined 12,830 samples, and have on file in our office for reference over 60,000 samples of well cuttings from the Panhandle field.

In the preliminary work in the field we used to take well cuttings from the ground all the way down to the depths of the wells, because it was necessary to find out exactly what the conditions were in all formations, and we did not wish to overlook any possibilities in the upper formations. As a result of our experience in examining the wells located in different portions of the field, we are now able to narrow our examinations to just certain portions of the formations in certain portions of the field. For example, in the portion of the field where Texoma Natural Gas Company is drilling its wells, our examinations begin at about a point slightly above the top of what has been called the Big Lime. This is the top of the anhydrite section.

119 On Exhibit 16 the top of the big lime is shown by a heavy dark line beginning at the figure "1000" and going irregularly across to the words "Top of the Big Lime." That big lime, however, is not confined to the area presented by this cross section. It occurs all over the field in the same relative position with reference to other layers. The only difference is that in some places it is a great deal thinner than is shown in that cross section.

I have had something to do with the drilling of Texoma's wells. My duties for Texoma involved choosing the best locations for the drilling of wells, the determination of the points at which casing must be set in these wells, the determination of what depth these wells shall be drilled to, and also it is part of my duty to determine the relative value, geologically, of acreage owned by Texoma, to determine whether or not the company shall drill on leases or shall acquire leases. In this connection my work is limited entirely to determining whether or not a lease should be bought or sold or drilled. I have nothing to do with the commercial values of these leases. That is determined by the economic part of the company—what price they shall pay for these leases or sell them for. I pass on the prospective production of the lease—whether I think it is advisable for Texoma to drill or to acquire it.

I have a record on each well we drill of the formations through which the driller passes as he goes down from the surface to the producing formation. The record, which is kept by the driller, is called a log of the well. This log shows the formations encountered in the well, the depths at which they are encountered, the shows of oil or gas which are encountered in the well, and the depths at which they are encountered.

I have personally spent a great deal of time in studying conditions during the drilling of Texoma's wells. As a matter of fact, I have many a time gone out to a well and stayed on the derrick floor for periods ranging from 18 hours to 36 hours, and in one case even 72 hours, without any sleep, so as to get actual information regarding the formations encountered, the way they were encountered in the well, the way that gas was encountered in the well, the actual thickness of the formation containing the gas, and how it acted when it was encountered. I have personally during the drilling in of a well gauged that well during its drilling in at five foot intervals, to find out just where the gas was.

One of the methods of determining the thickness of pay is to drill in the gas and take a gauge of it, take another gauge after it is drilled a few feet more, and if the gas has decreased in volume we will drill another five feet beyond to find out if there is any gas in that part of the formation; and if we get an increase in gas we will know that in that way we found out exactly how thick the gas formation is.

All of the logs of Texoma's wells are on file in my office. I have in my office probably over 3000 logs on file of wells in the Panhandle field. I continually study these logs in connection with my duties, and have studied them over
120 the past nine years. They are my Bible down there.

They are logs from other wells drilled over the field. They are all the logs which are available to me and such as I can get for my study. I study every known log. I watch the logs of new wells as they come in, in order to keep abreast of the conditions as they are revealed by new wells drilled from time to time. I go out and watch them drill some of the time. I watch wells drilled by other companies and always make arrangements to obtain samples from them for my collection so I can tell what formation they went through, what they encountered in their wells. In that way we can get an idea of what the conditions are outside of Texoma's own acreage. That is the only way we can keep informed—by a study of wells being drilled outside of our own acreage. That gives us an idea of the chances we have to run.

Texoma has at this time approximately 159 wells. I say approximately because we are in the process of drilling a number of them and I can't state the exact number now because some may have been completed since I have been up here in Chicago. I am just talking about the number of wells we now own. We have had to abandon seven wells.

Going back to the period prior to 1928 when I was making an investigation down in the Panhandle on which I made reports concerning the advisability of building a pipeline from that field to Wichita and Kansas City by the Cities Service Gas Company the field was not at that time known to cover the same terirtory it is now known to cover. The development at that time was considerably restricted as compared with what the development is now. The borders of the field could not be outlined as they can today through the use of wells which have been drilled. In 1928 most of the production had been along the northeast flank of the field and mainly consisted of wells which were drilled for oil. As a matter of fact, many of the wells encountering gas were drilled with the idea of encountering oil. Very few wells had been drilled prior to that time for the definite purpose of producing gas. Most of them drilled prior to 1928 were drilled with the intention of encountering oil. They got off the clearings as far as oil was concerned and brought in gas wells but no oil. By that means it became known that there was a large quantity of gas in that field, but they kept drilling for oil and kept getting gas instead. They were very disgusted with it, for they were after oil.

Going to Exhibit 13, I will point out on that exhibit where the oil fields in 1928 were. The main producing pool, at that time was near the town of Borger, known as the Borger field, which is in the southeast part of Hutchinson County. It is a little hard for me to remember that far back as to where the oil pools were; but they had some oil at that time out near Pampa, in western Gray County, and they had done some drilling in the Lefors area. That is another town in the central part of Gray County.

Having found by the development to that time that there was oil in that country, the bold, who were willing to speculate with their money, had drilled a good many wells scattered out all over that country in search of oil; and in the doing of that they had discovered these gas formations demonstrating that a great gas field lay there. 121
The real big oil development started in 1926.

I did not know at that time how far west and how far south the gas field extended. We did not know how far west, how far northwest, how far south or how far southwest that field extended until we obtained our present information, which was in 1937. We haven't been able to change any of our ideas of the boundaries of the field since 1937; but down to that time the boundaries were being changed by outlying developments, finding wells where it was not known before that wells could be found. The present contours of the field have not been as they are now until 1937. We think we have a pretty good idea of the limits of the field now. It may be changed at any time. It might extend a little further than we have it outlined. It is very hard to tell just what you are going to get in a well drilled on the edge of the field; but we are pretty certain that the edges of the field are defined now on account of our structural conditions. The structural conditions show that we have about reached the limits. The producing formations as we go around the perimeter of the field are dipped down approximately to sea level. As we are able to project the depth, as shown in the wells, it is about to dip into water at the limits as we now have the field defined.

Since 1937 a slight change has been made in the perimeter of the field by the Texas Railroad Commission; but I did not adopt that change. The main change they made was in the border of the field which is shown in the central part of Carson County—a comparatively short line in a northwesterly direction to the central part of Carson County as shown on Exhibit 13. They moved it slightly to the southwest because they had a couple of wells located incorrectly on their maps. These wells were wells which occurred in Block 5, B & B, which is in the west portion of Carson County. They thought they were in Block 5, I & G N, near that boundary of the field which we were just discussing. From that they drew their line on account of these incorrectly located wells. They are now aware of the fact and admit that those wells were incorrectly located. In other words, they put the wells on the same section numbers in Block 5, I & G N, that had actually been drilled in Block 5, B & B, and that got them out of the border of the field as it then existed, so they just dropped their line further over. They thought they had a development which warranted changing the borders which had not occurred. I have pointed that out to them and they admit there is no reason for changing the border of the field there.

My conception of the field is the same as it was portrayed on the Railroad Commission map of 1937. I think it was one of the best jobs that was ever done in outlining the field. That map is Exhibit 17, as is my present conception of the boundaries of that field.

The change was really not a major change. You can hardly detect the difference between it and the line I have used on Exhibit 17. They had a couple of wells which they thought were located approximately in the center of Carson County, near the "S" in "Carson" as shown on Ex-
122 hibit 13. They thought those wells were there and
they moved this line slightly down and increased the area of the field slightly. It was not major and did not affect the area very much, because the change was compensated for, but I wanted to draw attention to the reason why I am defining the border as I am over there. My Exhibit 17 keeps the line in the old place.

That is a part of the difference in acreage that Mr. Brown pointed out in his testimony, but another reason for the difference is that I have used a different method of measuring my acreage. My acreage has been estimated by taking each section, section by section, and checking the number of acres involved. The Railroad Commission's estimate of acreage was obtained by the use of the planimeter.

At the time I was first engaged in the study of gas reserves and prospective productivity in the Panhandle, back in 1928, it was known that there was some sour gas there and there was a tentative location of part of that line. The development at that time did not show just where the line was located throughout the whole field. There had been some sour gas wells and some sweet gas wells drilled then in the search for oil; but they had not drilled enough in the vicinity of that line so that its location was definitely known. There was not enough development on the border between the sour and sweet gas to determine just where the sour gas was located.

There was not sufficient information in 1930 and 1931 to definitely locate that line on the ground. Practically all the information about the line in 1931 was about its existence in Western Gray County and northeastern Carson County and southwestern Hutchinson County. There were one or two sour gas wells in Moore County at that time, but nothing could be told then as to where the line was. There had not been enough drilling to locate it. Our impression at the time from the one or two gas wells we had was that they were freaks. We didn't think it meant anything. In 1931, we did not know that the sour gas line was in the position in which it is now shown on Exhibit 13.

(EXHIBIT NO. 19 for identification, offered and received in evidence without objection.)

I have already stated that in 1928 and on down to 1931, wells had been drilled and were being drilled in search of oil, and that in many instances those wells did not produce oil but disclosed the presence of gas.

Prior to 1928, there was a small local pipeline going to Amarillo, Texas, from Potter County, but there were no large pipelines going out of the field at that time.

The wells which had been drilled into gas down to 1931 did not make the same quantity of gas per well. There was a big variation in the open flow potentials. The wells ranged from one million to one hundred twenty-five millions. From the fact that we had one million cubic foot wells and 125 million cubic foot wells in different parts of the field, I drew the conclusion that there was an immense variation in acre content and reserves underlying the different 123 portions of the field; but I did not know in 1931 the production of the field would turn out to be, as I do in 1939. There was then no way of being certain about that. An immense number of wells have been drilled since 1931 in search of oil and also in the development of gas.

In December, 1938, there were 4032 producing oil wells and over 1500 producing gas wells. That does not include all the wells which have been drilled. It includes only the wells that are now producing oil or gas. A great many wells have been abandoned in the field, especially in the oil fields, and a considerable number of gas wells have also been abandoned.

(Map entitled "Rock Pressure Map, Texas Panhandle, 1932", marked Exhibit No. 21 for identification. Map entitled "Rock Pressure Map, Texas Panhandle, 1935", marked Exhibit No. 22 for identification. Map entitled "Rock Pressure Map, Texas Panhandle, 1937", marked Exhibit No. 23 for identification.)

Exhibit 21 is now presented to me. It is marked "Rock Pressure Map, Texas Panhandle, 1932". I contoured the map and the exhibit was made under my direction in 1932. It purports to show by contours at 20 pound intervals the rock pressure conditions existing in the Texas Panhandle field in 1932. The different 20 pound contour intervals are designated by different colored bands with the exception of the contours which would reach above 400 pounds. On the exhibit, the area which had a rock pressure above 400 pounds, is colored yellow. Also on the exhibit the area in which the rock pressure was below 200 pounds is colored gray. The intermediate bands between the gray, representing pressures below 200 pounds, and the yellow, representing pressures above 400 pounds, represent areas in which the rock pressure is divided into 20 pound intervals.

This map also purports to represent the outside boundaries of the field as it was conceived in 1932. There has been considerable change in the boundaries of the field since 1932. Changes have been made in almost every portion except along the northeast as development has progressed, and some changes have been made even along that line. Nearly all of the lines have been changed as between 1932 and 1938. Exhibit 17, the 1938 map, represents my preseir conception of where the boundaries of the field actually lie.

On Exhibit 21, a large uncolored area is shown near the center of Gray County, surrounded by heavy dark lines. The significance of that area is that because of dry holes having been drilled there it has become evident that the area has no content of gas or oil in it, for which reason it is regarded as one devoid of productivity. We had to change our conception of that area as time went on, just as we changed our conceptions of the field. In other words, as more dry holes have been drilled, there has been a change of the boundary of that area.

I have stated that in 1926 important oil production took place in the Panhandle. In 1932 the production was largely localized along the northeast part of the field, but still in practically the same position as formerly, only that there was more of it. Prior to 1932 very little gas had been produced for pipeline purposes from the field, and there was practically no restraint of the wastage of gas in the drilling of oil wells prior to that time. There was an immense wastage of gas along the northeast flank of the field by wells which were being drilled for oil. It was wasted by drilling through the gas formations down to the oil
124 producing formations, allowing the wells to blow wide open while they were drilling through the oil portion of the formations. It was also used for flowing oil wells. They would use the gas in the upper formations for flowing oil and then let it escape to the air. A lot of gas at that time—really, it was free dry gas—was used by the gasoline plants. They would bring in wells drilled for oil and they would have gas in the upper formations above the oil formations and they would produce this gas with the oil and call it casinghead gas, but the term casinghead gas has been very loosely used in the Panhandle field. There has been no technical reason for it—just the fact that the gas came out of a casinghead made it constitute casinghead gas. This gas had no relation to the gas that was originally in absorption in the oil. Most of the gas that has been used in the gasoline plants in the Panhandle and referred to by the term "casinghead gas" has just been dry gas used in those plants.

A lot of it was wasted in other ways. It was used in casinghead plants and carbon black plants, and wells were left to run open for weeks at a time. I was down there in 1928 and I can remember especially seeing one well drilled on the Burnett ranch which was a 79 million well. They had a little trouble getting the gate valve shut off, and it ran wide open for three weeks—79 million cubic feet of gas running into the air, every day. The approximate location of that well was Section 79, Block 4, in the northern part of Carson County.

Where oil was developed in a well back in those days, or at the present time the casing is generally set just above the oil pay, which would be about the lower part of the gas bearing formation, as the gas comes right on top of the oil. In the earlier days of the field a great many of the wells there had the casing set without being cemented, and the casing was in many instances raised, which allowed the gas to come down the sides of the casing and go into and be produced with the oil, and in other places it was reported that the casing was ripped. Slots were made in the casing by ripping, which allowed the gas to enter into the well hole and facilitate the production of oil; that is, the gas would be produced with the oil. This is what they all call casinghead gas.

The greater part of the gas which has been called casinghead gas in the Panhandle was, prior to its production, located in the dry gas area—approximately all of it. A negligible quantity, so small that it is commerciaclly of no value to any pipeline or even to a lot of the gasoline plants down there, has come out of absorption in the oil. They couldn't even connect the wells that they have any of that gas in. They don't even take the trouble to connect them up. That is the type of well that the Railroad Commission reports as having no oil-gas ratio. Some of them that have a slight oil-gas ratio are not connected to gasoline plants because there isn't even enough gas to warrant it.

I make the statement that all the gas that has been termed casinghead gas has come out of gas bearing parts of the formation because I have seen wells drilled in and have seen that gas coming into the wells and coming out with oil in a great many instances. I have said "practically all"; there is some real casinghead gas in the Panhandle
125 field. I am not saying there isn't some. I say that it is a negligible quantity as compared with the total gas that has come out because the proportion is infinitely different. It is a very small quantity in comparison to the total amount of gas that has come out.

I have had occasion to investigate the source of the gas that has been produced over the Panhandle during the nine or ten years that I have been down there. I have conducted researches and investigations and made observations to determine where that gas is coming from. The result reached by me as a consequence of those researches and investigations is that I consider that the major portion of the gas comes from the gas producing formations. It would have been impossible for that gas which has been produced from oil wells down there to have come out of absorption in the oil. The quantity would be absolutely negligible in comparison with the total amount of gas that has been produced with the oil in the field. In comparison with other fields in the United States, there are very few where there has been such an immense amount of gas that has been produced with oil. It has been out of all reason.

Questions by the Examiner.

Casinghead gas generally comes out as the oil flows and frees itself in a comparatively short time. The point I am trying to make is that the immense amount of gas which has been reported as casinghead gas and as produced with oil in the Panhandle field is not casinghead gas nor gas from absorption. That immense quantity could not possibly come from either of those sources. The only way we can tell that oil has a certain amount of absorbed gas would be by analyses of oil, such as has been submitted in this hearing by other witnesses. When gas is absorbed by oil you will not be able to detect it with your eye. It is a subject for analysis.

Direct Examination Resumed by Mr. Morgan.

If the gas is absorbed, it has become a part of the liquid. It may escape as the pressure goes down. Some of the gas might come out of the oil as the pressure was reduced, which would allow this liquid to turn into a gas.

It has not been an uncommon thing in the Panhandle field to find a well producing ten million cubic feet of gas and one barrel of oil. I do not think there is a chance in the world that ten million cubic feet of gas have been absorbed in a barrel of oil. That is the point I am trying to make.

The wastage of gas in the Panhandle field did not cease when the pipelines were built into the field. As a matter of

fact, shortly after the major number of pipelines were built in the field some of the greatest wastage of gas occurred in the Panhandle field. This waste of gas occurred mainly in 1935, as I remember. At that time legislation allowed the use of dry gas by gasoline plants for the production of gasoline and permitted these gasoline plants to pop the residue into the air, and since the dry gas had a very small gasoline content of about three-tenths of a gallon per thousand cubic feet, the gasoline plants, in order to make a large amount of gasoline, had to use immense quantities
126 of gas, and since they were not restricted in the usage to which they put their residue they just popped this gas into the air. The result was that at one time there in 1935 they were popping into the air one billion cubic feet of gas a day. That gas was being produced largely along the northeast flank of the field, just off and in the oil producing part of the field.

I have a map or graph in which I have portrayed the production of gas from the Texas Panhandle field by years. The figures used in that graph for the years prior to 1932 were obtained from records published by Victor Cotner and H. E. Crum, published and presented before the American Association of Petroleum Geologists at an Oklahoma City meeting in 1933. Those men had lived and studied in the Panhandle gas field practically since the beginning of the field. At the time, prior to 1932, when they were present in the field, the Railroad Commission did not issue reports on the production from gasoline plants. They did issue some pipeline reports; but on a lot of those details of gas they did not keep records. Mr. Cotner was with the Columbian Carbon Company, which was interested in gasoline production from gasoline plants, and these men were in position to obtain actual information on the gas which was being used by these plants which was nowhere else obtainable, and they kept careful records, and their reports of production have been generally accepted as the best records that can be obtained on the production of gas in that period.

They worked in collaboration with other geologists and production engineers in the field in compiling that original estimate of gas produced as of the time they made it. They not only took their own figures, but they were in continual contact with everybody from whom they could get such information, just as when they wrote their report they got all the geologists down in the Panhandle field, practically, to aid them with their information. This estimate of reserves by Cotner and Crum was a published scientific paper, based on very extensive researches, and is the generally accepted authoritative estimate of reserves as of the time it was published. It is accepted by the fraternity of geologists and members of the American Association of Petroleum Geologists as an authoritative document, and the Railroad Commission of Texas, in all of our legal contentions with it, has never questioned it in any way.

At the present time, the Railroad Commission keeps a record of the production of gas wells, and in addition to those two sources, the Railroad Commission reports and the Cotner and Crum publication, I have from 1932 on used records that are available from the Railroad Commission of Texas on the withdrawals of gas, such as those by the gas pipeline companies and the gasoline plants. In addition to that, there is quite an amount of gas the production of which is recorded nowhere and which has to be estimated. There is the gas, for instance, which is used for fuel in drilling wells, the gas which escaped from unconnected oil wells, the gas which escapes while oil wells are being drilled in, and the gas which escape while gas wells are being drilled in. With the aid of information obtained from the scouts of the different oil and gas companies in Amarillo, I have made estimates of the gas which has been used in these ways. This information consists of actual reports on the wells which are drilling, the amount of time they are drilling, and the amount of gas which they encounter as they drill. With the aid of this information, by figuring the actual well days during which the gas is
127 being used for fuel or is escaping from wells or is being
wasted in the drilling of wells, I made my computations. I go to an immense amount of detail in that matter. It is the best estimate I know to make. It is an important part of the gas. It isn't a big amount, but it does have an importance.

I have made it a part of my duty to my employer to keep abreast of the production of gas in that field throughout the period I have been down there as chief geologist. It is a very important matter to us to know the amount of gas that is being produced from the field.

(Graph entitled "Total Gas Produced From Texas Panhandle Oil and Gas Field Shown by Daily Averages, 16.4 lb. Base," marked Exhibit No. 24 for identification.)

I collected the information for the graph marked Exhibit

24 for identification and had it made under my direction. I explain the graph by pointing out that the blue coloring at the bottom represents the gas used by gas pipelines in daily averages. It shows the daily average throughout the year for each separate year. The brown area above the blue portrays the total gas used by gasoline plants, in the aggregate. There is some cross-hatching in the lower portions of the brown columns. That portrays the residue gas used for carbon black by the gasoline plants. That part of the brown area not hatched represents the gas used by gasoline plants where some of the residue is blown to the air, some used for plants on the lease, and some for the operation of the gasoline plants. For the period between 1927 and 1935 a great proportion of the residue was blown to the air.

The green color represents gas blown in the air and used for fuel in drilling wells. It includes gas used for fuel in drilling oil and gas well and gas blown to the air, not from gasoline plants, but during the drilling of those wells.

The red represents casinghead gas not treated but which was allowed to escape from oil wells not connected to gasoline plants.

In 1926, there is a small coloring in blue and a comparatively small coloring in brown. That is accounted for by the fact that during the inception of the usage of gas in the Panhandle field neither the gasoline plants nor the gas pipeline production had been initiated in any great amount. The only pipelines in the Panhandle using gas for pipeline purposes in 1926 were local lines like the one to Amarillo and pipelines to other little towns around the field or in the field. In that year, which was the first year of oil production in any substantial quantity, the casinghead gasoline plants were just being introduced.

By the next year, the pipelines were still confined entirely to local consumption; but the gasoline plants had begun to get in their work, and the column jumps up, as indicated by the daily averages in millions of cubic feet shown on the chart. We find the pipelines probably had about ten million a day during 1926 and slightly more than that in 1927, whereas the gasoline plant use had jumped
128 from approximately 100 million a day in 1926 to approximately 740 million in 1927.

In 1928 there is a perceptible change in the blue coloring, due to the starting of production of gas by the Cities

Service gas pipeline that was built in that year. The Denver line was also completed in that year. Gasoline plant consumption continued to go up until it had reached a substantially higher figure in 1928.

The total production of gas for all these purposes during 1926 was approximately 655 million cubic feet per day. In one year the production jumped up to 1,390 million per day; and the next year the daily average figure was 1,480 million. In 1929 the total figure had reached 1,700 million. In 1930 it was 1,690 million. In 1931 it was 1,380 million. In 1932 it went down to a little over 1,140 million cubic feet per day.

The occasion for the gasoline plant use going down during that period was partly because of a lack of demand for gasoline, the industrial conditions, and the price of carbon black; but there was also a tightening up by the Railroad Commission in the matter of the wastage of gas and the abuse of the use of dry gas in gasoline plant operations. Mr. R. D. Parker was in charge of oil and gas regulation enforcement for the Railroad Commission during the years 1930, 1931 and 1932. Mr. Cottingham came after Mr. Parker.

In 1933 the production jumped up again. There was a slight increase in the production of pipeline gas, but a larger increase in the use of gas for other purposes. The occasion for that increase was that in 1933 the Railroad Commission began to loosen up its restrictions and allowed a greater production of gas wastefully. Special permits were issued permitting the use of dry gas for the manufacture of gasoline, allowing the residue to be popped off in the air. That resulted in an increase in the number of gasoline plants in the field, beginning in 1933 when those permits were issued. By 1934 a number of new casinghead plants had been completed and the State of Texas allowed them to use dry gas for gasoline and pop the residue to the air, and the production shown for the years 1934 and 1935 resulted. The total production for 1934 was about two billion one hundred million cubic feet per day, and in 1935 it had gone on up to 2,110,000,000 cubic feet per day.

In 1936, through litigation, the State of Texas was prevented from allowing the use of dry gas for production of gasoline where the residue was allowed to be popped to the air. That reduced the total production of gas in the year 1936 by some 600 million cubic feet per day.

In 1937 the usage of gas increased. The pipeline gas increased and has been steadily increasing right along. In 1937 the total amount of gas produced amounted to 1,610,000,000 cubic feet per day. There was an increase in the production of carbon black, or gas used in the manufacture of carbon black, in 1937, as compared with 1936.

In 1938 the carbon black production fell off some-
129 what because of a decrease in the price of carbon black
and an over-supply for the market at that particular time. The use of gas by the pipelines fell off somewhat in 1938, due to a decrease in the use for industrial purposes. I think this falling off in the production of gas for both carbon black use and pipelines use in 1938 as compared with 1937 was due entirely, to the difference in business conditions, because so far as the usage of gas is concerned in the Panhandle field, the wastage is being very well controlled and the falling off is not due to control in the field, but to outside business conditions causing a smaller use of gas.

This graph shows that the general trend has been for the gas used by gas pipelines to increase in amount as the years go by. The last of the large pipelines out of the Panhandle field was completed in 1931. All of the lines now taking gas out of that field have been there since that year; but they did not take as much gas in 1932 as they did in 1933, or in 1933 as they did in 1934, and they did not take as much any year after that time as was taken the following year until we get down to 1938. The pipelines now taking gas out of the field are not taking all the gas they are capable of taking.

The trend of the usage of natural gas for carbon black purposes during the history of the field to 1938 has been for its use to increase each year, except for one or two years when there has been minor recessions in the use of gas for that purpose. There was a slight falling off in the use for carbon black in 1938. The gas used for carbon black is produced on the northeast flank of the field from the gasoline plants. It is not produced from the plants, but is produced from dry gas wells and the major part of this production comes from the sour gas area of the field. The rest of it comes from gas which is produced with the oil in the oil area. I should say there are approximately 33 of those carbon black plants in the field.

I wish to make an explanation to the Examiner concerning the total quantity of gas that goes to gasoline plants in the Panhandle as shown by Exhibit 24. In the reports of the Railroad Commission the only gas which they report is the gas used by gasoline plants and the gas used by pipeline companies. Now, as it happens, in the Panhandle field the Northern Natural Gas Company uses residue gas for a part of its load. This gas is reported in the report to the Railroad Commission as gas going to gasoline plants; so in making up my summaries, to keep the usage of gas segregated between gas used by gasoline plants and gas used by pipelines, I subtracted the gas used by the Northern Natural from residue gas from the total gas which is used by gasoline plants and added it to the gas used by gas pipelines, just to keep my total figures correct showing the proper usage of the gas. The correction is used from 1932 through 1938, and involves approximately 40 million cubic feet per day.

The reason I am calling this to your attention is that if you check the records of the Railroad Commission against my chart they won't agree in that respect; because I have had to make this correction in order to get the
proper usage of gas separated as it was really used.
130 This volume has not been uniform during the period
from 1932 to 1938 but has varied from year to year,
starting at a great deal less than that and gradually increasing. I have the figures from year to year and they are readily available.

All of the gas that is carried out by pipelines is included in the blue, even though it goes through a gasoline plant. That is true as to Texoma's gas, which goes through a scrubbing plant. This scrubbing plant is used to scrub the gasoline out so it will go through the pipeline at an economical cost. That is true of nearly all the gas, and the reason I make a distinction in the case of Northern Natural, and perhaps others, is that they buy this gas from gasoline plants instead of producing it and running it through their own plant. There is one other little difference. In the report issued by the Railroad Commission, they report the disposition of residue gas, and in that disposition show gas used for repressuring. The gasoline plants use some of their gas for repressuring. They run it back into the gas wells or into the oil wells, which increases their production. Since this gas goes back into the field, I always subtract it as being gas that has not been produced. I do this to avoid duplication. I consider that as having gone back into the field, so it has been subtracted from the gas used by gasoline plants. That would make a slight difference between my results and the annual reports of the Texas Railroad Commission because they have not gone into those details.

I have prepared a tabulation of the daily average production of gas in the field during the years to 1938, inclusive, which is portrayed by the graph marked Exhibit 24.

(Document entitled "Gas Produced From Texas Panhandle Field," marked Exhibit No. 25 for identification.)

(EXHIBITS 24 AND 25 for identification, offered and received in evidence without objection.)

I have used this same graph and this same set of figures in litigation with the Texas Railroad Commission. I used the figures from the year 1926 through July, 1935. They have never challenged or questioned those figures in any way. They are the same figures which were adopted by Mr. Brown in his direct testimony, except that they are brought on down to the end of 1938. I have listened to Mr. Brown's testimony and have also read the transcript.

Exhibit 22 was prepared under my direction by my own staff. I did the contouring on it. It portrays by 20 pound interval contours and colored bands the rock pressure conditions in the Texas Panhandle field in 1935. The same legend is used on this map as that used on Exhibit 21. The gray area shown on the northeast flank of the map is the area which has a rock pressure of 200 pounds and less. The colored bands extending on the exhibit in a southwesterly direction across the field show by separate colors, by 20 pounds intervals, from the 200 pound interval up to the 400 pounds interval. The area colored in yellow on the map is the area which is above 400 pounds; that is, which was above 400 pounds in 1935.

This map was made in 1935, using the then existing official pressures as shown by the records of the Railroad Commission.

The 1932 map was based on information obtained by consulting some of the Railroad Commission records in
131 Pampa and from consulting different companies which
owned wells in the field. In 1932 the Commission did not issue any report of the rock pressures. I obtained them from actual records of pressure tests, either from the Commission or from the company which owned the wells. I got most of the data from the Commission's files. They had the information but did not issue a report in 1932. As I remember it, they began in 1933 to get out the reports.

It was some time between 1932 and 1935 that they began that practice.

Exhibit 23 was made under my direction. I contoured it. It has the same caption as the other pressure maps except that it is for the year 1937. This exhibit portrays the same conditions, with the same legend as that appearing on Exhibit 22, only this is for the year 1937 instead of 1935, as shown by Exhibit 22. The same pressure bands represent the same pressure on each of the three exhibits, Nos. 21, 22 and 23. The pressures on Exhibit 23 were the prevailing pressures in the year 1937 as shown by the records of the Railroad Commission and appearing in its report. The exhibit was made in 1937.

Exhibit 17 was prepared under my direction in my office in 1938. I did the contouring on it. The same colored bands signify the same pressures on that exhibit as on Exhibits 23, 22 and 21. The same color scheme has been attempted to be used, although the colors are not exactly the same, as I note some of the color is a little darker on this map than on the others; but the same general scheme has been used. When I use yellow, whether it is of the same shade of yellow or not, it portrays the same pressure.

The Railroad Commission in getting out its reports on rock pressures for the Panhandle field usually makes these reports cover the end of either July or August in each year. These maps represent the conditions shown by those Railroad Commission reports, and the date on each map shown in Exhibits 21, 22, 23 and 17 is approximately the end of July of each of the years mentioned. The Railroad Commission causes tests to be made of the pressures and the open flows of all the gas wells in the Panhandle in December of each year, and those tests are incorporated in these reports from which I took the data that is represented by these maps.

These tests generally involve a period of about three months. A test on one well may be made three months before or after the test on another well. They send a force out into the field about June and keep them there until they finish the job. They consider July as about the mean date of the time in which they do the work.

The 1932 map was not predicated upon a report issued by the Commission; but a great deal of the data was obtained at the office of the Commission and was supplemented by information directly from the operators who owned wells in the field. In 1932 the date mentioned was September,

except for Wheeler County. The legend states that
132 the Wheeler County Pressures were taken in December, 1931.

These exhibits all show pictures of the same gas field. The only difference in the figures which are colored on each one of these maps is due to the circumstances which I have already mentioned, that the border line and some of the details, like the extent of this barren area near the center of Gray County, have been changed by information derived from the drilling of additional wells after the first map was made.

You point out for illustration that the barren area shown in Exhibit 21 near the middle of Gray County has a narrow neck of yellow colored area lying between it and the uncolored portion of Gray County lying immediately south of it, while in 1935, three years later, a large part of the six miles immediately south of this barren area is now in color, except that a serrated wedge-shaped area extending almost out to the barren area is not colored. When we get over to 1937 this irregularly wedge-shaped area has disappeared, and the line runs substantially across in almost a straight line, except that there is an area that is uncolored at the top of Sections 160 and 161 and on the south. Counsel suggests that all of those changes in that immediate vicinity have been occasioned by actual drilling operations which have occurred from time to time. That statement is correct. The maps are made up entirely on the basis of what the drilled wells have shown to be the conditions.

Counsel also points to a heavy red line running from north to south through Gray County and cutting this gas field in two right across the barren area of which we have just been talking, in Exhibit 23. That line represents the boundary between what is known as the West Panhandle field and the East Panhandle field as designated by the Railroad Commission. It is also shown on Exhibit 17; but it does not appear on Exhibits 21 and 22 because when those exhibits were made the Commission had not divided the field into two separate fields. That was done sometime between 1935 and 1937. It was just a designation made for proration purposes, like the proration designations for the Panhandle proper, Moore County, and the Osborne area made for the purpose of prorating oil. The field was divided into the East and West Panhandle fields for the purpose of prorating gas at the time when they were going to prorate; but it is all one field, one great common reservoir.

Counsel directs attention to a perceptible difference in the appearance of Exhibits 21 and 22, covering the situations in 1932 and 1935 as to the extent of the colored area, and requests me to state the reason for that difference. The 1935 map shows the effect of a continued production of large amounts of gas in the northeast flank of the Panhandle gas field. This increased production, which has occurred between 1932 and 1935, has resulted in the spreading out of the colored bands on the map and a reduction in size of the yellow area on the map. The yellow area on both these exhibits represents the area in which the rock pressure is above 400 pounds.

In considering these maps it will be noted that the
133 yellow area is considerably less in the 1935 exhibit,
No. 22, than it is in the 1932 exhibit, No. 21. Also it will be noted that the rock pressure areas shown in gray occupy considerably more territory in the 1935 exhibit, showing the increase of the low pressure area, which is the result of the intensive production of gas which took place in that field. This can be carried on to the other exhibits. They all show the same process of the effect of production.

The color immediately next to the gray, which is a kind of orange color on all the exhibits, portrays pressures of 200 to 220 pounds. My attention is directed especially to Exhibit 21. It is pointed out to me that Exhibit 21 shows that in 1932 the area of pressure between 200 and 220 pounds was a little ring right around the town of Borger and a little ring around an oil producing area down north of the barren area in Gray County, while in 1935 the orange band has taken a very irregular course substantially north of the Borger oil field and encompassing another little oil field—in fact, coming up nearly to southwestern Hutchinson County and down and across the south line of the county into Carson County; then back up in a northeasterly direction back into Hutchinson County. Then it passes out of the colored area. That does not mean that there has been a row of wells drilled in that orange belt substantially along the course of that orange ribbon which has pulled those pressures down. The production from the gray area has caused an extension of the orange area. It is not alone the production from that orange area, although that has had some effect; but the production from that area alone would not have pulled the band down in that kind of a wriggly worm shape.

Coming down into Wheeler County we find a number of orange colored bands where the prevailing pressures in 1935 are shown to have been between 200 and 220 pounds. The same explanation applies to the shape and position of those orange bands as applies to those around the Borger pool. Their existence has been caused by production in those areas and in the areas of lower rock pressure.

The predominating influence determining the existence of those rock pressure bands and their shape has been the extremely high gas production in the northeast flank of the whole oil and gas field. The same explanation made as to the orange color would apply to the blue area immediately outside that color. The predominating influence is the high production which has occurred in the northeast flank of the field.

There is no conceivable reason why the wells on each of these bands would account for the change in their location. Of course the wells had some effect, but the maximum effect has come from the production to the northeast. In other words, taking gas from anywhere is going to have effect on the existing physical conditions. It is not physically possible from the standpoint of gas wells away from the oil field in the territory covered by the colored bands in Exhibit 22 to have caused any such depression of pressure conditions as is reflected on that map. If the wells drilled on those bands were the cause of what has happened there, the bands would be in an entirely different arrange-
134 ment and there would be little local drainage areas
around the areas of the bands if the change was caused by production in the bands themselves.

I have stated that the areas colored in yellow on each of the four maps represent the areas which at the time the respective maps were made had pressures in excess of 400 pounds. Those areas of lower than 400 pounds had reached the south part of the field by 1935. The area above 400 pounds in 1935 was entirely in a portion of the south part of the field just east of the county line between Wheeler and Gray Counties and just west of that county line, on the south quarter of the field, and the 400 pound band had almost reached the south border of the field in the eastern part of Carson County. All of this is shown by Exhibit 22.

Upon looking at Exhibit 23 we find that the map for 1937 shows a very extensive reduction in areas in which the rock pressure is above 400 pounds. In the map of 1935 practically the whole of the northern part of Moore County which is within the limits of the field was about 400 pounds, with the exception of three or four small patches in which the pressure was from 380 to 400 pounds. In the map shown on Exhibit 23, more than half the area in the north portion of Moore County was below 400 pounds rock pressure in 1937, and some of it was at a rock pressure of between 360 and 380 pounds, while in 1935 none of that area had a rock pressure range as low as that. Also on the 1937 map it will be noted that about four miles west of the boundary between Moore County and Hutchinson County a large pink area had developed. This pink area shows a range pressure between 380 and 400 pounds. In the 1935 map there was an immensely smaller amount of pink area. In other words, this pink area in 1937 has progressed more than halfway across Moore County to the west, as compared with its position as shown on Exhibit 22, where it is only a small band about six miles west of the county line between Moore and Hutchinson Counties.

Exhibit 22, showing conditions in 1935, shows that practically the whole of Potter County then had a rock pressure about 400 pounds. Exhibit 23 shows that in 1937 there were patches in Potter County having rock pressures between 380 and 400 pounds, a decrease in rock pressure due to drainage to the northeast.

In Carson County, on Exhibit 22, the area which is above 400 pounds extends northeasterly from the south border of the field some eight or nine miles, while in Exhibit 23, which shows conditions in 1937, there is just a thin triangular portion of Carson County which has a rock pressure above 400 pounds.

In central Carson County the area on the south border of the field in the 1937 map which has a rock pressure above 400 pounds entirely disappears, while in the southeast portion of Carson County and the southwest portion of Gray County a large area shown in Exhibit 22 as having a rock pressure above 400 pounds has become practically cut in half. Less than half of that area in 1937 is above 400 pounds. The gray area in the northeast flank of the field, which is the area in which the rock pressures are below 200 pounds, has increased greatly in Exhibit 23 as
135 compared with Exhibit 22.

In the gray area there are alternating dark gray and light gray bands shown on Exhibits 22 and 23. These bands signify 20 pound pressure contours—that is, the most southern gray band would be from 200 to 180 pounds. The next band would show a pressure interval between 180 and 160 pounds, and so on, as you go into the low pressure areas from the higher pressure areas. In some places it is 100 pounds or less.

The thing that happened in the northeastern part of the field in Moore County which has brought about the change in conditions between 1935 and 1937 was the increased drilling of sour gas wells in that area and the production from them. This drilling took place in 1936 and 1937.

There has been a very substantial change in the situation in the pink area in Gray County. The production of gas in the pink area itself could not have accounted for the spreading of the pink area. There has never been any substantial amount of gas taken from the south part of the field located in the East ½ of Gray County. Just a few wells were drilled over there and very little production was taken.

In the extreme east end of the field there is a triangular region still colored in yellow with all kinds of bands around it. This is an area in which the rock pressure has been maintained mainly because a good portion of that area is of such low porosity and so tight that the gas migrates with great difficulty from that area. What gas is in there is kept there by the low permeability. It can't get out to the areas of lower pressure. That is my interpretation of what has happened there which keeps that pressure up.

My attention is called to a little white spot in the southwest corner of Moore County on Exhibit 23 which did not appear on Exhibits 21 and 22. It was the selection of a well by me that created that area. Texoma drilled a dry hole there following my advice to drill a well. I advised them that they would probably get a gas well there, but they did not. My explanation of that situation is that in the area just west of the blank space shown on the map occur gas wells with not very high productive capacity. In the area east of that occur gas wells. At the time I had this dry hole drilled there was nothing to indicate that the whole area might not be productive between these two portions. After I had drilled a dry hole it was evident that there is an area in there with no productivity, and my geological interpretation of it is that the possibilities are that there is a fault in the area which leaves quite a gap. There are two ways of interpreting that, but that is my interpretation.

Going back to the central part of Gray County where we have a barren area, it is a fact that the northern edge of that white uncolored portion lies along a fault and the area

immediately south of the fault is barren. It is my impression that the same situation has occurred up here in Moore County, only on a smaller scale. It is entirely possible that
that has happened. The other explanation would be
136 that there is a low place structurally in that field, or
that there is a steep dip from the east and from the
west.

The size and shape of that area is all supposition. It is certainly logical to expect there would be some area outside the hole of the well which will not have any productivity in it. For that reason it is purely speculative as to the extent of the area which is affected. The barren area in Gray County has dry holes drilled around it which show that it is barren all through.

The well drilled in the dry area I have referred to is just south of the line which I have extended in a southwesterly direction from the southwestern part of Moore County, about half way down the curved line. While we were getting that well in it acted in a peculiar way. It didn't have water where it should have had water. There were things in the formation that prevented production in it, which made me think there was a fault there in close proximity to the well. That well is indicated on the barren area by the usual symbol for a dry hole. I have interpolated from the log readings of that well and the wells around it and reached my conception of how extensive that dip is. There is not enough drilling close to the well to give definite control. It could be a little larger than that, or it could be smaller.

Exhibit 17 was prepared under my direction. I personally worked out the contours. It portrays rock pressure conditions in the Panhandle field as of 1938, using the same legends that I used in Exhibits 21, 22 and 23. The pressure bands are described in the legends at the bottom of the exhibit, and the date of the map is also given at the bottom. This pressure map is on a 20 pound contour interval the same as the other exhibits, and the same color scheme is used. Each well has a rock pressure mark showing what its rock pressure is. Every one of the wells shown on Exhibits 17, 21, 22 and 23 has the rock pressure shown in close proximity to the well.

The pressure bands changed their locations between 1937 and 1938. The change is an increase toward the area of lower rock pressure. The lower pressure bands are increasing to the detriment of the higher pressure bands.

As a matter of fact, all of the belts or bands show increased length by reasons of protrusions to the southwestward, except the yellow band. The yellow band is gradually being eaten out by the low pressure bands.

In the north part of Potter County there are wells showing pressures of 405, 415, 395, 412, 386 and 388. Right near some of those wells, and including two of them, is a foot-shaped pinkish area. That is a local depression area. It is a local depression in pounds per square inch caused by local production from the wells which are in the middle of that area. That spot first showed up in Exhibit 23 for the year 1937. It was not quite so large then and in a little different shape. I think the pipelines that go to Amarillo go to those wells. Some of those wells are the oldest producing wells in the field. Upon further examination I recognize that those are the wells that feed the city of Amarillo in part, and have been doing so since the beginning of 137, taking gas to Amarillo. I am not certain of that date.

If there was no production from the gas producing part of this field to the south and southwest of the eastern flank where I have pointed out there has been tremendous production of gas along with the oil, the same pressure bands would not be reflected as are reflected by these maps progressively from 1932 to 1938. If the pressures had been affected only by production from gas wells and there had been no production on the northeast flank of the field, the drainage areas would have been formed where the production occurred from these gas wells. There would be rock pressure depression areas close to where the gas wells were located similar to the one that was just pointed out on Exhibit 23 in the southwest portion of the field in the northeast quarter of Potter County.

The pink patches, one of the common line between Potter and Moore Counties, another at a point to the southwest of the center of Moore County, and still another to the southeast of the center of Moore County, are local rock pressure depression areas where the production from the wells in those localities had a direct effect on the rock pressure at those localities. If the pressure had been affected only by production from gas wells up through that portion of the field, which lies outside the oil producing portions, you would have a series of spots in different colors instead of bands or ribbons such as are shown on these different maps. There would be depression areas along the gas well areas where the pipelines are located, and the tendency would be, if the production in those areas was great enough, for a series of bands to extend from the edge of the field toward the center of the field. They would emanate from the region of the pipeline production in both directions and would have formed a trough toward the edge of the field and across—a condition with the lower pressures at the bottom of the trough instead of having the low pressure areas along the northeast flank of the field.

(EXHIBITS 17, 21, 22, AND 23 for identification, offered and received in evidence without objection.)

Exhibit 16, labeled "Ideal Cross Section, Portion of Texas Panhandle Field," is now presented to me. I made the original drawing for that exhibit and it was prepared under my direction. In reality, as far as the major part of the exhibit is concerned, it is a typical cross section of that portion of the field, because the exhibit, as far as possible, has been made from the use of actual logs of wells, the locations of which are shown on the exhibit by vertical lines extending from the top of the exhibit, where miniature derricks have been shown, to the bottom of the exhibit. The reason the word "ideal" was used was because a portion of the exhibit in the lower part of it was not encountered by the wells shown. Wells in other portions of the field had encountered the conditions shown in the lower portion of the exhibit; but it was not possible to make a cross-section where those conditions existed and at the same time have a good portrayal of the actual gas pay occurrences. This exhibit was made primarily to show the actual conditions of the gas producing formations, and for that reason was taken through wells where we had good measurements of the occurrences of gas in the producing formations. The red streaks shown on the exhibit
138 have all been plotted to scale from the actual occurrences of gas in the wells shown. Of course, it will be noted from the exhibit that those streaks cross each other at places where they are distant from the wells. Those are interpretations and nothing in the wells could show you that these streaks cross each other away from the well, but that was an idea that my experience there led me to think is the actual occurrence the way the gas occurs, and that is another reason why we used the word "ideal," although so far as I know that exhibit represents in every detail the actual conditions in the field—as actual as you could get a picture of them and have them right.

My attention is called to two little squares abutting each other, across one of which is written the word "Hutchinson" and across the other "Carson," with an arrow and the letter "N" written in the middle of it, and over to the right of the arrow an irregular line with an "A" at the bottom and a "B" at the top. I am requested to explain those legends. The rectangular section shown at the top of the exhibit, one portion of which is labeled "Hutchinson" and the other "Carson," shows Hutchinson and Carson Counties and the actual position in those counties where this section was taken. The lines A-B I explain by saying that the A represents the south portion of the section, and B represents the north portion of the section, and the legend shows the plotted portion of the section as it was taken. That section is not in a straight line because I could not get adequate information on what I wanted to show if I went in a straight line. If I went in a straight line I would dodge these wells in which I wanted to show the conditions. In other words, if I had gone down there and cut a cross-section from A to B like you would cut a layer cake with a knife, I would not have been able to show the actual pay conditions that exist, because the wells in that section weren't where I could get them in a straight line.

The gray colored area at the bottom of this drawing, with a dark line above it, having two cones which are marked "granite" represents the granite core of the Amarillo buried mountain uplift. On the flanks of that mountain are colored areas on which I have written the words "granite wash." That represents the occurrence of the granite wash on the flanks of the granite ridge. On the left part of the exhibit that granite wash looks rather thick there. That is because this granite ridge at the time that granite wash was deposited was considerably larger than the part shown on the section, and as to the actual thickness as shown, the left border of the cross section shown is a log of a well and the oil pay shown in that part and projected to the right occurred in an actual well that was drilled in that portion, and the thicknesses were obtained from that well as to some of that granite wash.

This cross section was made by me in May, 1933. I did not prepare it as an exhibit for use in this particular case. It was prepared primarily for the use of the company and to form a basis for an exhibit shown at the Century of Progress Exposition in Chicago.

My attention is called to several perpendicular lines

coming down from the bottom of the objects which are small derricks along the surface. Each of those represents an actual well, the log of which was used in
139 making the cross section. The little derricks were put there just to show that they were actual wells and give an impression of the way things are on the surface. It was made for Exposition purposes.

The areas colored in green down at the lower end of each of the folds represents the occurrence of oil and represents actual oil occurrences shown by the wells used in that section. The right hand part of the section, to the right of the furthest well to the right, is not based on any log. I couldn't get any in there that would work. However, I had a log showing the existence of three oil-bearing layers or strata right in that vicinity, and the logs of other wells showed that those formations were continuous as shown on the section. They were sloping downward to the right. To the right on the exhibit means to the north. At the point where oil was encountered by well No. 1 coming south from the right hand side of the map and the log of the well next to it, No. 2 on the same map, coming in the same direction, shows that the formations which were encountered in the oil wells were sloping downward from No. 2 to No. 1 in a northerly direction, and I simply projected those formations on down to sea level. I stopped them there because I didn't want to carry my exhibit any further. If I had had the log of a well drilled at a point three-fourths of the way over from well No. 1 to the north side of the drawing, it would have encountered these formations below sea level and there would have been the occurrence of water there.

I do not mean by the drawing of the heavy black line labeled "Sea Level" at the north side of the map, to imply that these holes which are colored red in a portion of the map, and drop at intervals on the map, cut off at that dark line at approximately sea level. They would extend down into the water. I don't think anybody could know how far. Wells have been drilled over north and northeast of the limits of this field and the formations found to be saturated with water, then with oil, and higher up with gas.

The separate red bands represent separate gas pay streaks occurring in the formations encountered in the wells shown on the section. The tuba-like drawing almost in the middle of the map, almost directly over the most northerly peak of the buried granite mountain portrayed there, represents a typical case of the setting of casing in a gas well. It was put in there for exhibition purposes. My impression was that they might erect a derrick at the Exposition, making an exhibit of it. It is just an enlarged picture portrayed by these black lines which I have described as wells. It is an actual reproduction of an actual log of a well, and the formations encountered by that tube or larger group of lines are actually found in the logs of wells of which that is supposed to be a picture. The elevations were determined by sea level elevations and measurements taken from the wells from the elevations at the surface down to where the formations were encountered. All the formations portrayed on this map are in their proper relation to each other and to the line which I have described as sea level. They are drawn to scale, both as to position above sea level and as to thickness and as to position with each other.

140 On this large tube-like well near the middle there is a smaller or dimmer extension from the region just above a little red short line down below the heavy red line. That represents the reduced hole that is drilled down after the casing is set. It shows the extension of the bore of the well down through the pay formations after the casing has been set. In other words, the hole is drilled larger than the casing down to the point just above the second red line, and that shows exactly where the casing in the particular well was set. That casing was set on the floor of the well at the time the casing was set, and cemented, and then the tools that would work inside the casing continued the hole down, leaving a shoulder which holds the casing in place.

A casing is composed of lengths of pipe screwed together. These lengths of pipe generally averages 20 feet in length, from 20 to 30 feet in length. In setting a casing in a well a shoe is attached to the joint of casing which is going to be set in the bottom of the hole and that joint is lowered into the hole and then another joint is screwed into that. The first joint is let down into the hole with a top screw above the surface a few feet. Then you screw it into another joint of casing and let it down another 20 feet, and you continue until you get down to the place where you hit bottom. Then you set it on the bottom and cement it.

In cementing a casing you raise the casing so that it is slightly off bottom, and the conditions of cementing a casing will vary, dependent upon whether or not you are cementing a well which is drilled with cable tools or a well which has been drilled with a rotary. I don't like to go into the details of this process because I am not a petroleum engineer, but I can give you a rough outline that is correct. The cement is poured into the hole and pumped up around the side of the casing so that it goes down and goes up the sides of the casing and cements it to the rock and holds it in place, and it extends a little below the point where the casing stops. The casing does not fill the hole, but when the cement is around it it fills for two or three hundred feet up the hole.

After cementing they put the drill back inside the casing and come down to the bottom and drill the hole deeper, but, necessarily, they drill a smaller hole than the inside of the casing because the tools they are going to use to drill the bottom portion of the hole that goes through the pay have to go inside the casing. For this reason the hole that is drilled after the casing is set is necessarily of a smaller diameter. That is the projection which is shown in the bottom of that tube and shows the extension of the hole from where the casing was set down through the pay streaks.

The place where the gas gets to the bottom of the well and into the casing is an open hole. There is no casing in the smaller hole. Sometimes a liner is put in there. If there happens to be cave-in formation between the pay streaks, a slotted liner is sometimes set in so that the gas can go through it. That is the situation in certain portions of the field.

141 The gas gets into the casing from the red bands by going in the open hole which has been drilled below the end of the casing and going on up through that hole into the casing and on out to the top of the well.

The exhibit reflects the fact that the production from that well was from seven different layers of gas producing formation. The red line above the bottom of the casing was a little pocket of gas that was exhausted while the well was being drilled and there was no use trying to save it so we put the casing below it. The six below it all discharged gas into the open hole and produced gas through the casing. The several little short red lines at different parts of the dolomite are little isolated pockets of gas which have been found in some of these wells, some of which were exhausted very quickly, some not as quickly.

"Most of the isolated pockets of gas are located across the dark lines which represent wells but one is shown that does not cross one of the wells. That is because this is an ideal section to show the way the occurrence can occur. They have been actually found in the wells that way. It is probable that you could find others that are not shown in those wells. We just could not, as a practical proposition, so locate the wells that we would penetrate every one of these pockets when we got through drilling at the field because of their regularity in their occurrence."

These little bands of productive area in the formation we call gas pay streaks. They are sometimes called lenses. By a lenticular producing formation I mean one which varies in thickness and size and shape.

"In speaking of a lenticular producing formation, I was talking about something that had to hold gas. The formations around it are also lenticular formations to which the same description as to shape applies, but they don't hold gas. In talking about a producing formation, the pockets are called pay streaks, besides lenses, the technical term is a lenticular body. Looking at a cross section of a lense, it might extend perpendicularly in both directions and cover an area comparable to the table. It would be a solid body and have all the dimensions of a solid body and would extend in every direction but it is just a gas pocket. It is not a hole they are just porous formations. The word lenticular means a plate shape formation that is filled with gas."

We find those lenses or small areas of producing formations scattered all over the field in our logs.

"You can tell when you drill a well through a lense instead of a band because the gas in them exhausts very quickly and the amount of gas present there is generally very small. We know it is a local condition when the wells on each side do not have that occurrence. Bands are found in every one of the wells clear across the formation."

The green colored part of the formation contains oil. Other portions of that same band have gas and water too, water below and free gas above, and there is a little soluble gas in the oil. From my knowledge of Panhandle crude and from an analysis made from similar crudes, there must be a very small amount of gas dissolved in the Panhandle oil. If wells are drilled, as our No. 1 well reading from the right, into the oil bearing formation below the place where the top porus formation passes down the structure out of the area of free gas, you get only oil with such gas as is in absorption with the oil. If that well had been drilled so that it would have come down about an eighth of an inch to the south or to the left of where it is shown on the exhibit, and had encountered the red portion of the formation and also the green in the same band, you would have a flowing oil well producing both oil and gas. The oil would have been coming from the bottom of the hole from the portion of the formation which had oil in it, and the gas would be coming from the portion of the formation that had gas in it.

If the well had been drilled on down to the next two or three producing formations shown on the drawing, you would be producing oil from four different formations and producing gas also directly into the well from above out of the upper formations. There are situations comparable to that in the Panhandle field. Many wells have been drilled with those conditions that are both oil and gas wells in what we call the oil and gas zone of the oil field.

In a well like that, I would have set my casing above my first oil pay, first gas pay, also, if I had wanted to use that
producing oil. By that I mean that if I had wanted to
142 produce oil and they would let me use the gas, I would
try to keep the gas in there too and produce the gas
with the oil. As to whether I know of any oil producer in the history of the field who would cut off that gas, I say no, he would like to use the gas all he could in producing oil. It would push the oil out of the well so he wouldn't have to pump it. He would also have a lot which he would call casinghead gas, which was the only gas at that time he could use for the manufacture of carbon black, and there was a strong temptation for anybody who had a well in that situation to complete it so as to get a maximum quantity of gas out with his oil, because he could prolong the production of his oil in a flowing condition by getting as much gas as he could into the well. He would also get a larger quantity of gas which he could sell as casinghead gas for the manufacture of carbon black and gasoline.

Questions by the Examiner.

The Railroad Commission, as I remember, about two years ago, began issuing reports which showed what they considered actual casinghead gas. These reports they issue in connection with their reports on the disposition of residue from gasoline plants, to show the proportion of casinghead gas produced. Before that time the gasoline plants had to make reports to the Railroad Commission well by well of the gas that is produced from dry gas wells and from so-called casinghead gas wells. These reports show the actual wells which are producing the so-called casinghead gas. By going to the logs of the wells which the Railroad Commission or the gasoline plants have designated as productive of casinghead gas, you can very often determine where gas had occurred in the formations of these wells. That is the way I find out where the gas that has been designated as casinghead gas has come from, by going to the logs of the wells which are supposed to be producing casinghead gas and finding where that gas actually occurred as shown by the logs of the wells.

Our company doesn't happen to have any casinghead gas, but gasoline plants have to report it. The gasoline plants are the ones that generally use casinghead gas from the wells. They make gasoline from it, so they have to report all the wells from which they produce casinghead gas.

For a good many years there has been no precise term for the definition of casinghead gas. In the history of the production of the field it has been a very loose term. If a gas came out of a casinghead, it was casinghead gas. That is about the only way it was used. I believe there has been a statute written defining casinghead gas, but it has not been in effect very long.

I understand that the Examiner wishes to know what it is the Railroad Commission calls casinghead gas in their reports, and not the legal definition. I understand he is not talking about chemical or legal or any other kind of definition except the Texas Railroad Commission's as
143 contained in its reports. In the reports made by the
Texas Railroad Commission, by casinghead gas is meant any gas which is produced from a well which has oil in it, whether the gas comes from the oil or in the oil or comes from the formation above the oil formation. If it is produced in a well that has oil in it, they call it casinghead gas. As I said before, the way I find out whether casinghead gas is being produced from a well that is said to be producing casinghead gas in large quantities is that from the records of the Railroad Commission's office I can see that certain wells are stated to be producing casinghead gas to these gasoline plants, and an examination of the log may show that this well had amounts of gas in the formations above the oil producing formations, and that this gas has not been cased off, and, therefore, it must be coming

from the formations that are above the oil formations, and that is why I say that many times I can tell whether a gas produced from a well is real casinghead gas or not.

Direct Examination Resumed by Mr. Morgan.

Well No. 1 on the chart, reading from the right, or from north to south, is shown as encountering only the oil producing formations, so it would produce a very small amount of casinghead gas, but its production would be true casinghead gas.

I have noticed in the Railroad Commission reports references to wells having no gas-oil ratio. That means that that well produces its oil without producing any gas. It would be a well which penetrated the oil bearing formation and produced only such gas as is found in absorption in the oil, and the Railroad Commission has seen fit in its reports to treat that as none at all.

In my experience as a geologist in the Panhandle and from my study of the logs of oil wells in the Panhandle, I have never seen a log that indicated the presence of a catchment basin carrying free gas in the oil producing part of the formation and occurring directly above the oil. I heard Mr. Brown talk about a catchment basin. His term, as a matter of fact, is a very strange term to me. You state that, as you understand it, a catchment basin is a projection out from a portion of the oil bearing formation which carries free gas and not mere gas in absorption. I don't know of any such a situation. Gas in the producing formation will occur sometimes above the oil. That is natural. I never heard of a catchment basin or porous area down in the oil producing part of the formation which carried free gas. I don't know of any such occurrence in all the wells we have drilled in, that is, Texoma, where we have drilled through the gas producing formation, and we have done it a number of times, we have drilled down to where there were oil shows underneath our gas producing formation, and I do not know of any occurrence that we have had where the gas ever occurred below the shows of oil, except in one freak occurrence where we have oil occurring where gas ought to occur and gas occurring both above and below the oil. That is one freak occurrence in one of our wells; but that would not be a catchment basin. That is an occurrence of oil rather than gas.

I have studied a great many logs of oil wells in the

Panhandle field. I have studied all the available logs of gas wells and all the available logs of oil wells that I was particularly interested in near the gas areas. I haven't
144 gone into all the available logs of all the oil wells. In all the logs I have ever examined, I have never found any such situation as a gas formation down below the level of the pink lines or ribbons on that drawing and in the oil producing part of the formation.

Inside the heavy black lines and north of the colored part of the map on Exhibits 21, 22, 23 and 17 is shown a very substantial area on which are groups of small black spots. That is a portion of the oil area which has no free gas in it. It is a portion of the field that sustains the same position with reference to the gas bearing formations as typified by well No. 1 on the cross section of Exhibit 16, which enters only the formation which is colored in green. Those little black spots are oil wells, whether they be on the colored or uncolored portion of the drawing. There are oil wells which produce where gas can be produced also. There is a large area of production of both oil and gas. Those are the wells that are situated, with reference to the producing formations, somewhat as are set forth in wells Nos. 2, 3, 4 and 5, reading from the right on Exhibit 16. If a well be drilled in the position of wells 5, 4, 3 and 2, you can produce both oil and gas from that well. That is the situation that obtains where we find these black spots or groups of black spots within the colored area. That is the oil and gas producing portion of the structure. To be specific, those black spots on Exhibits 21, 22, 23 and 17 which are within the colored area are intended to represent wells which were drilled to oil producing formations, but through gas producing formations, and are capable of producing both oil and gas; but those black spots out in the uncolored portion along the northeast flank of the field are meant to portray wells which were incapable of producing free gas and produced only oil and such gas as was found in absorption in the oil.

Questions by the Examiner.

I have made no detailed cross sections for different parts of the field, other than Exhibit 16. I have made rough drawings for my own purposes in different parts of the field, but have not made them permanent records. I have used them in trying to find out how the situation was in different localities. This cross section conforms generally with all of the producing conditions of gas and oil in the field. I don't consider this exhibit to be particularly favorable to my testimony. The other cross sections would show the same general conditions, but they would show faulting some places to the south. If I took a cross section along the south part of Potter County in Exhibit 23, I would show a fault there, south of which is no gas production, or some other detail of that kind. So far as the occurrence of gas and oil is concerned, I think that is as good a general representation of the field as a whole as can be obtained. There is no distortion derived from the fact that these various zigzag planes are swung into one plane, except only the amount of dip—whether it was a little steeper or a little flatter.

"This zigzag is made up of a series of turning points and there are no wells between them. It has as many lines indicating wells as I have turning points which are drawn to a rough approximation of the scale just to show the general location. In making my section, I tried to get the proportions as close as I could. There isn't any distortion which would make any difference in the occurrence of the gas and oil. Those wells are not so far apart really as appears from the map. They are merely taken because each one of those wells had a good definite record of gas pay, and also of oil pays."

The location of the line A-B on Exhibit 16 can be located on Exhibit 21. Starting about the center of "o" in "Carson County" and extending northeasterly from Section 13 to Section 10, and then extending to a little beyond the "R" in the caption I&GN Railroad, Block 4, and the northwesterly to the section which is about two
miles northwest from the town of Skellytown on the
145 exhibit, it then extends northeasterly to a point about
one mile south of the small letter "a" in the word
"probable," and then a little further north.

The mountain cross sections are more or less ideals from occurrences in wells that are not on this cross section.

On the section a number of miles to the west from where I took this section, this granite was recorded in a well which showed the elevation of the granite ridge, and these wells you have noticed have gone into that granite wash. The line that forms the left border of the cross section shown on Exhibit 16 represents the actual lines of a well, and the oil occurrence shown in that well on the section actually occurred there, but it was extended to the north to show that this oil did not just occur in a little bit of a pocket. The right hand line of this cross section does not indicate a well.

(EXHIBIT 16 for identification, offered and received in evidence without objection.

Photostat copy of pages 43 to 48, inclusive, of documents entitled "Railroad Commission of Texas, Annual Report on the Panhandle Oil and Gas Field, July, 1938," marked Exhibit No. 26 for identification.)

(May 29, 1939.)

Direct Examination by Mr. Morgan Resumed.

Exhibit 20 was prepared under my direction. That exhibit portrays the classification of gas acreage which I used in making my estimate of gas reserve for the Texas Panhandle field. On that exhibit there are two classifications of acreage. First, the acreage on which wells are encountered with open flow above five million cubic feet per day, which I called the best commercial gas acreage. Secondly, marginal gas acreage, which is gas acreage on which the initial open flow of wells is below five million cubic feet per day. This refers to initial open flow in each case.

The acreage colored in yellow on the map is that on which wells have an initial open flow of five million cubic feet or more per day. That is classified as the best commercial acreage. The acreage having wells with less than five million cubic feet per day is colored gray on the exhibit. The acreage colored yellow, showing the best commercial gas acreage, contains a total of 1,033,970 acres. The area colored gray, which I described as marginal acreage and in which the initial open flow of wells is less than five million cubic feet per day, contains 432,967 acres. 676½, or just a little below 700, square miles is included in the gray area.

I have computed the weighted average pay thickness, or the weighted average thickness of the formations yielding gas, in the yellow area. In estimating the reserves of the yellow or best commercial gas acreage, I computed the weighted average thickness of the gas pay streaks in that area. Also by a study of the formations and of well cuttings, and all the geological information available, including geological information available in other fields, I arrived at a porosity of 20% for that acreage. I mean that 20% porosity would be the average to apply to that acreage. I do not mean that every acre would have 20% porosity in it. Some of them would have greatly higher porosity, and some of them greatly lesser porosity.

146 I have computed the reserves of natural gas underlying the acreage colored in yellow on the exhibit, using a pay thickness of 70 feet and a porosity of 20%. Those are the same factors for pay thickness and porosity used by Mr. Brown in one of his estimates. I do not apply it to the same area to which Mr. Brown applied it. My application is different from that which he used. In determining what factors to use I had to consider all the wells drilled in the area colored yellow, and to that yellow colored area this factor absolutely applied. There is considerable difference in conditions in the yellow area and in the gray area. The yellow area is situated in a better structural position as a whole than the gray area. By that I mean that it is the general rule in the Panhandle as a whole that the best productive acreage occurs in a relatively high structural position. The area colored yellow on Exhibit 20 is on the whole in a relatively high structural position as compared with the area colored gray. By that I mean it is further up the slope of the old buried granite mountain range. Its position is higher on the flanks and top of the old granite ridge. It is further away from positions where water would be encountered, and also the thickness of the pay streaks as defined by development in the pay areas is considerably less as an average in the gray area than it is in the yellow area. Also, an examination of the action of the wells which have been drilled in the two areas, and of the samples in these wells, shows that the pay streaks in the gray areas in many cases are a great deal tighter than the pay streaks in the yellow area.

By pay streaks being tighter, I mean that the porosity and permeability of these pay streaks is considerably less than that in the yellow area. The gas will not flow with the same facility through the formation; and there is a smaller amount of it present in this area.

My attention is called to two general areas of gray extending clear across from the south to the north side of the field. In that area the wells that have been drilled to date, and numerous dry holes, have shown the area to be tight, and of a low gas productivity. A great portion of that area shows thinness of pay streaks. The main thing about this gray area extending clear across the field just east of the area in which there is a kind of an island of unproductive area is the evidence of low productivity shown by the wells drilled in it and the evidence of thinness of pay streaks encountered by the wells drilled on it.

I have already stated that this area which I have described as an island of no productivity is low structurally. There is a dip in the formation at that point. This area is bounded on the north by a fault which has thrown it down with relation to the area north of it, and the area south of it dips into this area, which makes it an area of depression structurally.

Coming over to the east end of the field, the gray goes clear across between the Osborne field and the yellow area of Wheeler County. In this area there is a combination of low structural condition and thinning gas pay streaks, a particular lack of porosity and tightening of the pay streaks.

147 Had I averaged this 676½ square miles of area colored in gray into the yellow area and treated the field as a whole, and applied the factors of 70 feet of pay thickness and 20 per cent porosity, the result would be a greatly distorted representation of the actual conditions in that field. The gas area contained in the yellow is of such high productivity that if gas areas of very small productivity were averaged with them, it would give the idea that the whole field would be of good gas productivity, whereas the opposite is really the case. For instance, in the gray area, which embraces a little less than 700 square miles in extent, I would not recommend the drilling of a well for gas at all.

I have made a separate computation of the reserves of this gray area embracing nearly 700 square miles. I based that upon a study of the geological structural conditions in the different portions of that area, upon the thickness of formation encountered in the wells drilled in the gray area, and upon the relative porosities shown by the productivity of the wells drilled in that area. I had assistance from wells other than those which have been drilled in the gray area in arriving at my deductions. I used the wells drilled in the gray area in some instances in combination with dry holes drilled outside of the gray area to be able to determine the structural conditions that existed in the gray area. In other words, knowing the structural position of the pay, that is, the altitude above sea level of the pay formation along the south border of the yellow area, and knowing the structural position at which the formation yielded dry holes in the field south of the gray, I had satisfactory information concerning the structural position of the formations in the gray. The information shows how high it will be structurally, or what position it might come in contact with oil or water. Quite a number of dry holes have been drilled around that gas field. That is what helps define the boundary of the field. You know where the gas is because they get outside the clearing and get dry holes.

I have not made a computation of the gas reserves in the field based on the pressure decline method. I didn't do that because, on account of the variability of geologic conditions and the impossibility of obtaining equalizing of rock pressure, and the infinite variety of complications which are attached to the field, this was not practicable. It is not possible to get the right result.

In an application of the pressure decline method of computing reserves, the correct pressure factor to apply is that of equalized pressure. In other words, if you knew the pressure at which the field would equalize if every well in the field were now shut down and not permitted to produce until the pressures were the same all over the field, then the pressure decline method of computing reserves could be safely applied, with some other factors present also. If you knew that ultimate equalization pressure, it could be safely applied; but that pressure is not known. It cannot be computed in the light of the physical conditions and the pressure conditions which obtain in that field.

148 If the field had been so produced that every part of it had yielded up natural gas with the result that every well in the field and every acre in the field would now have the same pressure, the pressure decline method could be used; but that is not the condition in the field. That is one of the conditions it would be necessary to have.

If every acre in the field had exactly the same quantity of gas under it as under every other acre, then the pressure decline method of computing reserves could be used;

but that condition most certainly does not obtain in the field.

I have made an estimate or calculation of the average pay thicknesses of all the wells of Texoma. The pay thicknesses in the wells of Texoma range from 10 feet to 185, an average thickness of 79½.

I have a tabulation of the initial open flow of all the wells of Texoma. They range from 3,400,000 cubic feet to 114,515,000 cubic feet, having an average initial open flow of 29,203,000 cubic feet. Of these wells five or six were drilled in while the pressure was still virgin pressure. They were drilled before we acquired the property; that is between 1920 and 1926, back in the early days of the field. None of the wells drilled since Texoma acquired the property had a pressure of 430 pounds at the time it was drilled.

(Document entitled "Texoma Natural Gas Company Wells, 1931 to May, 1939," marked Exhibit No. 27 for identification.)

Exhibit 27, entitled "Texoma Natural Gas Company Wells, 1931, to May, 1939, Thickness of Pay and Initial Open Flow, C. J. Peterson, Witness," is a tabulation prepared by me. It is a correct list of the wells which have been drilled since Texoma acquired the properties, and the pay thicknesses of those wells and the initial open flow of each of those wells, together with the average pay thickness and the average initial open flow, and also of wells which were acquired by Texoma at the time Texoma started production. It includes both those wells which were bought as well as those which Texoma has drilled. In other words, it includes all of Texoma's wells.

(EXHIBIT NO. 27 for identification, offered and received in evidence without objection.)

I have records showing the pay thicknesses and initial open flow of all wells which were drilled prior to the time Texoma acquired them, and I have such logs of those wells as were in existence.

I have prepared estimates of the total original reserves of the acreage identified on Exhibit 20 in yellow and in gray and have combined those estimates, and now have estimates of the total original reserves of gas in the entire field. I applied in computing these estimates a recovery factor of 90%. I did this because it has never been possible to recover 100% of gas reserves in any gas field that I know of. The Panhandle field is a complicated field, with immense variation in porosity and thickness of pays, and the reservoir is not an ideal gas reservoir. It is subject to various imperfections, and there are a great many things which tend to prevent the recovery of gas in the field. That observation applied to reserves at any assumed abandonment pressure.

149 The conditions which make it impossible to recover 100% of the gas at any assumed abandonment pressure at the wellhead are, first, because at any assumed abandonment pressure the pressures in the areas surrounding the well at which any assumed abandonment pressure is used would be higher than the assumed abandonment pressure, for which reason gas would still exist in the reservoir at pressures which are higher than the abandonment pressure used. Secondly, due to the faulty completion of the well and the conditions which have allowed upper waters to pollute the gas pay streaks, and have allowed bottom hole waters to pollute the gas pay streaks, there now exists, and more will exist in the future, area where already water has been allowed to enter the gas pay streaks and cut off portions of the productive gas area, so that there will be gas entrapped in those areas. Also, some wells, although at comparatively high rock pressures, have become impossible to produce, and no operator will be desirous of drilling in those areas, where there is still some gas, but which is so polluted with water that they will not even attempt to recover it. This means that it is impossible to recover 100% of the gas in the field.

The bottom hole water is regular brine salt water, and the water that often comes from the upper formations has to pass through formations which contain immense amounts of salt. These formations which show salt are shown on Exhibit 16, labeled on the margin "Salt Series." When water passes through this section containing large amounts of salt it becomes heavily saturated with salt, and then when it gets into the well it has a tendency to enter the pores of the gas producing formation and salt off the gas so it can't get back in the well. By that I mean saline deposits. This salty water has two adverse effects upon the productivity of the sand. It will drown out the gas when it enters from the bottom; and it will salt off the gas formation when it becomes crystallized on the sides of the well.

Texoma has had to abandon seven wells. The last official pressures taken of those wells prior to their abandonment showed that they had an average abandonment pressure of 159 pounds. A considerable number of other wells in the field have had to be abandoned by reason of those conditions. I know of some of the data on those wells, but I have not personally compiled it.

You refer to a triangular shaped yellow area near the east end of the field in Wheeler County and another area to the south of the island of no productivity in the middle of Gray County, both areas being shown on Exhibit 17, and ask if it is my view that all the gas contained in those areas will be produced at any abandonment pressure. My answer is no. I believe there is no inducement for operators to drill in those areas, for which reason wells would not be drilled in them. Of course, there is some drainage from those areas; but the formations are so tight in those areas that it is not likely that the full amount of gas will be drained out, for which reason it would seem that there will always remain some gas not recoverable in those areas. I say it is not likely, which is rather a conservative statement to make. If it were coming out of there now, the pressure conditions there, instead of being 400 pounds, would be a greatly reduced pressure, as is shown in the adjoining 150 area. The reason it is not as low in the middle of the triangle as on either side of it is because of the tightness and the very small well in the center of that yellow area. There has been very little gas produced from it, while immense amounts of gas have been produced around the edges, which has not pulled the pressure down in spite of that fact.

I have computed the total original reserves of the Panhandle field, applying a recovery factor. I have computed the original recoverable reserves at assumed wellhead abandonment pressures of (a) zero pounds; (b) 25 pounds; (c) 50 pounds; (d) 75 pounds; and (e) 100 pounds. I made the five computations because I am personally unable to determine what abandonment pressure should be used.

(Document entitled "Natural Gas Reserves, Texas Panhandle," marked Exhibit 28 for identification.)

Exhibit 28 is now submitted to me. I have said I am unable to determine the abandonment pressure of the wells. I have been working in that field practically nine years, devoting my entire time there as a geologist. I say that I can't tell what the abandonment pressure will be because it is absolutely purely economic as to what abandonment pressure should be used. The abandonment pressure for different projects would be entirely different. For instance, the abandonment pressure which might be applied to a carbon black plant would rely upon factors which would be entirely different from those which would apply to a natural gas pipeline which was transporting gas through a pipeline for approximately 1100 miles. In the case of a pipeline, for instance, the market rates might stay the same, but as the years go on there is an increase in the costs of producing gas in the field—an ever increasing cost.

I might be able to determine whether or not, if wells were not spoiled by pollution of the gas pay streaks, they might produce certain amounts of gas at certain abandonment pressures, in case they were not flooded out by salt water or something else, but this would not be a determined abandonment pressure. The abandonment pressure is purely an economic question.

I have prepared Exhibit 28 on several abandonment pressures, so whatever the evidence shows the proper abandonment pressure to be the figures will be here. I have just carried them to certain figures. It may be that further figures will be required; I don't know. We might have to go to 150 pounds or 125 pounds. If it falls within this range of zero to 100 pounds, I have the figures here, by steps of 25 pounds from the lower to the higher assumed abandonment pressures.

In my judgment, the total recoverable reserves originally contained in the Panhandle field at an assumed abandonment pressure of zero pounds at the wellhead were 16,955,758,431,000 cubic feet.

At 25 pounds wellhead abandonment pressure, my figures are 15,991,092,936,000 cubic feet.

At 50 pounds wellhead abandonment pressure, my figures are 14,989,327,612,000 cubic feet.

151 At 75 pounds wellhead abandonment pressure, my figures are 13,987,579,763,000 cubic feet.

At 100 pounds wellhead abandonment pressure, my figures are 13,022,914,269,000 cubic feet.

These reserves were computed by me on a pressure base of 16.4 pounds per square inch, and based on a 90% recovery factor.

I have computed the recoverable reserves of the Panhandle field still remaining after January 1, 1939, at the same well head abandonment pressures, and have applied the same recovery factor in these computations as I did in those I have just stated, and used the same pressure base of 16.4 pounds per square inch.

(Without objection Commission counsel observed that there was no necessity for reading figures into the record which already appear in the exhibit.)

The recoverable reserves still remaining in the Panhandle field on January 1, 1939, at an assumed wellhead abandonment pressure of zero pounds per square inch, were, in my judgment, 9,799,519,611,000 cubic feet.

At 25 pounds there were 8,834,854,116,000 cubic feet.
At 50 pounds there were 7,833,088,792,000 cubic feet.
At 75 pounds there were 6,831,340,943,000 cubic feet.
At 100 pounds there were 5,866,675,449,000 cubic feet.

I have also computed the original recoverable reserves underlying the acreage owned by Texoma as of January 1, 1939, at the same assumed abandonment pressures, and applied the same recovery factor, on the same pressure basis.

My estimate of the original recoverable reserves underlying the acreage owned by Texoma on January 1, 1939, was as follows:

At zero pounds, 2,744,518,086,000 cubic feet.
At 25 pounds, 2,588,373,970,000 cubic feet.
At 50 pounds, 2,426,224,748,000 cubic feet.
At 75 pounds, 2,264,078,354,000 cubic feet.
At 100 pounds, 2,107,934,238,000 cubic feet.

I did not use the same sand thickness in computing Texoma's reserves as I used in computing the reserves of the area colored in yellow on Exhibit 20. I used the sand thicknesses which were shown for the wells drilled by Texoma as applicable to the areas where those wells were. The leases of Texoma were divided up into tracts which were mostly of 160 acres or less, and each tract was
152 carefully appraised and figured. I based the computation on the actual sand thicknesses underlying Texoma's leases, lease by lease, and subdivisions of leases when it was necessary to subdivide. In many cases the leases had to be subdivided into many parts to get the correct estimates.

I have also made a similar computation or estimate as of January 1, 1939 of the reserves of gas underlying Texoma's acreage which it owned on January 1, 1939. Those computations were made in the same way.

It is my judgment that the recoverable reserves underlying the acreage owned by Texoma on January 1, 1939, as of that date, were as follows:

At zero pounds, 1,989,662,119,000 cubic feet.
At 25 pounds, 1,833,518,003,000 cubic feet.
At 50 pounds, 1,671,368,781,000 cubic feet.
At 75 pounds, 1,509,222,387,000 cubic feet.
At 100 pounds, 1,353,078,272,000 cubic feet.

I have prepared a tabulation showing the gas that has gone out of the formations underlying Texoma's acreage which it owned as of January 1, 1939, including gas produced from its wells and that drained to other wells. This tabulation is broken down so as to show the production from Texoma's wells separated from the drainage to other wells or areas. In arriving at the figures shown by that tabulation I first secured the original recoverable reserves of Texoma's acreage to zero pounds abandonment pressure at the wellhead. Then by taking each separate tract of Texoma's leases and applying to that tract the rock pressure correction which was indicated by the rock pressure occurring on that tract at January 1, 1939, I computed the present reserves on Texoma's acreage. Applying the requisite abandonment pressure factor, where I am using in this tabulation an abandonment pressure of zero pounds gauge at the wellhead, I obtained the results shown on the tabulation.

I have already stated that the original reserves at zero pounds were 2,744,518,086,000 cubic feet. That is shown on my third set of figures on the first page of Exhibit 28. The recoverable reserves at the same assumed abandonment pressure as of January 1, 1939, are shown in the last set of figures on page 1 of that exhibit, which shows them to be 1,989,662,119,000 cubic feet. It is just a matter of deducting the January 1, 1939, reserves from the original reserves, and the result is a total loss to the reserves underlying Texoma's acreage amounting to 754,855,967,000 cubic feet.

Taking into account the gas produced from Texoma's wells prior to the time the company acquired those 153 wells and during the time the company has produced those wells, the total production was 284,852,785,000 cubic feet; so, in my judgment, there has been drained away from Texoma's property to the wells of others 470,003,182,000 cubic feet. Therefore, of all the gas that has moved out from under the lands of Texoma, there was lost by Texoma through drainage to other wells 62.26%.

The result would be the same if you were to take the same comparable figures at an assumed abandonment pressure at the wellhead of 25, 50, 75 or 100 pounds. It comes out exactly the same. That is the reason why I haven't given it for every abandonment pressure; but I have calculated it and it comes out the same for each of the subsequent abandonment pressures.

I have prepared estimates of Texoma's reserves, original reserves and subsequent reserves, in connection with other litigation prior to this time. I made estimates of the reserves of Texoma's properties in litigation which Texoma had with the Railroad Commission of Texas. I testified by affidavit two times and as a witness one time. I did not use a recovery factor in the estimates I made in that litigation, because I did not in that litigation estimate any recoverable reserves. In that litigation my estimates were for the purpose of determining the amount of gas underlying the Panhandle field and different portions of the Panhandle field, and the whole idea in making those estimates was to arrive at comparisons of different areas in the Panhandle field and to figure what drainage had occurred between the different areas. For this reason no recovery factor was needed. The amount of gas recoverable from the Panhandle field was not at issue in these cases. The life of the field was at issue. The issue was to determine whether or not the drainage was from or to the properties of Texoma, and the computations had to do only with drainage between different areas. It had nothing to do with the recovery of gas. The percentage and the picture as to drainage would have been the same in those cases had I applied a recovery factor. They would have come out exactly the same had a recovery factor been used.

I have not at all times used the same recovery factor in my computations as that which I have used in the computations concerning which I have just testified. I have been continually studying conditions in the field and have had different tentative recovery factors in mind at different times. In September, 1938, I had in mind a recovery factor of 95%; but this was just a tentative factor, and after very careful consideration of the different conditions in the field and of developments which entailed the abandonment of wells, I arrived at a factor of 90%, which I believe is more reasonable than 95%. I have never used the 95% factor for any purpose whatever. It was just a tentative factor I was mulling over in my mind and trying to get the right one.

Questions by the Examiner.

The estimates I made in connection with the litigation with the Railroad Commission of Texas were not on a comparable basis for the original recoverable reserve at zero pounds. I remember I stated my reserves at that time had an abandonment pressure of 25 pounds. 154 This was just for the purpose of litigation, and any per cent for drainage figured out about the same as it did here except that because of the time interval it was a little different. So far as I know, there was nothing fundamentally inconsistent with the results in that case and the results I obtained here, except that my estimates of reserves were different than they are now, as I did not have as much information. The acreage in the field was different and I had less information on the pay streaks, and I did not have the information available to make as correct an estimate as I can make today.

In reply to the inquiry as to whether in the gas produced I included an estimate of gas used in bringing the wells in and other miscellaneous losses, or whether I figured that into what I call drainage, I will state that the gas produced took in the total amount of gas produced from the company's wells. The company bought some of those wells at a certain period, and a certain amount of gas had been produced from some of the wells before they bought them. This figure of gas produced included the gas that was produced from the wells prior to their acquirement by the company and also included all the gas that the company produced from the wells. It does not include the gas that was popped off in drilling the well. It does include the gas that was used for fuel. That gas that was popped off was not very large for each separate well. Since it is not included in production, it would be included in the loss embodied in drainage; but as compared to the rest of the production it is a very small quantity. It would be less than 1%. At the present it is included in the item called "Drainage". The figure 62.26% probably should, because of that gas lost in drilling in the well, be 61 and fraction per cent.

Direct Examination Resumed by Mr. Morgan.

Exhibit 28 embodies the figures concerning which I have testified and shows my tabulations as I have stated them into the record, subject to the modification concerning the gas popped off to the air in connection with the completion of wells.

(Upon offer of Exhibit 28 it was objected to by Commission Counsel and Counsel for Illinois Commerce Commission on the ground that no foundation had been shown for the calculations.)

I went over my work sheets and computations with Mr. Claude C. Brown, a representative of the Federal Power Commission, in detail and gave him a copy of them. They differ slightly from the sheets I gave him in that at the time I gave them to him I had not definitely determined what recovery factor to use.

Without resorting to the arithmetic involved, but confining myself to the method I used in computing the reserves of the field and of Texoma's properties as shown in Exhibit 28, I will state that I first classified my acreage by two classifications, the first classification being the acreage on which wells drilled would have an open flow above five million cubic feet per day, and the second classification being the acreage on which wells drilled would have an open flow of less than five million cubic feet per day. Having done this, I determined for the acreage on which the wells drilled had an open flow of over five million cubic feet per day the average thickness of the pay, weighted by acreage and the average porosity. In determining that 70 feet was the weighted average
pay thickness, I went over the area in detail and ex-
155 amined the records of the wells all over the area and
got the weighted average per acre thickness of the pay streaks. I arrived at my 20% porosity factor by careful examination of the samples and by referring to records of other people who had done the same thing, and by comparing the productivities of the wells. Then, having ascertained these factors, I used the porosity thickness method in obtaining my reserves in that area. 20% porosity is the generally accepted figure for the average porosity of the better part of that field by the geological fraternity. It is mentioned in several publications.

As to the yellow area, I used exactly the same method that Mr. Brown used when he arrived at his content per acre, and obtained the same content per acre for the yellow area that Mr. Brown has used for the whole field. I mean that I obtained the same average per acre content. The only difference between what I did, so far as the yellow is concerned, and what Mr. Brown did was that I applied a 70 foot pay thickness and a 20% porosity for the part colored in yellow, embracing about 1,032,000 acres, whereas he applied the same pay thickness and porosity factor to the entire field. I did not apply it to the entire field because I did not think it was applicable to that part of the field colored in gray, embracing about 432,000 or 433,000 acres, because the facts that are applicable to the gray area do not show that state of affairs at all.

In computing the reserves in the gray area I went into the separate divisions of the gray area and determined for each separate division the per acre content, using the porosity method and the wells that were existent there to determine those factors. I can tell you exactly how many separate divisions I used in the gray area. I have all the figures here.

(Upon request, Company Counsel refused to make available the work sheet underlying Exhibit 28. Ruling on the exhibit withheld by the Examiner.)

Cross-Examination by Mr. Booth.

Counsel has asked me to describe for the record all of the data upon which the computations shown in Exhibit 28 were arrived at. (Colloquy between Counsel for Illinois Commerce Commission and the Examiner with respect to a request for all data, reports and investigations underlying the witness' conclusions set forth in Exhibit 28.) It seems to me I have already done that. I have some of my working papers here. First I will tell you how I got my thicknesses and where they were. I will go into how I got the column of gas, the weight of the column of gas, and its extent, used in determining my average weight of the column of gas used in these reserves. I will go through all that and tell you about all that if you wish. Part of the data is on file in the office of Texoma in Amarillo and I have some of it here; but if I am going to get these in the record it will take two or three hours to do it, but I will go right ahead and do it.

(Upon request by Counsel for Illinois Commerce Commission that in order to save time, representatives be designated to consult with witness to see what working papers the witness had in connection with Exhibit 28, a colloquy was had between Examiner and Counsel on the request.) I am asking for a little more time to get all my data together in order to show the information shown on this tabulation.

Questions by the Examiner.

I propose to take the gray area shown in Exhibit 20, divide it into sections—the sections in which I divided it in making my estimate—and assign to each section a number. Using these numbers as a key to the map, I will show for each one of the numbers the number of acres involved, the average thickness of pay used in that area, the porosity determined, the per acre reserves, and the
156 reserves for the area, and also I might put in some remarks showing the geological reasons which are involved, or some development reasons, such as the twenty dry holes, and things of that nature. I can say right now that most of these data have been determined by myself, without any text books of any kind or any other reports, but just from my experience in the field.

I have stated that I prepared and submitted affidavits to the Railroad Commission of Texas dealing with gas reserves. That was in 1932 and 1933. Counsel for the companies has stated that the cases are reported in 4 Fed. Supp. 222; 59 Fed. (2) 750; 2 Fed. Supp. 168; 300 U. S. 55; and 14 Fed. Supp. 318.

Cross-Examination by Mr. Slaff.

The citations which Mr. Hedrick read cover all the cases in which I have testified while I have been with the company. I haven't written very many publications because I have been so tied up with company business that I have never been able to get the time; but there is one publication I can refer to, which was written for the Oil & Gas Journal. It was a publication on the conditions of natural gas in the Mid-Continent and North Texas field, written for the natural gas symposium which the Oil & Gas Journal published. If I knew the date I would be glad to tell you. It was around 1928 or 1929. Since then

I have written no papers; I have been too busy to write anything. It is a wonder to me how a lot of these men who do commercial work get enough time to write papers.

I have not testified before any administrative bodies or any Legislature or legislative committee in the last ten years, except one case when the Texas Senate conducted a hearing in Amarillo, when I testified regarding some rock pressure conditions in the field. That was about 1934. That was the only time I have testified in addition to the cases the citations of which Mr. Hedrick read.

Redirect Examination by Mr. Morgan.

Counsel for the Federal Power Commission has made a statement indicating that there was a misunderstanding as to what I testified with respect to the information I turned over to Mr. Claude C. Brown. I have been requested to state what I did turn over to him. As a basis for my reserve estimates for the Texas Panhandle field I assembled a number of tables, numbered 1 to 10. These tables gave the basic data for the reserve estimate, with the exception that table 8 apparently did not go into the detail that Mr. Brown wanted. The details behind table 8 are a voluminous mass of information, and I thought I had given him all the basic data when I had given him the results of the tabulation of that mass of information.

I gave him a copy of the pressure map for 1938, which is Exhibit 17, except that it was not colored. I also gave
157 him a copy of Exhibits 16 and 20. I did not refuse to give him anything he asked for. I gave him Exhibit 13, except that he drew a line on it. I did not put the red line on there.

(Mr. Brown here states to the witness that when the witness gave him Exhibit 13 it had everything on it it now has with the exception of the purplish line, which Brown placed on it, indicating what the witness thought was the best commercial area on Exhibit 20. The witness agrees that that is true.)

Questions by the Examiner.

It would be possible to compile a production map breaking down the content of Exhibit 24 into production bars for the various years. It is possible to create production bars for the various rock pressure zones for any number of typical years; but I have never been able to get time to collect that information because the zones are shifting. It would be necessary to get the production from every well in each zone, which is a rather tedious job.

The only reason I do not have rock pressure maps for 1933, 1934 and 1936 is that I did not make them. Another reason is that in 1933 the information was not complete. It would have shown a very poor result to have made that map up. In 1934 the same conditions were in existence, for which reason I did not like to use the data that they had because it would not give as good control. It took about two months' preliminary work to make the 1932 map making sure of the location of the wells, getting all the rock pressures, and locating it accurately. The contouring takes about two weeks straight time, and then the coloring after that.

By porosity we mean the percentage of voids in a formation; that is, the percentage of the formation which has voids in it—speaking of the voids in that formation as a percentage.

By permeability is meant the ability that a liquid or a gas has of flowing through the formation. It is meant to be an expression of the ability that gas or liquid, such as oil, has of passing out of the formation and flowing. It is the flowing ability. It has to do with the power that liquid or fluid has, the rate at which it can flow against resistance. Permeability to me has always been a difficult term to define exactly. It is the ability of the formation to allow a liquid or gas to flow out through it. In other words, a substance could be quite porous and might have a high coefficient of friction. It is the ability the formation has of allowing the liquid or gas to overcome the friction.

In my estimates of the reserves in the gray area, I have taken no account of depletion. The figures I have given here are an estimate of the original reserves.

I will give you my conception of the buried mountain range. As far as I can determine, it runs along the structural axis of the field. The granite ridge has not been drilled in a number of places in the field, and that is the reason why we have to use this axis as our location of it, because it has not been definitely located by drilling in every portion of the field. The approximate location of the Amarillo mountain ridge, so far as we are able to determine, extends on Exhibit 17 from a point in about the cen-

tral portion of part of Potter County which is shown within the limits of the boundary of the field, eastward to about the junction of Moore, Potter, Hutchinson and Carson Counties, and thence in a southeastward direction to a
158 point which is in about the center of Block 5, I. & G. N. R. R. Co. survey, and thence in a southeasterly direction to a point about six miles north of White Deer in Carson County, and thence southeastward to the southeast corner of Section 155, Block 3, I. & G. N. R. R. Co. survey.

It must be understood that in this buried Amarillo mountain range, there are high places and low places. I have tried to give you the axis of the highest part that I know of. As we come into the area in the middle of the field, contiguous to the border which divides the West Panhandle field from the East Panhandle field, there is a depression in the range. Extending in a southeasterly direction from the island-shaped area, which has been described as being a barren gas area, and contiguous to the border between the West Panhandle field and the East Panhandle field, this axis is subject to considerable deviation, due to the existence of local lows and highs in that area. By local lows and highs I mean areas of locally high and low structural position. Whether they are a series of small axes or not, it is hard to define a big definite axis. In a general way, the axis of this buried mountain range would extend southeastward from the barren area described near the boundary between the east and west fields to a little east of the town of Shamrock in Wheeler County. At that point we are near the borders of the field and it is hard to follow it any farther. Also, this high part of the axis of the field has in general a higher portion extending northward from the center of Potter County through about the central part of Moore County; also a square running northwestward from Potter County, extending into Hartley County. The axis plunges downward into Hartley County, and downward into Moore County, although in the north central part of Moore County is an area where the axis is pretty flat; but near the edges of the field, in the oil area, there is a definitely different formation shown both to the north and to the northwest.

Cross-Examination by Mr. Booth.

Counsel inquires whether from my working papers with reference to the 470,000,000 MCF figure on page 2 of Exhibit 28, it could be divided up by years. There is no possible way in which anybody could figure out how to divide it by years.

(EXHIBIT NO. 20 for identification, offered and received in evidence without objection.)

159 R. D. PARKER, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(May 29, 1939)

My name is R. D. Parker. I live in Austin, Texas. I am 61 years of age. I am a consulting engineer. The firm name is Parker, Foran, Knode & Boatright. I have been a consulting engineer since June, 1934.

From 1909 until June, 1934, about twenty-five years, I was connected with the Railroad Commission of Texas.

I graduated in civil engineering from the University of Texas in 1898. Following my graduation I engaged in various lines of work mainly in railroad location, construction, maintenance and operation. After I left the university I worked with the United States Geological Survey for a short time, doing mapping work. Following that I was engaged with several locating parties for proposed lines of railroad in the State of Texas, and for about three years I was connected with the construction department of a line in Texas that is a subsidiary of the Missouri Pacific system. The principal work during that time was the construction of about 300 miles of railroad in Texas, with which I was connected, beginning in field work, location and construction, and finally acting as principal assistant to the chief engineer, and doing office work, supervising the making of estimates, design of structures, and work of that character. However, prior to my connection with this construction work, I was called back to the University of Texas for a year as instructor in civil engineering.

Following the connection I mentioned with the Missouri Pacific system, I was employed by the Southern Pacific system on one of its lines in Texas as office and resident engineer, which involved the control and management of all construction work and maintenance of way, bridges and buildings. That continued until 1909, when I was made chief engineer of the Railroad Commission, and I was engaged there principally in appraisal work for the basis of the issuance of securities by railroads in Texas under what is known as the stock and bond law. In addition to those duties, I advised counsel for the Commission, made investigations and aided generally in the administration of the laws controlling railroads, the matters of rates and service, my work being principally advising the Commission on operating matters under their jurisdiction, and I was engaged in several of their rate cases, some of them before the Interstate Commerce Commission and some before the State courts.

This work with the Railroad Commission continued until 1920, when I was placed in the Oil and Gas Division in charge of a subdivision known as the gas utilities division of the oil and gas department. That was organized after the enactment of the law which gave the Railroad Com-
160 mission jurisdiction over public utilities engaged in
the service of natural gas, which involved, of course, the matter of transportation and distribution and rates and service. Following that engagement was made chief supervisor of the Oil and Gas Division in June, 1926. I was head of the division which had control of the conservation of oil and gas, the making of rules and regulations governing the drilling of wells for the production of oil and gas, the transportation of oil and gas, and the production, and, in later years, what is known as proration, of oil principally in the beginning, and later on in the production of gas. I continued in that position until I retired from the Commission about eight years later.

I was responsible directly to the Commission as a whole during the time I was chief supervisor of the Oil and Gas Division. Mr. Cottingham served under me and under my direction during a part of the time I served there. I appointed him with the approval of the Commission.

During the period of my service I had occasion to know about the various statutes enacted by the State of Texas looking to the prevention of waste of natural resources, particularly oil and gas, and I had to do with the statutes enacted from time to time dealing with the subject of regulation of production of oil and gas. I don't think there is a statute that has been adopted with which I didn't have something to do. I personally sought to administer those statutes, as chief supervisor of the Oil and Gas Division during the time I held that position.

What is known as the original conservation act was passed on June 30, 1919, by the 36th Legislature. The position of chief supervisor of the Oil and Gas Department was created by virtue of that statute; but I did not occupy it until 1926. During the interval I was in the employ of the Commission and had occasion to keep advised of what was going on under the direction of the Commission.

I have brought here for the benefit of the Federal Power Commission and the Examiner, and others interested, a brief history of the legislative and regulatory policies of the State of Texas, dealing with the subject of oil and gas production and regulation.

(Objections by Commission Counsel and Counsel for Illinois Commerce Commission overruled.)

Questions by the Examiner.

While with the Commission I was not authorized to issue rules and regulations myself. I advised with the Commission with respect to the issuance of rules and regulations. I held hearings myself and made independent investigations. I was the head of the engineering forces that made investigations in the field, and drew practically every order that was ever issued during my administration fixing rules and regulations, based, of course, upon the hearing of testimony and investigations made by me through the agency of the Commission. I either ascertained the facts myself or ascertained them through sworn testimony or by investigation of agents acting under me.

The orders were drawn by me and adopted by the Commission by signature in the usual procedure that the average regulatory body goes through in adopting orders. I submitted proposed orders to the Commission, which either rejected, accepted or modified it. I should say the majority
161 of the orders were accompanied by my recommendations,
based on my views of what the hearing elicited or what I thought was necessary in the premises.

Direct Examination Resumed by Mr. Morgan.

The statutes regulating oil and gas and delegating to the Railroad Commission the duty of enforcing oil and gas regulations are based on Article 16, Section 59-A, which was an amendment to the Constitution of 1876, adopted by the vote of the people on August 21, 1917. That amendment declares that the development of all natural resources is a public right and duty and provides for the issuance of statutes by the legislature conforming with the constitutional amendment. These are the exact words of the amendment: "The conservation and development of all the natural resources of this state are declared public rights and duties, and the legislature shall pass all such laws as may be appropriate thereto."

I think you will find wherever I have spoken of the statute that it is in part the statute; that what I have to say is quoted verbatim, and wherever a court case is mentioned, excerpts or resumes of the decisions of the court, and if I mention the position of any company in this case in any suit, it is based on detail of the company's pleading.

The first statute in pursuance of that constitutional provision was known as the general conservation law, adopted in 1919. It is contained in the general laws of Texas for 1919, passed by the 37th Legislature, Chapter 155, page 285, and is known as Senate Bill No. 350. The law was designed to protect natural gas and oil reserves against waste.

(Examiner permits line of questioning to proceed with the understanding that neither the Examiner nor any party or the Federal Power Commission is bound by the witness' interpretation of statutes.)

In this statute waste was defined, declared unlawful, and prohibited, and the Railroad Commission of Texas was directed by detailed instruction and authority to make and enforce the rules and regulations to govern the drilling and operation of wells producing crude oil and natural gas in order to prevent waste thereof and to require reports to be made to it for that purpose. It was authorized to employ the necessary personnel to perform the duties imposed on it, and it was authorized to require reports to be made to it and to do all things necessary for the proper performance of its duties. The penalty for the violation of the law and the rules and regulations of the Commission was increased from the amount that had been provided in previous statutes to $1000.00 per day for each day's violation occurred and continued.

This statute was an oil and gas conservation law, and prior to the passage of that statute there were some individual provisions in previous statutes that dealt with natural gas and prevented the waste of same, by direct description, and penalties were provided for violation of the statute. One of them is part of the present law; the original gas statute adopted back in 1899 is the principal statute that regulates the production of natural gas at the present time. It has been amended numbers of times since, until the original simple article has grown almost into a book of laws.

The Texas statutes were recodified in 1925, and the 162 oil and gas conservation statute enacted in 1919 was carried into the recodified statutes. The recodified statutes omitted penalties for violation of the regulation in regard to prevention of waste of both oil and gas, and an amendment was enacted in 1929 which cured that situation (Objection by Commission counsel to entire line of questioning overruled.) The act I refer to was H. B. 388, effective March 29, 1929.

In the meantime I had become chief supervisor of the Oil and Gas Division. At the time this H. B. 388 was passed, the proration system of conserving the supply of oil and prevention of overproduction came into being. The oil industry had theretofore been highly competitive in all its developments, including production, which accounts in some measure for the improper practices in drilling and production. The operator, especially the one who had small holdings and who went into the business, as a rule, as a speculative venture, sought to realize what he could from his venture and get out. This type of operator was usually shrewd, ruthless and overbearing, and was not disposed to respect the law, and prevented legal control wherever and whenever possible in order that his speculations might pay.

(Objection by Commission counsel to characterizations as improper testimony ignored.)

The general practice in the Panhandle oil and gas field with reference to conserving the production of gas during the period from 1925 to 1929 was that the operators took advantage of the fact that no penalties were provided in the statutes, and practically disobeyed them at will. There was a lapse of four years when the Railroad Commission was without a means of preventing the dissipation of gas. During that period the operators permitted enormous quantities of gas to blow in the air in drilling through upper pay; that is, through these red bands on Mr. Peterson's exhibit, No. 16 I think it is. The oil is below the gas; and they drilled with the hole open through those upper gas formations and let the gas blow, and enormous quantities of gas were wasted in that way and still greater quantities were wasted in attempting to increase the production of oil by using the gas from the upper strata as gas lift operation, which would naturally increase the flow of the wells. This gas was let into the well bore in a number of different ways. It think it would be a good idea to introduce this exhibit that we have here showing those methods at this time.

(Document entitled "Texas Panhandle—Methods of Completing Various Types of Oil and Gas Wells," marked Exhibit 29 for identification.)

Exhibit 29 is a document which was prepared by me. It is a diagramatic cross section of the Panhandle field at the oil-water contact plane and the oil-gas contact plane; that is, in that region of the field where those planes exist, which is on the northeast flank of the structure in the oil producing area. It is merely typical and is merely used for illustrative purposes. It is not drawn to scale, but is purely diagramatic.

By that I mean there are wells drilled in situations portrayed on that document which are completed in the formations as portrayed there, though it is not stated that any particular well is represented by what is before us on that document.

At the top of the drawing, which is labeled "Texas Panhandle, Methods of Completing Various Types of Oil and Gas Wells," is an irregular line on which is shown some little derricks. They represent the surface of the
163 ground. A little ways below that are some perpendicular lines running down to a line which is marked by an open space, below which is another horizontal line. Those lines represent wells, the bottoms of which are represented by the diagram below which is colored. The open space between the first and second heavy horizontal lines, reading from the top, is merely a break in the continuity of the well indications to show that there is a break in the scale and a break in the indications, and the bottom portion of it is diagramatic, whereas the top part is nearer to scale.

The area below the lower of the two horizontal lines typifies what is known as the big lime, or it runs through the big lime where the oil and gas formations exist, where you have porosity that carries oil and gas.

The top of the dolomite is the first line running or dipping from the lefthand side of the diagram to the righthand side above the yellow band. It is the first heavy black line running in a declining direction from the lefthand side of the map or drawing to the east side and above the upper yellow band. The series of yellow bands are the porous spaces that carry gas down to the gas-oil contact line which has been mentioned. The gas-oil contact line is designated as the division line between the black indication of oil and the yellow indication of gas. Down below the yellow on each formation is black coloring, which typifies the oil producing part of the horizon down to the water level. The water level begins at the line between the black indication and the blue indication. In other words, coming down the structure or down hill along one of those porous formations we first encounter in the porous formations gas; then after passing out of the portion bearing gas we encounter oil; and then we encounter water, if we go on far enough down the structure.

This is an exaggerated diagramatic representation of the decline of those formations as you go down the structure along the flank of the buried granite mountain range. I drew it along a steep line merely to show the dip in structure. It simplified the matter of the illustration I sought to draw from it. I did not intend by this document to show the slope of the formation, the relative thickness of the formations, or anything else except what I have stated —the different types or manners of completing oil and gas wells that I have found to be prevalent in the Panhandle field.

I learned about these completions through investigations made by agents acting under me. They were revealed in hearings conducted by me, and they were revealed to me in investigations that I made personally, and I observed much of the waste going on in the Panhandle on frequent trips at the time it was going on.

During the period from 1925 or 1926, when the Panhandle gas field came in, down to 1935, there was a limitation upon the use of natural gas for the manufacture of carbon black in the State of Texas. The use of carbon black was prohibited except that only casinghead gas might be
burned for carbon black. I administered the provisions
164 of that law. In the early history of the Panhandle
field the carbon-black industry came on the scene and began its operations. In the beginning of the development of oil there was no other market for natural gas or casinghead gas; but when gas was produced in sufficient quantities the casinghead gasoline plants came in and utilized large quantities of it, blowing the residue into the air.

Some small quantities were returned for lease purposes, but it was immaterial. In the early history of the field it was possible to strip natural gas and blow the residue into the air if it came from a dry gas well. This was possible up until the time it was prohibited by H. B. 266, which became effective in 1936.

Going back to 1926, under the statute of 1899 the dry gas was required to be shut in until it could be used for light and fuel purposes. That was still the law in 1926 and continued to be the law until the enactment of H. B. 266 in 1936, except that in 1933 another act was passed which legalized the production of dry gas and its stripping. I refer to Senate Bill 92, passed in April, 1933. It authorized the utilization of dry gas for the manufacture of gasoline. It put no restriction on what might be done with the residue after the gasoline was extracted. Prior to the enactment of that statute the source of gas which gasoline plants could use for the purpose of extracting the natural gasoline and popping the residue to the air was from oil wells.

During the early history of the Panhandle the wells were completed in such a manner that the gas was produced out of upper parts of the producing formation, which bore gas in place, by means of oil wells for the purpose of lifting the oil and to supply gasoline plants with gas to manufacture gasoline. It was a profitable operation to take natural gas, whether it came out of an oil well or whether it came out of a gas well, and strip out of it by processing its content of natural gasoline and allow the residue to be popped off in the air. As a matter of fact, the oil operator who had wells in the Panhandle at the time when he could do nothing else with his gas was confronted with a constant temptation to utilize as much gas as he could get hold of for the purpose of this profitable operation of stripping the natural gasoline from it.

Taking a column in black on the righthand side of Exhibit 29 on each side of which are some green looking lines—that column represents an oil well completed in the oil portion of the producing horizon near the oil-gas contact line. It did not encounter any free gas in the bore of the well but it was completed near the contact line between the oil and the gas. By the contact line I mean the plane within the producing horizon which divides the oil production from the gas production. That oil-gas contact line is usually encountered in the Panhandle approximately 100 feet above sea level.

If a well were completed into the oil producing part of the formation which did not encounter any free gas in the well bore as it was drilled down to the oil bearing part of the formation, but which was near the gas-oil contact line, the result, from a practical operating standpoint, would be that the free gas would break through and be produced with the oil. In this well which we have just described the
165 casting seat is above the oil-gas contact line and the gas can break through on account of the position of the casing seat. The casing seat is shown on this drawing by a red jagged line. It is the bottom of the casing that is cemented between the casing and the walls of the hole. The green coloring represents the walls of the casing.

In some instances we have two strings of casing. One is a producing string and the other is a water shut-off. Where the casing is set at a level above the oil, the gas will break through and find its way to the oil well if the oil well be located near the line of contact between the oil and gas. It was an actual occurrence in the Panhandle that wells were completed into the oil at a place near the gas-oil contact line. In some instances an operator could not complete them anywhere else because of the restriction of his lease on the surface.

There is no way of telling from a longitudinal standpoint in advance of drilling a well just where that contact line is. (Objection by Commission Counsel overruled.) The operator was not always anxious to get away from that contact line when he completed a well back in those days, because he wanted the gas after he got a good market for it, with the limited amount of oil he could produce in that position on the structure. He had a market for casinghead gasoline plant operations. The oil operator manifested his objective by setting his casing high. He was limited by his lease restrictions on the surface as to where he could drill his well and the number of wells he could drill.

The operator could have minimized the danger of free gas getting into the well by setting the casing down into the oil formation so he could get a fluid seal on it where the gas would not break through. The gas will stay on top if the casing is driven through to an oil area below. If an operator decided to shut the gas out, instead of setting the casing in the position represented on column 1 on the righthand side of Exhibit 29, he would set it down inside the oil formation, and that would minimize the danger of free gas coming in; but as a matter of practice in the Panhandle during the earlier years of my regulation up there, he did not do that. If he wanted to produce gas principally, he set his casing high. If he wanted to produce oil, he would set the casing low in the oil.

Coming over to the next column, reading from the right on the same exhibit, we find the column goes down through two yellow bands and encounters the black band at the point where there is free gas also in the well bore, I can state that wells were completed in that situation in the Panhandle field. The operators of those wells could have adopted the same thing I indicated in connection with the other well to keep the gas out of the well—set the casing down in the oil so as to get a fluid seal on it so the gas could not break through; but it was not always possible to keep the gas out even when that was done. When you drill your well on the oil-gas contact line, it is not long before the oil is exhausted and the gas will break through, even though the casing be set down lower. The oil will soon be pulled out of that part of the formation below the
gas and gas will immediately replace it and find its
166 way to the well and be produced out of the oil well,
with a little oil coming from the other direction. That was a common occurrence in that field.

Coming over to the third column reading from the right on the same exhibit, I have a column which comes down through the same three yellow bands as that penetrated by the well on the right of it, and on into the band of oil producing formation. You have the same situation there as you had in well No. 2, so far as the casing point is concerned, or the point where you set your casing, in proximity to the oil-gas contact line; but the casing was perforated opposite the gas strata, and that permitted the gas to come in and be produced with the oil, operating practically as a gas lift. The oil field term for perforating the casing under those circumstances was to rip it. The common expression in oil field parlance is that the casing was ripped. The oil operator who owned this well knew just exactly where this yellow band was that had been penetrated by that well from the log of the well, and he ripped the casing by letting a casing perforating tool into it and punching holes in it. That is an oil well tool. They let it down in the oil well to a point immediately within the gas producing band, and by a process of machining holes were cut into the casing so as to permit the gas to go directly into the well bore.

The advantage the operator got from that was that he produced the gas. In the first place, he got more oil by the introduction of gas and using it as a gas lift, and produced the oil faster and therefore in greater quantities, and he got the advantage of his neighbors so far as the oil production was concerned, and then when the market for gas became available he could sell the gas to casing-head gasoline plants and get the gasoline out of it. When the carbon black plants came along to use the residue, he could get additional revenue out of it.

That was a common practice in the Panhandle. I learned that it was a common practice through the investigations of our agents and through hearings. The fact is, it was common knowledge generally. Nobody hesitated to admit it. It was freely admitted all over the field. . There were no restrictions. The penalty was off and they could produce it without being penalized and they made no bones about it. We were powerless to prevent it while the statute was in that form.

In the first column on the drawing are some yellow spots at irregular intervals up the column. That represents diagrammatically the gas being produced along with the oil. There are more spots of that character in column 2 then in column 1 because in the No. 2 wells you would get a greater quantity of gas, because there was a greater quantity of gas available in the upper gas strata. Over in No. 3 the spots are increased because there is still more gas available there from the gas strata and more gas would come into the casing through the perforations. In other words, I mean by the use of these yellow spots in the black columns to indicate the relative, though not necessarily the exact, proportions in the increase of the production of gas in the particular ways the wells are completed.

167 In column 3 there is a break in the green and a white patch between the end of the green at each of the yellow bands. These indications are made to show rips in the casings. They show the openings made in the casing that permitted direct entry of the gas into the bottom of the well.

I have referred to the use of free gas in the well bore for the purpose of aiding in the production of oil. The operation of letting gas in as I have described here creates a gas lift in the well and the gas lightens the column of oil and thereby increases the production of the well, causing it to flow up the well bore and out at the head of the casing where the derrick is. When the oil producing part of the formation is perforated, the oil rises in the well bore, and when you get the gas into the casing it increases the rate of the flow of oil up the well bore, and under proper circumstances causes the oil to go on out the wellhead. They call that raising oil by gas lift, instead of installing a pump to raise it. It has exactly the same effect that gas in a bottle of soda pop which is hot has, causing it to run over the top of the bottle. It will cause the oil to go up the well bore and flow out into a tank, just like water will flow out of the top of a bottle when it is charged with gas.

Leaving the first three and coming over to column 4, this represents a well drilled through the upper gas formations and completed as an edge well near the gas-oil contact line, similar to the wells on the drawing to the right, except that you have the gas above the oil in the well we are talking about now, No. 4, whereas you do not in No. 1. You have the same action of gas there by reason of the proximity to the gas-oil contact line of the casing point of the well, and the gas will break through just as it did in the well on the right.

In this well No. 4 they just drilled through the gas formation and left the hole open around the casing. Good practice would have been to cement back through the producing gas formation.

The red serrated area along the bottom of one of these columns represents the cement which is pumped back of the casing. It serves two purposes. It keeps upper water out of the oil formation, and limits, or should limit, the production to one formation, in the case of well No. 4, the oil, and prevents communication between strata. If that well had been completed properly, the cement should have come up on the side of the casing to a point above the two formations colored yellow. That was not always done in the completion of wells down there. In many instances the wells are not cemented at all. By that I mean that there was no cement put around the bottom of the casing at the time it was set. As a result of the failure to set the cement back of the casing and around the bottom of the casing, the upper gas would come in by migrating alongside the casing between the casing and the wall of the hole. It would come down and join forces with the gas from the lower yellow bands and find its way on down to the bottom of the well, and then it would be produced up the well bore and would be called casinghead gas.

168 I am familiar with the term "casinghead gas" as it is used in the records of the Railroad Commission. Those records during my tenure as chief oil and gas supervisor were kept under my direction. I was there with the Commission for twenty-five years, and I am familiar with the records and with the terms that are used in those records.

(Colloquy between Examiner and Counsel with respect to general objection of Mr. Parker's testimony.)

(May 30, 1939.)

My attention is now called to column 5 on Exhibit 29. That portrays the completion of a gas well in the gas area, and signifies that type of well as distinguished from the type of wells portrayed in columns 2, 3 and 4. It is a well producing dry gas only, as distinguished from the wells producing casinghead gas. That well is represented to traverse three streaks or layers in the formation. The casing is set above the first producing formation. That is the normal and usual way of completing a gas well which produces from more than one formation. The object of setting the casing above the top producing area is so as to take in all of the gas producing horizon, which is the part of the well below the red serrated area which, as I have said, indicates a cementing of the casing. That part of the column below that is an open hole, uncased, so that where it passes through these bands there is nothing between the open hole and the formation which yields the gas. That means that the gas flows freely in the well bore. That is also true of the other two gas bearing formations represented there. That is a representative type of well such as I know has been drilled and completed in the Panhandle. The producing formations were not always confined to three. You will sometimes find more than three bands. This is merely representative or typical and is not intended to represent the conditions in every well.

Gas is produced from each type of well illustrated here. Well No. 5 produces nothing but gas. Well No. 4 immediately next to it produces casinghead gas, which comes partly from the oil and partly from the gas formation. The other three wells do likewise.

During my tenure as chief oil and gas supervisor the words "casinghead gas" as used in the records of the Railroad Commission meant gas produced from the casinghead of an oil well. That definition had nothing to do with the source from which the gas came, as to whether or not it was free gas in the formation or otherwise.

The oil and gas division was the division which I headed, and the records, so far as the Railroad Commission is concerned, in so far as they pertain to oil and gas in any form, were kept in that department under my supervision.

When the casinghead gas reaches the top of a well and
comes out of the casinghead at the ground, it is run through
a separator on the surface, which is connected to the flow
line of the well. A separator is a pressure container or
device that is used for the separation of oil and gas. It
is a cylindrical pressure container in which the gas col-
lects in the top of the cylinder and the oil settles to
169 the bottom, and the gas is drawn off through a pipe.
If it is vented to the air, it goes out to the air. If it
goes to a carbon black plant, it goes through a pipe to that
plant. If it goes to a casinghead plant, it is piped from
the top of the separator. If water comes out with the oil
and gas, it is separated by means of gravitation and drops
to the bottom of the separator and can be drawn off. The
oil is also drawn off at that point. If there is more or less
oil in the water, the oil is carried to a feeding plant which
separates the water from the oil.

When this mixture of gas and oil or gas, oil and water first comes from the casinghead into the separator it tends to rearrange itself just as it originally was in the formation by gravitation and separation. The water flows and settles to the bottom. The oil comes next, and on top of that is the gas. The gas is drawn off to the casinghead plant or to the pipeline or to the carbon black plant or is popped off.

My office is four or five blocks from the Railroad Commission's office. I am up at the Railroad Commission's offices at least once a week. I get copies of orders issued by the Commission dealing with the subject of oil and gas. I am on their regular mailing list and get copies of all their orders. I get copies of all orders to keep my files up to date. I want to keep informed of conditions generally in that field. I practice my profession as a consulting petroleum engineer dealing with Texas oil and gas fields. (Objection by Commission's counsel and question unanswered.) If an order were issued by the Commission changing the meaning of the term casinghead gas, it would be of information to me. It would have a bearing on my work as a consulting engineer because we do gas testing work.

There are regulations which place a limitation on the use of casinghead gas which would control my advice to my clients. It is necessary for me to keep informed of the rules and regulations of the Commission dealing with the subject of natural gas regulations in order to carry on my practice.

I have engaged in branches of the oil and gas business myself. Our firm has an interest in three plants that separate gasoline from natural gas and return the residue gas to the formation from which it is produced. I keep myself informed concerning all rules and regulations which are promulgated by the Railroad Commission concerning the records which the Commission keeps concerning all types of gas that are produced in the State of Texas. I do that in the interest of my professional work and my personal interest as a part owner of three plants which process gas. I should say four plants. We really have an interest in four plants. Casinghead gas is involved in the processing. We have to report the casinghead gas used. By making a report of the casinghead gas used, I mean we make a report on a regular form for that purpose. (Objections by Commission's counsel and counsel for Illinois Commerce Commission overruled.) I have not heard of any change in the meaning of the term casinghead gas, as used in the records of the Railroad Commission, since I left there. I would be in position to have heard of such a change had one been made, and I am sure I would know of it if such a change had been made.

(Statement by Examiner that he is not to be bound by the witness' testimony on the regulations of the Texas Railroad Commission agreed to by company counsel.)

170 The term "gas-oil ratio" is a general term in common use in the oil and gas fraternity as well as by the Railroad Commission. It means the ratio of the oil to the gas produced from oil wells. The gas-oil ratio is expressed in terms of cubic feet of gas to oil in a barrel. A gas-oil ratio of six means six cubic feet to a barrel, and 6000 would mean 6000 cubic feet of gas to a barrel of oil. In the ordinary acceptation the term has nothing to do with gas in

absorption with the oil or dissolved in the oil. It is established by measurement on the surface of the gas coming from the separator through a meter, and the oil is gauged in the stock tanks on the lease.

Taking well No. 3, reading from the right on Exhibit 29, as an example, the gas coming out through that ripped casing from the oil formation goes into the separator and is measured. The gas-oil ratio of that well would be the number of cubic feet of gas produced per barrel of oil from the well. That quantity of gas is a variable thing. It varies with the wells, and depends on the conditions in the well and the completion of the well. The variance is due to the fact that in the oil area overlaid with gas it varies with the amount of gas that comes into the well from the gas strata. If the casinghead gas or the gas which enters into the gas-oil ratio were confined to the gas which is found in the oil, there would not be a wide variance in the gas-oil ratio in the Texas Panhandle. It would be confined to the gas which is in solution in the oil. There is a field in Texas where there is no free gas in the formation above the oil. The East Texas field is that sort of field and I guess it is in fact the largest field in the world. In that field the entire formation is occupied by oil and the entire formation has gas in solution in the oil. The gas-oil ratio in the East Texas field is 370 cubic feet to the barrel. The initial pressure in that field was 1600 pounds per square inch, as compared with 430 pounds per square inch in the Panhandle. I am talking about the bottom hole pressure. It is 1600 pounds as compared with 471 in the Panhandle.

No public comparison has been made that I know of concerning the oil in the East Texas field which would indicate it to have a higher absorption quality than that in the Texas Panhandle. The Bureau of Mines issued a bulletin on the question of the solubility of East Texas gas and oil. From that bulletin I took this oil-gas ratio which I have used, supplemented by my knowledge of tests which have been made in the field—the East Texas field, the one which I have described here as not containing any free gas. This field is located geographically in four counties in northeast Texas. It is not related by contiguity to the Texas Panhandle. There is no formation connection between that field and the Panhandle and no geological relation between the two. The principal city near the East Texas oil field is the city of Tyler, in the northeastern portion of the State. The Panhandle field is in the northwestern portion of the State in what is known as the Panhandle, near the city of Amarillo. It is about 500 or 600 miles from the East Texas field to the Panhandle field.

I do not have the bulletin of the Bureau of Mines here. I let one of the men in my employ have it this morning here in Chicago; but we can get that reference to it today or tomorrow.

(Colloquy between Examiner and Company counsel with respect to effect of testimony of Mr. Cottingham on evidence relating to Texas Railroad Commission Rules.)

171 The gas-oil ratio in East Texas would not be affected at all if the casing were set higher or if it were set lower, or in any particular position. That is true all over the field. The gas-oil ratio is constant. It does not make any difference where the casting is set, what part of the field, or how the oil is produced, the gas-oil ratio is the same. That is because it is inherent. It is all the gas that the oil will take into solution, and it is all the gas that is in the formation. It would not be possible to take the oil out of the formation without bringing the gas with it. There would be no point in reducing the gas-oil ratio of the gas which comes out with the oil as constituting that gas-oil ratio in absorption with the oil. You could not control it. It is not possible to reduce the gas-oil ratio by the quantity absorbed in a barrel of oil. (Objection by Commission counsel and question unanswered.)

The Commission has issued a general order limiting the gas-oil ratio in Texas to 2000, and exceptions are made in different fields. For many years there was no regulation at all. I do not recall when they first started regulating the gas-oil ratio. As applied to the Panhandle there was an order entered in 1932 limiting the gas-oil ratio to 25,000 cubic feet to the barrel, but the order was never enforced. The order now provides that the gas-oil ratio shall be held as low as possible. I think those are the exact words. While there is no limit now except the definition of gas wells and oil wells, that really does not concern this question of gas-oil ratio that we are talking about.

I have noted in the records and reports of the Railroad Commission that gas-oil ratios in the Panhandle field proper were shown to be 6.1 for the month of April, 1938, and that there were other gas-oil ratios in the same field running higher, an average for the month of 1,350 MCF per barrel of oil, and others having no gas-ratio at all. The higher gas-oil ratio is probably from a well that is located in the oil area which is overlaid with gas, and the gas over the amount that is in solution evidently came from the upper gas horizon.

Wells having no gas-oil ratio in the field were undoubtedly wells located in the northeastern portion of the oil field which is not overlaid by gas formation—where there is no gas contact. The gas from the upper formation could not get into the well and be produced. It is an inherent gas-oil ratio, based on the solubility of the gas in the oil.

You have pointed out that of the 3411 wells producing oil in the Panhandle proper in the month of April, 1938, 2108 of those wells had gas-oil ratios under 2000 cubic feet, and that those wells produced 44,131 barrels of oil and only 37,369,000 cubic feet of gas, while other wells were making large quantities of gas, the remaining 1303 making approximately 370,000,000 cubic feet of gas. I think the wide discrepancy in the gas-oil ratio in the 2100 wells from which the larger proportion of oil is produced, and that in the 1303 wells from which only a small proportion of the oil but most of the gas is produced, is due to the fact that the gas comes from the upper formations and gets into the wells and is produced with the oil.

172 You have referred to my testimony showing the way wells were completed so as to purposely let into the well bore, either around the lower casing or into the side of the casing by ripping the casing, large quantities of gas in proportion to the quantity of oil produced, and have asked me how much gas was produced in the Texas Panhandle in the early history of the oil production. There was no attempt to conserve the gas at all. There was no market for it at that time and nobody cared whether they wasted it or not. It was especially useful in producing oil because it increased the quantity of oil that could be produced from the formation. That period commenced in 1925 after the discovery of the Borger field, and continued during the early development of the field through 1926, 1927, 1928 and 1929. In 1929 the penalty clause was restored in the conservation law and that had the effect of stopping some of these practices, although some of them continued surreptitiously. (Objection by Commission counsel and question unanswered.)

The first order issued which was calculated to control or reduce the production of gas in connection with the production of oil was issued in December, 1932, and provided for gas-oil ratios; but prior to that, in 1931, an order was entered which provided for the use of what is called the Miller head, which was a device to reduce and prevent the waste of gas in drilling for oil through the upper gas formation; and the same order provided for proper cementing of the casing upon completion of the well.

The wells drilled in the Texas Panhandle field prior to 1929 were drilled in search of oil. Gas wells would be of no value because there was no market in that area for the gas. The wells drilled in the early days were drilled with cable tools. The well was drilled as an open hole by cable tools and the bit that drills the well was on the end of the tool, suspended on the end of the cable and operated by a continuous pounding of the bit as it turned around in the formation. The early wells were drilled in that way and the cavings or cuttings were taken out by what is called a bailer, which is a device with a valve in the bottom of it let down in the hole, and the cavings were taken out with the water. When that drilling found its way on down 2000 feet to the top of the first gas bearing formation, the gas escaped through the open hole; but they didn't do anything about it. They just let it blow while they drilled on down until they got down to where they hoped to find oil. In the meantime gas was flowing up through the open well.

The Miller head was used in connection with rotary control. The use of standard tools, that is, cable tools, was abandoned several years ago and very few wells are drilled in that way now. The Miller head is a device which acts directly on the principle of pressure control. The wells are brought under pressure control and no gas can escape from the well as it is being drilled. They were required in drilling through the gas formation to use the patented device called the Miller head, which would minimize the escape of gas into the air while they were going on down.

There was no gas-oil ratio regulation until 1932, and that
regulation was not enforced. The effect of it was
173 nullified by the issuance on the part of the Commission
of stripping permits. By stripping permits I mean
that free natural gas was permitted to be used for the extraction of gasoline and the residue blown to the air—that is, the portion of the residue which could not be sold for carbon black or lease purposes. The first permit that came to my knowledge was issued to Hagy, Harrington & Marsh in February, 1933. It was followed up by other permits and they became general all over the Panhandle.

Under these permits production was increased to approximately 1,700,000,000 cubic feet per day and the majority of this was wasted. This was all production to gasoline plants; there was other production at that time to pipelines.

This 1,700,000,000 cubic feet of dry gas was run to the gasoline plants for stripping. The dry gas would yield about .25 of a gallon of gasoline per MCF of gas. After stripping, the residue was popped to the air. The gasoline plants were located in a portion of the field north of approximately the central axis. That is where the source of supply was located. A great deal of the gas that was used came from wells in that area. Having unbridled authority to use it, the gas-oil ratio regulation became immaterial. You could not enforce it because there was a permit standing against it.

I received instructions from the Railroad Commission as to what to do about enforcing the gas-oil ratio regulations they had promulgated in December, 1932. We withdrew the order, or I might express it another way by saying that I instructed the deputy supervisor in that district not to attempt to enforce it. I did that on instructions from the Railroad Commission.

In April, 1933, what was known as the stripping law was passed by the Legislature. This legalized the practice of stripping. In other words, the permits which the Railroad Commission had been issuing since February became legalized as a matter of statute the following April. That statute was on the books until House Bill 266 superseded it in May, 1935. However, H. B. 266 was not effective until the following August. Between February, 1933, and the effective date of H. B. 266 in August, 1935, there was uncontrolled stripping of gas for gasoline. Nothing was done during that period toward regulating the gas-oil ratio of oil wells in the field.

House Bill 266 had the effect of stopping stripping. It defined the different kinds of gas and described how they should be used. Ordinary dry sweet gas, such as the large pipelines produce, could be used for light and fuel purposes only. There were carbon black plants in the area; but the use of dry gas for carbon black plants was prohibited. Sour gas could be used for the manufacture of gasoline and the residue used for the manufacture of carbon black. Sweet gas and sour gas were defined by the statute, and casinghead gas was also defined. The definition of casinghead gas contained in H. B. 266 is gas which is indigenous to oil formations and is produced with oil. The exact definition is "The term casinghead gas shall mean any gas and/or vapor indigenous to an oil stratum and produced from such stratum with oil."

174 That statute was passed in connection with defining the use to which a particular type of gas could be put. An oil well and a gas well were also defined by that same statute. Section 2 (e) provides that "The term oil well is any well which produces one barrel or more of crude petroleum oil to each one hundred thousand cubic feet of natural gas." My understanding is that an oil well is defined as a well which produces one hundred thousand cubic feet of gas to a barrel of oil. That is the substance of it. That is the dividing line between gas and oil wells. Any well that produces above a ratio of 100,000 cubic feet to one barrel of oil is a gas well; and if it produces more oil to make that quantity, it is an oil well. That is merely a definition of an oil well in order to have a dividing line in the statute so the wells could be classified. It it falls within the definition of an oil well, it is prorated as an oil well. If it falls within the definition of a gas well, it is treated as a gas well in the gas-oil ratio regulations promulgated by the Railroad Commission.

Any well producing 775,000 cubic feet of gas would be an oil well if it produced 7.75 barrels with that amount of gas; and if it is produced with a ratio higher than 100,000 cubic feet to the barrel, it is limited to the 775,000 cubic feet of gas regardless. They were not permitted to produce any more. That is what they call the displacement factor.

If a well produced more gas to the barrel of oil than 100,000 cubic feet, it was permitted to produce only 775,000 cubic feet of gas. That merely resulted in the well's being permitted to produce a certain amount of oil and gas. It was limited to that quantity.

I remember the first gas-oil ratio regulation following the enactment of H. B. 266 when the stripping of gas was no longer legal in the Panhandle of Texas. It was 10,000 at first. Under that regulation, where the gas-oil ratio was then 10,000, it meant that 10,000 cubic feet of gas could legally be produced to a barrel of oil. If there was a well in the Panhandle which had produced 100 barrels of oil legally under proration and that particular well happened to have a gas-oil ratio of 10,000, which was the maximum permitted gas-oil ratio, the well would be permitted to produce 1,000,000 cubic feet. The effect of this displacement factor on the gas-oil ratio of other wells in the field was to permit any well in the field to produce the amount of gas that the well producing the maximum amount did. In other words, any well in the field under the displacement factor qualification of the gas-oil ratio regulation was permitted to produce a million cubic feet, provided it produced more than ten barrels of oil, and providing that they did not get over the 100,000 limit and get into the definition of a gas well. The practical effect of this on the gas-oil ratio was that it nullified it, and the practical operation was that there was just about one well in the field which was being regulated, and all the rest of them could produce all the gas they could, unless they got over the 100,000 cubic feet per barrel.

They still have that displacement factor qualification to their gas-oil ratio regulation in the Texas Panhandle.
175 The last order issued sometime in January gives the displacement factor as 775,000 cubic feet. That is the order which is still in force and, therefore, any well in the Panhandle can produce 775,000 cubic feet of gas per day in an oil well if it produces as much as 7.75 barrels of oil. If it produces less than 7.75 barrels of oil a day, it can produce, under that displacement factor, 775,000 cubic feet, regardless of how much oil it produces.

During the time I was chief oil and gas supervisor, J. M. McDonald was deputy supervisor in the Texas Panhandle and worked under my direction, making reports to me in his capacity as deputy supervisor. Some of those reports had to do with the subject of gas-oil ratio.

(Document entitled "Table V. Summary of Wells Connected to Casinghead Plants—Classified as to Ratios", marked Exhibit 30 for identification.)

Exhibit 30 is now presented to me. It is a summary of the wells connected to casinghead gas plants classified as to gas-oil ratios. That report was made to me in July, 1932, and at that time I was chief supervisor of the Oil and Gas Division. That report lists 1154 wells. (Objection by Commission counsel to questions on Exhibit 30.) The report has never been published, but it was a report made to me as chief supervisor and is in my files. I have checked the document which I hold in my hand against the original and know that it is accurate copy of an official report made to me in the line of duty by the subordinate who made it. It is a correct copy of a page in that report. Frankly, I do not know how you could get access to the whole report. A great many of the old records in the Commission's offices have been misplaced. I do not know whether you could get it now at all or not. It was just a report that was made and filed away as reports by staff men are usually filed in a commission's files. I do not have a certified copy of the complete report and do not know whether I have the remainder of the report in my files or not. There was no attempt to extract any portion of the report and withhold the balance of it. I will try to get hold of a copy of that report and make it available to counsel on the other side; but I am not making any promises.

On this report gas-oil ratios are shown in the first column. Those percentages there are merely the percentage relation of the figures in the preceding column for oil, gas and water.

This report was made to me for my information on the very question we are discussing here. It was made in 1932, the year we had the hearings for the purpose of adopting regulations of gas-oil ratios. I do not recall the details of the report. I kept this portion of it because it is the part that I was especially interested in, and was the part I was interested in at that hearing. I believe I can find the original document, although I do not remember the details.

(EXHIBIT 30 for identification was offered and received in evidence over the objection of counsel for the commissions to each of whom the Examiner granted an exception.)

(EXHIBIT 29 for identification was offered and received in evidence over the objection of counsel for the commissions to each of whom the Examiner granted an exception.)

Cross-Examination by Mr. Booth.

I do not recall when I was first retained by Natural Gas Pipeline Company to make this study. I think it was some time last year. I do not recall the month. I have told you about all I can tell you about it—it was some time during last year. I do not recall how long a period I spent in the preparation of my data. I would have to make a guess at it. A memorandum is presented to me dated May 10, 1938.

The study which was contained in that report con-
176 cerned the legislative history of oil regulation and the administration history of it in Texas from the enactment of the first statute. The submission of the report concluded the work that I did for the company last year.

I was next retained by the company when I received a letter from Judge Morgan not over two weeks ago, asking me to be here to attend this case and to testify to what I had done, or rather to testify generally. He did not specify really what I was to testify about. The testimony which I have offered here was not contained in the report which I submitted to him last year.

Cross-Examination by Mr. Slaff.

With respect to the cases in which I have testified, the only rate case I have testified in was the proceeding before the Kansas Public Service Commission involving rates in Kansas City. That was in 1934. I do not recall the style of the case. It involved gas rates. I have a document here that has something to do with the testimony I gave in that case which shows the date of November, 1934. Evidently the proceedings were after that date. It was after I had left the Railroad Commission. I testified on behalf of the Cities Service Company, the company that sells gas in Kansas City. I do not know when that proceeding was terminated. I do not know whether the Commission issued an order. After I participated in it, I paid no more attention to it.

The subjects covered by me in my testimony concerned the question of the inclusion of stand-by gas reserves in the rate base. I accepted the reserves of Cotner & Crum that have been discussed in this proceeding as representative of the reserves in the Texas Panhandle field at that time. I accepted that report as the report of two reputable geologists and as the report that was sponsored by the American Association of Petroleum Geologists, and I regarded it as authentic. I have not testified in any other rate case since that time. I was there only a day, and that included both direct and cross-examination. I did not return at any other time.

I do not recall that I have testified in any other rate cases. I have testified in the District Courts in the State of Texas in cases involving oil and gas or involving regulations made by the Railroad Commission. Without attempting to be exact, I would say that I have testified in a hundred cases in the past five years since I left the Commission. Before I left the Commission I participated in a number of cases. I was present in practically all of the important cases that related to the Commission's activities. I was in no private cases at all.

The cases in which I have testified since I left the Commission involved the regulations of the Railroad Commission largely, as related to oil properties, the production of oil, the estimation of oil reserves, and things of that sort. A number of those cases went to the State appellate courts; but I do not think any of them went to the United States
Supreme Court. I could not say how many of them
177 went beyond the court of first jurisdiction in Texas;
possibly 10% of them did. I would have to go to the Supreme Court records, because I had nothing to do with the cases after they were tried in the trial courts. In those cases I was representing different people. I might and might not be apprised of the fact when an appeal was taken. Generally I would not be. I had no interest in them at all after my testimony. If they involved any question or principle that I thought unusual, I would probably inquire about it, and I get a regular flash service from the State House Reporter that gives all important orders of the full Legislature and of the Commission. It goes over my desk every morning. I follow that with the same degree of care that I follow other stuff that I get; but I do not charge my memory with the details of those cases. If it is an important case it would be mentioned in the service I get across my desk every day; but if it is unimportant it would not. The service I get does not cover all the appellate court decisions. It just picks out particular ones. I think the name of that service is State House Reporter.

I could go through my files and pick out my record of the cases in which I have testified during the last five years, and then go to the Court of Civil Appeals and find out what their records are, and I could go to the Supreme Court and search them out. I don't know how long it would take to get a list of the cases in which I have testified during the last five years. It would take several weeks because of the detail I would have to go through to find out which of them had been appealed; but it would not take long just to make up a list of the cases in which I have testified—probably a day.

In my duties with the Commission and in my capacity as consulting engineer since I left the Commission, I think I have been in print only once. That was in three or four issues of the Oil Weekly in Denver in 1934, on the questions we have been discussing here, waste of gas in the Panhandle. That was while I was still with the Commission. (Commission Counsel appealed to the Examiner to instruct the witness not to make gratuitous remarks.)

I will within a week make up a list of the cases in which I have testified during the last five or six years and send it to the Examiner or the Federal Power Commission. All of them are Rule 37 cases relating to permits to drill wells in Texas. Generally speaking, I have a complete record of the cases in which I have testified. I can prepare that list within the next ten days or two weeks.

Redirect Examination by Mr. Morgan.

I testified in a case known as Peoples Petroleum Company vs. Railroad Commission, which is a reported case by a three-judge Federal Court in Texas. That was before I left the Commission. I also testified in the Consolidated case which went to the Supreme Court. I did testify in many cases when I was head of the Oil and Gas Division of the Railroad Commission. I attended court and participated in most of the cases in which the Railroad Commission was a party which involved oil and gas regulation; but I did not understand counsel for the Federal Power Commission desired a list of any cases except those in which I have testified since I left the Commission.

178 In my testimony I have mentioned a displacement factor. This qualifies the regulation of the Railroad Commission dealing with the subject of gas-oil ratios. I have checked up on the displacement qualification or displacement factor, and find that any well producing a less amount than 7.75 barrels of oil would produce on the basis of the definition of an oil well 100,000 cubic feet per barrel. A well producing four barrels of oil would be authorized to produce 400,000 cubic feet of gas. In other words, it can produce up to 100,000 cubic feet of gas per barrel of oil provided it does not produce more than 775,000 cubic feet of gas per day. 775,000 cubic feet per day is the maximum amount of gas which can be produced from an oil well in the Panhandle at the present time.

(Company counsel in response to previous request which had been denied now offered all material underlying Peterson testimony for inspection for the purpose of cross-examination.)

179 J. D. THOMPSON, JR., a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(May 30, 1939.)

My name is J. D. Thompson, Jr. I was born in Johnstown, Ohio, January 31, 1891. I live in Amarillo, Texas.

I graduated from Denison University, Granville, Ohio, in 1914. I received the degree of Bachelor of Science, my major subject being geology. This was followed by approximately two years of graduate work at Cornell University at Ithaca, N. Y., at which time I not only studied there but also did some insttuction work, assisting in laboratory work and things like that in the field of geology. My graduate work was in geology. I was at Cornell in the years 1914-1915 and 1915-1916.

I left Cornell in the spring of 1916 to take a position as oil and gas geologist for the Empire Gas & Fuel Company. I have been engaged in that line of activity continuously since that time. I was employed by the Empire Gas & Fuel Company for three years, during which time I did work in Ontario, Canada; New York State, Pennsylvania, Ohio, Indiana, Illinois, Kansas, Colorado, Louisiana, Texas and Oklahoma. The kind of work I did for the Empire Gas & Fuel Company during those three years varied considerably. For a while I did what we called detail work, that is, plain table surveys, mapping structural geology. Later I was put on what they call reconnaissance work, in which they sent a man out in advance to look over unknown areas, and if in the course of his study he finds a place that looks like it might be favorable from a structural standpoint he puts in his reconnaissance report and then they send a detail party out to check the geology in detail. I also did subsurface work in Louisiana, with headquarters at Shreveport. I believe I was there about a year in that connection.

At the end of that time, about the spring or summer of 1919, I resigned from the Empire Gas & Fuel Company and took up work for an independent oil man named Leroy Adams, with headquarters at that time at Wichita, Kansas. I did work for him in various parts of the country, mostly detail and reconnaissance work. I stayed with him, I believe, until the spring of 1922.

At that time I took a position with the Gulf Oil Corporation, then called the Gulf Production Company, as district geologist for the Texas Panhandle area, with headquarters in Amarillo, Texas. I was employed by them continuously for seven years, until the summer of 1929. During that time I spent most of my time in Amarillo or in the Amarillo area. I was in the Fort Worth headquarters office for a while, but even when I lived down there I either had actual supervision of work in the Texas Panhandle area or
180 else was there in person, either doing sub-surface work,
or for a while I was transferred to the production department and had charge of the completion of wells. This was during the period of great activity there, what we call the boom period of 1926 and 1927. During those years I had charge of the completion of the wells that they drilled in that area. I believe we completed somewhere around 150 wells during that time. I might state that prior to that time, during the early years of my work up there, it was what we call a wildcat field. It was not yet defined, and it was only problematical as to just what the outcome of the exporation work was going to be; but we had special confidence in that field so that we leased something like 200,000 acres of prospective oil and gas lands.

In reply to the inquiry as to the location of the 150 wells, I can name the general area in which we did our operating. We had development work in central Gray County in the general area of the town of Lefors; also south and west of the town of Pampa. We had still further holdings on up in northeastern Carson County and in the extreme north and central portion of Carson County. I might say that that particular area is of interest because it was there that the Gulf Company drilled the discovery oil well of the Panhandle. They had made that discovery, however, before I went up there. We also had a large number of leases in the Borger area of Hutchinson County, as well as a still larger block in the area across the Canadian River from the Borger field, located at a point three or four miles south of where the town of Stinnett was located. The town of Stinnett was not there at the time we started our operations in that county. That about covers our actual development work. I think we had a little more acreage or a few more productive leases in southwestern Hutchinson County. Our spread of acreage of something around 200,000 acres, covered about the full length of the Texas Panhandle field. It was on the northeast flank on the main axis and on the southwest flank, except they did not get over into southwest Moore County and into Potter County. However, they took not only within the boundaries of the present known field but necessarily took some acreage that later proved to be non-productive, due to its peculiar position.

As to what I had to do with the completion of those wells, I had to take casing points and give instructions as to where the casing was to be run. I also had to be there and observe them where they were drilling into the pay formation and stop them before they went too deep and got into salt water. Those were my two chief duties in that connection.

That was during the years 1926 and 1927. My duties changed to some extent in 1928 and 1929 during the remainder of my tenure with the Gulf Production Company. I still had that kind of work to do occasionally, but I was assigned the job of correlating the sub-surface geology of the Panhandle and of West Texas with the geophysical survey work that they were having done. They had a magnetometer survey made that covered almost the entire area from the north line of the Texas Panhandle clear down into southwest Texas. There had been and were in
181 process of drilling a good many scattered test wells.

It beame necessary for me to study the cuttings of the samples from those wells and the logs from those wells and try to correlate the sub-surface geology with the geophysical picture. I believe that was the work I was engaged in when in 1929 I resigned and opened my own office as a consultant in Amarillo.

Since I opened my office in Amarillo I have been engaged continuously in doing consulting work on geological problems in connection with oil and gas. 95% of my work has been confined to the Texas Panhandle area. My work is rather varied. I make locations for wells, and give advice as to completion of wells. I make quite a large number of reports on the value of properties, particularly in connection with loans for banks. The operators quite frequently need money to carry on their operations and have to borrow money, and the banks take my reports as a basis for estimating the value of the properties to see whether the loans are secure or not. These reports have to do with the geological and structural situation of the particular leases and the prospects of those leases to produce oil or gas.

I have been consulted in connection with the settlement of estate taxes, in connection with appraising for estate or inheritance tax purposes properties located in the Panhandle oil and gas field, and once or twice on income tax matters. I have also been consulted by clients who desired to have me give technical testimony in hearings or lawsuits.

I have prepared a list of clients who have consulted me during the last several years in connection with my geological consultant practice. I came up here unexpectedly and was not able to remember all my clients. The list I have prepared is a partial list.

(Document entitled "Partial List of Clients of J. D. Thompson, Jr., Consulting Geologist", marked Exhibit No. 31 for identification.)

Counsel for complainant has commented that the Chicago District Pipeline Company is not mentioned. I was retained by that company to give some evidence up here in 1934. I am sorry I made that omission. I did that work, of course. I will be glad to supplement this list.

(EXHIBIT NO. 31 for identification, offered and received in evidence without objection.)

Cross-Examination Interposed by Mr. Slaff.

My first client named is stated as the First National Bank, Amarillo, Texas, and in parentheses "Earl Fuqua." He is president of that bank and I have done work for the bank and for him personally. Another one is William H. Bush Estate, Amarillo, Texas, and under that in parentheses is "Chicago." That means the estate has a representative both in Amarillo and in Chicago. Another one is Turman Oil Company, Tulsa, Oklahoma, and then in parentheses under that "International Petroleum Corporation." I believe the name has been changed from Turman Oil Company to International Petroleum Corporation, but I am not absolutely sure about that.

182 *Direct Examination Resumed by Mr. Morgan.*

In order to carry on my business I must keep an up-to-date file on all the development activities. I must obtain copies of the logs in particular areas that I am especially interested in. I must look over samples of the well cuttings, and in general keep up with the developments of the field, keep my files up to date and my maps posted.

I have individual county maps of that area and keep
183 the wells spotted on them as frequently as I am able

to, and I do a very fair job of keeping up with the field, of necessity.

I have access to other geological records in addition to the records and information assembled and kept in my own office. When I left the Gulf Production Company they were so kind as to let me have a copy of all the information that I needed or wanted from their files. That included information on all the development work up to that time, all the logs, and I keep a card record. I take a log, transfer the essential data from the well log on to a card and stick it in my card file, alphabetically arranged, so that it is ready for instant reference. Since I left the Gulf Company I have been a welcome visitor in all the offices of the major oil companies up there, particularly the Gulf Company. I have access to their geological information, particularly their tremendous collection of well cuttings. I don't know how many hundred thousand samples of well cuttings they have.

These samples are taken from the well and put in little sacks, and the depths are marked usually every five or ten feet. Then these little cloth bags of samples are brought into headquarters, washed, dried, and put in bottles. The bottles are marked as to depth and arranged in the proper sequence from the top to the bottom of the well, so that one can get a quick picture of the formations that the well penetrated, or can make as close a study of the samples as he may care to do under a microscope.

Those are all accessible to me, partly on the basis of personal friendship; but I do my bit in return for that. Numbers of my clients also drill wells and I make arrangements that they shall save samples of the cuttings properly, mark them properly, and deliver them to the major oil companies for their use; so I am contributing to these collections. It would be too burdensome for me, just a one man organization, to keep these tremendous libraries of stacks full of bottle samples; so that constitutes, you might say, my public library for drill cutting samples.

There is a clearing house, an exchange, for that kind of information maintained in the Panhandle for all these companies. It is located in the Herring Hotel at Amarillo, and I believe it is conducted by a young man named Dwight. I will secure that information.

At the time I went to Amarillo in 1922 there were two oil wells and not over 20 or 25 gas wells. As to whether they were being produced at that time, I will state there was a rather peculiar situation there. There was no oil pipeline into the Panhandle at that time, and two major companies, the Gulf Company, and the Texas Company, had very large leases up there which they had to hold by virtue of production or development. They found it necessary to produce these wells and store the oil. There were years up there when they pumped oil from the wells into the lease tanks and then into large 55,000 barrel tanks.

184 A portion of the 20 or 25 gas wells were being produced by the Amarillo Oil Company, which owned a pipeline from northern Potter County to the town of Amarillo. Nothing was being done with the gas from the other wells except the use to which it was put for lease development purposes. They used it to fire the boilers when they were drilling other wells if the wildcat well they were drilling was not too far away to lay a small pipeline to it. At that time it was not known where the various oil pools were that were afterwards developed up there. We knew we had two oil wells there part way down on the anticlinal structure. We knew that we had salt water further down, and we knew that we had gas on the apex of the structure, and that is a perfect situation for the development of further oil fields.

The two oil wells that I refer to are in Northern Carson County, almost midway along its north line. One belonged to Gulf Production Company and the other to the Texas Company. The 20 or 25 gas wells which had been drilled prior to 1922 were located mostly in the northern part of Potter County, southeastern Moore County or northern Carson County. Most of those wells had been drilled in search of oil. They found no oil, but found gas. There were a few wells drilled for gas, of course, to give supply to those pipelines to the town of Amarillo, where they were actually in search of gas.

At the time I went there and they had those two wells, they knew enough about the underground geology or subsurface geology to indicate that there might be valuable oil deposits in that country. The oil development and oil activity during the next three years after I arrived there in 1922 was exploratory. A large number of test wells were drilled, scattered throughout the area from one end of the field to the other. It became apparent that this was a tremendous anticlinal structure, along the axis of which you stood a very fine probability of getting gas, and that along the northeast margin of the field there were excellent prospects for oil. Of course there were wells drilled outside the area of production which resulted in dry holes.

By dry hole, I mean that it was barren of oil or gas. Probably all the dry holes contained salt water. It does not mean that they did not have anything in them. They just did not have oil or gas. Regardless of how much water they have, they are still dry holes in the terminology of the oil field. This salt water would be what we call bottom hole water, dip water, which occupies the pay formation down dip from the oil and gas field.

It is my information that by January 1, 1931, there had been a total of 373 dry holes drilled. Most of these dry holes were along the northeast flank. Some of them were in actual oil producing areas where they met up with tight formations and drilled the well too deep into salt water, and due to the fact that there was not sufficient oil in them they were termed abandoned as dry holes.

They began to produce oil in sufficient quantities to result in intensive development in the latter part of 1925.

Up to the spring of 1926 the development was confined
185 largely to the Borger area in Hutchinson
County; the Dial pool north of the Borger area and across the Canadian River from it; some development on the Burnett ranch in the immediate area of the two wells which I have referred to as discovery wells; and in the Lefors area in Gray County.

Several oil pipelines were built into the field and they then started producing oil in considerable quantities. Naturally, this had an effect on drilling. They had a market for the oil, so they started an intensive drilling campaign. I kept up with the drilling operations from that period in the latter part of 1925 or early in 1926, when the intensive development started, on through the remaining years of that development. I had to in connection with the development of the Gulf Company's properties.

A great majority of the wells encountered gas before they drilled into the oil pay. That was the common experience in the field. The streaks or strata of gas bearing formations encountered in the oil wells in the Borger area before the oil level was reached would vary from well to well. Sometimes there would be several gas pay streaks, and sometimes there would be only one or two.

That gas in the upper formations above the oil level would get into the oil wells unless it was cased off. The practice with reference to casing off the gas in those days varied to a considerable extent. A great many operators, wishing to obtain flowing wells, allowed at least a portion or all of the gas they encountered above the oil to come into the well with the oil. Others tried to case off the gas if they could, and then use the gas more conservatively, using what they called a gas flow, in which they injected a small amount of gas into the bottom of the hole and that flushed the oil out. That resulted in a much more scientific and conservative operation and preserved the gas.

The gas was considered important in those years in that it helped them to produce oil and furnished fuel for operations. It had no commercial value other than that, except for small local pipelines into the little towns in the area.

As to the practice with reference to producing gas along with the oil in those fields, the Borger oil field, the Dial field, the Burnett area, the various areas down the flank of the field toward Gray County, and in Gray County, a great deal of gas was produced with the oil. On the whole, I would say that there was very little consistent effort to conserve the gas. Tremendous amounts of it were wasted to the air which could have been saved if proper methods had been put into effect. I would say there was a continuous waste of that sort down to the year 1932. It was rather a public scandal. By the year 1932 the pressure had declined very materially due to the tremendous amount of gas that had been produced. I would like to add one amplification to my previous answer. Coincidental with the development of these oil fields, of course, came this tremendous gas waste that resulted in the development of a tremendous casinghead gasoline industry, accompanied also by the development of the carbon black industry, to which the casinghead gasoline companies sold a portion of their residue gas.

As to what I mean by casinghead gasoline com-
186 panies or casinghead gasoline plants, that is common
usage out there, referring to oil wells from whose casinghead, gas was being produced. The gas that came from the casinghead of the oil wells was either popped into the air and wasted, or used for fuel, or piped to the

casinghead gasoline plants. When it was piped to a casinghead gasoline plant, a portion of the residue might go again to field and lease requirements. A good deal of it went to the carbon black industry, and there was still some popping of the gas into the air, the residue, by the casinghead gasoline plants themselves. The casinghead gasoline plants extracted the natural gasoline from the gas. That was their objective, and then they made such disposition as they could of the residue gas. If they could make no disposition of it, they popped it into the air.

There were a great many of those plants built and put in operation in the Panhandle during those early years. The location of the gasoline plants is shown on Exhibit 12 by about half inch black squares. That map is dated July, 1938. The casinghead plants which had been put into operation by the years 1930 and 1931 were in central Wheeler County, central Gray County, northeastern Carson County, and south and south central Hutchinson County. They were situated near the oil fields because that is where they received their supply. They were not scattered all over the gas field because their supply was limited to so-called casinghead gas in the Panhandle.

It is my impression that they were not permitted to use dry gas for the manufacture of carbon black or for the extraction of gasoline in the years 1926 to 1931. I believe there was a statute preventing it. I am not very familiar with the legal history of this industry. (Motion by Commission Counsel to strike last two answers ignored.) I know it was not legal or was not permissible to use anything except casinghead gas in these casinghead plants back in those early days. It was under control by the Railroad Commission and there were regulations against the use of dry gas.

Another reason why the owners of oil wells would desire to produce large quantities of gas from their wells, other than for the utilizing of that gas to lift the oil and make the well flow instead of having to use pumps, was that they received quite a material income from the sale of gas to the gasoline plants. The casinghead plants supplied a very extensive outlet.

I am familiar with Exhibit 21. The condition which had developed by 1932 in that field with reference to the pressures obtaining in the oil fields and in the vicinity of the oil fields, as represented on Exhibit 21, was that areas of low pressure had developed in the oil fields and had set up a pressure differential between those low pressure areas and the dry sweet gas fields. The pressure losses have continued progressively throughout the years since then. It is my opinion that the reason for that pressure differential, beginning in 1932 and continuing on down to 1938, as reflected by Exhibit 17, is the tremendous withdrawal of gas in the oil fields from the dry gas producing formations.

I am familiar with Exhibit 16. It portrays what I
187 refer to as a typical example of the conditions found in
the sub-surface geology of the Texas Panhandle oil and gas field. By typical example I mean that a condition of that kind could and might exist in various places in the Panhandle. Naturally, there is considerable variation in the sub-surface geology from one end of the field to the other; but in general we have, as portrayed here, an oil bearing area down dip to the northeast, and then an area higher up on the structure to the southwest which is productive of gas only. After you leave the axis, or the granite core, and go to the southwest the rock beds start to dip downward, and continue downward, producing gas until the area is reached where salt water is encountered. I call the mountain range an anticlinal structure, and the center of it longitudinally I refer to as an axis. I am not speaking of a map but of the actual location of that buried granite range. It is irregular. We have observed the irregularity of mountains on the surface and we have a somewhat similar effect of sub-surface buried mountains in the Amarillo area.

As to whether there is a uniform southeasterly and northwesterly direction, I will state that, in general, it is a southeast to northwest direction. There will be places where the mountains would be low places, where there will be peaks when you progress northwestward; but about the center of the south line of Moore County there seems to be a change in the direction of the axis, almost due north, to part way up through Moore County, and also a continuation of the northwest axis out into the southern part of Hartley County.

You do not know where the mountain is unless you drill a hole down to it; but there were enough holes drilled to solid granite throughout the field so that we could establish with some degree of certainty where the geologic high peaks of the buried mountains were. If the beds seem to be in an extremely high structural position, you would probably anticipate a high granite peak. If you encounter granite wash at an exceedingly high spot, it is quite probable if you continue drilling into this a little ways you will get into solid granite. If you run into the top of the big lime at a high point above sea level, reducing it to sea level datum, you have a high datum point in one well, and then if the wells surrounding it, or the wells to the north and south of it, encounter it very much lower, that indicates you are probably on a buried granite peak.

My attention is called to the fact that at the bottom of Exhibit 16 appears a heavy black line, marked at each end "Sea Level." Along that line in a couple of places is the word "Water." By coincidence, it happens that the water table of the field in general flows along at about sea level. There is some variation, depending on the position of the field; but, in general, down around sea level you anticipate encountering water when you drill. If you drilled into the granite mountain, you would not strike water at sea level unless the granite mountain were fissured or cracked and let the water in that way.

By water table I mean the level that the water seeks in the sedimentary beds of the field. The sedimentary beds are the deposits on the top of the granite mountain 188 range, which are denominated, going from the granite mountain range to the top, as lime, red bed, and gypsum. That is what I mean by sedimentary beds—deposited beds.

My attention is called to a thick area between the heavy black line marked "Water" and "Sea Level" and another line just above with the words "Red Bed" several times, extending irregularly across the drawing from near the figure "1000" to a point on the right hand side of the drawing called "Top of Big Lime." That portrays the depth of the Albany formation. That is a geological formation which has been referred to as "Big Lime" by the drillers, and it has become commonly referred to among geologists by the same name. It is a key horizon which is very useful in determining the structural geology of the field. We can determine the position above sea level of that particular key bed and in that way portray the structure of the field.

Immediately underlying that is a series of shales, anhydrites and dolomitic limestone, which vary quite a bit in thickness but I would say on the average are around 300 feet. That is known as the anhydrite series.

Immediately below the anhydrite series is a series of beds composed almost entirely of brown dolomitic limestone, which is now generally referred to by the public as brown dolomite formation. It is rather difficult for me to describe the brown dolomite as portrayed on Exhibit 16; but it is the area between what is shown as the granite wash formation and a point about halfway up to the top of the big lime. On that cross section it looks like solid brick work. Most of it is quite dolomitic, but it varies in its physical characteristics. Sometimes it is very tight and non-porous, and again it is very porous and permeable.

My attention is called to the red bands or ribbon-like drawings across what I have described as the dolomitic formation. Later on the same bands are colored in green. The colored area represents the porous parts of the formation. What you find in those various portions of the formation typified by colored bands shown on Exhibit 16 depends upon their structural position. Those formations contain either gas or oil or salt water.

The production of gas from the oil fields has continued on down to the present time; but I don't believe there is as much gas being produced in the oil fields today as there was formerly, at the time when that waste was so terrific in the early stages of development. There is not as much gas there now as there was in those days. The pressures are down to 200 pounds and less.

I am familiar with Exhibits 22, 23, 21 and 17. In some portions of the oil fields the pressures are now below 100 pounds. Naturally, there would not be as much gas coming out of the oil fields under those conditions as when the pressure was around 430 pounds.

A am requested to take the pointer and point out on
Exhibit 16 the places from which the gas which has
189 resulted in these pressure differentials has come in
the formation. On this ideal cross section representing general conditions obtaining in the Panhandle field, it is my opinion that most of the gas produced as casinghead gas has come from the area which is represented by wells Nos. 2 and 3, reading from the right of the cross section. It has come from the upper beds of gas which are encountered before the oil pays were penetrated. They are colored red on the cross section, while the oil pay formations are colored green. Wells Nos. 4 and 5 also portray that same kind of situation.

As to how far it is from where those red bands change color to green bands down to the sea level or water table, perpendicularly, I would say it varies to some extent, but approximately 150 feet ought to cover that section. That 150 foot thickness above the water level, which is approximately at sea level, up to where the level of the gas and oil contact is, is streaked with alternate beds of porous and non-porous material. If that 150 feet between the water level and the level of the gas-oil contact was in a vertical range, there might be room for 90 feet of porous gas pay; but, as shown by the cuttings, we don't have any such condition as that existing in the oil field. In my opinion, there are no free gas bearing formations down below the level of contact between oil and gas and above the water level.

I don't remember ever to have seen a log portraying any catchment basins or other various regions down in that range of 150 feet which could account for all of the gas or any substantial part of the gas which has been produced in those oil fields or from those oil wells. If a well were drilled into that oil bearing formation and there were any such deposit of gas down there with the oil as that to which Mr. Brown testified—namely, 6,000 cubic feet for each barrel of oil—the gas would flow the oil out of the hole. That condition does not obtain when a well is drilled into that green formation. In the northeast edge of the oil fields, where no gas accompanies the oil, we have only pumping wells. A little further back, where you encounter gas immediately above the oil, it is entirely possible to have flowing wells. It is gas getting in with the oil which causes those wells to flow. I do not mean that it is gas which has been in absorption with the oil, but free gas that occurs above the oil level.

Without referring to the records, I would not want to be absolutely definite as to where the greater part of the oil is now being produced; but it is my impression that more oil is being produced from areas that contain only pumping wells. Some of the old oil pools which have been producing for ten or twelve years are in the process of abandonment. That is due to a large extent to the fact that they have been exhausted of their oil. They have also developed water trouble, due to improper completion of some of the wells, and some of the wells were drilled too deep, which necessarily allowed bottom hole water to get into the formation and damage the surrounding wells in addition to the well where the trouble started.

It is my judgment that only a negligible quantity of the

gas which has been produced from oil wells in the Pan-
190 handle field came out of absorption in the oil. I have seen oil come out of pumping wells where there was no gas accompanying it and about all there was to it was a bad smell. In the other type of wells, where the gas was encountered above the oil, you frequently have a very large production of gas along with the oil.

I would not be able to tell when the gas comes out ~~whether it has~~ been absorbed or not. I just assume that it has been absorbed, if there is no free gas present in the well. I do not see any other source. The absorbed gas would not free itself to any great extent on the way up the well. If it did, I think we would have more gas coming up to the top of those wells in which gas is not encountered in the well bore before oil is reached. It does not seem conceivable to me as a geologist, in the light of my experience, that if this gas, which enters into the gas-oil ratio of wells in the Panhandle, were coming out of absorption in the oil, many of the wells would make no gas at all, according to the Railroad Commission's records, and some would make only a slight bit of gas, while others would be making several million cubic feet per barrel of oil.

I have never seen a high gas-oil ratio well drilled in that part of the field where the gas is not usually encountered in the well as it is being drilled down to the oil pay. The wells with high gas-oil ratios are situated in the area where you encounter free gas in the upper beds before you drill into the oil pay in the lower part of the formation.

You ask if I know of any devices that were used by operators in the Panhandle field to get that free gas from the upper part of the formation into the well bore so that it would come out and be called casinghead gas. I think you refer to the practice of ripping the pipe or else lifting the pipe off the casing seat. When I say pipe I mean casing. I never saw that done. It is against the law. (Objection by Commission counsel.)

Questions by the Examiner.

I am firmly convinced that it was done. I am quite sure that I have advised my clients of that condition in connection with my remunerated services. I don't know that it is of record in anything I have ever written; but that situation is so generally recognized that we all speak about it as something we know to exist. Of my own knowledge, I am unable to name any one individual well where I know that occurred. (Objection by Commission counsel overruled.)

In the early stages of the history of the field, the overwhelming production of oil was in company with the production of gas. I think that now more oil is being produced unaccompanied by gas than with it. That means by pumping. I can explain that best by referring to Exhibit 23. In the later history of the oil production in this field some very important oil production has been encountered in the area shown uncolored on this map, where these little black spots indicate oil wells. They are in the northeast flank beyond the places where gas is known to exist. It is more a coincidence than anything else that that portion of the field was developed at a later period than the other
191 portion of the field. I think I can prepare myself for cross examination with respect to oil production in the field in the past.

Direct Examination Resumed by Mr. Morgan.

Bearing on my statement that the majority of the oil is now being produced with comparatively small quantities of gas, I am referred by counsel to page 34 of the annual report of the Railroad Commission, dated July, 1938, which is now Exhibit 26. That tabulation indicates that there are some 2108 wells with a gas-oil ratio of 2,000 cubic feet or less, producing 44,131 barrels of oil and 37,369,000 cubic feet of gas. The report shows a total of 3411 oil wells, so there would remain 1303 oil wells which have a gas-oil ratio of more than 2,000 cubic feet per barrel, and from those 1303 wells an oil production of 23,610 barrels is indicated, with a gas production of 375,970,000 cubic feet.

If that gas were coming out of the oil bearing part of the formation, it is not conceivable to me that there would be that variance between the quantity of gas produced per barrel of oil in the 2108 wells shown in the first group and in the other 1303 wells. I do not see how there could possibly be that much gas in the amount of oil indicated. I base that statement on my own experience and observation in the Panhandle field.

I did not prepare Exhibit 16; but I have prepared three cross sections of my own which portray the conditions across the field in three different localities.

(Document entitled "Gas Pay Cross Section A-B, Moore and Potter Counties, Texas", marked Exhibit No. 32 for identification.

Document entitled "Gas Pay Cross Section C-D, Carson and Hutchinson Counties, Texas", marked Exhibit No. 33 for identification.

Document entitled "Gas Pay Cross Section E-F, Carson and Gray Counties, Texas", marked Exhibit No. 34 for identification.

Map entitled "Zones of Productivity, Texas Panhandle", marked Exhibit No. 35 for identification.)

I prepared Exhibit 32. I made the original compilation and it was later drawn up by draftsmen under my direction. It portrays the variability of the occurrence of gas and oil pays in the Panhandle field. It shows a cross section running from north Moore County southward to northern Potter County across the west end of the Texas Panhandle field. The wells are indicated by small circles joined by a narrow line. Each one of those small circles has a name to the right of it, indicating the well represented by that circle.

The cross section in Exhibit 32 is located along the line A-B shown on Exhibit 35, crossing near the western end of the field. It is a broken line. The occasion for the sharp turns or corners is that the line connects the various wells used in the portrayal of Exhibit 32, and necessarily zigzags to some extent on account of the drilling pattern of the field. I tried to get as nearly a north-south line as I could in order to show what would be a typical cross section.

192 The most southerly well on Exhibit 32 is located at point A on Exhibit 35 and the most northerly well at point B.

I have undertaken to represent by the cross section only that portion of the wells where the pay formations were encountered. That was done in order to avoid making such a tremendously large exhibit portraying the total depth of the hole. The wells may or may not be oil wells. I show the total depth to which the well was drilled, but I do not show the upper part of the well.

Going to Exhibit 16, I point out that the portion of the formation portrayed on the cross section is that part in which oil and gas occurs—those occurrences being indicated by the red and green streaks on Exhibit 16. Exhibit 32 also portrays wells that were drilled deeper than sea level.

From the standpoint of vertical distance, the span covered by the cross section below and above sea level ranges from 1850 feet above sea level to 139 feet below sea level. Those wells are spaced along the cross section by scale. In the horizontal scale two inches equal one mile, and in the vertical scale one inch equals 50 feet. The colored portions within the tubes shown across the crosss ection are also drawn to scale.

The source of the information from which these wells were located and from which the porous or producing formations were located was the well logs plus whatever other information I happened to be able to obtain. I could get the location on the ground, the geographical location, from the ownership maps of the field, with which I am familiar.

The picture which is shown on Exhibit 32 is the bottom of the number of wells which are distributed along that cross section or the line which I have pointed out on these two maps. To illustrate, take the well farthest to the left on the cross section. As shown on the cross section, there is 1150 feet at the top and minus 62 feet at the bottom, which makes a total of 1212 feet shown of that particular well. That well is designated as Bivins A-13.

The legends set down in little rectangles in the upper portion of the exhibit indicate the various formations in which gas was encountered and the relative productivity of such formations. Those portions of the legend colored orange represent gas found in the red bed pay formation which has an open flow volume greater than one million cubic feet to one foot drill. That colored yellow shows gas production from the same pay formation which has less than one million cubic feet open flow volume per foot drill. By a foot drill I mean that if an oil pay of ten feet is indicated and it only produced two million cubic feet of gas, it would be colored yellow but if that same ten feet happened to produce 12 to 15 million cubic feet, I would color it orange.

The red and pink indicate brown dolomite pay, the red
being the pay where more than one million cubic feet
193 open flow volume per well per foot was encountered,
and the pink where it was less than one million cubic
feet per foot of pay. The blue indicates those places

where gas was produced from the white line, the dark blue indicating volume of greater than one million cubic feet open flow volume per foot of drill, and the light blue representing that portion where there is less than one million cubic feet open flow volume per foot pay drill. The brown indicates those places where gas was produced from the granite wash pay formation, the dark brown indicating the higher order of pay and the light brown the lower order of pay.

I do not find the same producing capacity even in the same layer or band of productivity in the same well. More gas will be produced, or less gas, immediately above another portion of the formation than immediately below, depending on its porosity and permeability.

The actual conditions encountered in the drilling of those wells are as delineated or represented by this cross section, according to the best of my information.

The figures to the left of the columns indicate the number of thousand cubic feet of gas encountered in the pay formation indicated immediately to the right. The figures to the right of the indicated pay formation give the depth at which the pay was encountered, and it is plus or minus elevation with reference to sea level. The depth figures give the width of pay. At the bottom of the column you will find the letters G.P. and then a figure following. That G.P. means gauge pay. For instance, in the well that I am indicating now, Troutman No. 1-SP., it has a gauge pay of 77 feet, by adding all the pays.

Taking the Harrison No. 1 well, located at point B on the north side of the field in northern Moore County, I presented the bottom portion of the log of this well from about 400 feet above sea level to a total depth of 3510, which is 44 feet above sea level. I might say that these horizontal lines indicate intervals of 50 feet above sea level or below sea level, as the case may be. Sea level is indicated by a line across the cross section marked in various places with the figure zero and marked at each end as being sea level. I did not show more of a particular well bore than that which is portrayed there because, to conserve space, I only showed that portion of the log which occupies a position in the pay formations. There were no pay formations shown by the log between the top of that portion of the well shown there and the top of the ground.

This Harrison No. 1 well encountered a showing of approximately one million cubic feet of gas at a depth of 3195 feet, which is 359 feet above sea level. The pay formation was so extremely thin that it is represented by a very thin line. I presume that the pay formation was less than one foot thick. It was so represented in the log.

This well encountered another show of gas at a depth of 3245 feet, which is 309 feet above sea level. The rest of the formation continued barren down to a depth of 3427 feet, which is 127 feet above sea level. At this 194 point salt water was encountered. The well continued drilling to a depth of 3510 feet, which is 44 feet above sea level. The total yield was estimated at around one million cubic feet of gas per day, and the pay thickness was so small that it was not given any footage.

Passing over to the Robertson No. 1-E well, that is shown on Exhibit 35 to be in the northern part of Moore County at the first break in the line south or below the letter B on that line. It is the first well immediately below the Harrison well which I just discussed, and is about two and a half miles from that well. In this Robertson well a show of gas was encountered at 3230 feet, which is 341 feet above sea level. At a depth of 3300 feet 1,500,000 cubic feet of gas was encountered at an elevation of plus 271 feet above sea level. A further increase in gas was encountered from 3370 to 3394 feet, the sea level elevation being plus 201 plus 177. At this point the well had 5,300,000 cubic feet of gas in it. This was immediately followed by a much better pay formation, where the gas increased to 11,500,000 cubic feet at 3394 to 3400 feet, or plus 177 plus 171. The well continued and was drilled to a depth of 3710 feet, which is 139 feet below sea level, without encountering any more pay formations.

The total pay thickness in that well was 30 feet, and the open flow volume was 11,500,000 cubic feet per day. That well was gauged at frequent intervals while it was being drilled, and the gauges indicated a very abrupt and sharp pick-up of increased gas in the last five feet or the last six feet of pay formation.

The Brumley-Gulf No. 1 well is approximately 1½ miles south of the Robertson No. 1-E well. This well encountered five million cubic feet of gas per day from a pay formation at 2835 to 2840 feet, which is sea level elevation plus 720 and plus 715. From there on down the log indicates continuous pay. I regard the record of that gas pay as being rather questionable. I was not on the well while it was being drilled, and the drilling superintendent said that there were barren spots and then also spots where they picked up large amounts of gas and spots where they picked up smaller amounts. At 2840 to 2980 feet the well encountered 56,000,000 cubic feet of gas per day. By the time it had reached a depth of 3094 feet of the gas had increased t 75,000,000 cubic feet per day. At the time it reached a depth of 3187 cubic feet per open flow volume of the well increased to 100,000,000 cubic feet per day. From there on down the well showed no more gas pay. It was drilled to the total depth of 3557 feet, which is two feet below sea level. It had a total gas pay log of 352 feet, with a total open flow volume of 100,000,000 cubic feet per day. They did not strike water in that well.

The red color merely indicates the fluctuation of the well less than and exceeding one million cubic feet. Since the record was somewhat questionable, I did not know exactly where to put in the rich part of the pay and where to put in the lean part of the pay, and I took this particular symbol to call attention to the fact that the record was questionable.

195 The Robertson No. 1-E well was drilled to a point 139 feet below sea level, and they did not strike water in that well either. You do not get water every time you drill down below sea level. It is variable and depends upon the position of the well in the field and the position of the porous formation which would carry water.

Referring again to Exhibit 16, if the well be drilled so that it encounters the upper green band near the right hand side of the exhibit, down below sea level, you would encounter water provided you still had a porous formation. If the well were drilled out near the edge of Exhibit 16 and had come down through this brick appearing formation, striking sea level, it would not have encountered water, since that formation has no porosity. Whether you get water at sea level depends on whether your bit is in a porous water-bearing formation or one of those tight non-porous formations when you get down to sea level or some point below sea level.

I will be glad to furnish Mr. Booth with logs showing the dates these wells were drilled. The logs would not show the porosity figures. The formation pressures are shown on that cross section. At the top of the column representing the log you will find the letters R. P., followed by the figure indicating the original rock pressure at the time the well came in. I am quite sure those are the official gauge pressures of the Railroad Commission.

(May 31, 1939)

I have been requested to explain the difference between porosity and permeability. Porosity is the actual void space in a formation; and permeability indicates the ability of the formation to allow gas or fluid to pass through it. You may, for instance, have considerable void space in such formations as volcanic glass, bubble holes, with no connection between those bubbles. It would have high porosity but no permeability. We can only judge the permeability by the ability of the well to produce. It is my impression that the principal factor in the permeability function is porosity. It puts it very well to say that the porosity of this building was the space contained in all of the rooms and the halls and the corridors, while permeability would be based on the doors and the windows.

There is a figure at the head of each of the columns showing the open flow volume as a certain amount in MCF, but that does not conform to the total of the figures along the left-hand side of the column, and I am requested to explain this discrepancy. Taking well No. 4 of Texoma, on Exhibit 34, I show at the bottom that when they completed
the well it made a test showing that it had an open flow
196 volume of 23,648,000 cubic feet. After they had shut
the well in and allowed the pressure to build up, they took a final test and got a slightly higher open flow volume, being 25,400,000 cubic feet. I might add that in other wells shown on these exhibits there is even a greater discrepancy, but that is all due to the fact that the final tests were made after the well had been shot or acidized, and the figures alongside of the line down below are the tests taken while the well was being drilled.

Quite frequently in the Panhandle acidizing is done immediately after the well is drilled. Once in a while it will be some time before they are acidized; but very frequently they will shoot a well with nitroglycerin or acidize it immediately upon completion. As a matter of fact, while the well is being drilled in, or drilled through the sand, they blow it down, and so much gas comes out that the volume is reduced by the time they can take the test. I have frequently noted that a well with a gauge of ten million cubic feet at a given point declines slightly when they drill several feet of non-porous gas pay formation.

On the log of the well indicated as Texoma's Haas No. 1 well on Exhibit 32, you will note different sections of pay marked "Gas Inc." That means "gas increase" which was not sufficient to measure.

Going back to Exhibit 32 and passing over to the Clark Gable No. 1 well, located south of the other two, the fourth well from the top in the legend at the top of the exhibit, this well is shown on Exhibit 35 at the fourth break in the open line that is in the yellow spot at the third turn of the line as you come from B down toward A. That well had a show of gas at a depth of 2860 feet, which was 711 feet above sea level. It then encountered 2,500,000 cubic feet of gas in a pay formation from 2885 to 2890. It encountered another increase in the pay from 2975 to 2990, where it had a total open flow volume of ten million cubic feet.

It was then drilled through a very thick pay formation, on which I am not satisfied that the record was accurate, so I again made the notation that the gas record is questionable. In any case, by the time it had reached a depth of 3135 it had encountered 45,000,000 cubic feet of gas. The open flow volume of 59,000,000 cubic feet is not questionable. Those two final gauges are the gauge tests at the time the well was drilled. After drilling some more non-porous formations the well again encountered an increase of gas from 3225 to 3250. That is from 346 to 321 feet above sea level. It had a total final gauge of 59,000,000 cubic feet. The total depth was 3250 feet. The gas pay formations logged in this well total 190 feet; but I seriously question if they did get that much actual pay formation. I think the record there is faulty again.

As you go along the side of the well and get the MCF you add them up each time—they are cumulative. The significance of the fact that the notation of 45,000 MCF is at an elevation of approximately 510 to 515 feet is just a matter of draftsmanship. It had to be put in there some place in that section and it looked pretty good there, so that is where I put it. There is no significance in the fact that it is about at the middle of the pay area.

197 That well finally settled, when the final gauge was taken, at 59,000,000 cubic feet. Apparently, in making up the log they just put "59," since that was the final

gauge, and they just put that down on the log as what it was at the bottom of the hole.

The next well immediately south of the Clark Gable well is the well known as Phillips Petroleum Company's Clarence No. 1. That is shown on Exhibit 35 in the red colored portion of the exhibit moving south from B, the fourth well from the first. This well encountered a total of eight pay formations, having a total thickness of 105 feet. The final open flow volume test was 23,000,000 cubic feet.

The next well is Texoma's Troutman No. 1-S. P. That is the well shown on Exhibit 35 as the fifth circle from the first circle. It had a total of seven pay zones, with a total thickness of 77 feet, and the initial open flow after completion was 14,000,000 cubic feet. When drilling stopped in this well it had blown down to where it had only 8,590,000 cubic feet. It is possible that this well was acidized or shot. It either rocked from 8,590,000 to 14,000,000 cubic feet or it was treated in some such way as to increase production. It was drilled down to a total depth of 3452 feet, which is 137 feet above sea level.

The additional depth to whiich it was drilled below the last pay formation shown, indicated that it was either in the dolomite or in the white lime below the dolomite. However, they had encountered non-porous, non-paying sections from a depth of 3065 to a total depth of 3452. The formation through which that well was being drilled from the bottom of the last pay zone down to the bottom of the well is a part of the general series in which pay zones might be encountered.

When I said either in the dolomite or in the white lime below the dolomite, I was basing my answer on my knowledge of the field. We can get samples from that well and determine very definitely whether it was brown dolomite or white lime. What I would expect to find would be the upper portion as non-porous, and that it would be tight brown dolomite followed by a series of tight non-porous gray and white limestone. In other words, I know from my own knowledge of the field the kinds of formation encountered in that part of the field, and I know from the drilling portrayed by my sketch that the well was in this series and not in solid granite. The reason they continued drilling that well so deep was that it was rather a small well, and most persons knew there was a possibility of getting additional pay streaks in the white limestone below the brown dolomite.

Coon No. 3-M well is the sixth well from the first shown on Exhibit 35. It would be on the edge of the red zone coming from B toward A, which is about a mile and a half north of that little white area. The pay formation was first encountered at a depth of 2500 feet, where they had a show of gas. That would be 932 feet above sea level. They encountered eight pay zones in that well, with a total thickness of 78 feet, and a total open flow of 10,500,000 cubic feet of gas per day. The last pay was at 2956 feet, and they continued drilling to 3140.

198 The next well of the cross section is Coon No. 1-M, drilled by Texoma. It encountered its first pay at a depth of 2675 feet, which is 715 feet above sea level. It encountered a total of seven pay zones, all of which were comparatively thin. The combined thickness of those seven pay zones was only seventeen feet. It had a final open flow volume capacity of 3,400,000 cubic feet of gas.

The pay in the Coon 3-M well was encountered at a higher level than in the Troutman No. 1-S. P. well to the north and the Coon 1-M to the south. That is one of those places where we had an apparently lenticular pay zone in the vicinity of Coon No. 3 which did not occur in the Troutman No. 1 or in the Coon No. 1 wells. It is represented by one of those little local streaks such as we see on Exhibit 16 in the middle broad column representing a well, some distance above the group of red bands.

The next well, Coon No. 4-M, is approximately 3½ miles southwest of the well we have just been discussing. It is shown on Exhibit 35 as the eighth circle from the first circle. This well encountered seven gas pays. It had a total open flow volume of 19,000,000 cubic feet of gas, with a total pay thickness of 82 feet. It also encountered a show of oil at 3120 feet, which is 354 feet above sea level. However, that oil showing was not in a commercial quantity, and the well was completed as a gas well.

The next well is Texoma's Thompson No. 1-P. It encountered eight pay zones, with a total of 69 feet in thickness and a total final open flow volume of 43,800,000 cubic feet of gas per day. This well drilled through the brown dolomite pay formation and encountered granite wash. They got their pay in the granite wash. The pay produced a show of oil and 1,600,000 cubic feet of gas. This pay was encountered between 3205 and 3210 feet, or from 380 to 375 feet above sea level. Farther down the hole, at a depth of 3349 feet, or 236 feet above sea level, they again encountered a gas pay, but this time it was in the white limestone formation. They encountered a still further pay at a depth of 3431 feet in connection with the white limestone formation. This well had a total of 69 feet of pay in these various formations.

The oil showing is indicated by the black line drawn horizontally through the well section. It was a lens in the granite wash protruding out in the limestone formation.

The next well, Thompson No. 4, is about 1½ miles southwest of Thompson No. 1. This well had eleven gas pays, with a total thickness of 84 feet. The final open flow volume capacity was 28,000,000 cubic feet of gas per day.

Here again we have gas pays in three different types of formation. The upper part of the pay formation, including five pay zones, was in the brown dolomite. This is followed up in the granite wash at a depth of 3006 feet by a pay in the granite wash. This is followed by a pay in the white limestone formation at a depth of 3019 to 3027 feet. Again it encountered a gas pay at 3238 to 3245 feet in a
199 granite wash formation; another pay at 3263 to 3267
in the white lime formation; and two more pays in the granite wash formation at depths of 3306 to 3312 and 3380 to 3390.

This Thompson No. 4 well is shown on Exhibit 35 as the tenth circle from the first. Several small showings of oil were found in this well in the granite wash pay formations both near the bottom and partly up the well. The first of those showings was at 3006 to 3012 feet. "That was a very small showing. Sometimes these showings amount to only enough to freeze up the tools. When I have a black line in the middle of the indicated pay, that indicates that there is a showing of oil. I think I have made a mistake here in indicating some oil showings, which are in reality gas cross-hatches indicated in my legend on the top of the map. I have made an error in my statement this morning in my description of Thompson No. 1-P well and in my description of Thompson No. 4 well."

There were no actual oil showings in Thompson No. 1-P. There was a showing in Coon No. 4-M at 3100 to 3120 feet, in the dolomite, but it was just a small non-commercial showing.

The next well, Haas No. 1, is shown on Exhibit 35 as the eleventh well from the first. It is 3½ miles south and west of Thompson No. 4. The gas pay was first encountered in this well at a depth of 2840 feet, which is 831 feet above sea level. It encountered gas in sixteen different pays, some of which were in the upper sands, in the brown dolomite, and the lower ones were either in the granite wash pay formation or the white lime pay formation. The total thickness was 100 feet, with an initial production of 66,700,000 cubic feet of gas per day.

The next well is Johnson No. 1. It is approximately a mile and a half due south of Haas No. 1. It is near the end of the little yellow band shown on Exhibit 35. The first pay was encountered in this well at a depth of 2840 feet, which was 858 feet above sea level. It encountered another small show of gas at 2875 feet. At 2920 it encountered a thick pay formation in the brown dolomite, where the increase seems to be almost continuous to the bottom of the pay at 2990. That is a range of 70 feet. It was almost continuous solid pay, or rather, the logs and gauge tests indicated a gradual increase down to 2965, then a very heavy increase from 2965 to 2990, and then a small increase from 2990 to 2995. It had at that point a total cumulative production of 62,000,000 cubic feet of gas per day. Its final test when it was shut in turned out to be 68,700,000 cubic feet of gas per day from a total pay thickness of 75 feet.

The next well is Canadian River Gas Company's Bivins A-21, approximately two miles southeast of the Johnson No. 1. It is located on Exhibit 35 in a little yellow band to the south of the yellow area in which the last two wells were located. This well encountered its first gas at 2645 feet, which is 1071 feet above sea level. It had a total of eight pay zones, five of which were in the brown dolomite and three of which were in the granite wash. The total pay thickness in this well was 50 feet, and the total final gauge was 54,000,000 cubic feet of gas per day. This well was drilled down to a total depth of 3485 feet. From 3020 to 3485, a distance of 465 feet, it drilled dry non-porous formations.

The next well is Coughlan No. 1, approximately three
miles south of Bivins A-21. It is just south of the Pot-
200 ter County line on the broken line between A and B.
The pay formation was first encountered in that well at 1780 feet, which is 1816 feet above sea level. This pay formation was in what we term the red bed sands. Near the base of the Permian red beds above the big lime of that area we have local areas which produce gas from the sands along the bottom part of the red beds. That is another of

those local lenses in what we refer on Exhibit 16 as the Cave Series. They have rather thin sandstone, true sandstone, which produces gas. They encountered five different pay zones in the cave formation series, the red bed series, where they had a total of 5,400,000 cubic feet of gas per day. These pay zones ranged from 1780 feet down to 2015 feet. Following that they drilled through a normal thickness, what we call the anhydrite series, and down into the brown dolomite pay formation. The first gas pay encountered in this formation was at 2295 feet. It had thirteen different pay zones between a depth of 2320 feet and 2440 feet. Its final gauge was 24,000,000 cubic feet of gas per day, and the total thickness of gas pay was 46 feet.

As you go out from the last well mentioned toward the edge of the field, the next well is approximately 4½ miles south and west of Coughlan No. 1. It is at a point just above the letter A in the gray band along the edge of the field as shown on Exhibit 35.

We encountered a very deep dip there, plunging off to the south, and the first gas was in one of those red bed sands at a depth of 2300 feet, or 1100 feet above sea level, as compared with 1816 feet above sea level in the Coughlan well, showing a very abrupt dip there on the edge of the field. It encountered two gas pay formations in the red bed series, then six gas pay zones in the brown dolomite formation, and finally a show of oil and water at a depth of 3155 feet, which is 248 feet above sea level. The total open flow volume capacity of this well was 4,000,000 cubic feet per day. The total thickness of the pay formation does not seem to be included here on this exhibit, probably left off by mistake. However, the thinness of the pays is indicated, so that you can form a picture in your own mind of about how much the pay thicknesses would have been. I can check the exhibit and add them up right now. In the first pay zone they had a pay from 2300 to 2318 feet, which is 18 feet of pay. Then in the eight following pays the thickness was not more than one foot each, which would make a total pay thickness for the well of 26 feet. The total open flow volume was 4,000,000 cubic feet per day.

I don't remember whether that well was acidized or shot by nitroglycerin. It is my impression that it was not. I know what we call the gray area as shown on Exhibit 20. They don't do much shooting or acidizing out there because they don't drill many wells there; but I am quite sure that some wells in the area have been acidized.

The fact that a gas show was obtained at a higher elevation in Coon No. 3 well does not mean that it was at a higher structural position. It was just a place where the porous zone was situated. This map in reality does not reflect a structure picture other than at either end of the exhibit. It is quite obvious that those two wells there do occupy a low structural position. The only thing that this cross section shows to one who is not familiar with the
201 field is a range of pay thicknesses, the zones which contain ribbons or bands of pay formation; but I would know that Coughlan No. 1 well, being very high, is probably underlaid by a granite peak.

Counsel asks me to visualize the situation by taking an ordinary tarpaulin or wagon sheet made of heavy cloth, then putting on the table several different objects such as a watermelon and a football, a grapefruit, an orange and a billiard ball, and then putting that tarpaulin on top of that. We would have bumps in it where the larger objects are, just as in the structure in the field we have bumps where the buried granite peaks are located. Between them are the depressions or valleys just like you find if you go out in the hills where there is a granite peak above the ground. You would not find a continuous peak running through the country, but peaks and valleys, some higher than others. When the sedimentary depositions were made, which afterwards came to be known as dolomite, it was spread over the top of all of those things and necessarily had a sloping irregular position with reference to a longitudinal line.

Questions by the Examiner.

The varying thickness of the overlying layer might occasionally be such as to throw one off as to what caused the bumps, if we didn't have a lot of additional data to check up with the one particular problem that we had in mind. When we obtain the log of a well down there, we also collect the logs of the wells around it, and they are of immense help to us in interpreting the true sense of the particular log under consideration.

I interpret the first gas pay in the Coon No. 3-M well to have been a local lens. That is in the brown dolomite. I would say the picture of the brown dolomite reflected on Exhibit 16 is a very fair portrayal of the actual condition.

Where the wells are drilled close enough together and we can obtain samples, we can be fairly sure about correlating these various pay streaks. I don't remember seeing any model which has attempted to correlate those pay streaks. Of course, I have made a lot of maps of cross sections myself in studying the various problems in the field, but they would go into the waste basket after I got through with them.

Direct Examination Resumed by Mr. Morgan.

Exhibit 33 is captioned "Gas Pay Cross Section C-D, Carson and Hutchinson Counties, Texas." I have the same legend and the same character of information portrayed on that exhibit as on Exhibit 32 for identification. This cross section extends from extreme northwest Hutchinson County southward into northern Carson County along the line indicated on Exhibit 35 marked C to D. It extends in an irregular, zigzag direction from well to well in a general northerly direction to D in northwestern Hutchinson County.

The first well reading from the right of the exhibit is the
Otis Phillips No. 1 at the northern end of the cross
202 section. It was drilled by Shell Petroleum Company,
and is located in northwestern Hutchinson County at
the point B in the gray area portrayed on Exhibit 35.

Of the wells portrayed by Exhibit 32, four were drilled to sea level and within fifty feet of sea level, and two of them were drilled quite a distance below sea level. It sometimes happens that you strike water before you reach sea level. There might be a little porous projection upward that the water might push in and fill up.

Going back to the Shell Petroleum Company's Otis Phillips No. 1 well as shown on Exhibit 33, I will state that 15 feet of pay sand was encountered in that well, for a total production of 2,765,000 cubic feet of gas per day. The pay zones were encountered rather low on the structure. The well was drilled to a point 140 feet above sea level. They got a small non-commercial show of oil in that well at 3204 feet.

Without going through all of the detail with reference to each of the wells shown on this cross section, I will say that each well speaks for itself and is accompanied by data showing the number of pay streaks or zones encountered, the thickness of those zones, the productivity of those zones, and how much gas was initially produced from the well, as did Exhibit 32. Exhibit 33 shows 19 different wells, of which six were drilled to sea level or below, and three were drilled to within 50 feet of sea level. Several of the wells had showings of oil at various depths but they were non-commercial showings. Sometimes these showings are what they call rainbows—just little rainbows spread out on the slush pit showing there is a little bit of oil near there. When the bailer is run down to pull out the slush from the bottom of the well, or the rotary throws it out in the process of drilling, a rainbow shows up on the tank out there that is known as the slush pit.

Passing to Exhibit 34, which is captioned "Gas Pay Cross-Section E-F, Carson and Gray Counties, Texas," I will state that this cross section has its south end in southern Gray County and its north end in northern Carson County. On Exhibit 35 this cross-section has its south end in southwestern Gray County, where we have the letter E, and continues north and west into northern Carson County, where we find the letter F, as shown on Exhibit 35.

The first well shown on that exhibit on the right hand side is the Magnolia Fee No. 1, located just south of the letter F in northern Carson County. It is near the oil bearing area of the gas field. This well encountered a show of gas at 2730 feet, which is 505 feet above sea level. It encountered another show at 2780 feet, another at 2798 feet, and another at 3115 to 3120 feet, which is 120 to 115 feet above sea level It had a pay thickness of 5 feet in the last showing and the upper shows were probably less than one foot thick each. The well was completed as an oil well with a show of gas. They encountered the oil pay at 3173 to 3193 feet, which is 62 to 42 feet above sea level. It was drilled to a total depth of 3208 feet, which is 27 feet above sea level. I do not know the gas-oil ratio of that well.

203 The next well, going from right to left, is Texoma's Schafer No. 6-S. It is located south and west of the Magnolia Fee well approximately two miles. On Exhibit 35 it is shown at a point just south of the town of Skellytown in Carson County. Eight gas pay zones were encountered in that well, having a total thickness of 50 feet, and the initial potential was 80,500,000 cubic feet of gas per day. No oil was encountered in that well.

The same legends and the same explanations are shown on Exhibit 34 as those contained on Exhibits 32 and 33.

Several of the wells shown on that exhibit had oil showings. The Cities Service No. 1 Stephens well indicates that it had oil pays at 3145 to 3150 feet and 3156 to 3161 feet.

I am under the impression that that was not a commercial oil well; but I would have to refer to my records to be certain whether or not it ever produced any oil.

The Hoerner No. 1 well had three places where the log shows oil was indicated. I do not believe that well produced oil in commercial quantities. For cross-examination I will bring the information as to whether either of those wells produced commercial oil, and will also bring the information as to gas-oil ratios of those wells which produced commercial oil.

Going over to the Wilson No. 1 well shown on the left side of that exhibit, I will state that well is located in southwestern Gray County as shown on Exhibit 35. It is approximately half a mile from the lowest small red area in southern Gray County, and is located in Section 202. In drilling that well they encountered six gas pays, which had a total thickness of 32 feet, and the total yield was 7,000,000 cubic feet per day. The well was drilled to a depth of 3475 feet, which was 200 feet below sea level. No porous formation was encountered below sea level. At a depth of 3232 feet, which is 43 feet above sea level, it encountered water. Above that it encountered two small oil shows.

Questions by the Examiner.

As to the nature of the salt water discovery and whether that is percolating salt water or the basic salt water, I will state that it is what we call bottom hole water that was in the formation. I can remember enough about the circumstances of this well so that I can tell you a little bit of the history of it. Ordinarily after one reaches salt water at a point less than 50 feet above sea level one would stop drilling, but this was in an unexplored area and they thought it worth while to spend a few hundred dollars more to make a depth test there and see if the situation in that area was any different from the situation in the rest of the field. It was an exploratory test in the true sense of the word. They encountered salt water at that particular place and then drilled through impervious formations which did not carry additional salt water. I do not remember whether it was granite wash and could not tell you that without looking at the log. Water is just like oil and gas; it only occurs in the porous parts of the formation and is not continuous through the formation any more than oil or gas.

204 Some of my legends use the words "Show Gas" and others "Gas Increase". A show of gas means a very small amount, and a gas increase means that there may have been a considerable increase but that the increase was not actually gauged at the time it was encountered.

Direct Examination Resumed by Mr. Morgan.

The last well on the left is located on Exhibit 35 at a point just above the letter "E" in "Section 200, Block B-2," in southwestern Gray County. On Exhibit 20 it is at a point in southwestern Gray County in the area colored gray.

That well encountered an estimated 4,000,000 cubic feet of gas in a porous zone at 2757 to 2763 feet, which was 525 to 519 feet above sea level. The well was drilled to a total depth of 3290 feet, which is eight feet below sea level, without encountering any more porous zones which could contain water, oil or gas—that is, the formation was so tight that there was no porous space to be occupied by any of those items. I remember that circumstance from the log and the samples of the drill cuttings which I looked at. The total pay in that well was six feet.

(EXHIBITS NOS. 32, 33 and 34 for identification, offered and received in evidence without objection.)

It is my recollection that Munger No. 1 well, shown on Exhibit 34, was neither acidized nor shot. As a practical proposition, it is not the custom to spend the money necessary to acidize or shoot a well which has only five or six feet of pay formation. Where they have such a small well they just consider it hopeless and abandon it. The shooting or acidizing is usually resorted to in wells which have a substantial pay thickness with a view of opening a larger void immediately beyond the bottom of the well.

I have computed the original reserves in the Texas Panhandle field.

(Document entitled "Natural Gas Reserves, Texas Panhandle," marked Exhibit No. 36 for identification.)

In computing the reserves I employed the porosity pressure method, or perhaps porosity pay thickness would describe it better. My formula was as follows: 43,560, which is the number of square feet in one acre, times 70, which is the average foot pay thickness in the commercial portion of the field, times 20%, which is the average porosity of pay formation in the commercial part of the field, times 471, divided by 16.4. 471 is the average original bottom hole absolute pressure. 16.4 is the pressure base at which the gas was measured. Solving that formula, you obtain a 205 result of 17,514,000 cubic feet of gas. That is the gas reserve per acre at zero pounds absolute in the commercial area of the field. The commercial area in the field I estimate to be 1,035,146 acres. That multiplied by the average per acre reserve gives a total of 18,129,547,000,000 cubic feet at zero absolute. I then gave consideration to what I referred to as the marginal area of the field, which I consider to be very low-grade productivity. I estimate this portion of the field to contain 426,790 acres. To this I assigned a productive value of five million cubic feet per acre average through the marginal area. This would give a total reserve then of 2,133,950,000,000 cubic feet of gas. The total for the entire field from both classifications of acreage is 20,263,497,444,000 at zero pounds absolute reservoir condition.

That is the original reserve at zero pounds absolute. By that I mean every cubic foot of gas in the reserves to begin with. I have corrected those figures to various assumed wellhead abandonment pressures, using (a) zero pounds, (b) 25 pounds, (c) 50 pounds, (d) 75 pounds, and (e) 100 pounds. I applied a recovery factor of 90%. My estimates of the recoverable reserves of the Panhandle field at the various assumed wellhead abandonment pressures mentioned are set out in the first group of figures on page 1 of Exhibit 36.

By the same method I have computed the reserves of gas remaining in the Panhandle field as of January 1, 1939, at the same assumed wellhead abandonment pressures and applying the same recovery factor. My estimates of the recoverable reserves as of the date last mentioned are set out in the second group of figures on page 1 of Exhibit 36.

I have also computed or estimated the original recoverable reserves, applying the same corrections and recovery factor, underlying the acreage which Texoma Natural Gas Company owned as of January 1, 1939, at the same assumed wellhead abandonment pressures. My estimates of those reserves at the various assumed wellhead abandonment pressures are shown in the third or last group of figures on page 1 of Exhibit 36.

I have also computed the recoverable reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939, as of that date, at the same assumed wellhead abandonment pressures, and my estimates are set out in the upper or first group of figures shown on page 2 of Exhibit 36.

I did not use the same pay thickness and porosity factors in computing Texoma's reserves as those I used in computing the reserves over the commercial part of the whole field. I used the pay thicknesses and porosities which were encountered in Texoma's wells individually. I solved my equations, using the various pay thicknesses and porosities encountered in Texoma's wells. Then in estimating the Texoma acreage reserves where no wells have yet been drilled on the tract, I went over the map, considered each individual tract as a separate unit, and applied what I thought was a fair estimate of the productivity of that
particular tract. In arriving at my judgment as to the
206 productivity of the undrilled tracts of Texoma, I gave
consideration to the productivity of nearby developed acreage and also to what I knew about the geological situation of each of those areas.

I have undertaken to determine the total quantity of natural gas that has been withdrawn, either through the wells located on the leases or by drainage to other leases, from all of the acreage owned by Texoma as of January 1, 1939, and have ascertained how much gas has been produced from the wells that have been drilled on those same lands.

The total production from Texoma's wells is 284,852,785,000 cubic feet of gas. That includes only the measured gas which has come from those wells. There would have been a small amount of gas wasted while the wells were being drilled. Whatever that quantity of gas is that was produced from those wells and wasted in the process of completing them is included in the quantity which I have stated in my exhibit was lost by drainage, so the word "drainage" is not just exactly accurate as it has been used in the exhibits. It would be a little more accurate to say the gas lost to Texoma's acreage but not produced and measured by them. The discrepancy would be simply the gas lost through wastage in drilling. I can think of no other factor.

I stated that the total amount of recoverable natural gas which I had arrived at was 20,263,497,444 M. C. F. and that was arrived at by adding 18,129,547,000 M. C. F. I did not take 90% of the 20,263,497,444,000 cubic feet in arriving at the original recoverable reserves shown in Exhibit 36. I applied a formula correcting the reserve to wellhead basis and then applied my 90% correction factor. I am sorry I did not make that clear in my testimony. The difference between the seventeen trillion and the twenty trillion is made up of two things: the correction at the wellhead pressure plus the 90%. I do not have available at this time the figure as to how much of the difference between 20,263,497,444,000 and 17,695,139,321,000 shown in Exhibit 36 is attributable to this correction and how much is attributable to the taking of 90% of the twenty trillion figure. The correction factor which I applied to reduce the reserve from zero absolute to zero wellhead was .97028, and then I took 90% of that result, which gave me the figures shown in the exhibit. In computing this correction factor I used a table of correction factors prepared from a Bureau of Mines formula for purposes of making various computations at various pressures, and that is the factor which applies between 471, which is the reservoir pressure, and 430, which is the wellhead pressure originally.

I arrived at the January 1, 1939, figures, as compared with the original, by subtraction. I subtracted the total withdrawals from the original reserves for the field as a whole. As to where I got the total withdrawal figure, we have been working on those figures down there for years. I have used Mr. Peterson's tabulations in my computations. Those are based on the Crum and Cotner figures plus the subsequent records of the Texas Railroad Commission. They are the same figures which Mr. Brown used, except he stopped them in July, 1938, and I brought them on down to January 1, 1939.

207 *Questions by the Examiner.*

As to whether I collaborated with Mr. Peterson in making my calculations in so far as using the fundamental method is concerned—that is, his section divisions and his averages and things of that sort, we did not collaborate so far as doing the actual work is concerned. I may state that I have made my own computations as to pay thickness and, of course, all of us have discussed these things down there for years, Mr. Peterson and I and other geologists, and we have had long consultations and discussions, and my adoption of the 70-foot pay thickness is due to work that I have actually performed myself. There has been a good deal of discussion of the porosity factor, and it has become a generally accepted figure.

I have been talking about the whole field. When I made up my estimates for the Texoma acreage, I did it privately, without consultation with Mr. Peterson, but it happens we both used the same method and arrived at fairly close to the same answers. My variation from him would be a difference of opinion with him on the geology of a certain area or some such thing as that. I think it will be obvious that my answer is so close to the answer obtained by Mr. Peterson that, having investigated the data Mr. Peterson will offer, I scarcely think you will find it necessary to investigate mine.

I used a 70-foot pay thickness for the entire area. Those figures are based on work I did some time ago. I doubt if the supporting data on that figure of 70 feet is even in my office. It is a standard figure. If you don't mind, I will give you a little history of it. In 1932 and 1933 when Victor Cotner made his report, several of us went into the matter quite thoroughly and arrived, if I recollect correctly, at a figure of 66 feet thickness. Since that time there have been 700 additional gas wells drilled, and of that 700 a large majority had more accurate records than the wells which Cotner and others had to work with at the time their estimate was made. In the light of what has happened and the information I have been able to get since that figure was adopted in Cotner's report, I felt it was necessary to raise that figure from 65 or 66 feet up to 70 feet. Those men with whose work I am familiar have also raised that figure. I believe those that I know about use 70 feet. I do not know of anyone who uses over 70 feet.

The porosity figure of 20% is also made up from the combined judgment of a good many men after careful discussion. It was used in the Cotner and Crum report and was very seriously considered by them before the report was published. It is now generally accepted by geologists who make estimates of field reserves in the Texas Panhandle. I do not know of any geologist who uses a different figure as an average for the whole area.

As to my reason for assuming five million cubic feet per acre in the marginal area, I will state to start with that since my marginal area occupied so nearly the same position as that indicated by the gray area on Mr. Peterson's map, Exhibit 20, and the gray area on Exhibit 35, I
208 have not thought it necessary to present what would
appear to be almost a duplication in the form of a map. I got together all the well data, well history of wells drilled in that area, both of the dry holes and the producing wells. I considered the log of each of those wells and I was

forced to the conclusion that that was an area of very low productivity. The well data indicated that perhaps there was only two or three million cubic feet per acre available there. However, I was a little bit dissatisfied with that because the data was rather scarce, and I decided I would give that portion of the field a per acre recovery of five million cubic feet on the average in order to take care of possible occurrences later on where a well might be drilled in that marginal area and encounter a larger amount of gas than I would anticipate.

"As to whether the Texas Railroad Commission likewise classified that same gray band as an area of marginal productivity. I am not sure that that is contained in any report of theirs." (Interruption and objection by Commission counsel.)

The figures which I used in calculating the recoverable reserves for the gray area indicated on Exhibit 20 were purely judgment figures, after I had abandoned the idea of using the porosity and thickness considerations in that area. In my Texoma calculations I had break-downs giving me small areas over which I used thickness and porosity and used average well readings. The average pay thickness for Texoma's wells was 79 feet. I did not check for average porosity; but I would expect it to run around 20%. As to my working papers, I will be glad to cooperate with Mr. Brown, of the Federal Power Commission, and give him as much information as I have available here in Chicago, and follow any suggestions he has to offer as to how much I should bring up from Amarillo. The same privilege will be accorded the expert for the Illinois Commerce Commission.

(EXHIBIT NO. 36 for identification, offered and received in evidence without objection.)

Direct Examination by Mr. Morgan Resumed.

I have stated in my computations of the recoverable reserves I assigned to each acre of marginal area five million cubic feet per acre. That area is substantially the same as that assigned to marginal acreage in Exhibit 20 and Exhibit 35. Mr. Peterson is not in accord with my figures as to the per acre content of the marginal acreage. As I remember it, his figures are around two or three million cubic feet per acre. The five million cubic feet which he suggested was in connection with his statement that in the marginal area the open flow volume of the wells drilled would be five million cubic feet or less.

I did not separate that district into several areas and figure them separately, as Mr. Peterson says he did. After giving consideration to every gas well and every dry hole that had been drilled in the area, I assumed an average of five million cubic feet per acre. I also gave consideration to wells along the edge of the commercial area and noted that quite frequently along the outer edges the well would be small, approaching the results obtained by drilling out in what I call the marginal area. I also gave consideration to some dry holes, purely from a structural standpoint.

Questions by the Examiner.

My working papers do not include a tabulation showing
209 the wells which were considered and the effect which I gave to the figures I had on them. I would have to refer to my card file built up from my study of it all, and take each separate card out of the file and present it in that way. My last estimate was made before Christmas, and I have seen no reason to change that estimate for the purposes of my present testimony. For that reason I am quite sure that some of my original tabulations have not been saved to present in orderly form. However, I could refer to my card files and present that detail if desired. I do not have those with me in Chicago; but I can make them available for consultation with the engineers of the Commissions if required.

I have not made any other estimates of the recoverable reserves of the Panhandle which have been saved by me. By that I mean I have not saved the working papers. I do have in my files reserve estimates which have been made in the past and simply revised from time to time to meet changing conditions. Those estimates will be available to the engineers for the Commissions if they wish to see them.

Cross-Examination by Mr. Booth.

I was first employed by Natural Gas Pipeline Company of America and Texoma Natural Gas Company to prepare some data during the winter of 1938. At that time I was directed to prepare a line of testimony similar to that which I have given here. I believe the total time I worked on that study was possibly thirteen months. I was re-engaged in

March of this year. I have made a report based on my work in 1938, and it will be available to the engineers for the Commissions. I do not have it with me in Chicago.

In connection with Exhibit 31, which is a partial list of my clients, you asked me about Chicago District Pipeline Company, and I indicated that it had been unintentionally omitted.

As to other estimates of natural gas reserves which I have made and to which I have testified in any court or commission proceeding I will state that I was employed by Texoma in a case styled *Texoma Natural Gas Company* v. *Terrell,* 59 Fed. (2) 750. I testified there by affidavit, and I believe there was some testimony on reserves. That was in 1932 and it is very difficult for me to recall what points I covered.

I was also employed in 1933 in *Texoma Natural Gas Company* v. *Terrell,* 2 Fed. Supp. 168.

I was also employed as a witness in *Texoma Natural Gas Company* v. *Thompson,* 14 Fed. Supp. 318; 300 U. S. 55, 81 L. E. 510. In this last named case I testified for the Railroad Commission of Texas.

I also testified in a rate case in 1935. It was a case before the Railroad Commission of Texas involving the Red River Gas Company in Amarillo. I don't remember much
about my testimony in that case, but I am rather of the
210 impression that I did not cover the subject of reserves.

I was retained in that case by the Red River Gas Company. I assume that case included the Chicago District Pipeline situation.

Referring to Exhibit 31, it is my impression that none of my work for any of the companies indicated there involved presentation of testimony before administrative or public agencies as to the amount of reserves in the Panhandle field. I have been retained in quite a lot of litigation down there; for instance, small oil leases and things of that kind, where I have given testimony on just a portion of the field but not involving testimony on the whole field. It is difficult for me to remember how many of them were heard and how many of them were compromised before they went to trial.

I don't believe I have ever published anything. My name is mentioned in connection with the Cotner and Crum study as one of the geologists who was consulted by Cotner and Crum and as participating in the preparation of that report. I did participate in the preparation of that report.

(Document entitled "Railroad Commission of Texas, Oil and Gas Division, Oil and Gas Docket No. 108" dated December 10, 1935, marked Exhibit No. 37 for identification.)

At this point, counsel for defendants read into the record the last paragraph on page 9 and the last paragraph on page 1 of Exhibit 37.

"Therefore, it is ordered, that effective December 11, 1935, the gas-oil ratio of each well in the field shall be kept as low as possible, and no well producing both oil and gas shall be permitted to produce gas in excess of 10,000 cubic feet per barrel of oil produced unless specially authorized by an order of the Commission to vary therefrom. However, any well which by reason of its location, mode of completion, or necessity for total fluid lift, shall be allowed to produce daily a total volume of gas equivalent to that of any other well producing from the Panhandle field proper, so long as the ratio of gas to oil does not exceed that set by statute. A gas-oil ratio determination shall be made on each well at the time of completion, and at the time of retest."

"The oil wells in the oil pools in the field were, as a general rule, drilled through one or more gas-containing strata before entering the oil-containing stratum, and, in many instances, the wells were so completed as to cause production of gas from the gas strata along with the oil and gas from the oil stratum, with the result that tremendous quantities of gas have been produced with the oil, large portions of it coming from gas-producing strata above the oil-producing strata. This gas was in large part blown into the air, and it is estimated that in excess of two trillion cubic feet of gas produced in this manner has been wasted into the air."

211 Document consisting of certain pages from Schedules of the Railroad Commission of Texas, relating to the production of oil in the Panhandle district of Texas, bearing the following effective dates: the first and second pages of Schedule effective May 20, 1936, and the first page of Schedules effective February 1, 1937, April 1, 1937, May 1, 1937, November 1, 1938, January 1, 1939, and April 1, 1939, marked Exhibit No. 38 for identification.

At this point, counsel for defendants read into the record certain statements appearing in the Schedules constituting Exhibit 38.

Schedule effective May 20, 1936: "Effective May 20, 1936, and until further notice, the displacement factor will be 1,071 M. C. F. per well per day."

Schedule effective February 1, 1937: "Effective February 1, 1937, and until further notice, the displacement factor will be 1,422 M. C. F. per well per day."

Schedule effective April 1, 1937: "Effective April 1, 1937, and until further notice, the displacement factor will be 826 M. D. F. per well per day."

Schedule effective May 1, 1937: "Effective May 1, 1937, and until further notice, the displacement factor will be 1,062 M. C. F. per well per day."

Schedule effective November 1, 1938: "Effective November 1, 1938, and until further notice, the displacement factor will be 775 M. C. F. per well per day."

Schedule effective January 1, 1939: "Effective January 1, 1939, and until further notice, the displacement factor will be 500 M. C. F. per well per day."

Schedule effective April 1, 1939: "Effective April 1, 1939, and until further notice, the displacement factor will be 775 M. C. F. per well per day."

212 C. DON HUGHES, a witness for defendants, testified as follows:

Direct Examination by Mr. Culton.

(May 31, 1939.)

My name is C. Don Hughes. I live in Amarillo, Texas. I was born in 1896. My profession is that of a geologist, and I have practiced that profession for nineteen years.

I received my technical education at the University of Kansas, completing my course in geology in the spring of 1920. I attended that institution during the four year term between 1916 and 1920, with an interruption due to the World War while I was in the service. I did not get a degree. I completed all the courses that could have been credited to me in the major on geology; but by taking extra work during the time I was in school, and doing summer work, I still lacked four hours toward a degree. Those four hours of credit could not have been in geology or any related subject, due to the regulations concerning a major subject. I completed all the work required in geology and other kindred subjects.

Prior to the time I left school I had practical experience as a geologist. During the summer of 1919 I was with the Kansas State Geological Survey doing field work in connection with the subject of sub-surface work. This was done under the direct supervision of Dr. Raymond C. Moore, who at that time was head of the Department of Geology in the University of Kansas and also State Geologist of Kansas.

After completing my school work I went to work immediately for the Empire Gas & Fuel Company and was located at Eldorado, Kansas, as assistant resident geologist in charge of the Greenwood County district. That covered the area of Greenwood County and adjacent areas in central Kansas. I was there until 1922, when I was transferred to Duncan, Oklahoma.

The nature of my work in the Greenwood County district was to make recommendations concerning the acquisition of new leases or the dropping of old leases where it became seen that they were outside the boundary of the developing field. It also consisted in the supervising of the drilling in of oil and gas wells, the recommending of the points at which casing should be set, and the depths to drill in order to get all of the pay formations and still stay out of the usual underlying water formation. My supervisor in that office was F. C. Holl.

After I was transferred to Duncan I became the district geologist in charge of the Duncan district of southwestern Oklahoma, covering all of the oil area of southwestern Oklahoma, which would include the territory west of Medill and northwest of Duncan.
213 That is the area in which the Wichita Mountains are located. While there I had occasion to make a study of those mountains and the character of the formations of the surface there. In addition to the regular work of a district geologist, I had some core drilling which we were doing around the Wichita Mountains. By core drilling I mean that we used a diamond core drill and drilled shallow holes to beds which we considered key beds, or beds that would be reliable enough to work structure from. I can explain this by pointing out on Exhibit 16 an example of where core drilling might be undertaken would be in the region of about the fifth well from the right-hand corner or the right-hand edge of the cross section. Assuming that, as it is exhibited here, that surface does not reveal any beds that are mapable

for structure, and knowing that there is a bed a short distance beneath, as exhibited by the Alibates dolomite in this cross section, we might core drill in that vicinity to find out the altitude of the underlying Alibates dolomite, which we would in this case assume to be a reliable bed for structural mapping. That would be an example of core drilling for structure.

In other words, knowing that a certain bed, having a certain type of formation, was somewhere underneath, I would search that formation, not a producing formation, only for the purpose of getting the type of structure. The depth below the mapable structure at shallow distances to which additional formations underlying would also lie at the same altitude, would vary from place to place. That would be determined according to the locality you are drilling in. I might make it plainer by observing that core drilling was usually resorted to in an area where mapable parts of the surface had dipped under and were still at shallow enough depths to render it advisable to drill for that structural information. Thus on this exhibit, assuming we are drilling over the Amarillo dome to determine the spread, we would use the map of the structure of the Alibates, with the idea that the underlying beds as shown on Exhibit 16 would conform. The Alibates would be indicative of what was going on underneath.

I did not have any superior in my office at Duncan. I was the district geologist in charge of that district. I stayed there until December, 1925. Core drilling was only one part of my general work as district geologist, which included work similar to that I have described in connection with the Greenwood County area, the supervising of drilling in wells, and actually watching the wells drilled to determined the casing points and how deep to drill.

After I left Duncan I had a temporary assignment at Cisco, Texas, still with the Empire Gas & Fuel Company, where I stayed from December, 1925, until February, 1926, when I was transferred to Amarillo, Texas, to open a district office there as its geologist. I was in the continuous employ of the Empire Company from the time I finished school until some time subsequent to the time I reached Amarillo.

My work for the Empire Company as district geologist in Amarillo was similar to what I have described

except, that being a much more active area, we had a great deal more of the same sort of things to do, such as the acquisition of new leases, recommendations for wells on leases we already had or new leases, supervising the drilling of those wells—that is, the drilling in of the
214 wells and the depth to which the wells would be drilled.

During the time I was in Amarillo that area experienced what is usually referred to as an oil boom. It was just starting at the time I was transferred to Amarillo. As I remember it, there had not been over 200 wells drilled in the Panhandle, including all the dry holes, the gas wells, and the few oil wells that were then existing. I think there were less than 200 wells. The oil development taking place at the time I reached Amarillo was principally in the vicinity of Borger in the south central part of Hutchinson County. The older area of the Burnett pool in northern Carson County had been partially developed. It was still relatively new. There was quite a bit of activity in that area, but nothing to compare with the activity at Borger. At that time there had also been a few wells drilled in western Gray County, just west of Lefors.

The Empire Company was in the process of completing a well right west of Pampa, which gave indication that a pool would be opened there. If I remember correctly, there might have been one well in the Magic City area of Wheeler County.

After I reached Amarillo the development speeded up very decidedly. I was present during the drilling in of a number of wells in those various areas. The Empire wells were drilled and completed under my supervision. One well in particular was right at the town of Borger. The town of Borger is on a portion of what was originally our lease. There were other leases, some to the northwest of Borger and some to the southeast, extending on down in our own particular company's activities as far as eastern Gray County. During the operations of the Empire Company in the drilling of those wells I kept in close touch with the operations and the formations in which the wells were being drilled. Of necessity, I kept advised of the conditions that were being found in wells drilled by other operators in the area.

The Borger area had formations above the oil in which free gas was encountered in large quantities, and in order to drill to the oil formations these gas formations had to be penetrated. The usual procedure was to drill down to what is commonly called the top of the "Big Lime" as indicated on Exhibit 16. After drilling a short distance into that so-called "Big Lime," we then set the casing and drilled on through the gas bearing formation. This resulted in enormous quantities of gas being blown into the air during the drilling. In fact, as a matter of field practice, when a person drove up to a well that was drilled under those conditions, he would observe which direction the wind was coming from and stay on the windward side, so that he would try to diminish the possibility of fire due to the starting of cars, because of backfire and igniting the gas that might be blowing from that well.

On that cross section I can point out the illustrative points where the oil wells drilled around Borger were actually drilled. Illustrative of the Borger type of wells would be the ones shown as Nos. 3, 4 and 5 from the right hand corner of Exhibit 16. In drilling, after
215 we had entered the big lime, we would encounter the top of the gas formation, and as that drilling proceeded the gas would increase with the drilling until finally we were at the bottom of the gas bearing formation, when we would have our maximum amount of gas that was coming from all of the various ribbons as represented in red on Exhibit 16. The oil would be under that.

We have had cases where a well originally completed as an oil well and making no gas, or substantially no gas, would thereafter produce large quantities of gas. Those cases were frequent in the Borger field. From my knowledge of the formations out there, the explanation was that in drilling through the gas formation the common practice during the Borger boom was to seat the pipe when we thought we had got through the entire gas-bearing portion or formation, thereby shutting the gas off before drilling into the oil formation, so we knew by the time we seated the pipe how much gas had been encountered in that well. Then coming back to the usual practice, it was to get what we called a formation shut-off—that is, seating that string of pipe so that it cut off the gas. We depended on this seat in the formation in the holes to shut off the gas. If the shut-off held as we drilled into the oil formation, we would not encounter any appreciable amount of gas. We did encounter the oil, however. In numerous cases the casing seat would break loose, and here would come all that gas which we had just drilled through, into the hole where the oil was. Since it resulted in a definite aid to oil production in bringing the oil to the surface, it was usually not attempted to be remedied.

If the casing seat were knocked loose accidentally, the same thing would happen as if the casing seat became loose intentionally. I know what is meant by ripping a pipe. It is a procedure of running a tool into the hole, which is in effect a sort of knife, and by the manipulation of this tool the casing would be ripped. If someone should either accidentally or intentionally rip a casing, the immediate effect would be that a great volume of gas would come into the well.

In the early life of the field the practice was not to cement. That practice finally reached a point where a great many of the operators decided they would cement their wells and cement off the upper gas so that it would not come into the hole; but after the practice of cementing became prevalent, the ripping of casing also became prevalent. Even when the pipe was cemented, the cement would not always hold. At that time the usual procedure was to dump some cement in the bottom of the hole if you could. In many cases you had so much gas there that you could not do it. Then the Halliburton method came into existence, in which they pumped cement down against pressure. This was a more efficient method than the other; but it does not always prevent gas from coming into the bottom of the hole.

Questions by the Examiner.

In my opinion the cementing was done as a gesture toward conserving the gas; but it was only a gesture. I really don't know whether it was done as the result of an order of the Railroad Commission or as a get-together of the
216 different companies and operators. As I remember it, the boom took place in 1926, and it was probably in 1927 that cementing became customary.

Direct Examination Resumed by Mr. Culton.

Shortly after the operators started to cement the casing, the split casing practice started. That would have the same effect of letting gas into the hole from the upper formations, as a failure to get a good casing seat.

In the Borger area the gas was largely from what we call the brown dolomite, while the oil was from the immediately underlying gray lime. For all practical purposes, they are all one part of the big lime formation.

The cross section showing the producing formations to be in bands is a correct delineation of the way we found them in the Borger field? The producing portion was in bands or ribbons that are all interconnected, as represented on that cross section; but in the well bore they are separated—usually by a tighter portion of the dolomite or lime or a shaly portion of the dolomite or lime. Since they have no porosity, they do not carry gas or oil or water.

In drilling those wells in the Borger area, after getting into the formations usually referred to as the producing formations, we usually encountered gas somewhere near the top of the dolomite formation in what is shown on the cross section, Exhibit 16, as one of the ribbons or one of the pay streaks or producing zones of the dolomite. After passing through that streak or zone we would encounter tighter portions of the formation, either tighter portions of the dolomite that had no porosity or shaly portions of the dolomite which had no porosity and carried no gas. Then after passing through a band of that character we would frequently find another zone of porous formation which would be gas bearing. There was no definite regularity in the number of these porous formations. Even from one well to the next it was difficult to predict just where those ribbons or zones of pay would be encountered. Between the ribbons you would find tight zones or horizons, in which there was no gas due to lack of porosity.

After passing through the gas ribbons as I have described them, and before reaching the oil area, we would generally find another tight horizon devoid of porosity, and it would be in that type of formation that we would try to seat the pipe—in the hard formation that carried neither gas nor oil—if we wanted to produce oil only; but if we wanted to produce oil and also produce gas from the upper ribbons we would be careless in where we would seat the pipe and how we would seat it, or after having seated it at that point, you might actually pull the pipe up and work it up and down. The effect of this would be to let the gas from the gas bearing formations down into the hole on the inside of the casing with the oil.

You ask whether there were gas-oil contact points in that area where a well drilled into one band would produce both

oil and gas. Occasionally you would encounter a condition where you felt certain you were at one of those
217 contact points, the exact contact, in which the gas immediately above and the oil below could not be cased off: but that situation was an unusual one.

I continued in charge of the development work of the Empire Company in that area until the spring of 1929, when I resigned to go in business for myself. Meanwhile the Empire had drilled under my supervision wells in other pools in addition to those drilled in the Borger pool. They had drilled wells in the field from a point northwest of Borger several miles extending southeast of Borger, in the vicinity of the town shown here on Exhibit 17 as Skellytown, in northeast Carson County, and in western Gray County, west and southwest of Pampa, and in eastern Gray County. Those were oil wells. The conditions I have described in the Borger area would be representative of the other areas I have described.

I am familiar with the Texas Railroad Commission's map and its outline of the field. There is a portion of the area shown thereon which did not have the bands of gas but did have the band of oil which I have just described as being found in the Borger area. That portion shown on Exhibit 17 to the northeast of the colored bands—the area which is uncolored northeast of the colored bands on Exhibit 17—is, I am sure, an exact replica of that same portion as shown on the Railroad Commission map. There the formations have dipped so low that the beds which carry the first porosity are down in the oil table, so that those beds carry oil instead of gas, and you do not find any free gas in the oil or in the areas just described above the oil. I never heard of any casing ripping in that area; but there would be no reason for ripping the casing there because even if the casing were ripped, there would be no gas going in to come out with the oil. The only gas that would come out with the oil in those areas would be the gas which was bubbling out of solution from the oil, which is just a negligible quantity. They get the oil out there by pumping the wells.

Questions by the Examiner.

I said that the uncolored or white area northeast of the colored bands on Exhibit 17 is an exact replica of that same portion as shown on Exhibit 12. I should correct that by saying that the outline of the field as shown on Exhibit 17 is a replica of the Railroad Commission's outline of the field on their 1937 rock pressure map; and Exhibit 12 is the 1938 rock pressure map and has some changes. I don't know. It is possible that some of those changes are in that area. The white areas just north of the Lefors basin in Gray County on the 1938 Railroad Commission map are areas in which the Railroad Commission finds no free gas above the oil, and are in addition to the white areas outlined on Exhibit 17. There is no gas in appreciable quantities in that area. That area is colored in gray indicating that it contains gas. This is Mr. Peterson's rock pressure map of the field and the area referred to is the Wilcox area. There was gas there when the field was originally brought in, at the point where it is now colored gray. There is an area in that restriction northwest of the Lefors basin which even on Mr. Peterson's map seems to show no rock pressure on any of the wells, so I feel sure there are no gas wells in that area.

218 *Direct Examination Resumed by Mr. Culton.*

During the time I was with the Empire Company I had occasion to make a special investigation of the Panhandle for the purpose of determining whether the gas reserves for pipeline use were available. That investigation was the result of the desire of the Empire Gas & Fuel Company to find a reserve of gas sufficient to justify the construction of a pipeline from Kansas City to the reserve. The development which had been taking place had definitely proven that there were large gas fields in areas adjacent to the Borger area. I recommended to the Empire Company that we acquire the gas rights on the Burnett ranch in north central Carson County. On Exhibit 17 that ranch is a rectangular area 12 miles wide and 14 miles long, which includes all of Block 5, I&GN Survey, and the west two rows of sections of Block 4, I&GN Survey. That recommendation was made in 1926, and the company later acquired gas rights on a substantial portion of the ranch.

I am acquainted with that portion of the ideal cross section, Exhibit 16, marked in green, representing oil. I have never found in any portion of the field in bands of that character any gas except that which I have described as infinitesimal. I have not known of any oil wells drilled in the area marked white inside the field limits, which later turned into producers of gas in substantial amounts. I have known of that happening in wells drilled immediately southwest of the line—in many of them.

I have an estimate as to the amount of gas contained in solution in the oil in those green bands. That judgment is based on a search for information having a direct bearing on the Panhandle for other purposes, but it resulted in my judgment that there is not to exceed 100 cubic feet of gas per barrel of oil dissolved in the Panhandle oil. That statement is based on a search I made through available information several years ago in connection with an oil proposition and not on observation of natural conditions. The search included going through the literature on the subject, my geological professional bulletins, which are decidedly sparse on the matter; talking with the representatives of the Bureau of Mines at the helium plant at Amarillo, Texas, who keep up with such matters; and finding at the time what I thought was the most up-to-date available literature, and from that putting it together largely by process of elimination. It did not include any definite study or results of solutions of gas in the Panhandle oils.

Questions by the Examiner.

I cannot say what the maximum solubility of the Panhandle oil is. It is my idea that as oil containing gas rises to the mouth of the well, the gas bubbles out after it reaches the surface, and I don't think you could tell by observation how much dissolved gas it had contained at the bottom of the well.

Direct Examination Resumed by Mr. Culton.

It was customary for some of the operators in some of the leases to save, for processing, the gas coming from the wells in that area because that gas is richer in gasoline content, although very small in volume. I have been discussing the uncolored area on Exhibit 17.

219 As I have stated, I resigned my position with the Empire Company about 1929 to go into business for myself at Amarillo, and ever since then I have been practicing my profession as a consulting geologist. I have caused to be made a partial list of the clients I have had during that period of time.

(Document entitled "Partial List of Clients of C. Don Hughes, Consulting Geologist," marked Exhibit No. 39 for identification.)

I have at various times done geological work for each and all of the clients whose names are listed on this exhibit. That work has been of various natures, including the recommending of where to buy leases for the drilling of oil and gas wells, recommendations for the purchase of royalty under oil or gas or prospective oil or gas areas, the drilling in of wells, the making of appraisals for commercial and various uses, including inheritance tax payments and income tax payments, the estimating of reserves of gas, studies having to do with drainage of gas, and various purposes of that nature.

I am a member of the local geological society and of the American Association of Petroleum Geologists. I take the publications of the latter regularly. Our local association meets from time to time and discusses local geological problems. It meets quite regularly through the winter.

(EXHIBIT NO. 39 for identification, offered and received in evidence without objection.)

In my work at Amarillo I have had occasion to familiarize myself with the records of the Railroad Commission of Texas. Most of the records relating to the Panhandle are kept in the office at Pampa, Texas. I have had occasion from time to time to personally handle those records and take data therefrom. I am familiar with their method of keeping records. I have had occasion to investigate the method used by the Railroad Commission in its office of Pampa in keeping track of the amount of gas produced from oil wells in the Panhandle. The information which they have comes to them on what is called the E-H-4 report, made by the companies, showing the lease name and the company name and the well numbers of the leases that produce gas from oil wells. These reports make no distinction between the amount of gas produced from the same band which contains the oil and the gas produced by those same wells from upper bands. It is all run in as one figure so long as it is coming from the oil well. (Objection by Commission counsel.)

Questions by the Examiner:

I know these records from having handled them and having seen and worked with them in the Commission's office after they had been sworn to by the companies and sent to the Railroad Commission. As a part of my profession I am constantly working with figures of that nature, and on numerous occasions I have had to go through those figures on various portions of the field. I have not done it for every year that they have issued an annual report. I did not do it for 1938. In fact right at the present time, I have not checked the figure. I would not be able to say exactly for what year I did check the figures. There was a time when Mr. Alex Crowell was in charge of that office that we worked together on the annual figures. In some cases he included in his annual reports some figures taken out of my notebooks.

Direct Examination Resumed by Mr. Culton.

There is no other report made to the Commission of the gas produced from oil wells except the E-H-4 report.
220 I know as a matter of course that the gas being reported to the Commission must come to them on this E-H-4 report. That is what it is for. The general instructions from the Commission are to make the report on that form. I have seen the forms, and I think they carry that instruction on the front of each one. (Objections by Commission Counsel to foregoing testimony overruled.) From my familiarity with the reports themselves and the methods used by the Railroad Commission, I would say definitely that they are the forms from which the annual reports are compiled. (Objection by Commission Counsel and question withdrawn.)

I feel sure that the term "oil-gas ratio" has a definite meaning in that region. It is the ratio in MCF per barrel of oil of the amount of gas that an oil well produces while producing its oil. As to whether the source of the gas enters into the definition or whether it is the volume of gas irrespective of its original source, it is the volume irrespective of the source. (Objections by Commission Counsel to above testimony overruled.)

During the time I have been in Amarillo I have spent a great deal of time in studying the gas problems of the Panhandle field, including the amount of gas in there, the amount of drainage, and things of that character. In making that study I have observed that there is a great variance over the field in so far as standard productivity is concerned with respect to the gas area. The potential open flow of the field varies a great deal as shown by the

Railroad Commission on their maps. It varies within the outline of the field and ranges from zero to more than 100 million cubic feet per day.

Exhibit 35 is a map I have caused to be prepared showing the potential production in different portions of the field. By potential or open flow I mean the volume of gas in cubic feet that a gas well will produce in 24 hours.

On Exhibit 35 I have spotted all the gas wells in the Panhandle field. I have made allowance for wells that came in at a time when the pressure had declined by estimating back to what they would have been at virgin rock pressure conditions, so that the map indicates a picture of the conditions that would have obtained had the wells been drilled in those various areas under virgin rock pressure conditions. The potentials or open flows of the wells under those conditions are indicated on the map in numerals.

The areas colored yellow on the map indicate the regions in which the largest gas wells occur, and, as shown by the legend, those are the areas in which an open flow above 40,000,000 cubic feet per day was encountered. The wells scattered throughout the various yellow areas have figures alongside them. Those figures refer to the millions of cubic feet the respective wells will produce. The highest productivity as evidenced from the open flow potential is shown in the areas colored yellow.

The next band is shown in green, and includes wells with open flows ranging from 25 to 40 million cubic feet per day. I used the same method in outlining the green area which I used in outlining the yellow areas.

221 The next band of productivity is the red area, which designates areas in which open flows of 10 to 25 million cubic feet per day are encountered.

The next band is blue, and it indicates areas of open flow of 5 to 10 million cubic feet per day; and the next one, the gray, indicates areas below five million cubic feet per day.

All of those figures relate to potentials based on original pressure. Some of the wells which I have used as control points were not drilled when the area was at virgin pressure. In those wells the open flow was computed back in accordance with the U. S. Bureau of Mines back pressure curves. I did that for the purpose of getting what would have been virgin open flows on the wells that have come in at declined rock pressures. I might say, however, that the bulk of the map was made up of wells drilled sufficiently early in the life of the field so that that procedure was not necessary.

My attention is called to a blue area down in the heel of this enormous foot with some red areas in it, more or less on the boundary between Carson and Gray Counties. Those red areas are indicated due to the presence of gas wells at those positions which encountered open flows of 21 and 22, and I cannot tell what the other figure is. The line indicating Mr. Thompson's cross section has gone over one of my figures. I didn't color the entire area in red because there are other wells out away from these which encountered volumes of 3 and 4, and out a little farther even some dry holes.

Since the map was prepared I have learned that there is an area where the coloring was based on erroneous information. There is one well over in southeast Hartley County that has come to my attention. I banded it for the gray because it was indicated as a 1.4 million open flow well on the Railroad Commission report of last year with practically virgin rock pressure. I have since learned that that well was approximately a 10 million well when it was first drilled in. In the light of that information, a small blue area should really be colored around that well—just a small blue island covering possibly a quarter section or so.

Exhibit 35 has the same colors as are used on some of the bands on the pressure map, but it is not related to the pressure map at all. It is prepared solely for the purpose of showing the zones of open flow in the field.

If we have two wells with the same pressure and the same thickness of sand, there could be a difference between the productivity of the two tracts. The first observable difference would be evidenced in the size of the well, the open flow potential. The open flow potential is ordinarily regarded as an indicator of the relative productivity of the tracts. This is especially so in the Panhandle. I have had occasion to make a special study of that with respect
to the Panhandle for a number of years, and have
222 concluded that there is a direct relationship between
open flow and the amount of gas in the area per

acre. This situation would not necessarily apply to every field to the extent that it applies in the Panhandle.

If in the Panhandle you have a well with a potential open flow at virgin pressure of 20 million cubic feet of gas daily, and that well has been completed in a normal way without shooting and without acidizing the volume I would expect to find contained in the formation would be remarkably close to that figure of 20 million, except it would be an expression of the amount of gas per acre rather than of open flow, and would be used on virgin pressure conditions at a 16.4 pounds measurement. My studies have resulted in my reaching the conclusion that the factor of approximately .9 is the exact relationship. In other words, multiplying the volume of daily potential at virgin pressure by .9 gives approximately what I consider the gas in the formation to be per acre.

I have checked that in a great many ways over the past several years. The first checking was an application of the porosity thickness method of computing reserves, which led me to the first observation that the two figures were remarkably close. I reached that conclusion after having watched wells drilled in and observing their thickness and using what I considered the best available information as to porosity, and computing from those thicknesses and porosities the reserve per acre, and then after having done that I observed that the well itself had resulted in a figure almost identical. It was purely a happenstance. It might not happen in another field at all.

When I first discovered that situation I attempted to apply it to areas scattered over the field, and found that it worked remarkably well. The next step in my study of that process was to zone the field and, instead of using two zones as Mr. Cotner and Mr. Crum used in their reports, I went on and zoned the field into further bands, and by applying that relationship and adding up all the answers I arrived at figures that were what I considered reasonable and correct figures for original reserves of the field. I found that my computations checked with those made by other geologists on the acres times thickness. They checked remarkably close. They would not always be the same as to individual portions of the field; but in the final analysis, and in a great many cases in portions of the field, the figures came out fairly good.

It is not true that all the wells are properly drilled and completed in the field. It would make a difference whether or not a well was completed in a standard condition. For instance, if I accepted as the potential of a well a figure that was the result of acidization or the shooting of a well, it is obvious that that would not be the figure I should use; so in assembling my information I have made careful attempts, and have made the corrections, in order to get the open flows which represented the natural state of the well before acidization or shooting occurred.

I heard Mr. Brown speak of the pressure decline
223 method of determining reserves. I am familiar with
that method, and I do not think the method as he applied it could be applied in the Panhandle field. The first reason is that the pressures in the Panhandle are not uniform throughout the field. The pressure decline method, as Mr. Brown used it, by taking a weighted average pressure of the field based on acreage alone, leads to the definite assumption in that application that each and every acre had the same amount of gas in place under it to start with, which we know is not the case. Therefore, that application would not give a correct figure. If the acreage all had the same productivity, the pressure decline method of computing reserves could be applied. It could also be applied if the pressures throughout the field were going down uniformly so that each and every well in the field exhibited the same pressure, even though the amount of gas per acre in place did vary as it does in the Panhandle field.

The only other circumstances under which the pressure decline method could be used, as applied by Mr. Brown, would be that if the field were shut in sufficiently long to allow an equalization of pressures to take place, then that equalized pressure would allow the application of the pressure decline method. In other words, it is necessary to apply the equilibrium pressure factor in using the pressure decline method, after the reservoir has obtained equilibrium; but that has not happened in the Panhandle. The pressure map is all that is needed to show that that situation has not resulted.

It is not the same thing as the equilibrium pressure to refer to the weighted average pressure. In the Panhandle field it is not true because a great deal of the areas which have suffered the sizable pressure declines are areas which originally had much more gas in place to start with than some of the other areas which still have high pressures. There is not enough gas out in the lean areas to move into these low pressure, originally rich areas, to build the pressure and volume back up to a weighted average pressure, weighted by acreage alone.

Under ideal conditions there would be the same drop per pound in a reservoir where the pressure decline method is used, whether the given volume of gas was taken off in the early part or the latter part of exhaustion. The same production per pound drop would have the same effect on the reservoir pressure at any time during the life of the reservoir.

If the pressure decline method used by Mr. Brown were applied for different periods in the history of the Panhandle, you would not get the same results for those different periods. You would not get the same per pound drop for the different periods.

(June 1, 1939.)

(Document entitled "Railroad Commission of Texas, Annual Report on the Panhandle Oil and Gas Field, July, 1938", substituted as Exhibit No. 26 for identification in lieu of photostat copy of pages 43 to 40, inclusive, thereof.

Exhibit No. 26 for identification, offered and received in evidence over the objection of counsel for each of the two Commissions, to whom the Examiner granted exceptions. But see Examiner's statement as to agreement with Commission Counsel's position at transcript page 1357.)

Direct Examination by Mr. Morgan.

I have stated that if the proper pressure factor be used in applying the pressure decline method of computing reserves, the withdrawal per pound drop should be the same at any time in the history of the field. In other words, if 337.66 were the proper pressure factor to apply in computing reserves by the pressure decline method, the per pound drop from the original pressure down to a pressure of 333.66 pounds should represent the same volume per pound drop as the volume per pound drop over the period 1937 to 1938, and that would be true for the periods 1936 to 1937 and 1935 to 1936.

I have stated that I prepared Exhibit 35 and that the different colored bands, yellow, green, red, blue, and gray, represent my views of the relative productivity of the areas of that field. I have also stated that in my judgment the wells in those areas colored yellow would make from 40 million cubic feet per day up, or would have, had they been drilled at virgin pressure; that wells in the green bands would have made, if drilled at virgin pressure, from 25 to 40 million cubic feet per day; that wells in the red area would have made from 10 to 25 million cubic feet per day; that wells in the blue area would have made between 5 and 10 million cubic feet per day; and that those in the gray area would have made below 5 million; down to zero. I mean by that last statement that all the acreage colored in gray is not, in my judgment, productive of natural gas. I have included it in Exhibit 35 because it is within the outline of the field the Railroad Commission used in 1937. I have simply adopted the Railroad Commission's outline of the field and then have backed my judgment as to whether some of that area is productive of gas.

My attention is called to the fact that on Exhibit 17 Mr. Peterson showed an area which he portrayed as being barren, due to what he believed to be a fault. That barren spot is not shown on my Exhibit 35 because I treated that area just as I have treated numerous other parts of the gray in which dry holes have been found. In reality, that dip of the gray color into the field in southwest Moore County drops down and includes the dry hole that has been mentioned, the Texoma Brown No. 1, and it is so indicated on my map. I did not put it there because it does not appear on the Railroad Commission's map. The outline of the field I am using is that which the Railroad Commission used, and in using that outline, even though there are dry holes within that outline, I did not revise it. I did not cull out what I considered the dry spots in the field in actual area. However, in computing my reserves I did not back my judgment as to whether all of the area included by the Railroad Commission in the field would produce gas.

In my judgment, these areas of productivity, that is, of potentials based on original pressure in the field, as portrayed on Exhibit 35 in the bands of yellow, green, red, blue and gray, represent the relative quantities of reserves
225 originally in place in those respective areas.

In computing my estimate of reserves I have given weight to the relative potentials of the wells on the theory that there is a direct relation between the potentials of the wells and the per acre content in the immediate vicinity of the wells and in the band in which the well is situated. I applied to those potentials a factor of .919211. That factor, after having been applied to the average potentials in each zone, gives the amount of gas at zero bottom hole pressure within each zone. As stated, the area colored yellow, corrected back to virgin pressure of 430 pounds, had potential open flow capacities ranging from 40 million to over 100 million cubic feet per day. I applied that same factor to that yellow area and obtained an average potential of 60.3959 million. I considered that the wells in the yellow area would have averaged that potential had they been drilled at virgin conditions. That, in my judgment, is the average producing capacity of all the wells that could have or might have been drilled in that yellow area had they been drilled at virgin pressure.

When I got to the green area I applied the same factor to 30.9067 million, which was my judgment of the average potential open flow that would have been encountered in wells drilled in that area at virgin conditions. The same method was used in arriving at the potentials in the green as in the yellow. In my judgment that is what the wells which might have been drilled in the green area would have made had they been drilled at virgin pressure.

After I arrived at the potentials about which I have testified, I applied the factor of .919211 to the area represented in green and also to the areas shown in blue and red. That does not necessarily mean that every well in the yellow area would have made at least 40 million cubic feet.

The comparative figures in the other areas, which compare with 60.3959 million in the yellow, are 16.2301 million in the red area, 6.3697 million in the blue area, and .4651 million in the gray area.

The figure I have indicated for each zone would be the average of the wells drilled in that zone. For example, in the yellow area the figure was 40 million and up, but the average in that area was 60.3959 million. I would not say that every well in that yellow area would have made as much as 40 million. There might be some that would make a little less than that; but they would average around the 60 million.

In order to explain how I arrived at the factor of .919211 which I applied to the average potentials of the various zones, it is necessary to go back to the basic observations which led me to that factor.

The first thing that started me toward the use of that factor was a number of years ago in my experience in that

field watching gas wells drilled in, and having what I considered from first hand knowledge, accurate information that was available to me on that. I mean the thickness of the pays that were encountered and the porosities of the pays. I made the usual calculation based on the porosity-thickness estimation of reserves on that one well, and then after having made the calculation on a well I found that the figure which would result in the expression in mil-
226 lions per acre reserve was almost identical with the
figure of the resultant open flow of the wells expressed in millions of cubic feet per day. In other words, the calculation that resulted in an indicated 10 million per acre reserve was also accompanied by a well whose open flow was ten million cubic feet per day, and likewise the calculation resulting in a five million cubic feet per acre reserve accompanied the resultant open flow in a well of five million cubic feet per day open flow. The per acre reserve would simply be the function of the pressure times the thickness times porosity. The basic calculation of thickness and porosity to get the indicated per acre content is the usual formula which is to be found in any text book or handbook defining that method. It was explained here the other day by Mr. Thompson, and it is the method used by Mr. Brown. We call it the porosity-thickness method.

I made that observation on a number of wells which I was watching at the time and on which I considered I had the most accurate information from my personal contact. The amount of variation was an approximate figure, but it was remarkably identical. It was close enough that at that time I decided to use, and did use, in my regular course of professional work a figure which resulted in the application of the factor 1. In other words, from that point on, knowing the relationship, if I wanted to estimate the reserves under a well having 10 million open flow, I would multiply it by one, or use the ten million per acre directly on the ten million open flow.

I did not make a graph of my results showing the number of wells that lay off this line of .919211. In fact, at that early stage of the development it was a process of growth, and the answer was arrived at through observations. The first time I used this method I did not explain it in a report to anybody. As I remember it, the first time I definitely used it was in an appraisal of some gas acreage for the city of Omaha in 1930. That gives you an idea of how far back the general idea had come to my observation. The relationship at that stage, of course, was founded exactly upon the porosity-thickness method. Then later it occurred to me that I would be able to apply that observation to the field as a whole, bearing in mind that it was possible to zone the field. In fact, a little later on, in Mr. Cotner's report it is seen that they zoned the field. If I remember correctly, he zoned the field according to estimates of areas which would produce ten million per day and up and the marginal areas of below ten million per day.

But I went ahead, and instead of stopping at two zones, I arrived at four zones. I had a zone of below ten million, another zone of 10 to 25 million, another of 25 to 40, and a fourth, or highest, 40 million and up. By arriving at an average for each zone I applied the factor 1, or multiplied directly by the open flow the number of acres in the zone, and adding them all together and getting what I considered a reasonable estimate of the reserves in the field. At the time that was done, it was a figure which was remarkably in line with figures which others were using.

Then at that stage of the development I noticed that I had a method that I could check for its accuracy by applying the pressure decline method; but instead of applying it to the field as a whole I would apply it to each zone.
227 Also by that time the procedure of having a field-wide survey made within a reasonable length of time by the Railroad Commission had developed. Prior to that time we did not have a complete uniform survey of the field for pressure conditions.

Having those zones, or rather, the field zoned into four different zones, and having my estimated amount of gas under each zone, I contoured the field and arrived at a weighted average pressure existing in each zone. This was weighted by pressure and acreage of each individual zone. In other words, I found that at that stage I had so many acres of yellow with a resultant weighted average pressure of a certain figure. That resultant figure, being lower than the original virgin pressure, gave me a direct relationship which would indicate the amount of gas or the fraction of the amount of original gas still remaining in place. Or the number of pounds lost from the original pressure to that weighted pressure gave me the fraction representing the amount of gas that each yellow area had lost.

I made a similar calculation then for the next zone, which in this case was the green zone. I took the weighted average pressure in the green zone and by taking the pressure loss

I made the calculation which indicated the amount or fraction that it had lost. Applying that fraction to what I had already estimated was in the green area, it gave me a certain figure. I had already arrived at that figure on the yellow, as I have previously described.

Then I took the next zone, which was the red area. I took the weighted average pressure of the red zone, which again gave me by subtraction the fraction which represented the amount that it had lost, or the amount of gas which had gone out from under it, when applied to my estimate of the original amount there, and I put that figure down.

So far, I have got three figures representing my idea of the amounts of gas that have gone out.

Then I took the last zone, which at that time was the zone between zero and ten millions. I used the weighted average pressure in that zone, and by a similar method I computed the fraction which represented the amount of gas that had gone out of that zone.

Then to test whether my method was correct or not, I
added all of those fractional portions of each zone, which
were expressed in millions of cubic feet of gas. Then I
turned to my production records of the field and found that
the production of the field at that time had been a certain
figure. The figure was not the exact figure that I had ar-
rived at by my method of calculating what it should have
been, and since it was not the exact figure, I calculated to
see what factor would have represented the correct figure.
That gave me a factor that, as I remember it, was a little
larger than my 1 which I described a little while ago and
which had been arrived at through the porosity-thickness
method; so I decided that since there were some unknown
factors in both methods, I would split the difference,
228 and arrived at a factor which at that time I began us-
ing by applying it to the open flow, which gave me what
I considered a compromise between the two methods. As I
remember it, that figure was 1.075 instead of 1.

It was several years ago that I arrived at this factor of 1.075; but by doing what I have described I finally figured it out and obtained the factor I am now using, .919211, and which in my opinion and my judgment is the correct figure to use in order to get an estimate of reserves.

As to how I checked my former work when I revised my figure of 1.075 down to .919211, I will say that in the meantime the zone map which I made when I first started using this idea naturally was based on the wells that had been drilled in the field at that time. Wells are constantly being drilled in the field. There have been several hundred wells drilled in the field since the time I made the first zone map; so my procedure was to spot the new wells that were drilled in the field to get the information on their open flow, that is, the open flow encountered when the wells were drilled into the formation and before any acidization or shooting took place. In other words, my idea is based on the relationship under natural flow conditions. Since the time I first started it, with the declining pressures in the field, it has also become necessary to be a little more specific in correcting the wells back up to what they would have been at virgin conditions.

So, after spotting the new wells which are drilled in the field on the map, to get their open flows under natural conditions, if those open flows exist at declined pressures, which is the case in a great many from now on, those open flows are carried back in accordance with the Bureau of Mines back pressure method to what they would have been at virgin conditions, and they are spotted on the map. In a great many cases they fall within the zones in accordance with what I have indicated they should be in. In other cases they do not fall within the proper zones, so from time to time I have to revise the delineation of those zones; but as time goes on it has been observed that those changes are of a compensating nature and that within a certain pressure zone of the entire area there will be areas of red, for instance, which must be extended, and, on the contrary, there are areas of red which must be contracted so that they tend to compensate.

Exhibit 35 represents my most recent map, and it represents the picture at about January 1, 1939. I have pointed out that I had an incorrect figure on the Bivins A-9 well in southeastern Hartley County. To be absolutely correct, that well now should show a little circle of blue, or a little extension of the blue in the immediate vicinity, to compensate for that error. There has also been a dry hole drilled in the last month or so in the Hagy-Harrington No. 1 in eastern Carson County, in Section 46, Block 7. Those two areas are in the relatively high pressure area, and would compensate for each other.

In addition to the constant revision of the zone map, we have had to correct pressure losses which I originally started out with. We have had additional withdrawals, so

that those two facts tend toward giving us more cor-
229 rect information as time goes on.

When I make another of these maps I will correct it for the development down in Section 46 and over along southeastern Hartley County, and will make changes in my map from time to time so that the changing conditions will be revealed except that in the case of the dry hole, which I stated was within the Railroad Commission's outline of the field, I will not change the outline of the field at that point. However, the fact that there is a dry hole in the gray area will be taken into account in figuring reserves for that area. I would apply a smaller average figure to the same number of acres. The observation might be made that if the Railroad Commission or anybody would want me to include in that map any additional area which I considered dry area, it would not make any difference in the result which I obtained when I started out in that line. When I adopted the Railroad Commission's outline of the extent of the field, my outline of the field included 1,200,000 acres, so that by subtraction it would be observed that I considered over 200,000 acres in that gray area to be absolutely worthless. I think I used the 1,200,000 acres at the time I was in Chicago in 1934 for the Peoples Gas Light & Coke Company. I have not changed my mind about its being worthless. I still consider it worthless.

The formula of .919211, I arrived at through a process of experimentation extending over a period of more than nine years. During that time I have spent much time checking the formula and revising it to conform to what I think the changing conditions require in dealing with the reserves. Constantly during the development of that formula I have spent time trying to find a better method, if it was possible to find one, and I have been unable to find a better method.

In the various checks and tests which I have made and which resulted in my adopting that factor, I have used my knowledge of the geological conditions dating from my first contact with the Panhandle in 1922. My first definite intensive study of that field started in February, 1926. Since that time I have devoted most of my time to the Panhandle field and its problem.

It is not my position that the .919211 factor applied to the natural potential open flow at the virgin pressure of a well is indicative of the per acre content in the vicinity of the well in every field in the country. I doubt if there would be another field where that identical factor or a similar one could be used. There might be some areas in which a similar factor might be used; but it would be a coincidence entirely, and it would have to be arrived at through a procedure similar to what I have used. The factor which I apply is one established by me to my satisfaction by research and experimentation and by a process of trial and error over the years going back as far as 1930.

As I remember it, I broke up the band, which I described
as one producing 10 million or less, at the time I de-
230 cided to use the Railroad Commission's outline of the
field. I broke what at that time I was using from zero
to 10 million open flow band into two bands as shown on
Exhibit 35, as representing from zero to five million open
flow, and from five million to ten million open flow.

In my judgment the area colored in gray is not productive throughout, but contains a lot of worthless acreage. By that I mean actual dry holes and wells that were drilled which had only showings of gas, and in some cases wells that were reported around one or two million cubic feet open flow. In most cases those wells were drilled in search of oil, and after having found no oil, and either no gas or not enough gas to save, they were plugged and abandoned.

Passing to Exhibit 35, I will describe some of those dry holes so that they can be found on the exhibit. I will now point to a dry hole as shown on this map, and it is a dry hole in fact, at a point four miles west of Benonine in southeast Wheeler County. There is another dry hole a mile southwest of it. There are several oil wells in that immediate vicinity which had no gas. There is another dry hole three-quarters of a mile west of the first one I mentioned. Coming to the two wells in northern Collingsworth County, which is south of Wheeler, shown on this map as two million and 1.8 million, I happen to know that those wells were drilled in search of oil, and not finding the oil, they were plugged back and saved, and I happen to know that those two wells have produced very, very small quantities of gas, resulting in a decided pressure decline, as shown on Exhibit 17, which shows a very low content of gas per acre, because, with small amounts being taken out, it is taking the pressure down very rapidly.

There is a dry hole, although it was shown and listed as a gas well, right at the edge of the town of Shamrock. It is shown on this map as a 1½ million gas well. That well is owned by some clients of mine who have the gas company at Shamrock, and the well itself is not over a few blocks from the gas office in Shamrock; but yet they go up north several miles to a couple of wells they have there for their gas for the town of Shamrock. In reality that well is not capable of producing any gas in commercial quantities.

These same clients own another well out east of Shamrock, shown as a one million well, and that well is so small that they have not seen fit to lay a pipeline to it, and no one else has seen fit to do so. I might add that those two wells are the wells which are the control points for this yellow area on the pressure map. The control points for the yellow area at Shamrock as shown on Exhibit 17 are the pressure readings on those two wells. One of them, right at the town of Shamrock, is 421 pounds, and the one three miles east of that town is 442 pounds. The one at the town has a potential of 1½ million and the one east of the town has a potential of one million. They are so small that the owners have not seen fit to connect them.

Going on northwest of the town of Shamrock is another dry hole, about a mile and a half. West of the town of Shamrock about six miles is another dry hole. South
231 of it is another dry hole. I might mention that there are some more dry holes outside of this boundary that help the Railroad Commission in showing their line as they do at that point.

Coming on over into Gray County there are a number of dry holes scattered through the entire east half of Gray County. This well in Section 4 was drilled by Upham Gas Company in search of gas, but it was not found, and the well was plugged and abandoned. It was not even carried on down in search of oil. Northeast of that well about two and a half miles is another dry hole in Section 23, Block 25, still in eastern Gray County. They are really so numerous in here that it would take a lot of time to indicate them. There is one in Section 57, Block 25. Here is one in Section 32, Block 25; Section 12, Block 25; here is one shown as a half million in Section 9; a dry hole in Section 20, Block 30, still in the same portion of the county; a dry hole in Section 18, Block H; a number of dry holes in Sections 52, 51 and 70, Block 25; a dry hole at the south part of the field in an irregularly shaped section, Section 1. It does not show the survey, but it is just northwest of the town of Alanreed, about three miles. There are a few wells through here that record two, three or four million.

In that connection I happen to know that it was quite common in the drilling of an oil well, if an operator encountered just a small amount of gas, he would show on his log a couple of million of gas. In other words, many of those wells were never even gauged, for practical purposes. I know that in some cases there was not even that much gas, but it is easy in making up the log to say, "Well, it had a couple of million of gas."

Those wells which show one or two million are located south of the barren island. There is a dry one in Section 111, Block B-2. Now we are over southwest of the barren island. There are a few oil wells. There was a development in that area southwest of the island in search of oil which resulted in the finding of some small quantities of gas, and the drilling of some wells there, but they did not find any gas. That would still be in Gray County. The last area I mentioned would be Sections 79, 101, 102, 110, 81 and 111, Block B-2. There is a dry hole in Section 187, Block B-2.

We come around now to the most recent dry hole within the boundary of the field, which I mentioned before, the Hagy, Harrington & Marsh No. 1 Dillard, in Section 46, Block 7, Carson County. In Section 14, Block 7, is a one million foot well. Coming on around the edge of the field, where the wells are small, I do not see any completely dry holes within the area that the Railroad Commission shows here until we get around to the well that was mentioned earlier this morning as the Texoma Brown No. 1, in Section 6, Block 2, G & M, in southwestern Moore County.

There is a little fault where that dry hole came in. Mr. Peterson maps a fault there. That is the fault he was talking about.

There are still more small wells in the area, going
232 on around northeast in Moore County, of figures of two million cubic feet, two million cubic feet, and three million cubic feet, until we get into another area in which more wells have been drilled in search of oil, and that also resulted in a number of dry holes. That area is west and northwest of the town of Stinnett, in western Hutchinson county. It is not in the area uncolored on the Railroad Commission map of 1937 and I believe that in that vicinity they have not changed. The part I am referring to is along the line just west of the town of Stinnett, and apparently that is the same line that I have on my map—the line going out to the edge of their colored area.

I might explain that on my map I stayed with their outline of the gas portion of the field, and I did not put in the additional line which starts at about the town of Pampa in northwest Gray County and more or less parallels the line of the gas field, again coinciding with it at a point in northwest Hutchinson County.

The oil wells shown on Exhibit 12 in the uncolored portion are outside my line. They are outside the Commission's free gas portion of the reservoir.

Some of those dry holes northwest of Stinnett are to be seen in Section 7, Block M-24, Section 30, just south of Block M-24, in the G-Bacon Survey, in the W. M. Cole Survey. Although it is shown as an abandoned well, it reported a million cubic feet of gas. Coming on southeast, we are in the oil field area, and there are a number of those wells which do not account for appreciable amounts of gas. When I say oil area, as I have just used that term, I mean the oil area within the colored or free gas area represented on the Railroad Commission's map. Although theoretically they are in the area of free gas, there are places through there where no appreciable quantities of gas were encountered.

I have used the Railroad Commission's delineation of the free gas bearing portion of the field as of 1937 instead of 1938 because I saw no definite reason why I should make the changes that they did in general, and I saw one change which, when it was called to their attention, they admitted should not have been made. That has been mentioned before. It is the area in central Carson County in which there was an error, probably in draftsmanship, in locating some wells in the south and southwest portion of Block 5, I. & G. N. Survey, which in reality were located in similar sections numbered in Block 5, B. & B., or Block 3, A. B. & M. It seems to me that when I checked up there were two blocks involved in addition to Block 5. The correction has not been made on the map which has been offered in evidence. The erasure which can be seen on that map is where they made their change, but the map has not been corrected. The blurred part on Exhibit 12, the 1938 map, is the correct delineation of that line.

Exhibit 35 shows by symbol what the dry wells are. I have not estimated the per cent of dry holes to the gas wells in the gray area. My figure of .4651 as the average content of the gray area takes into account all the dry holes and the areas which in my judgment they condemned.

The symbols used on Exhibit 35 for gas wells are 233 circles with six little diameter projections, or prongs sticking out in what might be called a star arrangement. The dry holes have only four. It would be the effect of a cross over a circle, and the oil wells are just black circles. The point to which counsel refers in Section 12, Block 25, H. & G. N., Gray County, is a dry hole, just a little circle with a cross through it, whereas a circle with several prongs making it look like a star or an asterisk signifies a producing well.

A number beside a gas well represents the open flow in millions of cubic feet daily. If there is a number beside an oil well, it refers to the amount of gas it encountered while it was drilling. However, the fact that there is not a figure beside an oil well does not mean that it did not encounter gas. We could not readily put in all the control points in the oil area.

Exhibit 18 is now presented to me. I am familiar with that drawing. It is a copy of a cross section in the Cotner report, and portrays the fault which exists in Potter County near the southwestern edge of the gas field about which we have been talking. It is along the straight line running in a southeasterly-northwesterly direction along the northern part of Potter County.

On Exhibit 12 are shown some circles below that straight line which I have referred to as a fault line. Those circles are the sub-surface contours of the top of the lime in that area, and they delineate the helium or Bush dome in Potter County. The dome is called the Bush dome because a number of wells are on land owned by the Bush estate. The first well drilled there was on the Bush estate. That fact gave it the name, and it was afterwards found that it contained helium. It was then condemned by the Government and is the source of most of the Government's helium supply in this country. That dome is faulted off from the main structure of the Panhandle gas field, and this exhibit is a portrayal of the fault line in Potter County.

My attention is directed to the fact that on Exhibit 18 we have expressions such as "Dolomite," "Dolomite Series," "Gray Lime Series," "Gas," and down farther "Oil," and the words "Sea Level" are written below one line. Counsel has inquired what the colored areas on this drawing represent. On that drawing, going from the lowest formations upward, the orange color represents the granite wash formation, the sandy material which was derived from the granite peak. The next one in order is the blue, which represents the gray lime series. The next one is the dolomite series in either a lighter shade of blue or a gray. The next one, in purple, is the anhydrite series, and the top of that is what we call the top of the big lime, although it is not shown. These three series, the anhydrite, the dolomite and the gray lime are all successively below the line marking the top of the big lime.

I am familiar with Exhibit 16. On Exhibit 16 the portion comparing with the anhydrite series on Exhibit 18 would be the formation immediately below the dark line indicated on Exhibit 16 as the top of the big lime. That portion would extend down approximately a third or more of the distance, approximately to where the colored ribbons occur on Exhibit 16. That point on Exhibit 18 is shown as the dolomite series and it is the dolomite series that contains a portion of these colored ribbons. The dolomite series extends on downward to approximately two-thirds the distance into the big lime series, and beneath it on Exhibit 18 is the portion colored blue, which is the gray lime series, and that gray lime series also contains some of the ribbons which on Exhibit 16 would be largely the ribbons colored in green, in a little triangular portion just to the right of the granite and granite wash. 234

Counsel has called attention to the red bands changing in color to green bands, going down the structure to water level, as shown on Exhibit 16, and has inquired whether those bands are consistently porous and capable of containing or yielding gas and oil according to the level at which they are found. They occur only in thin bands or ribbons. They do not occur as the complete thickness of porosity, including the formation, is indicated on Exhibit 18.

Counsel has called attention to the fact that as you leave the granite some of the series continue at substantially the same thickness and others seem to fan out into wider thicknesses as you get away from the granite cone, and has inquired whether that means that the producing part of the formation containing oil or gas thickens as you get out there or whether it is the whole series that thickens. It is the whole series that thickens as you go basinward to the right on Exhibit 16—as you go down the structure.

The porous bands or streaks containing the gas above a certain level and oil below that level down to where water begins at another level do not thicken as you go basinward. The portion of the bands carrying gas definitely becomes thinner and thinner, due to the geometry involved in the dipping planes. Many of these bands dip into water long before you reach the east side of the field because they are closer to the mountain and have a steeper decline. Many of the bands which bear oil dip off and disappear into the water at a distance comparatively close to the mountain, taking the whole spread into account. That is typical of the whole situation around the field, except in a few places where the porous streaks even pinch out and become non-porous before they reach that point.

(EXHIBIT NO. 35 for identification, offered and received in evidence without objection.

EXHIBIT NO. 18 for identification, offered and received in evidence without objection.

Document entitled "Volume 17, No. 8, Bulletin of the American Association of Petroleum Geologists, August, 1933", marked Exhibit No. 40 for identification.)

My attention is called to Exhibit 12 and to two areas, one immediately to the northwest and the other to the northeast of the area which has been called the barren island near the middle of Gray County, which are uncolored, indicating that they are oil producing areas which were not originally underlaid with gas, as viewed by the Railroad Commission. I am asked whether that has been the appearance of the Railroad Commission's maps prior to the 1938 map. I am certain that that is not the case. In other words, these areas were colored prior to that time. My attention is called to Exhibit No. 17 which contains what the Railroad Commission calls a pressure contour map of the Panhandle, July, 1938; that has been the appearance of that area on the maps I have seen prior to the map. I don't know how it happens that Exhibit No. 12 has the appearance that it now has. I colored the same areas on my map on the theory that I was following the lead of the Railroad Commission at the time I made it.

235 I have made an estimate of the original reserves of the Panhandle field based on the method of computation which I have described in my testimony.

(Document entitled "Natural Gas Reserves, Texas Panhandle", marked Exhibit No. 41 for identification.)

In computing the reserves I applied a recovery factor. I computed them as of different assumed wellhead abandonment pressures and computed the reserves as of those pressures, using a recovery factor of 90%. From the basic figure, which represented the gas in place at zero absolute or bottom hole pressure, I calculated the amount of gas which would have been present down to those various assumed abandonment pressures, and then took 90% of that in each different case. I corrected the quantities which I found to be in the reservoir at zero pounds absolute to wellhead pressure before applying the 90% recovery factor. The figures which are shown on Exhibit 41 represent my estimates or computations of the reserves as of the several assumed wellhead abandonment pressures after applying my recovery factor of 90%. Those figures also carry a correction from zero pounds absolute in the reservoir to wellhead so that they represent the recoverable reserves based on assumed abandonment pressures at the wellhead.

I had a reason for applying the recovery factor in computing the reserves of gas down to any assumed abandonment pressure. I had several reasons. One is the fact that at any assumed abandonment pressure, there will still be some gas left in the reservoir higher than that pressure. I know because at the time you cease producing the well you would not have been able to produce from it immediately prior to that time if that were not the case.

Assuming that the red line running from north to south which appears on Exhibit 35, and has been established as the line dividing the East Panhandle field from the West Panhandle field, represents a gas well which is producing from the bottom casing down near the place where the red line runs into the black one. If that well is producing at 25, 50, 75 or 100 pounds, there will be a pressure gradient extending from the bottom of the well out away from the well over the territory that the well is producing from, which will have a higher pressure than the bottom of the well. If this were not the case, the well would have ceased producing, because in order to produce there must be a pressure differential. If you are producing gas to any given wellhead pressure it is necessary in the very nature of things to leave gas in the reservoir which will not be reached at that pressure. The less distance between the wells, the less area would be affected by the outlying higher pressures.

The result down in the gray area, where comparatively few wells have been drilled, will be that those areas will tend to give up a smaller percentage of their gas than the others, if that condition continues through the history of the field. Another factor, which would enter into the per-

centage of the total volume of gas contained in the reser-
voir which will be ultimately recoverable down to any as-
sumed abandonment pressure, is the effect of water,
236 the source of which in the Panhandle field is both from
below and from above. That has an effect in that wells
will have to be abandoned and are being abandoned due to
the water coming into the wells, both from below and from
above, damaging conditions in the well itself, and also from
the water getting into the formation.

In the case of bottom water, it can get into a gas well through a condition in which that well itself has been drilled into water, as is the case with many gas wells which were drilled down in search of oil. They did not find oil and drilled into water, not knowing in the early history of the field just where the water was situated. Later on, in plugging that well back to become a gas well, there was an inefficiency of the plugging method. There are numerous cases where the water was not successfully plugged back and came out into the hole.

In the Borger field a great many wells have encountered water. That is an area which forms a direct connection with the underlying water. In some cases it has undoubtedly damaged the producing capacity of the oil wells to produce oil. In other cases as the oil was taken out the water became present in the oil formation. The result of water intrusion on the capacity of the wells in the Borger area within the colored areas has been that it limited them in their capacity to produce gas. In fact, a number of wells have been abandoned due to that cause.

The appearance of bottom water in gas wells has not been limited to the oil areas. There are a few wells scattered through the gas portion of the field itself in which that water has come up from below. I don't know exactly how many. I have made a study or tabulation of the wells which have been drowned out and abandoned by reason of water either from below or above.

(Document entitled "List of Dead and Plugged Gas Wells", marked Exhibit No. 42 for identification.)

Exhibit 42 was prepared by me. I obtained the data from which to prepare it at the Railroad Commission's office in Pampa, Texas, on May 2, 1939.

That exhibit shows a list of gas wells that have been plugged and abandoned and the pressures of the wells at the last test date before they were plugged and abandoned. It shows the tract of land on which the well is situated, the description, the company name, the number of the well, the lease name, the section and block, the cumulative production in MCF at January 1, 1939, and the date of the last gauge before being shown dead or plugged. That gauge included the pressure pounds and the potential in thousands of cubic feet. In the case of wells that are dead but not yet plugged and abandoned, it shows the first date which is noted on the Railroad Commission's sheet at which the well was shown dead.

89 wells are shown on that list. 55 of them are dead and 34 of them are dead and have actually been plugged and abandoned. The principal difference between the dead wells and the plugged wells is that the dead ones have not yet been plugged. The plugging is accomplished by pulling what pipe is possible to be obtained out of the hole, plugging the hole, and then abandoning it. If you did not plug the well, it would have an effect on the field because gas would still continue to escape. The plugging consists of an attempt to plug the hole so as to 237 shut off the gas entirely. It fills the hole, in other words. It might stop the intrusion of water into the formation if it were possible to plug it in such a way as that it absolutely shuts off all the formations; but the chances are that it would not accomplish that purpose.

The Railroad Commission has a regulation requiring that wells be plugged before being left as abandoned. The only distinction between the dead wells and a plugged one is that some dead ones have been plugged and some have not been reached yet.

These wells which have gone out are situated in Carson, Gray, Hutchinson and Wheeler Counties—all the counties except Moore and Potter.

The dates on which the 89 wells went dead are indicated. The date of the last run of gas is indicated in the last column on each page. This list shows that about 40 of the wells were plugged during the last year—40 out of the 89 I think. A great many of those wells went dead in 1937 and 1938. They were still producing at the dates mentioned in the last column. In other words, those are the dates of the last production. Some of them had produced on into 1939 and have gone out in the present year.

I think there is an explanation as to why those wells would be going dead at a more rapid rate in the last year or so than prior to that time. The decline in pressures in the areas results in lower open flows of gas wells, and less chance for the well to be kept clean of water. With the reduction in the amount of gas that it is possible for the well to make, it lessens the ability to keep the water blown off at intervals. As time has gone on, pressures are reduced. Another factor is the corrosion of the casing or pipe in the well, and the deterioration of the casing seats in the case of cement. In connection with this particular factor the trend is to gain momentum as time goes on. In my opinion, as a result of the tendency to admit more water into the formations, or water into formations of more wells, due to corrosion, and the result of the lack of resistance offered by the gas under pressure in the formation, and the encroachment of water, the difficulty along that line will increase from now on as compared with the difficulty from water in the past. I am influenced in that opinion by the actual history of the field.

The exhibit will not show whether the wells went dead because of water through intrusion into the formation or whether it was because of the rising of bottom water. In fact, it is often very difficult to know for sure which is the case—both being salty water makes it difficult.

(EXHIBIT NO. 42 for identification, offered and received in evidence without objection.)

Cross-Examination Interposed by Mr. Slaff.

Practically all of the wells shown on Exhibit 42 went dead because of water. I have made no segregation between those which did go dead for that reason and those which did not; but from my knowledge of the field 238 conditions I would be able to say that practically all of them went dead from that cause. A case which might be an indirect important cause, but the result of water, would be one where the well became salted up, but the original cause, of course, would be water. It is really hard to think of any other cause for wells to go dead except the intrusion of water.

I don't have the dates these wells were drilled on the tabulation. Those dates are available. Looking over the wells, I am sure that most of them were drilled several years ago. That information would not be available in Pampa, Texas, at the Commission''s office; but it would be shown on the logs of the wells. I can supply a list of the dates of the drilling of each of the wells shown on

Exhibit 42. After I return to Amarillo, it will not take very long.

"N. P." under "Pressure Pounds" means that there were some cases where in making the field-wide survey for pressures the condition was such that they were unable to make the test at that time, and they put the letters "N. P." down, which indicates that the well was not prepared for testing. That information sometimes appears under the "Pressure Pounds" column and sometimes under the "Potential" column.

A Bradenhead well is one which is a combination oil well and gas well. It produces gas from a separate casing from that in which it produces oil. It is known as an oil well, and the gas which comes off from that well is called Bradenhead gas. It produces gas from outside the casing in which oil is coming out, but inside of another casing.

Cross-Examination Interposed by Mr. Booth.

The term "Date Last Run" means the date at which the last gas was run from the well and reported to the Railroad Commission's office. The term "Last Date Before Shown Plugged" means the last date on the sheet for the given well in the Railroad Commission's files at Pampa. Often the actual date of plugging was not noted on the sheet, and I copied merely what was available at their office.

Questions by the Examiner.

That date was merely to give me an idea of when the well had been plugged. In other words, it had been tested on the last date shown. They have a sheet in their books for each well. There is just a regular record on that sheet. For instance, there is the pressure and the potential at each survey. On the sheet also is the amount of withdrawal for the various months, so that by looking at that sheet in their files you are able to watch from one month to the next what is being produced by the well. Finally, when it drops off of production, you see that because it shows no run was made. Finally a notation will come along that it has been plugged.

My attention is called to the fact that the dates vary
239 from the second and third months to the seventh, eighth and eleventh months. That is because the usual

date I have copied here shows the date of the last survey of the field for pressures and potentials. In other words, in some years those surveys were made in the months of January and February of that year, and in a good many years they were made in June, July and August. The owner has to make a production report to the Railroad Commission every month and that production report is published in that record. When the well goes off production, no production report is made, and therefore there is no notation about production.

Cross-Examination Interposed by Mr. Booth.

The records upon which this exhibit is based do not indicate which of the wells were plugged as a result of water. I made no independent investigation of the wells to determine which of them were plugged because of water conditions or other conditions. I am unable to state at the moment which wells were in fact dead or were plugged because of water conditions. I can state that the plugging of them was done, but as to just exactly when, I couldn't state. That could be ascertained by getting in touch with the owner of the well. That is not reported any place.

(Statement by Company Counsel that EXHIBIT 42 is offered, not to show how many wells were dead on account of water, but that that many wells were dead as a reason for applying a recovery factor.)

Direct Examination Resumed by Mr. Morgan.

I do know as a matter of knowledge that wells were abandoned on account of water. I was personally acquainted with the history of some of those wells. There are six or seven of the Texoma wells there. Six of them are shown in the Commission's files. As a matter of common knowledge, I know that most of the other wells which have gone dead in that field have done so on account of water.

There are some other factors which would enter into the question of whether or not all the gas could be recovered from the field down to any given assumed abandonment pressure besides increased pressures out around the wells, the water complications and other complications resulting in the well going dead while still having substantial pressure. Those other factors include the reason that the nature of the formations themselves is such that they are not perfect gas containers. I mean by that that they are not a container that will immediately yield its content of gas. There are areas that have tight formations where the gas is not given up readily.

The reason I did not pick out an abandonment pressure of zero pounds or 25, 50, 75 or 100 pounds and then make one calculation instead of making five in estimating the reserves down there, is that I have definitely arrived at the conclusion that it is not a geological matter alone that allows the answer. In other words, the production problems, the engineering features, and finally the economics of the thing, of any particular type of use for the gas, enter into it to the extent that I do not consider that I could give you an answer.

I have prepared estimates to the several assumed abandonment pressures because I have been asked for the 240 facts at those assumed abandonment pressures. I have computed the recoverable reserves of the field as of January 1, 1939. In arriving at those figures I deducted the production from the figures shown in the column where I set out my original reserves, and made the corrections for the different abandonment pressures. My estimates of the original reserves are set out in the first group of figures immediately under the caption of Exhibit 41. My estimates of reserves in the field as of January 1, 1939, are set out in the next group of figures immediately under that first group.

I have computed the original recoverable reserves under the acreage owned by Texoma on January 1, 1939, at the same assumed abandonment pressures. By that I mean that I have taken the acreage owned by Texoma on January 1, 1939, and have computed the original reserves under that land. Those figures are set out in the third tabulation at the bottom of the first page of Exhibit 41.

In arriving at those reserves, I treated the leases of Texoma tract by tract in the light of the zones indicated on Exhibit 35. I located each tract on the colored band and then applied my original amount of reserves per acre in that band to that lease ~~or~~ portion of the lease falling in that band. I did that for each lease and tract and arrived at the total. For instance, having arrived at the gas in place per acre under the yellow area if there was a lease belonging to Texoma in that yellow area, I applied the same per acre content to that particular lease. If it fell partly in the yellow, partly in the green and partly in the red, I subdivided the leases in accordance with the facts, and assigned to that part of the lease which fell in the yellow band the same per acre content as I have given for the yellow, and so on for the other bands into which they happened to fall. I then applied the same method used by me on the original reserves of Texoma that I applied in computing the reserves of the whole field.

I have computed the reserves under the same acreage of Texoma in these different areas in the field by using the same assumed abandonment pressures as of January 1, 1939. Those computations are the first tabulation on page 2 of Exhibit 41. In arriving at those figures I made the same application, tract by tract, that was described in connection with the original reserves, but by observing all pressures existent as of January 1, 1939, on the various tracts, and made the calculation by the pressure decline method, which gave me the remaining amounts of gas in each tract.

I applied the pressure decline method in the case of the Texoma acreage because I had what I considered the correct figure to start with of the original content and the original pressure, so I had the factors of pressure, original content and acreage, which I considered in my estimates of Texoma's reserves, tract by tract, through the use of the pressure decline method.

I do not reject the pressure decline method as a means of estimating the reserves of gas. There is a difference in the things I have done in computing Texoma's reserves and in taking my factor of .9 and so on which I applied in computing the original reserves, and that which I
241 heard Mr. Brown say he used in computing the reserves over the field as a whole by the pressure decline method. What I have done that was not done in his method was to zone the field into five different zones and then apply the pressure decline method to each zone, with the known factors that the zones vary from one to another in the original amounts of gas in place, and knowing the ratio of that variation. In other words, in arriving at my formula, or checking my formula by the use of the porosity-thickness method, I used the relative producing capacities of the various zones which I had colored in yellow, red, green, blue and gray. I took into account in my checking, the relative producing capacities of the several areas that entered into my calculation as I had zoned them.

When I came to apply the same method of computation to Texoma and arrive at its reserves as of January 1, 1939, I had the same known factors, tract by tract; under the Texoma leases. Since I had the original content of Texoma's leases, which I had already arrived at, and knew the original content of the leases, the original pressure in each zone, and observed the present pressure, it was feasible to apply the pressure decline method ~~in computing~~ the reserves.

I didn't apply the method used by Mr. Brown in computing the reserves for the field as a whole. I considered it erroneous because the pressures in the Panhandle are not uniform. Since they are not uniform your would have to assume that each and every acre to start with had equal amounts of gas under them, which is not the case. The pressure factor that must be applied in determining the contents of a gas field by the pressure decline method, when applied to acreage only, is the pressure at which the field would come to equilibrium if it were shut in for a period of time. In other words, the ultimate equilibrium pressure at which the withdrawals at the time at issue would ultimately equalize if every well in the field were shut down. If I wanted to estimate the contents of the field by the pressure decline method as of today, I would need the pressure figures at which the field would eventually reach equilibrium if it were shut in today—the pressure that would result from the production down to the present time.

I have computed the volume of gas which has been drawn from Texoma's leases as of January 1, 1939, whether through its own wells or by drainage, and have classified it between gas withdrawn from its wells and measured, and other gas drawn from those wells. The total amount of gas which has gone out from under those leases as of January 1, 1939, was 730,492,821,000 cubic feet, of which Texoma had withdrawn from its wells and measured into its pipeline 284,852,785,000 cubic feet. This left 445,640,036,000 cubic feet of unmeasured gas which has gone out from Texoma's leases. Of the total withdrawals of gas from leases of Texoma, only 39% has been produced and measured.

The production figures showing how much has been taken and measured from Texoma's wells represent, as I understand it, the total taken from those wells by Texoma and its predecessors. Those are the same figures used by

Mr. Brown and the other witnesses I think, except that they are down to January 1, 1939.

242 *Questions by the Examiner.*

In reaching my estimate of the recoverable reserves as of January 1, 1939, shown on page 1 of Exhibit 41, I did not use the pressure decline method. I arrived at that figure by subtracting from the figure in the previous tabulation the amount of gas that the field had produced. As a matter of fact, I used the figure in Mr. Peterson's tables—the same production figures that Mr. Brown used, except that they were brought down to January 1, 1939. This table is in part based on the Cotner and Crum report.

The figure shown on page 2 for "gas produced and marketed from wells now owned by Texoma Natural Gas Company" is a figure that was supplied by Texoma and is the same identical figure that Mr. Thompson and Mr. Peterson used in that connection. My table of original recoverable reserves in the Panhandle field, shown on page 1, is based upon the data contained on Exhibit 35, as heretofore described.

(EXHIBIT 41 for identification, offered and received in evidence without objection.)

Direct Examination Resumed by Mr. Morgan.

When I explained that in estimating the reserves of the Panhandle field I had divided the field into zones, I referred to the zones portrayed on Exhibit 35. I am not talking about the bands which are shown on Exhibit 12. Those are bands of pressures, whereas my zones are content of gas.

My Exhibit 35 also reflects the open flow or potentials of the wells, which I have related to the actual content per acre in those zones by the method I have outlined.

In connection with my partial list of clients, Exhibit 39, I listed Peoples Gas Light & Coke Company, of Chicago. I also listed Public Service Company of Northern Illinois. I think I should explain those listings. In 1932 I came to Chicago for Peoples Gas Light & Coke Company and appeared as a witness for them, and in that same year I appeared for the Public Service Company of Northern Illinois at Springfield. When I came to Chicago again in

1934, having been called here by the same people, by Mr. Griffith, I assumed that it was for the Peoples Gas Light & Coke Company; but I have been informed that in reality the appearance in 1934 was for Chicago District Pipeline Company. The same man, Mr. Griffith, called me in that instance, and I found him in the Peoples Gas Light & Coke Company building. The first time I knew the testimony I gave at that time was in the Chicago District Pipeline Company matter instead of Peoples Gas Light & Coke Company, was when it was mentioned to me last night that one of those appearances was for Chicago District Pipeline Company.

Cross-Examination by Mr. Booth.

It was my impression that when I testified in 1932 it was a rate case here in Chicago. If I remember correctly, it was before the Illinois Commerce Commission. I testified on the subject of the Panhandle field; but I do not recall what all I did testify to, Mr. Daily was the attorney in that case.

243 *Cross-Examination by Mr. Slaff.*

Within the last five years I testified in the Cities Service case at Topeka, Kansas. I think that was in the spring of 1935. It was before the Corporation Commission in Kansas and was in connection with the rates in Kansas City. I testified on behalf of Cities Service Gas Company. I do not have the date of my testimony with me. It would not be a difficult job to check back in my records and find out the date. I will do that and send it along with the other information which I am to send. The subject of my testimony there was the Panhandle gas field, the reserves, and various other matters. I think that case and the ones I have just mentioned in Chicago are the only rate cases in which I have testified.

As to other cases in which I have testified on the question of reserves in the Panhandle field, I remember I testified in some cases in Texas. I do not recall just what they included. One of them was styled Texoma Natural Gas Company *vs.* Terrell, heard in Austin, Texas, on November 4, 1932, in the Federal Court. I apparently testified by affidavit in that case.

The market demand case has also been mentioned. That was styled Texoma Natural Gas Company *vs.* Terrell, February 3, 1933. I testified by affidavit.

I also testified by oral testimony in the ratable production case which arose under House Bill 266. That case was styled Texoma Natural Gas Company *vs.* Thompson. There was two trials, one in February, 1936, and the other on the merits a couple of months later. That is the case which finally went to the Supreme Court of the United States, reported in 300 U. S.

There have been some other cases in which I have testified which had to do with drainage conditions and things of that nature in connection with gas. I think I could mention two or three of them. One was for the T. M. Deahl Oil & Gas Company. I think that case was against the Railroad Commission at Austin in 1931. That had to do with drainage conditions of gas. It was in a state court in Texas. The Henderson case had to do with carbon black. That was a case in the Federal Court in Houston in the spring of 1936. I testified by affidavit.

I also made some affidavits for the Attorney General's department of the State of Texas that were used by the State in some cases. My testimony dealt with drainage and pressure conditions of gas. As I remember it, it was in the spring of 1936. I do not remember offhand the cases in which those affidavits were used; but I will dig them up.

There was also a case in connection with gas drainage. I do not know whether you would really call it a case. It was before an examiner in Dallas in connection with the income tax of J. T. Sneed, Jr. That was in the spring of this year.

244 My service on behalf of the City of Omaha, which I referred to, was the making of an appraisal report in connection with some gas properties that were proposed as a reserve behind a proposed line to Omaha. Those properties were located in the Panhandle field. I think that was in 1930. I was engaged by some commission of the city, which I think they called the Utility Commission.

I have not published anything. I don't recall having testified before any legislature bodies—I understand you do not mean to include the Railroad Commission of Texas.

(Note: On June 27, 1939, counsel for defendants, in open hearing, stated that he had been informed by Mr. Hughes that his testimony in the Cities Service case was in Topeka, Kansas, on January 23 and 24 and April 12,

1935. Counsel also stated that the affidavits prepared by Mr. Hughes for the use of the Attorney General of Texas were not used because the cases in which he had prepared the affidavits were dismissed.)

Cross-Examination by Mr. Booth.

The method I used in computing the reserves in Exhibit 41 is similar to the method I have used in computing reserves in other cases, to the extent that due to the time element involved in the history that I recited this morning in connection with the development of that method. I was using the method at that stage. That would be the only difference. Since I perfected that method my standard practice is to use it. As to when the method was perfected, I would have to go back and look at my files. I intended to cover that this morning, both as to chronology and method at the same time. It has been only a difference of my factor, which has changed from time to time, as I have explained here, coupled with the difference in the physical conditions as revealed by a subsequent drilling. The method used has been the same.

In determining the recoverable reserves in other studies I do not recall having set out a number of abandonment pressures as I have here. I have used both methods at different times. Basically, it is the intention to give the basic figures from which any assumed abandonment pressure figure might be calculated. I am sure I have computed abandonment pressures in other cases where I estimated reserves upon specific and single wellhead abandonment pressure, and I am sure that in some cases it was 25 pounds. At times I merely calculated the basic figure that was involved, and the client, or whoever wants to, can make his own calculations. Sometimes I put it on a certain abandonment figure. It it merely a matter of arithmetic carrying it from one to another. That is true also of my recovery factor. If I get the basic figure, it is a mere matter of arithmetic. As a matter of fact, I have used abandonment pressures when I have been asked to do it, and the reason I used 25 here is because I was asked to do it.

It might be that, in computing the recoverable reserves of the Panhandle field in the Chicago District Pipeline Company case, I computed those reserves and expressed an opinion as to the amount of reserves based on 25 pounds wellhead abandonment pressure. I can refer to the records on that matter readily. I have also computed those reserves at 25 pounds abandonment pressure here, and at several other pressures that I was requested to compute them to. It may be true that in the Chicago District Pipeline Company case I was asked to determine the recoverable reserves in the Panhandle field. I would have to check into that.

245 C. J. PETERSON, a witness for defendants, on being recalled testified as follows:

Direct Examination by Mr. Morgan.

(June 1, 1940.)

(Document entitled "Explantion of Reserve Calculations", marked Exhibit No. 43 for identification.

Document entitled "Details of Reserve Estimate, Marginal Gas Acreage, Texas Panhandle Gas Field", marked Exhibit No. 44 for identification.)

Exhibit 43, consisting of four pages, was prepared by me because in connection with preliminary cross-examination by counsel for the Federal Power Commission and for complainant and by the Examiner, I was requested to prepare a statement in explanation of my reserve calculations. My explanation is embodied in Exhibit 43.

Exhibit 44 was also prepared by me. I was requested to prepare a document showing the details of my reserve estimate of the marginal gas acreage set forth in Exhibit 20. That detailed study is embodied in Exhibit 44. The document divides the marginal acreage up into the fourteen sectors which I used in estimating the reserves of gas underlying that area. Those sectors are described on the detailed explanation so that they can be identified on Exhibit 20. I show the number of acres in each sector or subdivision, and in addition I have furnished the average thickness in feet of the gas pays, the porosity in per cent determined for each sector, and the reserves per acre in thousands of cubic feet. I mean, of course, the average porosity and average reserves for each sector. I also show the total reserves for each sector to zero pounds absolute abandonment pressure in the reservoir on a 16.4 pounds base; also the number of wells used in each sector in determining these reserves, the number of dry holes in each area from which reserves were estimated, and a tabulation of remarks which are explanatory of the factors involved in estimating the reserves.

In Exhibit 28 the figures included these figures here for the marginal acreage corrected to the different pressures therein set forth and after applying a 90% recovery factor. All these matters are explained in my Exhibit 43.

In the gray area shown on Exhibit 20 I found 66 dry holes.

I wish to make a statement or explanation in connection with my description of that gray area. I understand somebody got a wrong inference which I did not intend to give, and the Examiner may have gotten the same impression. I wish to clarify the record regarding the yellow and gray areas shown on Exhibit 20 used in making my estimate of reserves for the Panhandle field.

In order to simplify matters, I divided the field into the gray and yellow areas as shown on Exhibit 20. The whole field is complicated, and in describing the two areas on Exhibit 20 I have used two descriptions for each of the areas —that is, the yellow area I have described as the "Best 246 Commercial Gas Area, Open Flow Above Five Million Cubic Feet Per Well", and on the gray area I have used the legend, "Marginal Gas Area, Open Flow Below Five Million Cubic Feet Per Well." In drawing the boundary line of the gray area shown on Exhibit 20, I adhered as closely as possible to the legend last above quoted; but I do not want it to be understood in this connection that all the wells in either the yellow or the gray area have an open flow as thus stated. In other words, I wish to make it clear that in the gray area there are some wells with an open flow of above five million cubic feet per well, and in the yellow area there are some wells with an open flow below five million cubic feet per well. However, in figuring the reserves for either of these areas, I have in each case taken account of the respective reserve values indicated by the size and productivity of the wells in eac area, so that in the gray area where wells occurred with an open flow above five million cubic feet per day I have used the values thus indicated in figuring the reserves of that area, and in the yellow area where wells occurred with an open flow below five million cubic feet per well I have taken these sectors into account in figuring the reserves underlying the yellow area.

I left some wells in the yellow area which made less than five million cubic feet, instead of creating a gray area, because I was trying to treat the Panhandle field in just two separate areas, and the wells used here which were less than five million cubic feet were surrounded by wells considerably above five million cubic feet. In other words, the average in the yellow area is a great deal above five million cubic feet per well, just as the average in the gray area is a great deal below five million cubic feet per well.

As to whether I can point out on this map a well in the yellow which made less than five million cubic feet per day initially, I will say that it is hard to see it on this map on account of the scale; but I will state that two Texoma wells in that area made less than five million cubic feet per day, but surrounding them were wells of considerably higher open flow capacity, so I left them in the yellow area instead of creating a dozen different areas in the field. The wells I refer to are Texoma Coon No. 1-M, located in Section 149, Block 44, H. & T. C. Ry. Co. Survey, in Moore County, and Texoma Coon No. 2-M well, located in Section 151, same block and survey. There are some others too, but I do not just remember the locations now.

When in a few instances I found a well in the gray area which made above five million cubic feet but which was surrounded by wells making less than that, I used those wells and gave them their proper weight in estimating the reserves in the gray area.

(EXHIBITS NOS. 28, 43 and 44 for identification, offered and received in evidence without objection.)

247 STANLEY GILL, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(June 2, 1939.)

My name is Stanley Gill. I am forty years old, and live in Houston, Texas. My profession is that of an engineer engaged in consulting practice, principally in the field of petroleum engineering. By that I mean engineering problems in connection with the production of oil and gas. I am not employed by any particular concern, but I am in the general practice. Of course, I am retained by various concerns, and practice throughout the State of Texas.

I graduated from the University of Washington with the degree of Bachelor of Science in Mechanical Engineering, and followed this training with the completion of a three year graduate course in engineering at Columbia University, from which I graduated with the degree of Chemical Engineer in 1923. Beginning in January or February of 1923 and for a year thereafter, I stayed at Columbia University as an assistant in the physics department and later in the chemical engineering department. I also engaged in a rather miscellaneous and wide-spread independent consulting practice in chemical engineering. While at Columbia I was assistant in the physics and chemical engineering departments. I was a member of the faculty at that time, which took about a third of my time, the balance being spent in consulting work.

In February, 1924, I was employed by the Mellon Institute of Industrial Research at Pittsburgh, Pa., and was immediately assigned to work for the Gulf Production Company, which at that time was the producing subsidiary in Texas, Louisiana and Arkansas of the Gulf Oil Corporation. I was sent to Houston, Texas, for the Gulf Production Company in February, 1924, and remained there with them until the end of 1931. During the first four or five years of that period I was employed by the Mellon Institute of Industrial Research, and during the latter part of the period I was directly employed by the Gulf Production Company as a member of their research department.

In the beginning my duties were concerned almost entirely with the investigation of corrosion problems. As time went on my work extended into all phases of production engineering, principally from the research angle; and during the latter part of my employment there I was head of the division of the Pittsburgh research department and was assistant head of the Houston research department, in which we had twenty or thirty production engineers engaged primarily in petroleum production engineering research.

Beginning in January, 1932, I entered the consulting practice in Houston, and have been engaged in that practice since that time.

248 I have said that the professional work I do in connection with my practice has to do with production problems of the oil and gas industries. The work that I

have done, and do, covers a very wide range. It goes from consulting work for manufacturers of oil field equipment, in connection with the design and testing of certain of their equipment, through field work, beginning with certain phases of exploration through drilling. At times I have specialized in drilling mud problems. I have been employed to supervise drilling operations under some rather difficult conditions where wells got into trouble; to testing and general engineering supervision of production operations in certain fields and areas—in fact, all phases of engineering work in the field connected with oil and gas production. I do a very considerable amount of estimation and appraisal work on oil and gas reserves. I have been employed from time to time as an expert in connection with litigation of a great many types.

My practice has not been confined to the State of Texas. I do a great deal of work in Louisiana, and have done scattered jobs in Arkansas and Oklahoma, and one job in California. At the present time I am engaged in some work in connection with the Turner Valley oil field in Alberta, Canada.

My practice has taken me to the Panhandle oil and gas field. I have been keeping in touch with and making a study of the conditions in that field since late in 1926 or early in 1927. I remember that I was in the Panhandle in April, 1927, and that was my second or third trip. My first work there was in connection with corrosion and water problems in the oil area. Since that time I have been intermittently in and out of the Panhandle field in connection with all sorts of problems.

I am familiar with the extent of that field and its general structural conditions, as well as the pressure conditions that obtain throughout the field. I have seen the pressure maps which were offered in evidence in connection with Mr. Peterson's testimony and have carefully examined them. In the light of what I know about the situation, I understand the pressure conditions to be as portrayed on those maps and by Exhibit 12.

I am familiar with the conditions as to productivity throughout the field, especially with reference to whether it is uniform or variable as to gas wells. The field is highly variable, and has very wide variations in productivity. I would say that the range of variability in productivity which obtains in the Panhandle as it is defined by the record here, as it appears from Exhibit 12 and other exhibits which I have seen offered in evidence in what is considered more or less commercial area is a variation of 50 or 100 to one. Some are 50 or 100 times as large as others. There are also dry holes in that area.

I am familiar with the structural conditions showing where the oil, the gas and the water in that field are located with reference to each other. Of course, I know those areas from conditions on the ground. I have never made any independent structural studies; but I have examined a great many very thorough studies, and consider myself familiar with the conditions. I have not examined the logs of wells in that field systematically; but I
249 have seen a great many of the logs and studied them for special purposes.

In that field, from a geographical standpoint, gas is located generally toward the southwest. The oil is along the northeast flank, and the free gas to the southwest of it. There is free gas in the same geographic location as the oil; but it does not extend over all the area from which oil is produced. It is a usual situation; that is, the gas exists within the same porous formations above the general level of the gas-oil contact.

Structurally, the relationship of the water, oil and gas in that field is the usual relationship—water on the bottom up to a general level of the water-oil contact, and then the oil up to a general level of the oil-gas contact. I don't remember just how far above the water-oil contact the gas-oil contact level is, but there are some couple of hundred feet of formation. Gas is above the level of the gas-oil contact. When I say a couple hundred feet of formation I mean vertically. It does not mean that much porosity, but that much vertical distance. That distance is several miles horizontally along the Panhandle field.

I am familiar with Exhibit 16. I have known it pretty well for three or four years, and have seen it used in one other proceeding, to-wit, the case of *Texoma* v. *Thompson*, which finally became *Thompson* v. *Texoma*, reported in 300 U. S., which has been referred to here repeatedly.

There is no significance to the circumstance that the line which has been referred to here as the level of contact between water and oil is substantially at sea level. That is just where it happens to be. If you run into a porous part of the formation which extends on down below that level of oil-water contact, the porosity is filled with water, and from that level upward is found oil, until you reach the level of the oil-gas contact, and then from that part up you find gas.

I have a very definite opinion as to whether or not there is free gas in the space between the level of the oil-water contact and that of the gas-oil contact. I don't believe there was originally any appreciable quantity of free gas in that part of the porous formation in the Panhandle field lying between the general level of the water-oil contact and the general level of the oil-gas contact. There was a little bit of gas in solution in the oil.

I have done a great deal of work in the field of chemistry and physics to learn something about the capacity of oil to absorb gas, and have read rather extensively on it. By the term "gas in solution" or "gas in absorption" in the oil, I mean that it is gas which is dissolved in the oil. It is gas which exists in the liquid phase. To make a rigorous definition, I think you would probably say that the gas in solution is that portion or that part of the hydrocarbon system which we normally consider as gas, which, under the conditions we are considering, is a part
of the liquid phase. It is like the carbonated gas in a
250 bottle of beer. It is just like that gas that is dissolved
in the liquid.

There is no distinction between the terms absorption and solution. Absorption is not a very good term. That term comes into this industry from the fact that one method of recovering natural gasoline from gas is referred to entirely as the absorption process. In that process the gas is passed through absorption towers, and the gasoline constituents are dissolved in the oil and taken out of the gas. That is the reason that term absorption is used in this industry. Solution is the correct term. It is really gas in solution or dissolved gas.

I have made no tests of the solubility of Panhandle oil or its capacity to absorb gas; but there is not a wide range in capacity to receive gas in absorption among the different types of oil. Going back to the basic theory of solution of gas under such conditions, it is a matter of the vaporization equilibrium constants of the individual constituents. Those equilibrium constants are commonly referred to as "K" values. I am not going into the theory unless you ask me to; but the results of the application of that theory, which is supported completely by all tests had, leads to the conclusion that the composition of the liquid oil has very little to do with the solubility of gas, but that the composition of the gas is the controlling factor. The result of that is that gas of a given composition will have roughly the same solubility in different crudes of approximately the same gravity.

There may be a wide variation between natural gases as to their solubility in oil, because there is a wide variation in the composition of natural gases. I have analyzed gases that ran all the way from 40% to 90% of methane, which is one of the principal constituents of natural gas. In the Panhandle gas it is very much a constituent.

With respect to the probable range of solubility as between Panhandle oil and other crude oils, so far as gas composed largely of methane is concerned, I would say that for dry gas in this territory the solubility of Panhandle crude will be just about the same solubility as any other crude of about the same gravity.

By the expression "composition of gas" I mean its chemical analysis—so many percent of this, so many percent of that. The big percent of Panhandle gas is methane. It has also the usual series of light hydrocarbons. Methane is the widest of the naturally occurring hydrocarbons. That is what we call the paraffin series. There is methane, ethane, protane, isobutane, butane, pentane, hexane, heptane, octane, and so on up. For methane the chemical term is CH_4. Ethane is C_2H_6. Protane is C_2H_8, and so on. That series carries a general formula of C_nH_{2n}, and from this are the steps of that series. I think duodectane is the name of the one that is the twentieth. That would be $C_{20}H_{42}$.

In a gas which carries from a quarter to a half gallon
of recoverable gasoline per thousand cubic feet, the
251 percentage of methane will normally run anywhere
from 80% to 90%, with a small percentage of ethane,
usually, and of the higher constituents. There are exceptional cases which carry high concentrations of those higher hydrocarbons. The Panhandle gas is high in methane. It also contains considerable nitrogen, which is a fixed gas and serves just as a diluent as far as the solubility relationships are concerned.

This gas which is in solution in crude oil formations in the Panhandle gets to be gas by passing out of solution as the pressure is reduced. In other words, when the well is opened, the reaction in the oil as it starts through the well to the surface is like the uncorking of the bottle to which you referred. The gas begins to bubble out of the liquid. It is that pressure which holds it in solution. Whether there is a pressure point at which the freeing manifests itself depends entirely on whether the oil is saturated or not. If it is saturated under any given pressure, some gas will come out of solution as soon as there is any reduction in pressure. If it is not saturated, the pressure can be reduced down to the pressure corresponding to the amount which there is in it.

All of the oil in the Panhandle field is not saturated. I would say that some of it is not saturated at all. The oil in the formation is under-saturated. When it is saturated, it has the maximum amount of gas dissolved that it can hold. When it is saturated, you cannot get any more into solution. In a sense it could be compared to a sponge that has been dipped into water or some liquid and which has taken up all that it will hold. A better comparison is a glass or cup of coffee. You can put one spoonful of sugar into it and fill it up and it will dissolve all of it. All of that sugar will go into the liquid. You can put in another three or four and it will still take it all up; but if you put in eight or ten, no matter how much you stir it, you can't make that coffee take up all the sugar.

I have an opinion about what the saturation point of Panhandle crude would have been under the original reservoir pressure. I think it would be not very far from 100 cubic feet of natural gas per barrel.

Questions by the Examiner.

There is a state that can be compared to an emulsified oil, which would enable the oil to have a comparatively higher gas composition than you would get by simply dissolving gas into the oil. It is a condition under which minute particles of gas are disseminated through a body of oil. That is not an equilibrium condition. It is a condition we get in oil fields after production has started, when pressure through parts of the body of oil has gotten to the point where the pressure of the oil still way back in the formation is reduced so that the gas starts coming out of solution. Under that condition we do encounter

dissemination of those minute bubbles of gas throughout the oil body; but so far as I know, that condition has never been encountered in a virgin oil-bearing formation, and I don't think it ever will, because through geologic time those minute bubbles will be sorted out by gravitational action and separated from the oil, but it is a condition
252 which is definitely encountered in fields that have
produced some oil.

That would not give you a higher gas-oil ratio than if you had gas in solution. It will go to the original solution point. In other words, that gas was in solution when those formations were first penetrated, and then as the gas and oil were withdrawn and the pressure reduced back in the formation, some gas would come out of the formation, but it would produce a homogeneous mass of oil with little bubbles of gas which will have the original gas-oil ratio.

There is such a phenomenon as gas bubbling through the oil and giving the oil a higher gas-oil ratio. In that sense it is not emulsification, except theoretically. You get a foamy condition, and you get it in the strings of the well from which oil and gas are flowing under certain conditions. As to that in the formation, it becomes guesswork, but I don't know of its happening in the formation. I don't know of any way that it could; but it does still happen. In fact, it happens all the time that the gas will break through to the opening through backing oil into the well, and you get a downward coning of gas—that is, an inverted cone of gas in the well, holding the oil back. That is because the gas has a viscosity so much lower than the viscosity of the oil that it will, under pressure differential, run ahead of the oil. That is a very common phenomenon.

Direct Examination by Mr. Morgan (*Resumed*).

The gas-oil ratio is not synonymous with the gas in solution. The gas-oil ratio, in the units which we usually use, is the number of cubic feet of gas which is taken out of the well with each barrel of oil. That is a measure of what happens at the surface. Gas in solution is dissolved gas, which we have just defined. Here is what can happen. You can't produce an oil well with a gas-oil ratio any lower than the quantity of dissolved gas in the formation. You can't get any lower than that. If there is 100 cubic feet of gas dissolved in each barrel in the formation, 100 to 1, that is the lowest ratio that you can produce, because each barrel of oil that comes into the well brings 100 feet of gas with it. But you can produce at any higher ratio—that is, the gas-oil ratio may be higher than the dissolved gas ratio by any amount.

In a situation such as that obtaining structurally in the Panhandle, the gas-oil ratio might rise to infinity. If you get a dry gas well, it makes no oil at all, and therefore it has an infinite ratio. If it has a little oil, it depends on how much oil has gotten into the well. It might be a hundred thousand million, or any amount.

In the Panhandle some microscopic part of the gas which comes up might come from the gas-oil contact; but for all practical purposes every bit of the gas will come from above the original gas-oil contact.

I have had considerable experience in computing gas reserves. I am familiar with what is commonly referred to as the pressure decline method of computing gas re-
serves. That is a calculation of the total quantity of
253 gas originally present in a reservoir by use of the
relationship between the production which has been had from that gas reservoir, or which is had from it during any particular interval, and the decline in average pressure, or equalized average pressure, within that reservoir. That method of computing gas reserves is based on Boyle's law.

To apply the pressure decline method of computing gas reserves you must have as known factors the quantity of gas produced during any particular period, and the average pressure within the gas bearing formation at both ends of that same period of time. By average pressure I do not mean the geographic pressure. I mean the pressure to which the contents of that gas reservoir would equalize if the wells were shut in a sufficient time to give the field the opportunity for the establishment of equalization.

I have used that method of computing reserves of a gas field a number of times. It is the best method there is when the data is available. I have used it under conditions where the gas bearing formations were substantially of identical thickness and porosity over the entire producing area of the field. If they are of the same thickness and porosity, that means they would have substantially the same per acre content. I have also used that method where a correction could be made for differences in different parts of the field—that is, in the wedged edge where the formation dips out under water, and it is possible to make a correction for that difference. The other fundamental, of course, is where you have a completely equalized pressure. There are conditions in a gas field where the pressures are equalized. The most recent estimate I have made of gas was in a field where that was true. There the pressures were within ten pounds, and the average bottom hole pressure was approximately 4000 pounds per square inch. That was the Old Ocean field in Brazoria County, Texas.

I think that method of computing reserves can be applied to the Texas Panhandle field by weighting to a per acre content of the field, which is essentially what Mr. Hughes did in arriving at his constant. He weighted his pressures both to area and to per acre content in order to arrive at an average pressure. I think you get a fair approximation that way.

It cannot be applied to the field as a whole, as was done by Mr. Brown, the witness for the Commission. His method was completely wrong. He did not use the right pressure. He used the pressure weighted to area alone, and the thing is grossly incorrect because it takes into account an area containing a lot of acres which consist of high pressure areas, and which naturally contain very much gas, which gives an incorrect average for application for the reserve estimation.

(Document entitled "Diagram Illustrating Effect of Withdrawals on Pressure", marked Exhibit No. 46 for identification.)

Exhibit 46 is a chart which I have caused to be prepared, from which I can illustrate what I have been talking about.

254 That chart is simply a representation of five gas containers of different sizes, which are noted on the drawing, connected into a manifold with valves, and each carrying a pressure gauge. Container A is assumed to have a content of 25,000 cubic feet of pressure base gas under a pressure of 100 pounds absolute per square inch. Container B is assumed to hold 15,000 cubic feet of base pressure gas under the same conditions; container C,

7,000; container D, 2,000; and container E, 1,000. The total content of all the containers, therefore, would be 50,000 cubic feet of base pressure gas. When I say base pressure gas, I mean if you measure it at 16.4 pounds per square inch.

Assuming that it is desired to withdraw 25,000 of that 50,000 cubic feet, we could get it from one container or we could get it from several containers. If you take 25,000 cubic feet out of container A the pressure would be sucked down to absolute zero. If you didn't take any out of the other containers, the pressure in A would be down to zero absolute, and you would have 100 pounds absolute in each of the other containers, and the arithmetical average of the pressures prior to equilibrium would be 80 pounds per square inch. That would be a withdrawal of 1250 cubic feet average per pound drop in your average pressure. If that reduction per pound drop were applied to the original pressure of 100 pounds, you would have 125,000 cubic feet as the original content of the entire system, which would be two and one-half times as much as was actually there.

If we take 15,000 of the 25,000 cubic feet out of container A and the other 10,000 out of container B and none out of the others, we would have taken 3/5 or 60% of the gas which was originally contained in container A, so its pressure would be 40 pounds absolute. We have taken ⅔ of the gas originally in B, so its pressure would be 33⅓ pounds per square inch absolute. The arithmetical average pressure of the five containers is 74.7 pounds per square inch absolute, which is a pressure drop of 25.3 pounds per square inch reduction in average pressure, and the production for each one pound of that drop would have averaged about 980 cubic feet. The application of that average to the original pressure would represent an estimated original reserve of 98,000 cubic feet, or approximately twice the actual reserve.

You would get a different result most anyway you distributed your withdrawals. Taking that same chart, you can withdraw the same quantity of gas from different containers and get different average pressures prior to equilibrium and a different indicated original reserve each and every time you do it. Those arithmetical average pressures after withdrawal will range all the way from 50 to 80, depending on how the withdrawal is distributed. 50 is the equilibrium; but we can go to the other side of 50 in this way: We can take all the gas out of container B, and all the gas out of containers C, D and E, and pull them all down to absolute zero. That would give us a withdrawal of 25,000 cubic feet. We have left the initial pressure in container A. The arithmetical average pressure would be 20. I don't know what the reserves would be; but it would be a very low figure. The result would be on the other side if the production was from the lean end of the system of containers.

255 So long as the greater proportion of the production has come out of the large containers, that method will lead to an over-estimation of reserves; and the other way will lead to an under-estimation.

In the Panhandle field, the large production as a whole has come out of the best part of the field, where the original content was greatest—in other words, to make a wide jump by analogy, from containers A and B. Therefore, if you average the pressures in the different areas as the Railroad Commission did it in arriving at what it called a weighted average pressure, the indicated reserve will be an over-estimation.

If there had been heavy withdrawals from the south and southwest parts of the Panhandle structure and relatively lighter withdrawals from the northeast, an application of pressure weighted on area would lead to underestimation of reserves. As it is, that application leads to a large overestimation.

I have caused another drawing to be made by which I have sought to apply the principle demonstrated by this system of containers to the conditions existing in the Panhandle. It shows principally that the assumed sizes of those containers are in reasonable accord with the proportion which actually exists in the Panhandle field.

(Document entitled "Variation in Productivity of the Panhandle Field, Cross Section from South to North on the Carson-Gray County Line," marked Exhibit No. 47 for identification.)

That chart is essentially two charts. The upper is a rock pressure profile from south to north along the line between Carson and Gray Counties. The horizontal scale which is indicated both at the top and the bottom of the chart shows the sections which that line cuts across. Most of those divisions are a mile. The upper part of the chart simply shows the rock pressures across that line of section. It is based on the Railroad Commission's 1938 rock pressure determinations.

The lower part of the chart is a cross section along the same line based on Mr. Hughes' map, Exhibit 35, and shows the variation in productivity across that section.

Comparing it to Exhibit 35, I point out that the cross section is along the line between Carson and Gray Counties. Starting on that line at the south boundary of the field on Exhibit 35, you can see that there is a little bit over three miles colored in gray, which is classified as having an open flow of less than five million cubic feet per day.

On Exhibit 47, the first part, starting from the left and corresponding to the south end of the section, is shown with a productivity of less than five million. It is idealized somewhat by being tapered off to pretty nearly zero at the extreme south boundary, which is probably the actual condition.

256 Returning to Exhibit 35, after leaving the gray zone on Exhibit 35, that county line traverses approximately eight miles of blue, which is zone classified as having open flows between five and ten million cubic feet per day. On Exhibit 47 that eight miles is shown in blue, and the upper line, productivity, runs between five and ten with this hump in Section 236 being put in there because of a well which actually exists very close to the section at that point.

On Exhibit 35, after leaving the blue, the county line traverses maybe a mile and a half of red, then a little bit less than two miles of green, then another mile of red, and then a little bit more green. On Exhibit 47 these zones are colored in the same colors that were used on Exhibit 35 and to scale as to length to show that the county line traverses these zones in the case of red of productivity between ten million and 25 million, and in the case of green of productivity between 25 million and 40 million. The county line toward the northern part of the field traverses something over two miles of yellow zone, which is classified as the area in which open flows are above 40 million feet. This same distance is plotted in on Exhibit 47 as a zone in which productivities range from 40 million upward to 60 million. This again is a little bit idealized at this point. 60 is actually the average for that zone, according to Mr. Hughes.

Passing north of that area of yellow on Exhibit 35, the county line traverses for short distances zones which are colored in green, red, blue and gray, and then leaves the field. These same belts are plotted into both horizontal and vertical scale on Exhibit 47. In other words, the thing is a productivity profile of the field along that line.

Questions by the Examiner.

If I had followed Mr. Hughes' map I would have used blocks instead of curve to illustrate the proper profile of my productivity curve. A correct or rigorous following of Mr. Hughes' map would call for a block plot. This is rather an idealized thing for illustrative purposes, and it does show that the actual proportions of zones in the field across that line of sections are in reasonable accord with the proportions we have assumed in constructing Exhibit 46. That is its only purpose.

Direct Examination Resumed by Mr. Morgan.

A comparison of the rock pressure profile of Exhibit 47 with the productivity profile shows conclusively where that heaviest withdrawal has been. As shown by that exhibit, we still have pressures up around 425 at the edge of the field. Toward the left of the south cross section we still have pressures which are virgin, or substantially virgin. That area corresponds, as is shown by these two different profiles, with the zone of least productivity. Then passing north the rock pressures become progressively lower down to a minimum of considerably less than 100 pounds, though it is shown here as 100 pounds minimum, at the north edge of the section, with the greater part of the low pressure zone corresponding to the areas which are colored in red, green and yellow on the productivity profile. That shows that the heavy withdrawals have been from the more productive part of the field.

257 If the pressures in the field along the bands portrayed on Exhibit 12 are taken, and the arithmetical average of the pressures of each band is taken, thus arriving at an average pressure into which only pressure

and area have been weighted, a very large error results from applying the pressure decline method of computing original reserves. That error leads to over-estimation of the original reserve.

I took that particular cross section because it was just a handy place, and it was easier to set up one there that had quite a little bit of blue in it than it would have been to come up here to Potter County and Moore County, where we have a larger proportion of blue but where the section would have been much more complicated. We could have shown the same kind of a proportion, but it would have made a more complicated profile, and we just picked that spot because we had a pretty good distance across the field and it had a reasonably simple distribution of the zones. The same thing could have been shown by a section anywhere else. If I had gone into Moore County or up through Carson and Hutchinson Counties, I would have had the same variations in productivity, but they would have been in a more complicated succession.

Exhibit 26, a report of the Railroad Commission dated July, 1938, is now presented to me. There is a tabuation on page 12 of that report which shows the acreage within each of the pressure belts on Exhibit 12. This table on page 12 shows at rock pressures below 150, 59,947 acres, which is 4.1% of the total acreage; at pressures of 150 to 199, 78,159 acres, which is 5.3% of the total acreage; at pressures from 200 to 249, 117,435 acres, which is 8% of the total acreage; at pressures of 250 to 299, 145,579 acres, which is 9.9% of the total acreage; at pressures of 300 to 349, 154,805 acres, which is 10.5% of the total acreage; at pressures of 350 to 399, 524,495 acres, which is 35.5% of the total acreage; and at pressures of 400 plus pounds per square inch, 394,904 acres, which is 26.7% of the total acreage.

The yellow and green zones on Exhibit 12, which take in everything having pressures of 350 pounds per square inch or higher, cover 62.2% of the total acreage. From my knowledge of the field, it is my judgment that there wasn't anything close to 62% of the total original reserves of the field in those two belts.

As to whether I have calculated it in any way, I have made some rather extensive studies attempting to get at precision figures on drainage. As I said earlier, I have never estimated the reserves of the Panhandle field; but I have made some rather extensive comparisons of pressure drops and withdrawals in connection with drainage studies. Although those have not even led me to a definite proportionality between original reserves in different parts of the field, they do show very conclusively that that large area to the south and southwest is the lean area of the field—that it originally contained much less gas per acre than the fat part of the field.

If we make different distributions of area, and weight by area, we would get different results, and all of the 258 results would be wrong when applied to reserve estimates. If there were low pressures in lean areas, you would get one kind of error, whereas in the low pressures in another content you would get another kind of error.

If the heavy withdrawals have been from the rich areas, as they have in the Panhandle, the application of these average pressures weighted only on surface area will lead to an overestimation of reserves. If the larger part of the total area is in those rich areas and we weight in by area, that will tend to reduce the error. If the larger part of the total area is in the lean portions of the field, which have had the light withdrawals and which are now areas of high pressure, as is the case in the Panhandle, weighting by area will increase the error and give an even greater overestimation than we would have on arithmetical average.

The sum total of what I have said is that in order to apply the pressure decline method in computing reserves of a gas field, you must know the ultimate equilibrium pressure to which the field would settle were it shut down as of the time of the inquiry, and there are conditions under which that can be calculated. There are field conditions under which that equilibrium pressure can be determined; but this pressure factor cannot be determined in the Panhandle by weighting the average of pressures in each area with the extent of the area, as was done by the Railroad Commission in arriving at that factor of 337.66 used by Mr. Brown in his computation.

I am familiar with what the Railroad Commission did in arriving at that 337.66. Referring to Exhibit 12, which is the Railroad Commission's pressure map, and particularly to the gas wells in the gray area along the northeast flank, the Commission, after having determined the rock pressures of the gas wells in that area, added those rock pressures together and divided by the total number of wells for which they had measurements, and thus arrived at the arithmetical average of the rock pressures of the wells on which they took tests expressed in terms of per pound per square inch gauge. Then they went to each band and did the same thing, with the result that they took the average of the pressures of the wells in the yellow, the green, the blue, and on through the field in the different bands, and then multiplied each of those average pressures by the quantity of acres contained in each band, obtaining as many results as they had bands, and then they added those up and divided by the total number of acres.

The pressure factor, which they multiplied the acreage by in the yellow band or yellow zone, was the arithmetical average of the pressures of the wells in that zone, and those pressures varied from 400 to 430. When they got over in the green those pressures varied from 350 up to 399; and they had the same variation of 50 pounds in each one of those bands, as the legend on the map shows.

If we start with the assumption that weighting of pressures by area alone will lead to an average pressure and that that figure is correct for purposes of reserve estimation, then, in other words, it would lead to the adjusted equilibrium average pressure within the reservoir. If we assumed that one method of weighting to area will do it, then other subdivisions of areas should lead to the same
259 correct result. What I mean is that if those particular
fifty pound bands would do it, twenty pound bands should do it, dividing the things up into squares should do it, or most any other way of doing it. The one correct number would not just happen to be the one you would hit by splitting up into fifty pound bands and averaging certain wells. In other words, Mr. Boyle, when he developed his law, never heard of the Railroad Commission or that map; and it would be just as logical and just as feasible to arrive at these weighted average pressures in which only pressures and areas are concerned, if we weighted by counties touched by that field instead of these yellow, green, blue and so on bands across there.

I have zoned that field by counties and made exactly the same kind of calculation that the Railroad Commission made in arriving at that 337.66. I have that tabulation in such form that it can be offered as an exhibit.

(Document entitled "Railroad Commission Weighting

Method "Applied to 1938 Rock Pressures by Counties," marked Exhibit No. 48 for identification.)

Exhibit No. 48 shows the details of the calculation of an average rock pressure calculated from the data which were the bases for Exhibit 12 by dividing the area by counties rather than by 50 pound pressure contour bands. There are ten counties. I believe there is one well in Sherman County which is not included on these averages. It is not certain whether it is a part of the field. As yet the Railroad Commission does not so consider it.

Going from left to right, the first column of this tabulation is the counties. The second is the number of wells within that county on which the Railroad Commission reported rock pressures as a result of their 1938 survey. The third column is the sum of the rock pressures reported for those wells by the Railroad Commission. The fourth column is the sum divided by the number of wells or the arithmetical average of the rock pressures reported by them for the wells in that particular county. The fifth column is the total acres lying within the particular county and within the boundary of the field. The final column is the product of the average rock pressure, which is the fourth column, by the total acres, which is the fifth column. The sum of those products as shown at the foot of the last column, 445,126,437, is divided by the total acreage, which is the total of the next to the last column, 1,475,324, to give a weighted average pressure of 301.71 pounds per square inch.

There are no wells in Oldham County. There is a little bit of acreage there, and we assigned to it the same average pressure as that of Hartley County.

Except for the fact that a different division into areas was used, this process is exactly the same process as that used by the Railroad Commission in arriving at their 337.66. The difference is that our areas were chosen by counties instead of by these bands of varying pressures.

260 If you could arrive at the ultimate equilibrium pressure by the means adopted by the Railroad Commission in arriving at that pressure of 337.66, using 50 pound bands, you should get the same result if you used the 20 pound bands that are reflected by Exhibits 21, 22, 23 and 17. It seems to me if one method of dividing areas would give a weighted average pressure which is the equilibrium pressure, then another method of dividing the area should give the same result. There should be nothing sacred from the

reserve standpoint about these 50 pound bands and the arithmetical average of pressures within them.

If you narrow the bands from 50 down to 20 and create more zones, as appears on Exhibit 23, I do not think you would come any closer to equilibrium pressure, but you should come closer to the true weighted average weighting on surface area alone. The smaller the area that is considered, the closer you should be to true weighted average on surface area alone; but you wouldn't necessarily be any closer to equilibrium pressure.

You ask if it were possible to get that result by taking bands of pressures, stepping up from low to high at intervals of 50 pounds, as was done on Exhibit 12. You should get that same result, if it be the right result, namely, the ultimate pressure equilibrium, by going up in steps of 20 just as logically as going up in steps of 50. My answer is that if that initial assumption, which I believe to be entirely incorrect, were made, it seems inescapable to me that conclusion would be true.

I have made such a calculation, stepping up the pressures by steps of 20 pounds, on the 1937 rock pressure survey. I used the 1937 survey because six or eight months ago I had done that for the entire west field for an entirely different purpose, and I used the 1937 rock pressure map, which is Exhibit 23. Since I have been in Chicago I have done the east field from that same map, and combined those results to give an average on 20 pound bands. There is another difference in that method of calculation too. Instead of using the arithmetical average on the rock pressures of the wells within the bands, I used the average pressures for the bands, which I consider more nearly correct. I did not use the absolute pressures, which would be still a little bit more correct. In other words, for the band reading from 400 to 430 I used 410, because the map I worked from in figuring the west field was contoured in that zone at even closer intervals.

With respect to my saying that it would be more accurate if I had used absolute pressure, if you average three and five you get an average of four but if you average three plus two—that would not work out. I may be wrong on that. I just have the impression—that works out it would be the same. I am mistaken on that. It would be a percentage variation, but I was mistaken there; I was not thinking straight.

I had taken Exhibit 23 and constructed from it for my own purposes a map which was contoured for the west field, not in pressures but in loss of rock pressure from original—that is, 430 on Exhibit 23 would correspond to zero on my pressure log map, 330 pounds per square inch would correspond to the 100 pound contour for pressure loss on my map. I had planimetered that map for an entirely different purpose and had that detail with me. What I did was to arrive at the weighted average pressure loss for the area, following the same principle that the Railroad Commission used in arriving at this 337.66, except that it was on 20 pound intervals of pressure instead of 50, and I weighted on acreage alone. I have prepared an exhibit showing the results of thus comparing the pressures and weighting them as to area.

261 (Document entitled "Panhandle Field, Railroad Commission's 1937 Rock Pressure Data Weighted By Acreage From Maps Contoured to 20 Lb./Sq. In. Intervals," marked Exhibit No. 49 for identification.)

That entire exhibit covers a determination of average rock pressure weighted by acreage from the 1937 rock pressure data on Exhibit 23. The first page, under the heading "A", covers the determination of this average for the West Panhandle gas field. As I stated this morning, this calculation is made from a map that I had prepared in my office contoured to loss of pressure from the original rock pressure. As you can see on this first page, the first column on Exhibit 49 shows the zone average pressure loss. The next column is the corresponding average rock pressures of those zones. The third column is the area in acres. The fourth column is the product of area and pressure. The sum of those products divided by the total acreage gives a weighted average of 350.19.

At the head of the second page is the Railroad Commission's weighted averages for the same set of rock pressure figures. Those figures were obtained from the 1937 and 1938 reports of the Commission. In their report the West Panhandle field is divided into sweet and sour gas, which I have combined, and which gives 367.71, or approximately ten pounds higher than the weighted average arrived at by my calculations.

Under the heading "B" on the second page is a calculation of averages for the East Panhandle field. These calculations were made during the last week in Chicago from the map, Exhibit 23, which is the 1937 pressure contoured at

20 pound intervals. That calculation leads to an average pressure of 272.59 pounds per square inch, as compared with the Railroad Commission's weighted average for the same data of 283.84.

On the last page, page 3, I have combined my figures to reach a weighted average pressure, weighted on acreage alone, of 335.58, as compared with the Railroad Commission's average of 347.05.

Using the method employed by the Railroad Commission, which weights the well pressures in areas of 50 pound pressure ranges, the same method of computing gives 347.05 pounds per square inch for the year 1937, whereas if you use 20 pound intervals for the same year, that is, during the same period, the result, instead of being the same, turns out to be about 11½ pounds lower. The average determined from the 20 pound interval map is about 11½ pounds per square inch lower than the one which the Commission determined, or 335.58 as against 347.05.

If you vary the method employed by the Railroad Commission, changing it from seven 50 pound bands to counties, but using exactly their method of computation, the 1938 comparison was 337.66 for the Railroad Commission as against 301.71 when you computed it by counties and used the same data. That is a difference of approximately 36 pounds per square inch.

If you make a computation of 20 pound bands instead of 50 pound bands, using the average pressures times acreage as your products successively as you go across the field, you will not necessarily get any closer to the equilibrium 262 pressure. As you subdivide into successively smaller units of area for a determination of that kind, you will get closer and closer to the true average, weighted on area alone. That is just the mathematics of the thing—as you subdivide into smaller areas you get a more precise thing.

If you did it for the field as a whole, your accuracy would not be as great as if you did it in 50 pound bands. If you do it in 50 pound bands, your accuracy is not so great as if you did it by 20 pound bands; and if you do it by 10 pound bands, you will get that much more accuracy. You would approach a more correct determination of the average weighted on area alone. But that would not necessarily be any closer to the correct equalized average which would be obtained if the field were shut in. The things are not necessarily related. That is where I went haywire this morning.

I misspoke myself and then got all balled up. What I meant to say was that a closer approach to the true average pressure condition within the reservoir would be made by using, rather than surface rock pressure, the pressures corrected to reservoir pressures by allowing for the weight of the column of gas in the well. You would get a truer picture because your ratio is greater off high pressure wells than low pressure wells, since there is more gas in the high pressure wells.

(EXHIBITS Nos. 46, 47, 48 and 49 for identification, offered and received in evidence without objection except as to EXHIBIT No. 48, which was received in evidence over the objection of counsel for each of the two commissions to whom the Examiner granted exceptions. Motion to strike reference to Exhibit No. 48 and portions of that exhibit which were read into the record or referred to denied.

Document containing calculations showing variations in withdrawals per pound drop in pressure on Railroad Commission's method of computing weighted average pressure, marked Exhibit No. 50 for identification.)

In applying the pressure decline method of computing reserves, if the correct pressure factor to be used in that method of computation has been ascertained, it is necessarily true that the withdrawal of the field per pound drop should be uniform during any period of the depletion of the field. There is one exception which comes in on very high pressure fields, where there is a deviation from Boyle's Law; but where the gas conforms to Boyle's Law that is necessarily true.

If the correct initial and terminal pressures for the period between July, 1935, to January, 1936, and the period from January, 1936, to July, 1936, were applied, the production per pound drop should be the same for those periods.

Having obtained the correct pressure factor, namely, the ultimate equilibrium pressure for any given time, and comparing that with the correct equilibrium pressure as of another time, and having ascertained the quantity of gas withdrawn per pound drop during that period, the same rate of withdrawal per pound drop should apply at any other period in the life of the field.

I have made a study of the volume of withdrawals and pressure decline in the Panhandle field to ascertain whether or not the situation obtained when I used the weighted average pressure ascertained by the Railroad Commission on acreage alone in the manner that they ascertained it.

263 Exhibit 50 was prepared by me and shows the calculations I have referred to.

It first sets out the source of the data used, and you will note an initial correction there of one number. It shows the calculation, the date, first, on which the pressures were determined by the Railroad Commission; the weighted average pressures determined by them as of those dates in pounds per square inch gauge; the corrected reservoir pressures corresponding to those averages in pounds per square inch absolute; the loss of reservoir pressure for each of those periods; the total quantity of gas, expressed in millions of cubic feet, produced from the field during that time, from the reports of the Railroad Commission, including casinghead gas; and, in the final column, the millions of cubic feet produced for each one pound per square inch loss in reservoir pressure during the particular period.

As you can see, those values in the table on the first sheet of Exhibit 50 range from 237,000 million to 484,000 million cubic feet of gas being produced, and then there was a gain in pressure as reflected by the Railroad Commission's files; and that the other three figures range from 43,000 to 54,000 million cubic feet per pound drop.

On the next sheet the first two periods which are given are combined to give the production in millions of cubic feet per pound drop for the period from July, 1935, to July, 1936, and those figures are compared with the other two periods, July, 1936, to July, 1937, and July, 1937, to July, 1938. They show a very wide variation. That, of course, shows merely as a test the inapplicability of those particular pressures to the calculation of reserves by the pressure decline method. It shows that those pressures are not applicable to the calculation of reserves by the pressure decline method.

(EXHIBIT No. 50 for identification offered and received in evidence without objection.)

Questions by the Examiner.

The gain in pressure was not a mathematical aberration of some kind. It was a true reflection of the increase in pressure weighted on the surface area. I don't think the coming in of new wells at high pressure was the cause of it. Just before that period there had been a tremendous wastage of gas, and that wastage of gas had been stopped. That waste had resulted in some low pressure areas to the northeast, and when that tremendous wastage of gas at local spots was stopped, the wells located in those spots built up quite rapidly and gave an actual increase in the average by the method used by the Railroad Commission.

As to whether the figures used for each of the four or five intervals are comparable as to their selectivity or application or weight, I think that one of them is just as likely to be correct as the others. There is some uncertainty in the production figures for that first six months' period. The ultimate production loss figures on page 2, the last two, are identical with those on the first page. My earlier figures did not take into account any unreported gas. That would
make the disparity much more, because, as you can see
264 on the second page, the greatest production per pound
drop for the three years was from July, 1935, to July, 1936. Such unreported gas as was produced in quantity during this three year period was produced during that period. If it were included it would make even greater production than the 72,000 million MCF that is included by using only reported gas.

On page 2 of Exhibit 49 I show the West Panhandle sweet and the West Panhandle sour gas and give the Railroad Commission's average. The Commission divided the West Panhandle into sweet and sour. Their division on their page 11 is for the whole Panhandle, but there is no sour gas in the East Panhandle field.

The sour gas line runs into the border just south of the town of Pampa, which is some miles west of the dividing line of the East and West fields. I have simply weighted those two for purposes of acreage; that is, multiplied it by this acreage and divided it by the total acreage in the West Panhandle in order to get what I have called the Railroad Commission's weighted average for the West field. I tested that by making a similar weighting of the three divisions which are shown on page 11 of Exhibit 26. I tested that method of weighting by weighting the three divisions which are shown by the Commission, by the acreage of each, divided by the total acreage, and got a final result of 347.05, which is identical with the final weighted average pressure of the whole field. That would eliminate any question arising from my handling of it as I have done on pages 2 and 3 by another method. It shows that the method which I used there is the same.

The fifth column is the Railroad Commission's reported production for the period, including casinghead gas.

Direct Examination Resumed by Mr. Morgan.

I have tried to make a comparison between the volume of withdrawals per pound drop during the three one-year intervals—or rather they are not one year intervals—the three intervals of August 1, 1935, to January, 1936; January 1, 1936, to July 1, 1937; July 1, 1937, to August 1, 1938, using the same mechanics as were used by Mr. Brown in computing his estimates on what he called the pressure decline method, applying that to the Railroad Commission's weighted pressure, using area alone.

Mr. Brown, in applying what he called his pressure decline method, used total production up to July, 1938, which I believe was something over five trillion. The total production I used was six trillion, nine hundred billion; and the figure which Mr. Brown used as the withdrawal from the dry gas field was equal to that total production of approximately six trillion, nine hundred billion, minus six thousand times the total number of barrels which had been produced up to that time. I applied the same arithmetic for the three different periods of time, and prepared a tabulation showing the result.

(Document entitled "The Pressure Decline Method as Applied by Mr. Claude C. Brown But Using Various Intervals Instead of One Date", marked Exhibit No. 51 for identification.)

265 Exhibit No. 51 shows the details of that calculation.

Taking the first line across, the withdrawals from August 1, 1935, to January 1, 1936; during that period there was production out of the Panhandle field, according to the Railroad Commission's report, of 8,738,262 barrels of oil. Multiplying this number of barrels of oil by six, we arrive at an equivalent quantity of gas of 52,429,572,000 cubic feet.

In the fourth column is Mr. Peterson's figure for total quantity of gas produced during the period, which was 263,940,459 MCF. Subtracting from that quantity the 52 million odd that was calculated by multiplying the barrels of oil by six, I arrive at a figure of 211,510,887 MCF of gas, which is analogous to the five trillion figure used by Mr. Brown in his estimation. In other words, it is the total quantity of gas produced, minus six times the number of barrels of oil produced.

In the next column I show the pressure at the beginning and end of the period corrected to absolute pressure at a depth of 2,618 feet.

In the next column we show the change in reservoir pressure during the period.

In the next column we divide the net quantity of gas, 211,510,887 MCF by the pressure drop of eight pounds to arrive at the MCF of gas produced per pound drop, which in the case of this first line is 26,438,861 MCF.

At the original rock pressure of 430 pounds per square inch gauge, the pressure in the reservoir is estimated to have been 471 pounds per square inch absolute. At 25 pounds per square inch abandonment pressure at the wellhead, the pressure at the reservoir is estimated to be 40 pounds per square inch absolute. Subtracting 40 from 471 gives a production interval, you might call it, of 431 pounds per square inch. 431 times production per pound drop in pressure gives the indicated original reserve to an abandonment pressure of 25 pounds per square inch gauge at the wellhead as 11,395,149,091,000 cubic feet of gas.

Unfortunately, we had to split the period into odd intervals because we didn't have the gas production figures broken out for July, 1936. We therefore have a first period of six months, a second period of eighteen months, and a third period of a year.

It should not make any difference if the correct pressure factor had been arrived at by the Railroad Commission. It should come out identical for any of those periods. It should come out the same for any of them, as it should for any time back of the beginning or between any of them.

The actual results expressed in estimating the original
reserve under an abandonment pressure of 25 pounds
266 gauge at the wellhead ran from eleven trillion up to
something over twenty-nine trillion. It was twenty-nine trillion plus for the period ending July, 1937, and 22 trillion 882 billion for the period ending August 1, 1938. In this computation I followed exactly the steps followed by Mr. Brown without applying a recovery factor.

(EXHIBIT NO. 51 for identification, offered and received in evidence without objection.)

Questions by the Examiner.

The figure of 11 trillion might be more in line with the 29 trillion if I had taken into account the wastage in the first period. That would tend to bring up the thing. What we were using here were Mr. Peterson's production figures, in which Mr. Peterson has attempted to make some correction for that wastage. If more gas were produced, it would bring it up closer in line.

Cross-Examination Interposed by Mr. Slaff.

By saying that the figures were not broken out for the period ending July, 1936, I meant no total had been brought out to that period. The production in Mr. Peterson's tables was not split in the table for the year. In Exhibit 50 I used the Railroad Commission's figures, which had monthly figures, which can be calculated to any of my dates.

Direct Examination Resumed by Mr. Morgan.

If the correct ultimate equilibrium pressure could be arrived at in the manner used by the Railroad Commission of Texas, if we assume that that method would give the right result, we would get the same results if we used 20 pound bands as if we used 50 pound bands. I expect the same thing would be true if we used bands of 5 pounds or 100 pounds, or any other size. This physical law gives no effect to the coloring on the map at all. You could use intervals of 10, 50 or 100 pounds, or you could use the whole territory, just as logically so far as the results you could hope to obtain would be concerned, and you would be just as likely to get the right answer.

I have been asked to explain the difference between the terms porosity and permeability as those terms are used in the profession. Porosity is simply a measure, expressed in terms of percentage of the bulk volume of the volume of voids or pores. That is, if we had a barrel full of buckshot, it has a bulk volume of 42 gallons of buckshot. We can pour into that barrel quite a lot of water. We can pour in enough water to fill up the voids, and we can probably pour in about ten or twelve gallons of water. Say that we could pour in ten gallons of water into our 42 gallons of buckshot. Our porosity would be 10 divided by 42, or the porosity in that case would be approximately 24.8%.

We can distinguish, and do distinguish in the case of reservoir rocks, between total porosity and effective porosity. The analogy there would be to fill our barrel up with hollow glass balls. The total porosity in that arrangement would be very high because if we were to crush those balls down we would have very little solid material in them.
267 We might have a total porosity in such a case of as much as 99%, as we have in volcanic ash, or pumice stone, which is stone so light that it will float. However, in the case of this arrangement of glass balls, all the water that we could pour into our barrel would be enough water to fill the space between the balls, and that would measure the effective porosity. It would probably be on the order of 20% to 25%.

Permeability is something else. Permeability is a measure of the ability of a porous medium to permit the passage of fluid under a pressure differential. There is a strict analogy to permeability in the electrical field. In the electrical field we have conductivity and resistivity—conductance and resistance. One is the reciprocal of the other. Permeability is the reciprocal of the resistance of a formation to the flow of fluids, just as conductivity in electrical terms is the reciprocal of the resistance of a conductor to the flow of electricity. The term fluid means anything that will flow. It includes gas, oil or liquid.

Questions by the Examiner.

In response to the inquiry of whether when I talk about the permeability of gas I mean anything about the velocity with which the gas flows through, I will say that the thing applies as long as you have what is described as a steady or streamline flow. When you get into a turbulent flow your losses increase. The energy in an electrical system is thickly analogous. As long as there is a steady flow below the turbulent speed your loss is small. When you get into the turbulent flow you have losses which result in increased consumption of energy; but the electrical analogy would be strictly true as related to pressure conditions.

The time it takes gas to soak through a porous layer has nothing to do with the permeability because the only thing that makes it soak through is the pressure. Permeability does not vary with the pressure; it is the fundamental unit. Permeability multiplied by pressure is the measure of the velocity.

When you say permeability or impermeability, you take into account the frictional character of the substance which the gas is attempting to get through. Your friction results in low permeability, just as your I^2R in the electrical field, where your loss is higher in the conductor of electricity.

You don't have a permeability factor like you do a porosity factor. The fundamental unit of permeability is based upon the rate of flow of a fluid having a viscosity of 1 through 1 centimeter cube of porous medium, and it is called a Darcy.

The gas industry has not done as much as the oil
268 industry in conducting tests as to the length of time
it takes to pass through a porous substance. In the last few years the oil industry has been studying the permeability of the formations very thoroughly, and they use gas and air as the fluids for measuring those permeabilities. There has been an extensive research on that. They do that in an attempt to determine the extent of drainage. I would not say that no work has been done in connection with the drainage of gas, but there has been much less work done in connection with gas fields.

You inquire how much of a shift in position and change of color of those bands shown on Exhibit 12, is due to gradual encroachment or spread, or density of gas and oil wells in that area. I don't know. I have been attempting off and on for months to arrive at a conclusion which would satisfy me on that point. I have constructed zone maps showing as nearly as I can determine how much gas has been produced out of wells in various parts of the field, and I have worked up that information from pressure loss figures in an attempt to work out some means of computing how much gas has come from here and there, and how much pressure drop in any area has been caused by production out of wells in each area; and how much has been caused by drainage from that area to other areas, and I don't know the answer yet.

Direct Examination Resumed by Mr. Morgan.

From my knowledge of the Panhandle field, I think there is some rather consistent relationship between the quantity of gas in place and the potential open flow of the well. I think the assumption that the area in which a 40 million foot well is located has twice the per acre reserve of the area where the 20 million foot well is located is the best presumption we can make of the relative per acre content at the present time. I don't suppose that it is rigorously or scientifically correct as to a couple of wells; but I believe on the average over the field it is pretty close to a correct relationship, and I think it is the best figure we have.

In the oil and gas business, where a new field is opened up there is always an inrush of the bold and speculative, trying to get in on the play. There is a partiality toward leases for sale in the vicinity of a big well as compared with those which may be for sale in the vicinity of a small well. The preferred acreage is that close to a big well, and it always commands a higher price than the acreage where the wells are small. This is based on experience that where you have big wells, there are the areas which make the greatest ultimate recovery per acre.

I have from time to time estimated reserves of gas in gas fields in connection with my practice. I have been using a recovery factor ranging from 80% to 85% most of the time in estimates I have made in recent years. Incidentally, most of those were on fields where the recovery conditions were more favorable than in the Panhandle. If I were going to make an estimate of the recoverable reserves as compared with the reserves in place in the
Panhandle field, I don't think I would use a recovery
269 factor as high as 90%. I have not made an estimate
of that field. I don't believe they will ever recover
90% of the gas out of the Panhandle.

In estimating recoverable reserves I have used abandonment pressures anywhere from 25 to 500 pounds per square inch, depending on the pressure in the field and upon what purpose the gas was to be used for. I have used pressures as high as 500 pounds in cases where the gas was being run into a pipeline without compression—that is, using the well pressure to force the gas through the pipeline. In that case the economics of that particular situation was such that only gas available above 500 pounds could be recovered. The matter of ascertaining the proper abandonment pressure in computing recoverable reserves is an engineering and economic question. I don't think the geologists know anything about it. For a particular use it is a question of the minimum pressure, and the minimum pressure rate of production to which the wells can be operated in the light of the entire situation involved. If I were selling gas out of the Panhandle field to the town of Pampa, I could operate my wells down to a very, very low pressure because of its proximity to the field; but with a long pipeline we can't operate to anything like that low a pressure. It is a question of the economics involved in the affairs of the particular producer whose recoverable reserves are under consideration. It is a matter of the particular setup.

Cross-Examination by Mr. Booth.

I have made an estimate of the reserves in a natural gas field; but so far as I know, none of my estimates has been submitted in any proceeding before any administrative agency or court. I believe one estimate I made on one well was filed with the S.E.C. As far as I know, that is the only one of my estimates which was used for any such purpose.

I have never testified in any rate case. The estimates I spoke of were prepared on various occasions. I don't remember all of them now. Some of them were made in connection with proposed gas pipelines. Some were made in connection with valuation of properties for loan purposes; and some, I believe, were made more or less to satisfy the curiosity of oil operators who had leases for oil production and found out they had a lot of gas in the formation. None of those estimates was made in connection with the operation of Natural Gas Pipeline Company of America or Texoma Natural Gas Company. None of those estimates entered into the conclusions which were submitted in connection with my testimony today that I know of. They are a part of my general experience; that would be the only way.

As to whether I have testified before any regulatory commission on any phase of the subject such as I have testified to today, I will say I have testified in two cases as to the Panhandle. One of those was *Texoma* v. *Railroad Commission*, reported in 300 U. S., and the other was *Taylor* v. *A. & K. Petroleum Company*. That case had to do with metering and had nothing to do with any of these subjects.

I don't believe I have ever written any papers along
270 any particular line dealing with any general subject
on which I have testified today, and I am pretty sure
I have never furnished any reports to any technical societies.

I have not made any estimates of the reserves in the Panhandle field in any connection. I have made estimates in the Cotton Valley field in Louisiana, the Dickinson field in Galveston County, Texas, the Old Ocean field in Brazoria County, and a number of others I don't remember. They have been made for various clients. Within limits, I will supply further information concerning those estimates if you desire it. Of course, it was confidential work for a client. I can tell you what it was, etc. I could supply the names of the other places where I have made an estimate of reserves.

Redirect Examination by Mr. Morgan.

I have published a good many articles in scientific journals. I wrote a book called "A Report on the Petroleum Industry in the United States," which was presented to the Cole Committee of the House of Representatives, which investigated the oil industry in 1934.

Recross Examination by Mr. Booth.

That report was prepared for a group of clients, about fifty independent operators, who employed me to prepare it. It was privately published by the Gulf Publishing Company of Houston, which is not a subsidiary of Gulf Production Company but is an independent organization.

(Letter from the Chairman of the Railroad Commission of Texas to the Examiner, dated June 1, 1939, explaining that Commission's interpretation of the terms "casinghead gas" and "gas-oil ratio", marked Exhibit No. 52 for identification. Objection by Commission Counsel to the reading of the letter into the record sustained.)

(At this point the following discussion appears:

Mr. Booth: We have a witness. In view of the fact that the company has proceeded with the presentation of its evidence, and has indicated off the record that they are going to be ready to proceed again within a period of three or four weeks, I believe, it is my opinion at this stage of the case, that except for the presentation of this balance sheet of the company, that it would break up the logical presentation of the testimony in the case if we presented very much testimony.

I just want to clear up one thing. I understood Judge

Morgan to state that they were going to present all of their testimony dealing with reserves in the Panhandle field. Do we now understand, in order that we can prepare for cross-examination of the companies' witnesses, that this is all of the testimony you are proposing to offer? If that is not a fair question to ask, Judge Morgan, I will withdraw it.

Mr. Morgan: I don't know whether it will be all or not. It may be we will have some more testimony on redirect after the rebuttal testimony has occurred. That is all we have prepared at this time. We are trying to have an analysis made of this Panhandle oil as to its solubility. If we succeed in doing that in time, we will, of course, want to offer it, but that will not disturb the due order of the proceeding here in any way.)

271 JOHN M. WOODFORD, a witness for complainant, on being recalled, testified as follows:

Direct Examination by Mr. Booth.

(June 2, 1939.)

My name is John M. Woodford. I have previously testified in this case.

I prepared Exhibit 15. In checking it I found a number of typographical or other errors in the figures shown in that exhibit. Some were found by me and the company called my attention to some additional errors. Those corrections have been put in the form of an exhibit.

(Document entitled "Errata—Exhibit No. 15," marked Exhibit No. 53 for identification.)

Exhibit 53 is the correction sheet referred to. The errors on pages 6 and 9, lines 20, 39 and 31 are typographical errors. As to page 10, the company has notified me that the correct name of the Coltexo Gasoline Company was Coltexo Corporation. The mathematical figures on page 10 were purely an error on our part. As to page 11, which is statistical, I was notified by the company that there was a duplication in the year 1932 of some 150,000 MCF of gas used in 1931 by the company which has been included by us in the 1932 figures. The errors on pages 13 and 16 were typographical errors.

I have prepared balance sheets of the company, in the form of an exhibit, taken from the company's books for the years December 31, 1934, to 1938, both inclusive.

(Document entitled "Natural Gas Pipeline Company of America, Texoma Natural Gas Company, Balance Sheets Per Books At December 31, 1934 to 1938, Both Inclusive," marked Exhibit No. 54 for identification.)

Exhibit 54 is the exhibit referred to. It may be divided into three parts.

Page 1 is a balance sheet of Natural Gas Pipeline Company of America and is supported by page 2, being a statement of the plant and equipment. The figures are recorded on the books of the company at the dates stated without adjustment.

Page 3 is a balance sheet of Texoma Natural Gas Company, also supported by a statement of plant and equipment on page 4. The figures are also recorded on the books of the company as of the dates stated without adjustment.

Page 5 is a combined balance sheet of Natural Gas Pipeline Company of America and Texoma Natural Gas Company after eliminating intercompany investments and other items. Both companies maintain general ledgers in which are recorded specific accounts, to which accounts are posted monthly all transactions summarized in the companies' general journals and other supporting records. The balances remaining in these accounts at the end of each month are recorded in a book called
272 "Monthly Trial Balance Book." From these trial
balances the companies prepare their balance sheets by grouping their accounts under various headings. The individual accounts for each of the years have been grouped in accordance with the grouping used by the companies in their 1938 balance sheet. The companies did not group the accounts uniformly in each year, and 1938 was taken by me as representing the latest basis used.

In all of the statements in the exhibit, the first column (a) is for the year 1934, ending December 31, and the remaining columns (b) to (e) are for the years ending December 31, 1935, 1936, 1937 and 1938.

Page 1 of the exhibit is a balance sheet of the Natural Gas Pipeline Company of America. Lines 2 to 6 show the balance remaining in the Plant and Investment account at book cost. The investments are Gas and Pipeline First Mortgage Six Per Cent Gold Bonds Series A, due December 15, 1946, of Texoma Natural Gas Company at par. Lines 8 to 18, inclusive, show the current assets of the company, included in which are notes and interest due from Texoma Natural Gas Company.

Line 20 represents the unamortized balance at the end of each year of the discount and expenses in connection with the companies' funded debt.

Line 21 gives the total of all the companies' assets per the books at the dates stated.

Line 23 gives the company's capital stock, 1,500,000 shares at a stated value of $2.00 per share.

Line 24 shows the funded debt of the company, which is a 15 year First Mortgage Pipeline and Collateral Six Per Cent Gold Bonds Series A, due December 15, 1946, issued in an original principal amount of $60,000,000, and in December, 1933, an additional one million dollars principal amount were issued. The company has reduced its outstanding bonds from $61,000,000 at January 1, 1934, to $46,500,000 at December 31, 1938.

Lines 27 to 34 show the current liabilities of the company, included in which are accounts, notes and interest payable due to Texoma Natural Gas Company.

Line 35 shows the balance remaining in the Depreciation Reserve account after charging to such account the proportionate part of property retired. This account is set up largely through corresponding charges to operating expenses.

Line 36 shows the excess of assets over liabilities and for the years 1934 and 1935 shows a deficit, and the remaining years show a surplus, which at December 31, 1938, was $918,791.50. The figures presented on this line agree with those presented in Exhibit 15, page 7, line 13.

273 Line 37 shows the total liabilities of the company and agrees with totals in line 21.

Page 2 is a breakdown by general ledger accounts of the company's plant and equipment, and the totals shown on line 16 agree with the figures on line 2 of page 1.

Page 3 is a balance sheet of Texoma Natural Gas Company. Lines 2 to 4 show the total balances remaining in the plant accounts of the company at book cost.

Lines 6 to 17 show the current assets of the company, included in which are accounts due from Natural Gas Pipeline Company of America.

Line 19 shows the balance remaining of unamortized bond expenses, which is being written off over the life of the bonds.

Line 20 shows the total assets of the company at the dates stated.

Line 22 shows the capital stock outstanding, represented by 10,000 shares without par value.

Line 24 presents the funded debt, being Gas and Pipeline First Mortgage Six Per Cent Gold Bonds Series A, due December 15, 1946. There were originally issued $25,000,000 principal amount of these bonds, which are deposited as collateral under the trust indenture of Natural Gas Pipeline Company of America. Since issuance and up to December 31, 1938, a principal amount of $5,350,000 has been retired.

Lines 26 to 34 show the current and accrued liabilities of Texoma Natural Gas Company and included therein are notes and open accounts due Natural Gas Pipeline Company of America.

Lines 36 to 38 show the balances remaining in the depreciation and depletion reserves after charging to such accounts the proportionate part of property retired.

Line 39 represents payments received on account of the conditional sale of a gas well to the Coltexo Corporation, the terms of which sale were not carried out and in 1937 the balance remaining in this account was transferred to income account, as will be noticed in Exhibit 15, page 9, line 9.

The figures presented on Line 40 agree with those presented on page 15, line 7, of Exhibit 15.

Line 41, or the totals shown on line 41, agree with the totals shown on line 20.

Page 4 is a summary of the plant account by general ledger accounts and the amounts shown on line 19 are the same as those shown on line 2, page 3.

274 Page 5 is a combined balance sheet of Natural Gas Pipeline Company of America and Texoma Natural Gas Company after giving effect to elimination of the investments in Texoma bonds by Natural Gas Pipeline Company of America as well as the notes and open accounts between the companies.

There is also eliminated the amount of the transportation charges paid by Canadian River Gas Company to Texoma and then paid by Natural Gas Pipeline Company of America to Colorado Interstate Gas Company, which items offset..

(EXHIBITS NOS. 53 and 54 for identification, offered and received in evidence without objection.)

Cross-Examination by Mr. Morgan.

In the preparation of Exhibits 15 and 54 I dropped two years. Exhibit 15 covers 1932 and 1933, whereas Exhibit 54 leaves off those two years. There was no specific reason for dropping them, but our chief accountant suggested that five years would be sufficient. I have the figures for the other two years available.

I have been getting these figures for a year and a half. I don't remember just when I started work on this matter. I believe it was early in 1938, or it may have been around December, 1937. I had quite a crew of men working on the matter. We completed the work about the time the Federal Power Commission men moved in.

I have the other balance sheets including those two years. They were left out because our chief accountant said five years would be sufficient.

275 (June 26, 1939.)

(Document entitled "Panhandle District Casinghead Gas Report, July, 1932, J. M. McDonald, Deputy Supervisor," marked Exhibit No. 55 for identification.

EXHIBITS NOS. 37 and 38 for identification, offered and received in evidence without objection.

Letter from defendants' witness, R. D. Parker, to the Examiner, dated June 14, 1939, setting forth a list of cases in which said witness has testified since June, 1934, marked Exhibit No. 56 for identification. EXHIBIT NO. 56 for identification, offered and received in evidence without objection.

Letter from defendants' witness, J. D. Thompson, Jr., to defendants' counsel, dated June 13, 1939, setting forth a list of items of information which said witness was requested to furnish by counsel for the Federal Power Commission and the Examiner, including table showing completion dates of wells shown on Exhibits Nos. 32, 33 and 34 and data on gas-oil ratio of such wells, marked

Exhibit No. 57 for identification. EXHIBIT NO. 57 for identification, offered and received in evidence without objection.

Document entitled "Hughes' Method of Estimating Gas Reserves, Texas Panhandle Gas Field," marked Exhibit No. 58 for identification. EXHIBIT NO. 58 for identification, offered and received in evidence without objection.

Document entitled "Reference to Exhibit No. 42," showing the completion dates of certain wells referred to by defendants' witness, Hughes, marked Exhibit No. 59 for identification. EXHIBIT NO. 59 for identification, offered and received in evidence without objection.

EXHIBIT NO. 52 for identification, offered and received in evidence over the objection of counsel for each of the Commissions to whom the Examiner granted exceptions.)

276 MELCHIOR PALYI, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(June 26, 1939.)

My name is Melchior Palyi. I have been living in Chicago since the end of 1933. I lived in London in 1933, and prior to that in Berlin, Germany. I was born in Budapest, Hungary. I obtained my final papers as an American citizen this month.

I received my college education in Hungary, and studied law at the University of Budapest. Then I started my business course in Germany, and had a business course in Frankfort and at the Munich business school and at the University of Munich. I got my Master's degree in business economics at the Business School of Munich, and my degree of Doctor of Political Science at the University of Munich. The degree in political science is more a general title covering the different social sciences. I specialized in economics and statistics. I specialized from the beginning of my study in money and credit.

Since I received my degree of Doctor of Political Science I have had partly academic and partly business positions.

In academic life I started as an instructor in Munich in 1918, and was appointed professor at the Universities of Goettingen and Kiel, and then at the graduate school of commerce in Berlin, where I became a professor in 1929.

I was invited to England in 1933 as lecturer at the University College of Oxford, and came to the University of Chicago as a visiting professor, beginning with January, 1934. Since 1937 I have been a research economist at the University of Chicago.

I have had other connections than my position of research economist at the University of Chicago during my residence in Chicago. I combine most of my time in academic and business work.

I started during the war in the external service of the Hungarian Ministry of Agriculture, and then of the Austro-Hungarian National Bank. Then I had a year's training in a western German commercial bank. Later, in 1928, I became chief economist of the Deutsches Bank. In 1931 I became the advisor, scientific advisor, of the Reich Bank, which is the central bank of Germany.

After I came to this country I was for a year connected with an investment advisory firm, and since early in 1937 I have been consulting economist to Stifel, Nicolaus & Company, an investment banking house, of St. Louis and Chicago.

277 The investment houses with which I have had connections recently are Stein & Roe, in Chicago, who are general investment advisers handling portfolios mostly of private persons, and Stifel, Nicolaus & Company, which specializes in municipal bonds. I was with Stein & Roe in 1934.

As to the phases of economics and monetary matters with which I have had occasion to connect myself in the course of my business and professional background, for twenty years I have specialized in money, banking and finance, especially along three lines. One is the theory and history of money and coinage, including problems of precious metals. Another is central banking, with which I have been also connected in a practical fashion and in which I made a close study of inflationary experiments, paper money inflations in Europe. I went through personally three major inflations and studied several others, and was incidentally also a member of the committee of the German federal government in 1922 and 1923, which had the job of working out a program of stabilizing currency during the inflation. That was a second field. The third one is banking, commercial and investment banking, in a technical sense, in different aspects of it. For example, I wrote studies about bankers' balances and international capital movements, and also about mortgage banking. I have published a comprehensive encyclopedia on banking in Germany, covering the field.

I have with me a list of my English as well as my German publications, with the titles translated. Those publications are as follows:

I. Books and Pamphlets:

1. Monetary Chaos and Gold. The University of Chicago Press, Chicago, 1934. 26 pp.
2. Principles of Mortgage Banking Regulation in Europe. The University of Chicago Press, Chicago, 1934. vii—38 pp.
3. Liquidity. Minnesota Bankers' Association, Minneapolis, 1936. 23 pp.
4. The Chicago Credit Market. The University of Chicago Press, Chicago, 1937. xvi- 448 pp.
5. Life Insurance and the Financial Frontier. Reprint from Journal of Business, University of Chicago, Vol. XII. Nos. 1 and 2, Jan. and Apr. 1939.

II. Articles in Periodicals, etc.:

1. "Adam Smith on the Continent." In the symposium on Adam Smith published by the University of Chicago, 1927.
2. "Internation Capital Movements." Encyclopedia of Social Sciences. (N. Y.)

278 3. "International Aspects of Problems of Production and Trade." The American Economic Review, Vol. XXV, No. 1, Supplement (March, 1935), pp. 45-62.

4. "Prospects for Inflation." (The University of Minnesota Press, 1936), pp. 12-18.
5. "The Liquidation of an Induced Prosperity." Pamphlet published by Stifel, Nicolaus & Company, Inc., Chicago, Oct. 1937.
6. "Bank Portfolios and the Control of the Capital Market." Journal of Business, University of Chicago, Vol. XI. No. 1. Jan. 1938.
7. "Present Federal Reserve Policies." Journal of Farm Economics, Vol. XX. No. 1. February, 1938.

8. "Inter-Bank Balances." Pamphlet published by Stifel, Nicolaus & Company, Inc., Chicago, March, 1939.

9. "Why Gold?" Pamphlet published by Stifel, Nicolaus & Company, Inc., June, 1939, Chicago.

10. "Is the Liquidity of Banks a Hindrance to the Rate of Prosperity?" 1934 Group Conferences, Illinois Bankers Assn., pages 22-30.

11. "Open Market Policy and Totalitarian Control." The Review of Politics, July, 1939.

III. Book Reviews and Minor Publications:

1. Numerous Book Reviews in the Journal of Political Economy, the American Journal of Sociology, the Journal of Business of the University of Chicago, Journal of the American Statistical Association, etc.

2. Numerous Minor Pamphlets published by Stifel, Nicolaus & Company, Inc., Chicago.

3. Shorter Articles in Magazines and Newspapers—Manchester Guardian Commercial, Daily Telegraph, The Financial Post (Toronto), etc.

Dr. Palyi's Publications in German.
(Titles Translated.)

I. Books and Major Pamphlets:

1. The Monetary Theory of the Romantic School. Dissertation, Munich, 1916.

2. The Political Theory of Money. (1922.)

3. International Capital Movements of the Post-War Era. (1926.)

279 4. The Balance of Payments of the United States. (1929.)

5. The Economics of Gambling. (1929.)

6. Encyclopedia of Banking. (1932.)

II. Major Articles in Scientific Periodicals and Symposiums.

1. The Economic Organization and Foreign Trade of Soviet Russia. (1922.)

2. What is Inflation? (1923.)

3. Unsolved Problems of Monetary Theory. (1925.)

4. Capital Movements and the Balance of Payments. (1926.)

5. The New Agrarian Revolution in England. (1926.)

6. A Century of Prices and Real Wages. (1928.)

7. The Problem of Inventories. (1929.)

8. Financing the Reparations by Foreign Loans. (1928.)

9. Central Banks and Commercial Banks. (1930.)

10. Historical Survey of the Theory of International Trade. (1930.)

11. Coinage and Paper Money. (In the German Encyclopedia of Social Science, 1931.)

III. Dr. Palyi was Editor of the following German Works and Periodicals:

1. Max Weber's "Economic History." (1923.)

2. "The Present State of Sociology." Symposium, two vol. (1924.)

3. "Post-War Economics, Theory and Policies." 2 vol. (1925.)

4. Series of Economic Textbooks published by J. Springer, Berlin, 1928-32.

5. "Monetary Economics." Monthly publication of the Institute of Currency Research, Berlin, 1932-33.

IV. Numerous short articles and book reviews in scientific periodicals, financial magazines and daily newspapers.

As concerning Natural Gas Pipeline Company of America and Texoma Natural Gas Company, I was asked to
280 make a study of the factors which were likely to influence the general price level and the level of costs affecting those two companies within a period of, say, thirteen years. I commenced that study about a year ago. I have been working on it, with interruptions, for eleven months.

The general price level is determined by a number of factors, among which the most important, and those to which I have given particular attention, are, first the gold production and gold reserves; second, the credit volume in this country and abroad; third, the velocity of circulation of money and of bank deposits; fourth, governmental policies affecting the monetary and credit system directly, such as devaluations or revaluations, and credit policies, including budgetary deficits or balanced bugets, and similar things.

Furthermore, factors on the side of the production of goods, commodities, such as technological progress, volume of production, and results of general policies, not particularly monetary policies, but general policies, ranging from national policies in the field of labor and other fields to international policy, such as war and peace.

With all reservations one has to make in one's price predictions and such things as future price trends, I made the attempt to evaluate and estimate these different factors, and came to the conviction that the period of fifteen years is long enough to make it strictly probable that a major rise of prices is most likely to happen.

Discussing first the question of monetary gold reserves, may I start by saying that we are living in a world in which the monetary systems of the leading countries are based on gold, and that the volume or size of the gold base is a very important factor in determining credit volume and thereby the volume of purchasing power of each individual country. The volume of gold available for monetary purposes has risen in an extraordinary fashion.

The rise of gold production started after the war in 1922, was accelerated somewhat in 1926, and then took a rapid pace about 1930. Between 1929 and 1939 the annual gold production in ounces doubled. The annual worth of gold production in terms of dollars, due to the devaluation of the dollar, trebled. By devaluation of the dollar, I mean, of course, the change in the gold content of the dollar; that is, the fact that instead of minting some 20.7 dollars out of one ounce of fine gold, gold of standard fineness, since February, 1934, the American mint is supposed to mint 35 dollars out of the same quantity of gold. That was a proclamation of the Federal Government changing the content of the American dollar early in 1934, so that an ounce of gold today represents 35 dollars instead of 20.7 dollars.

With respect to the increase of the annual produc-
281 tion of gold, I will state that the increase in the twenties was minor and largely accidental. It took place largely in South Africa. The reason was that the gold ore deposits in the Rand Mountains, which belonged to the South African government, had not been exploited before for bureaucratic reasons. It took a long time before mining got under way. There was, however, a minor increase in the twenties only. The major increase in the thirties is largely due to the depression and the devaluations. The depression lowered the general price level all over the world. The devaluation raised the number of monetary units which are mined out of an ounce of gold. The two together had the consequence that gold production became

much more profitable. The gold producer, who pays practically the same wages to labor, or in some countries even lower wages than before 1930, receives a higher price in dollars or pounds sterling for his product.

In addition, his product commands a greater amount of commodities and services in the markets of the world. His purchasing power rises, both in money terms and, in addition, in goods terms.

Therefore, a great incentive has been given to gold production, with the result that gold production has been stimulated all over the world. Old mines, or so-called marginal mines, marginal shafts, which have not been used before, have been opened or have been restarted again. New fields have been discovered, especially in Russia, in Australia, western Australia, New Guinea; to a lesser extent in Japan, China, Brazil, and also in Canada gold production has been stimulated. Furthermore, technological progress has been applied to a greater degree to gold mining and dredging, since it is remunerative to do so.

The net result of all this has been a rise in the annual production of gold, which I mentioned. The annual gold production amounted in 1929 to nineteen million fine ounces, and in 1938 to 36.7 million fine Troy ounces. It has practically doubled. The growth was from 19 million to 36.7 million ounces, which is an extremely unusual rise in gold production, and only paralleled in modern history in similar lengths of time during the nineties and at the beginning of the century; that is, shortly after the discovery of the Transvaal mines.

Most of this increase in the supply of monetary gold comes from Russia, Canada, the United States, and Australia, together with New Guinea. South Africa used to produce in the twenties half of the world's annual output. Now it is only responsible for one-third of the annual output. Its production has risen only slightly. The increases are in Russia, the United States, Canada, and the other places I have just enumerated, and were due to the causes which I have just mentioned.

Another substantial source of monetary gold supply has been in the last six or seven years the eastern gold hoards.

India and the rest of the Far East used to hoard gold
282. and used to absorb annually, for example, in the
1920's, on the average something like 70 million dollars worth of gold which went into private hoards of all

kinds. From 1932 until 1939, about one and one-half billion dollars worth of gold came from these sources to the world markets because of the rise in the gold price in terms of pounds sterling, and combined with the fact of unfavorable balance of trade in India and China, and with the lack of British capital flowing into those countries, induced or compelled the Indians and Chinese, and so forth, to give away major or minor parts of their gold hoards, and so the very unusual thing happened—very unusual in the entire history—that such an amount of gold reappeared which was supposed to be buried forever in those eastern hoards, and reappeared on the London gold market and went into monetary uses.

Furthermore, a minor addition to the monetary gold supplies came, curiously enough, from the so-called industrial use of gold, from the arts, which formerly absorbed a minor portion of the annual gold output. Since the depression the process has been reversed. Instead of absorbing gold, the arts gave back gold; that is gold in the form of ornaments or other forms has been melted down and returned into the monetary systems. This was partly due to artificial political measures, such as in Germany, Italy, and in similar countries, and, as in Poland, where the appeal was to the patriotism or other motives to make people hand back even their rings and other ornaments to the government. Partly as a consequence of the depression, gold in the form of jewelry lost value. Gold in the form of coins, that is, of money, gained value, purchasing power, so it became remunerative to turn the gold from the industrial into the monetary use.

The normal amount was, for example, in 1929, 25 million gold dollars, which was taken off the annual output for non-monetary use of this country in 1929. In 1934, which was a record year of back-flow from industry into the monetary use, that back-flow in this country alone amounted to 62 million dollars in terms of the new dollar.

I have prepared a graph or chart, showing the annual growth of the monetary gold supply. It covers the period from 1926 to 1938, inclusive, and shows the total addition to world gold supply, the South African production, the other than South African production, the changes in eastern hoards, and the flow into and out of industrial use in the United States.

(Document entitled "Sources and Annual Growth of

Monetary Gold Supply (1926-1938)," marked Exhibit 60 for identification.

Document entitled "Annual Growth of Monetary Gold Supply in the World, 1926-1938," marked Exhibit 61 for identification.)

Exhibit 60 shows that from 1926 the total addition to world gold supply, that is, production plus addition from other sources, has risen from about 18 million ounces a year to about 36 million ounces a year.

The most important part of these supplies consisted of what is called on the chart "Other World Production," which accounted in the first year for about half of the total addition and in the last year for about two-thirds. South African production was about one-half of the total
world production in the first year, but has only risen
283 by about two million ounces in the twelve-year period,
so that its role at present is much slighter than it used to be—its apparent role, I should say.

Eastern hoards appeared for the first time in 1931. 1932 was the year of the greatest amount of addition from that source to the monetary gold supply. From then on the contribution of the Far East and of India declined.

A minor amount is represented by the curve "Industrial Use," which until 1931 meant a diminution of the world money supply. That amount was taken off every year, an amount averaging something like one million ounces. From 1931 on, with the peak in 1934, the industrial use, as I mentioned already, adds to the annual gold supply for money gold purposes.

Prior to 1931, the eastern hoards would have been negligible. They are shown in what I call a flow-out. I did not have the precise figures about them, so I did not put them in. It is a little difficult to find out how much gold the Hindus and Chinese and these Orientals put in circulation. The figures on eastern hoards from 1931 on are very precise figures, because they represent the outflow from India, China, Egypt, the Straits Settlement, to the London gold market.

Cross-Examination Interposed by Mr. Slaff.

Exhibit 61, merely gives the data and the sources from which Exhibit 60 was compiled, except that it adds one factor that is not shown on Exhibit 60, the last column representing the total monetary gold reserves in central banks and treasuries. That is a factor I intended to mention later on and which I put in the same table for the sake of convenience.

I haven't the figures showing the Oriental hoards for the year 1938. As to the flow-out for the years 1937 and 1938, the Director of the Mint has zero for 1937—that is, no flow-in or flow-out—and for 1938 I have not seen the figure. The figure for 1938 is not yet available because the report of the Director of the Mint is not out yet. The latest figure I have seen was zero, which means plus or minus or an amount so small that it is practically zero. I have no objection to adding that to Exhibit 61.

Of course I have not the figures here, and therefore it is not authentic, but I am saying this from memory. The reason I did not put it on is probably because I did not have the figure reliable enough. I can review that figure when the Director of the Mint comes out with the report in June, which will be in a few days, and I can easily procure that figure for 1937 and possibly for 1938. I would like to verify it from the new report.

(EXHIBITS 60 AND 61 for identification, offered and received in evidence without objection.)

Direct Examination Resumed by Mr. Morgan.

As to whether, in my opinion, the production of monetary gold at the present rate will continue, increase, or decrease over the next twelve or fifteen years, my judgment is that the future supply of gold is a question
284 which cannot be answered with absolute certainty,
but for the most important single mining source, for South Africa, very good knowledge is available. The estimates are that South Africa can maintain the present rate of production for at least about twenty years to come. As to other countries, the knowledge of the sources of production is less definite; but, on the whole, for example, in the next important countries like Canada and United States—important for gold production—it is also pretty well known that for a number of years the present rate of gold production could be maintained. On the whole, there is no reason to believe that the gold ore reserves of the world that would be available would not be

sufficient for at least another ten years for the same amount of annual production as at present.

Furthermore, there is one more factor in the situation which I did not yet mention, namely, the South African production policy. In 1932-1933, under the pressure of the South African government, the leading mining interests, the five big corporations and the few minor ones in South Africa got together and agreed on a so-called conservation policy, according to which they are not using at present, since that date, their so-called high-grade ores. They only produce gold from low-grade ores. Just as a figure to indicate this, the average gold content of the ore produced in South Africa has declined very substantially in these years, namely, from 5.844 pennyweight per ton of ore milled, which is abbreviated Dwts., in 1933, to 4.460 pennyweight in 1937, the last year for which I have figures. In other words, the quality of the ore which they use is 20% lower now than in 1933.

The reason for this policy is that they figure at the present cost of production, which is slightly lower than in the twenties, and at the present high price in money terms for gold per ounce, they get sufficient for their gold product to make it worth while to produce the low-grade ore. If, for example, the value of the pound sterling—they sell always to the London market and count in pounds sterling—should go up again, the gold content of the pound sterling should go up in the future, then it would not be worth while in the future to produce the same low-grade ores, and, therefore, they preserve the high-grade ores until such time to come when it may not be remunerative to attack the low-grade deposits. Consequently, the conservation policy, from the point of view of the question asked me, amounts to a building up of future reserves.

As to whether in mining the low-grade ore they have to get out the high-grade ore too, with the result that they are loading part of the future cost of production on to this in addition, I will state that in mining the low-grade ore they do not get out the high-grade ore too. They are in different layers. They choose the layer in which they operate. However, I am afraid I am not much of a mining engineer, and cannot express myself very technically on it.

In consequence of the circumstances I have stated, I do not believe there is any major risk of a decline in 285 gold production for a substantial length of time to come, unless very radical measures are taken, such as a revaluation of the pound sterling and the dollar to somewhere around their previous gold content, and at the same time a substantial rise in the cost of production of gold, which would make it absolutely unremunerative to produce most of the gold presently produced. Personally, I do not believe that such radical measures would be taken or even contemplated by any government, unless to offset a very substantial rise of prices, but then the rise of prices would have occurred already, and it is a question whether such rise would occur or not.

The history of government policies concerning the devaluation and then the reviving upward of gold is that devaluations, or what they used to call depreciations of currencies, occurred many times in history. The coin was clipped or otherwise its precious metal content diminished many times in every country. In modern times it did not occur in the 19th century. It did not occur here or in England. In England, as well as in this country, they went off the gold standard and permitted a depreciation of paper money in circulation in war times, such as the Civil War, the Napoleonic Wars, and the World War; but in Great Britain since 1715, when Isaac Newton introduced the foundations, as Master of the Mint, of the present gold standard, no devaluation for other than war periods occurred previous to 1931, or for over 200 years. But rare as such devaluations are, revaluations in the opposite direction, raising the gold content of the currency, are still more unusual, or occur still more rarely.

Minor efforts have been made by modern governments to revalue the gold content or increase the gold content of the monetary unit. For example, Great Britain revalued her pound sterling by about 5% between 1919 and 1925, when she returned to the gold standard, but those are very minor and do not affect substantially the general price level or prosperity, and even that created terrific political trouble in the country. Major revaluations practically never occur, and never have occurred, so far as I can recollect from my own studies, since the days of Queen Elizabeth, and there was only one example of a major revaluation in Europe and that was the Czechoslovakian experiment in 1919, when finance minister Rasin, who inherited, of course, from the Austro-Hungarian monarchy their monetary system, tried to re-establish a new currency by raising substantially, I think, some 25% or so the gold content of the circulating paper money. He got away with it, but they shot him. And that is the only case I can recollect in the last 250 years.

That is not a very good precedent to cite to the powers that be. I do not know any movement in this country or in England of any importance or size, except a few academic individuals, who would advocate at present the substantial revaluation of the pound sterling or of the dollar, while very substantial movements exist which advocate further devaluation. The price trend when the Czechoslovakian experiment was tried was a rising price trend—a post war rising price trend. In the depression Rasin would never have made the attempt.

286 Passing now to the relation of gold and the annual increment of monetary gold to price tendencies, in the normal course of events, of course, the effect of increasing gold supply on prices is not a direct one. The direct effect under modern conditions when gold does not circulate and when many times the volume of gold circulates in the form of credit money, such as paper money or bank deposits, the direct effect does not amount to much except to the extent that the gold producing countries become richer and more prosperous and thereby represent greater demand for international commodities. In South Africa, for example, a great wave of prosperity exists at present. 75 to 80% of the annual exports consist of gold. In Canada, 20% of the last year's exports consisted of gold. So far as these factors go, they are a direct but very unimportant influence on the general price trend. The important tendency of influencing prices is through the indirect one of affecting the credit system. The credit system in each major country at present—I shall have an opportunity, perhaps, to discuss the countries and possibilities where that is not the case—is based on gold; that is, the influx of gold automatically expands the currency basis and the credit system, either in the form of more notes put into circulation or more bank deposits put at the disposal of the deposit owners who, in turn, can dispose of the notes or deposits for purchasing commodities or services, which in turn represent the rising

purchasing power and cause the subsequent tendency toward raising prices.

The increase in the monetary gold supply brings about the results I have stated in this way: Referring to this country, what happens is this: suppose somebody from London makes a deposit in a New York bank. He has to make it in dollars. The dollars are not available on the London market, consequently he has to send gold over. The gold on arrival is deposited by the New York bank in the Federal Reserve Bank of New York, which hands it over to the Treasury, which in turn buries it in Fort Knox, Kentucky. The Treasury hands over to the Federal Reserve a gold certificate, which represents a gold reserve of the Federal Reserve. The bank receives a deposit, a balance, at the Federal Reserve. That balance is as good as cash, as legal money. The situation now is, after the receipt of that deposit, the New York bank has an obligation to a customer; say, in London, and at the same time has the same amount on deposit with the Federal Reserve. The New York bank is under legal obligation to keep at present 22½% legal reserve for the $100 deposit; 77½% are free, so to speak. The New York bank may want some additional so-called excess reserve, say, another 22% or 25%, or a similar amount, but that still leaves the New York bank this 50% of the one hundred dollars deposited with it available for whatever purpose. If these deposits grow, the New York bank is likely to feel that it has to do something with them, according to the market situation, or the capital and money market, according to circumstances, and to the value of such deposits it will sooner or later lend money or buy bonds, which amounts also to lending money, and thereby put the money into circulation.

In short, at least a substantial part of that deposit
287 will sooner or later become a volume of purchasing
power, an amount affecting the demand for something in the country. If it buys securities, the seller of the security will in turn receive a deposit and will be in the same situation as the bank was before. He will either deposit with another bank or the same bank, or will himself buy something, such as a security, until in the long run, at some point, to some extent, somebody is going to buy commodities with a substantial part of that money.

We have received in this country something like ten billion dollars worth of gold since early 1934—roughly, ten billions. It is a little more now, approaching eleven billions. This amount is represented by deposits in the commercial banks of the country, almost entirely check deposits. Those deposits, half of them or more than half of them, permit the banks to give credit and thereby to add further to the deposit volume of the country. In other words, the influx of gold does not only automatically create deposits, but also permits the creation of more deposits in so far as the banks proceed to use the additional lending power which the free part of the deposited money gives them for expanding the credit volume. Credit expansion—that is the short result—is the necessary consequence under all the circumstances of a major and lasting gold influx.

I am speaking of the present situation of the 1930's. In the normal situation, money coming in and deposited with the banks is quickly used. That is, the banks do not keep major excess reserves which amount at present to over four billion dollars. They represent out of the ten or more billion dollars of total reserves with the Federal Reserve banks some four billion or so, which are excess reserves. This is a very abnormal situation as compared with the twenties. In the 1920's the American bank system as a whole had no reserves at all. It operated on a margin of credit borrowed from the Federal Reserve system. At present the banks do not borrow at all from the Federal Reserve system, but deposit four billion dollars more than they should deposit, according to legal standards, which legal standards have been doubled since the depression. On the whole, therefore, we live under very extraordinary circumstances compared with the twenties. Our potentialities of credit expansion have been cut down very substantially, and in addition the banks are very reluctant, as is everybody else, to make use of their funds.

Questions by the Examiner.

The legal reserve requirement for a check deposit was not quite doubled: It was 12% until 1933, and until 1936, as a matter of fact, and that has been double to 25%, and now it amounts to 22½%. That is not quite double. I just roughly said doubled. The Banking Act of 1935 permits changing the legal reserve requirements for commercial bank deposits in a range from 100% of the previous reserve requirements to 200% of that requirement.

I am using so many figures by heart that I am not precise. 13% was for the Central Reserve city banks. The legal reserve requirement before the Banking Act of 1935 was 13% for check deposits and 3% for savings deposits. The maximum up to which it can be raised by the Board of Governors of the Federal Reserve system is now 288 6% for savings deposits and 26% for check deposits.

Actually it amounts now to 22½%, I think, for check deposits, and, I think, 4½%, if I am not wrong, for savings deposits.

The increase of reserve requirements was based on the idea that since a discount policy ceased to operate, and we are living in an era of allegedly permanent cheap money—at any rate it is permanent for the time being—the discount rate cannot be effective if it is raised, and therefore some other method should be put into the hands of the central bank to check on an expansion of the credit system. Therefore, in 1937, when an expansion got under way, the Board of Governors of the Reserve system decided that they ought to check it, and in several steps, from 1936 to 1937, gradually doubled the reserve requirements. Then came the recession of 1937, upon which they decided that they would lower it a little again.

Direct Examination Resumed by Mr. Morgan.

You ask for the meaning of the term "legal reserve" in the banking world, and inquire whether, if a bank had a million dollars on deposit formerly, it had to retain in cash or call deposits at least $130,000, or 13% of that, and could lend the balance of that million dollars. It had to retain that amount in the form of a deposit in the Federal Reserve bank of its district. It was at liberty to lend out and extend credit for the rest. That ratio has now been raised and the amount available for extending credit accordingly diminished.

We still have an excess of inactive deposits in the banks under present conditions. I account for that in this way. The great excess available at present is due on the one hand to the influx of gold. I mentioned the fact of a ten billion dollar influx, or more than ten billion by this time. My figures refer to April, and we have had a tremendous influx in the last three months. This, plus the amount due to the gain, or so-called gain, in the value of gold by devaluation inside of this country, and some amount due to the money printing, to put it shortly, by the government. In short, it is due on the one hand to more money coming in to the banking system and expanding the currency basis, and, on the other hand, it is due to the fact that the banks do not use it, and your question boils down, therefore, to this: Why don't the banks use this excess?

They do not use it because, in a depression and under given circumstances, they are either reluctant to give credit or do not find what they regard as proper prospective borrowers for the credit which they would be willing to give. A non-expert way of expressing it would be to say the banks are afraid to loan to the man who has nerve enough to borrow under such circumstances as we have now.

On the whole, there is very little demand for credit of the kind which is regarded as a good risk from the bank's point of view, and this is due to the diminishing profit expectation on the part of the entrepreneur, on the part of the business men. There is a diminishing expectation of profit due to a number of factors, external and internal;
external, such as war prospects, a decline of interna-
289 tional trade, and the prospects of further decline;
internal, such as labor troubles and similar burdens on the minds of the persons who would be otherwise the prospective entrepreneurs and borrowers.

If the major inhibitions to enterprise which presently interfere with business activities, especially with the investment of capital in new ventures, would be eliminated —and personally, I think, though I cannot prove it, of course, that the external inhibitions are more important than the internal inhibitions in their general effect—we would find ourselves in an extraordinary situation. We would find ourselves with gold reserves and potential possibilities of credit expansion on hand as we never had in history. In the late 1920's we operated on a gold base of some four billion dollars. We would operate now on a gold basis of some 16 billion dollars or more. In the 1920's the Federal Reserve system had not gone very far in expanding credit, but still the credit extended by the Federal Reserve system amounted to some 120 to 140 per cent of the system's gold reserves. At present the credit, which the system has given only in the form of government bonds owned by the system, amounts to a small fraction of its gold reserves. In other words, the system could go on and give four or five times more credit to the banks than it has now in circulation. The banks in turn could go on and expand credit four or five times on that basis, even with the present legal reserve requirement. It would be a possibility of fantastic credit expansion and the problem would be how to check it rather than what expansion could take place.

With respect to the 1937 data embodied in Exhibit 61, I wish to state that I had no opportunity to check on it during the recess; but I am pretty sure the reason why I did not have the 1937 figure for industrial use of gold is because the Director of the Mint publishes his annual report always in June for the previous year, and does not yet have in June the previous year's figures for that item, so the latest available report, that of 1938, has not the 1937 figures. They will come with the 1939 report. That is the regular procedure. They are nearly two years behind. The data on industrial use are collected all over the world on a calendar year basis, and it takes a long time until the Director of the Mint gets from the American consular agencies from every country their reports from their respective countries showing what happened, how much gold has been consumed and for which purpose, in each country. For instance, you get the 1936 figures out of the 1938 report. The exhibit states in a footnote that the figures for industrial use were taken out of the annual report of the Director of the Mint for the fiscal year ending June 30, 1937, and that is the report which is published in 1938.

(Document entitled "Member Bank Reserves and Related Items—Ratio Chart (In U.S.A.)," marked Exhibit 62 for identification.

Document entitled "Gold, Money in Circulation, Deposits, Etc. In U.S., 1879-1939," marked Exhibit 63 for identification.)

Exhibit 62 was prepared by me. The chart on Exhibit 62 is drawn on a logarithmic scale. It indicates from year to year changes in percentage terms, that is, the percentage change from one year to the other on each of the four curves. The purpose of that chart is to show especially that the volume of money in circulation, plus net deposits, moved fairly parallel with the gold stock of the country.

290 With the gold influx, deposit volume rises. Major gold loss is accompanied by a decline of the deposit volume or of the volume of money in circulation, respectively, or the sum of the two. The reasons for this we have discussed this morning. Gold, being the basis of the currency, the influx of gold automatically causes expansion of the currency system, including the deposits.

By net deposits I mean the total deposits minus bankers' balances, because counting bankers' balances would amount to a double count. The deposit of one bank in another bank is a redepositing of the deposits which are already deposited in the first bank. Their elimination is the usual procedure for certain purposes.

You will see on the chart that from 1934 on there is a very rapid rise in percentage terms of the gold stock taking place, or rather, from 1933 on. The deposit volume does not move upwards to the same extent. The reason is that this gold stock is figured in dollar terms, which means that it includes the valuation gained on the four billion gold reserve we had in this country before the devaluation.

Most of the devaluation gain, however, is still kept in reserve and has not yet been used for expansion of the credit system. 1.8 billion are in the stabilization fund, and some four to six hundred millions of so-called free gold in the Treasury, which is just about the difference between the rise of the gold stock and the rise of the deposit volume.

You also notice that the reserve balances, that is, the balances of banks deposited with the Federal Reserve Bank, moved almost exactly parallel to the gold stock, for the reason of that automatic correlation between the two which I discussed this morning.

The conclusion to be drawn from this is that further rise of gold reserves would carry into greater volume of deposits and currency in circulation. Of course, also, a decline of gold reserves would cause contraction of the deposit volume. However, as to the latter point, it may be remarked that the decline in the deposit volume does not necessarily follow the outflow of gold, because reserve ratios permit credit expansion of the present size and even of a much greater size, even if you would lose, say, half of the present gold reserves.

Exhibit 63 was also prepared by me. It gives the figures out of which the chart on Exhibit 62 has been constructed.

Member bank reserve balances, of course, are not available prior to the reserve system. The exhibit covers a period from 1879 through the spring of 1939. The sources of the figures are stated in the footnotes numbered 1 to 18 on pages 2 and 3 of the exhibit.

Questions by the Examiner.

As to what occurred between 1915 and 1920, that 291 caused the money in circulation to show a different rate of increase, having in mind the gold stock curve of that same period, I will state that the money in circulation alone does not move parallel to the volume of gold in the country, as you notice at almost any time. Money in circulation depends on a number of other factors, too. The parallel movement is between the gold stock and the deposit volume, rather than between the gold stock and money in circulation.

Money in circulation consists of cash, essentially small change and bank notes, different kinds of notes in circulation in this country. The volume of those notes in circulation is determined by such factors as, for example, the silver purchasing policy of the government since 1933. It depends on the habits of the country in having smaller or larger amounts of cash in their pocketbooks, habits which undergo changes in time, and which are independent of the gold stock. Therefore, that curve is not responsive to the gold volume to any major extent. What matters is the deposit volume and its response to the gold volume.

Incidentally, the deposit volume amounts to some fifty billion at present, the net deposit volume, without the eight billion of interbank balances, eight or nine billions, while the money in circulation at the present is no more than seven billions. In other words, money in circulation is only a fraction of the total amount of cash purchasing power in the country. It is a minor item compared with the deposits as related to the question of the effect on the price level.

There are several factors which account for that deviation. For that deviation in those years or that period during the war, it had to do with the hoarding policies, the cash hoarding policies of that period. During the war, European nations turned to dollar notes, because European moneys started to depreciate, and dollar notes for the first time became a favorite instrument of private hoarding, and we exported a lot of dollar notes from this country into

Europe and also to the Far East. That probably explains the most of this deviation at that time.

Later the explanation is, for example, in the years immediately after the depression, or rather during the depression, hoarding in the country, dishoarding after the depression, and the silver purchasing policy of the government.

Cross-Examination Interposed by Mr. Slaff.

On page 2 of Exhibit 63 I show a figure for gold stock in millions of dollars in the first column, and then I show another figure in millions of dollars which is different from the first column on the second page. That is for the period 1914-1933. Footnote (5) refers to the $287,000,000, which is the difference between the two gold stock items. The $287,000,000 has been subtracted in the reports which are published by the Federal Reserve system in its monthly bulletin, a technical publication, which I simply follow. I don't remember now what was the reason for subtracting in those years the $287,000,000. I think it had something to do with some accounting technique for hoarded gold.
292 They may have changed their technique of accounting for gold in circulation for that twenty year period. That is something which they at some time regarded as American gold in circulation, and afterwards they decided it was not regarded as part of the American circulation, or some such technicality in statistical tabulation. For the purpose of my tabulation I took the total figures, but recorded the figures also of the Federal Reserve Board publications. That applies also to the two parallel columns of figures for money in circulation for the years 1914 to 1933.

On cross-examination I will be prepared to supplement that explanation. The curves were constructed by me from the underlying figures. I shall make an investigation as to the reason for the correction in the Federal Reserve Board figures. At the same time I will remark that I made the correction on those curves, on the gold reserve stock and the money in circulation, so the relation is not changed throughout the item.

(EXHIBITS 62 and 63 for identification, offered and received in evidence without objection.)

Direct Examination by Mr. Morgan (*Resumed*).

Down to this time I have for the most part been talking about the normal relation between gold deposits and gold stocks for monetary purposes, and deposits and circulation. You inquire whether or not the normal tendencies have been felt in their effect upon prices since the beginning of the present depression.

Prices reached their bottom in general about in 1932, the end of 1932. Since that time recovery of the prices of the so-called raw or crude materials has taken place, reaching in early 1937 a rise of about 60%, just about as much as the devaluation amounted to. Since then prices have fallen, and even now the same wholesale prices, from most indices, indicate a level somewhere around 30% above the depression low, on the average. In other words, even the level of internationally marketed raw materials, their wholesale price level, is not adjusted even to the amount of the devaluation, to say nothing about the rise of gold reserves and other elements in the situation.

You inquire why price has not responded to the increased supply or annual addition of monetary gold and the corresponding increase in deposits resulting from that increase in the monetary gold supply. It is not possible to answer that intricate question in one sentence. In the first place, the price level does not necessarily adjust itself quickly to changes in the volume of gold. The history of the price trend with reference to the rise and fall of the annual output of gold in the past is that it always lags substantially, depending also on the business cycle. If you inject into the economic system a lot of new gold at the time of a boom or upturn, you get a very quick response in the form of more boom and higher prices. If you do it at a time of depreession or a crisis, then it has no effect at all, or it takes some time before it takes effect.

Take, for example, the latest comparable period, which is extremely interesting, the period of the discovery and development of the greatest gold reserves ever discovered and developed, namely, those in the Transvaal. In 1890 the Transvaal was discovered as a gold producing country. From 1890 to 1898 the world's gold production more than
doubled, and, accordingly, the monetary reserves of
293 gold have risen very substantially. During this same
period, especially from 1892 on, a very severe crisis
took pace. From 1892 through the year 1896 prices had

fallen. In 1896, the end of 1896-1897, we turned the corner, so to speak, and the politically minded Americans ascribed this to the election of McKinley, which may or may not have had some influence. The real influence, or one real influence, was certainly Transvaal gold, probably more important than McKinley. At any rate, even after McKinley's election it took another year before prices started to rise.

From 1897 on, with several interruptions, such as during the Boer War of 1900 to 1902, during the crisis of 1907, etc., prices rose, up to the beginning of the World War, by about 50%.

Summing up, from 1890 to 1914, in those twenty-four years, the annual world output of gold has quadrupled—has risen fourfold. Prices had fallen up to 1897 and rose in the second part of that period, from 1897 to 1914, by nearly 50%.

You see by that example the lag of prices behind gold production, even under circumstances of much less interference by government and similar factors, much less of war problems, etc., existing then than exist at present.

In discussing the fluctuation in price levels, I meant the wholesale price level of raw materials or crude materials, which are virtually moving all over the world identically, except in countries with special monetary conditions, but all over the world, in the gold standard countries, they moved in the same fashion; so it makes no difference for that discussion whether I referred to the English or the American or the French prices.

As to the other factors which have tended to retard the normal and logical advances in prices that should have accompanied the tremendous increase in the annual increment of gold for monetary purposes and the consequent increase in bank deposits, and whether there are other factors than those I have mentioned, namely, the lack of confidence on the part of the banks and those who would normally borrow money for business purposes, which has caused them to lend and borrow a minimum, and the war conditions, and the other factors immediately entering into it, I will say that confidence is a general term; so is lack of confidence. It includes everything. Therefore, the question is how many things we include in that term and what are the factors which determine the existence or the lack of existence of the higher confidence or lower degree of confidence, which, incidentally, is a very weak term.

As a matter of fact, what happens in modern society is that certain circumstances, such as technological progress, growth of population, expansion of the gold base and consequent credit expansion. stimulate the enterprising imagination because they create the expectation of profit. That profit expectation creates what we call speculation, and speculative investment and speculative buying. In the first place, speculative investment means that capital values rise.

Securities and real estate rise in price, because the fu-
294 ture profits are discounted in advance in the higher
present value or the higher present capitalized value of
those future expected profits.

Furthermore, more inventories are piled up in expectation of the need for those inventories. That raises the price of commodities. The demand for commodities is further enhanced by the speculator who expects more inventory buying and, therefore, either keeps back his own inventories or adds to the fire by buying in expectation of other people's future purchases. These speculative psychological developments are the ones which bring rising prices under way.

A tremendous expansion of gold production and credit expansion, unless counteracted by war fear or depression psychology, necessarily creates such expectations. If they do not work out, it is then because other factors offset them. What are the other factors that upset these expectations of profit and the natural reaction of the speculative-minded entrepreneur? Well, there is the problem of costs, labor costs, the possibility or the expectation that higher profits will not materialize because wages might rise as much or more than gross profits. Another expectation of a negative kind is or may be the fear of higher taxes or the fear that exists that taxes may interfere with the profits; or a further expectation that international policies or national monetary policies may interfere with profit making. In other words, there are a number of expectations which, under given circumstances, offset the profit expectations naturally created by the expansion of the credit base and the credit system or the deposit volume.

That is the situation at present, and the question from the point of view of the problem we are dealing with is whether these negative expectations are likely to last. The positive expectation of monetary expansion is practically certain to last. The negative expectation may or may not last.

I am asked to assume that Europe and the rest of the world got over the war scare and resigned themselves to peace, or attained to it, and state what ought to be the reaction on prices of the economic situation as it is presented here in my testimony concerning gold reserves and deposits, circulation, etc. I would like to formulate my answer a little more general than the question was asked.

If it comes to a major war, prices would rise almost instantly because war creates a scarcity, or rather, the expectation of scarcity. War is the greatest consumer one can possibly think of. At the same time war interferes with production as well. If you consume much more than usual and produce much less than usual, you are bound to have rising prices. Therefore, war always creates rising prices. That most certainly occurred in connection with the World War. The tremendous rise in prices during the World War was the outcome of the war situation. It had nothing to do with gold production. Gold production, as a matter of fact, went down during the war.

If, on the other hand, a settlement of the European
295 issues can be arrived at, and the Far Eastern issues,
and the danger of a major war is practically eliminated, then the consequence would be (a) an elimination of a factor which inhibits capitalists from investing money, and money investing means demands for goods and for labor, and means that it has a price-rising tendency; and (b) it would also mean restoration of normal or more than presently normal channels of capital movement and the international exchange of goods and services, which in turn would also mean greater demand for goods. In short, the result would be again, even more than previously stated in connection with a possible general war, an upward tendency of prices.

The only case in which the international situation interferes with rising prices, and in which it depresses the general price level of the world, is the case which exists at the present time, namely, a case in which there is no war and no war scarcity of commodities, and there is no peace, and no peacetime normal exchange of goods, no peacetime normal possibility of investment.

That is a thing which, from the viewpoint of an economist, is very unlikely to obtain for long. As a matter of fact, both parties to the game, if it may be reduced to a basis of two, are far progressing in the direction of an economic breakdown, and therefore they are not likely to carry on without either going actually into war or actually making peace.

Cross-Examination Interposed by Mr. Slaff.

By both parties, I mean, of course, the two major groups of powers—the so-called Facist and the so-called democratic powers. I am speaking of the old world. Of course, I must be somewhat indefinite, because it is possible that Japan may step out and maybe Russia will step out; but in the main the problems of war are so interconnected on the two sides of the old world that if there is peace on one side of it, there is likely to be peace on the other; and the same holds true for war as well. I am speaking of a grouping on the one hand of Germany, Italy, Japan and their satellites, and on the other hand of England, France, possibly Russia, and their satellites.

Direct Examination Resumed by Mr. Morgan.

(Document entitled "Wholesale Prices and Index of Gold Production, 1790-1937," marked Exhibit 64 for identification.)

Exhibit 64 was prepared by me. The figures are all easily and generally available. The chart is intended to show the development of prices on the one hand and of gold production on the other hand. The price indices are taken from the English so-called Sauerbeck index and the American Bureau of Labor Statistics index, both wholesale price indices. The most generally used data on the annual gold production are those of the Director of the Mint of the United States, which I use. They are regarded as the most reliable figures, and I merely translated them into an in-
296 dex number by using the decade from 1851 to 1860 as
100. The figures along the bottom of that exhibit represent the years covering the period from 1790 to 1938. The figures along the lefthand side are the indices in terms of 100—that is, in multiples of fractions of 100, showing in percentage terms the rise or decline of the price level and the gold production respectively. They are relative figures.

I will now explain that exhibit and what it discloses. The comparison between gold production and international indices—I call them international because they refer to internationally marketable articles, especially the Sauerbeck index, and largely also the Bureau of Labor index—is not very valid for the period before 1870, because before 1870 or 1873 very substantial parts of the world were still on the silver standard, or a combined gold and silver standard, and consequently the comparison is vitiated through the volume of silver, silver production, and similar figures. The discussion, therefore, is not very fruitful for those periods.

If you look at the figures from 1873 on, practically the whole of Europe turned to the gold standard. England was already on the gold standard then; so was the United States, except for the period of the Civil War and the subsequent period of greenbacks. You will see that the index of gold production shows a decline which reaches the bottom in the early 1880's. The decline of gold production follows after a period of substantially rising prices in the previous two decades. You must go back two decades that the prices have risen, in the period from the end of the 1840's to the beginning of the 1870's, which rise was very substantial, and following which gold production has declined. The decline of gold production goes hand in hand with a very substantial decline of prices. Then the prices declined and reached the bottom in 1896 or 1897. The gold production already turned the corner in the late 1880's, and especially from 1890, with production in Transvaal, begins to rise rapidly.

The tremendous rise of the gold production, a fourfold rise, virtually, is followed a few years later by a gradual rise of the world market prices.

In 1914 the war started. Two things happened. One is that prices jumped up without any relation to the amount of gold production. That is the war scarcity situation. Gold production declined because of the high cost of the production of gold, which makes it unprofitable to produce gold except in the very rich mines, very high-grade ores. The bottom of the decline in production of gold was reached in 1921. That is at the same time when the price situation changes.

The prices have risen in spite of falling gold production. Then the price situation changes very substantially after the war. Prices decline and gold production starts to rise. Gold production rises slightly during the twenties, and in the thirties rises so that we have no place on the chart to express it. The words "To Infinity" express that there is no place on the chart for it. It would go up to over 297 600. In other words, we would have to add about the same size paper to express the rise in gold production.

The apparently unusual thing that happened in this decade is that in spite of this rise in gold production prices continue to fall. They fall in the long run. All prices have been falling, and they go on falling in spite of the tremendous rise of gold. That appears unusual except that we have that in the long run period as characteristic of the relationship between gold and prices. That relationship is only a long run situation because so many factors enter into that situation that the two do not adjust themselves except in such long periods as one or two decades or longer. But, even so, even in terms of historical experience, this is an unusually long period of rising gold production being paralleled by falling prices. I account for that by all the factors mentioned before.

Cross-Examination Interposed by Mr. Slaff.

The Sauerbeck index is one commonly used and therefore I did not note down the base year. I think it is about 1870. It is quoted in the London Statist every week. It has been so commonly used for sixty or seventy years I did not refer to or put down the base here. I will supplement that figure.

As to why I did not cast these on to an equivalent index—in other words, use the same period for all three lines as 100 so that the lines would follow more comparably—I will say that I took them as they exist. They are the most popular indices, the most popular American price index and the most popular English price index. The gold production index I took has as the base years the first decade for which I took these figures. I don't think it makes much difference, however, in the long run. I think other statisticians would agree on that—that the benefit of the chart would not be influenced to any major extent by the difference in the base year. It would be an easy thing to recast them to 100, using any year as 100. You would get the same type of relationship between the curves.

The Bureau of Labor Statistics is from the Bureau of Labor in Washington. It is a wholesale commodity price index of the Bureau of Labor. It is called Bureau of Labor Statistics. I assume it is a statistical bureau, a statistical department of the Bureau. They have computed different indices. They have a short run index, for short periods, which is a monthly index. This is a yearly index which goes back a long period, and which is based on the decade of the nineties. I do not think the long range index base is 1926 as 100. I may be wrong on that, but I don't think so. I did not construct this index number, I just took it.

Direct Examination by Mr. Morgan (Resumed).

The legend "Bureau of Labor Statistics Index (1891-1900 equals 100)" means that the average of those ten years 298 is taken as the base, as equalling 100, and the price fluctuations of each year before or after that period is expressed in percentage of that 100. That is the explanation of the next similar notation under the "Value of Gold Production Index." The relationship remains the same no matter what base is used, provided it has the same figures.

Questions by the Examiner.

The Sauerbeck index is one constructed in England by a man named Sauerbeck. I think it began in 1860 to 1870. It is an unweighted wholesale commodity price index, and is not adjusted for any particular effect. It is a very simple index. They did not discontinue it between 1912 and ....; but I discontinued it on the chart for the reason that it jumped so high due to unusual inflation in England that it jumped up through the roof. There was an inflationary price situation in England. England was off the gold standard and prices went up for everything.

As to how the value of gold production was determined by this index, I point out that gold production is simply taking the amount of gold produced, translated into dollars, up to 1934 at the old price, and from 1934 on at the new price. It has been corrected to show the devaluation. It is not in ounces; it is in dollars.

(EXHIBIT 64 for identification, offered and received in evidence without objection.)

Direct Examination by Mr. Morgan (Resumed).

I have said that wages enter into the price level. The wage problem comes in in a two-fold way in the problem of the study of general price levels and their future possible development. One is the question of political influences, including bargaining organization of the labor market, and their effects on the wage level, or rather, on the labor situation in general.

In that connection my point was that labor problems, which are more than wage problems—they are problems also of labor efficiency in general and similar issues—are at present one of the problems pertaining to future profit expectations of the entrepreneur, and one of the reasons why the velocity of circulation of deposits is as slow as it is, very much below what it used to be. That is one aspect of the wage problem.

The other aspect of the wage problem comes up in a different connection. Discussing and analyzing price trends, one comes to the question of how far volume of production and its expansion, plus technological progress, would affect the price level, and how far expanded volume of production and growing technological progress could and would offset rising prices.

In other words, suppose that inhibitions would be eliminated and that the rising gold volume and credit volume should work themselves out in the form of greater expectations of profits, thereby stimulating speculation, and carry into rising prices. Could such rising price trend be offset either by more production, that is, better utilization
299 of the existing plant and expanding plant on the one hand, and by technological progress, permitting more production.

I am asked whether I have taken into consideration the thought that by improved machinery man-power is dispensed with and production incidentally increased, and that this tends to bring about unemployment of men and depreciation or fall in the prices of the commodity used as a result of these mechanical improvements, commonly referred to as technological improvements.

Of course, every analysis of price trends would be very superficial if it did not take into account such an important element. The theory just stated is very widespread and has very great influence in many respects. I am discussing it, of course, in terms of a longer period, such as a ten or fifteen year period, and in terms of that longer period I would like to state very definitely my conviction that in such a period even substantial technological progress should not interfere and is not likely to interfere to any major extent with a rising price trend if such a rising price trend exists for whatever reason.

The reason for the ineffectiveness of technological progress in lowering prices is a very simple one. Technological progress creates in the first place new demands for labor and commodities, raw materials to produce the kinds of products which are used for the technological progress, and thereby stimulates prices upwards rather than downwards, at least for a while. In the second place, technological progress, inasmuch as it lowers prices of commodities which are already on the market, makes free a part of the consumer's income, which in turn is likely then to be used for purchasing something else.

Consequently there is the probability that in so far as technological progress lowers the price of commodity A, is contributes to raising the price of commodity B. As soon as a technological progress has taken place all over, in every kind of commodity within the same period, the probability is that the rising price trend in one corner offsets the falling price trend in the other corner.

And more important, technological progress does not profit the consumer very substantially in the form of lower prices. The profit to the consumer usually consists in getting some new commodity which he has not had before, or in getting a better quality of the same commodity rather than getting the same commodity at a lower price.

In the next place, the most important single factor is that the greater part of the advantage which technological progress makes does not go to consumer at all; it goes to labor. What happens in a period of technological progress in a long period is that real wages rise; that labor gets a higher share of the social product; that the consumer, other than labor itself, is not benefited in price terms directly from the technological progress to any major extent. Nominal wages rise generally very substantially in periods of progress, in periods of inventions and improvements. This rise in nominal wages benefiting labor is independent of the lowering of the cost of living, and is certainly concomitant with a rising price level.

In several important points labor gains mostly from technological progress. I have some figures at hand over a long period, showing in periods of great technological progress wages have risen in extraordinary fashion. For example, take the long run period between 1890 and 1926, the average working hours in the United States were reduced from 58.4 hours per week to 49.8 hours per week, while hourly earnings from 21 cents to 71 cents—a decline of 20% or so in the working hours and a rise of more than 300% in the hourly earnings.

That represents a rise in nominal wages, not in real wage figures. And the same thing has happened in both England and the United States, showing also in the long run gains to the laboring class.

What I am driving at is from the point of the price level the nominal wage rise offsets the decrease in other costs of production. For labor all over the country, including the kind of labor which did not have any major advantage from technological progress in that very long period of 36 years, the gain is so substantial that it couldn't be offset by a similar rise in the average productivity of the wage earner. It is not likely that the average American wage earner will produce substantially more than three times, or almost four times, the value product that he did 36 years ago.

The figures are for the manufacturing working hours and wages, and were compiled by Professor Paul Douglas in his study of wages. I did not compile the figures. I took them from him because he is regarded as a high authority. I am not sure whether I have comparable figures for 1937 and 1938. There are some figures available at the Bureau of Labor Statistics, but how comparable they are to these long run figures I can't state now.

There is a draftsman's error on Exhibit 62, which is the graph of member bank reserves and related items, in that after the year 1928, the figure "28" is repeated. After the year 1928 it should be 1929, 1930, etc. The error would make no change in the chart. It would not be necessary to change the graph in any way. The chart is correct but the numbering of the years is wrong.

I made the observation that the advances brought about by inventions, improvements, etc., do not operate to reduce wages. I explain that in this way: The main reason for rising wages in a period of technological progress is that progress creates a new demand for labor and for labor of higher skill. More labor is demanded, and labor of higher qualifications, thereby, for both reasons, raising the average price of labor.

301 When technological progress is taken place you can see, at least in the very early stages, that it does not mean to displace men or machines simply, but it means to displace less qualified men by more qualified men. We have to put in more intelligent men, technically more skilled men to do the work, even if we have to put in a less number of men. The consequence of the progress is that the volume of production increases so much that a new kind of production arises, namely, the production of new kinds of products. That in total has a double effect, more demand for labor and demand for more skilled labor.

Counsel has referred to the history of the automobile. I am not very familiar with the technical and engineering principles involved in that industry; but I would like to state that technological progress did not displace a product but added a product to the old one. We do not travel less on the railroads than we did before. As a matter of fact, the volume of traffic on the railroads is larger now than it was in 1920, but we added a new volume in the way of movement on the highways; and we thereby added a tremendous new volume of additional demand for labor. Another example of the automobile is the fact, in recent years especially, that technological progress does not necessarily benefit the consumer in the lower price, but rather in the form of higher quality.

The automobile created a demand for good roads, and it created a demand for materials to be used in constructing the good roads, for the technical services of those used in the planning and building of these roads, and for labor employed in the building of those roads. You might add the increased production and use of rubber, which was very slight before the automobile and which has become a great industry since the automobile came into existence. Also, in connection with the rubber, carbon black became widely used and became a very important commercial industry because of its use with rubber in the manufacture of automobile tires. The automobile has also had something to do with the expansion of the oil business. Prior to the automobile they used crude oil originally as a method of creating artificial light and then gradually for power; but the total volume of it used for those purposes was very slight. With the oncoming of the automobile and the use of gasoline as a motive force, it immediately resulted in a tremendous expansion of the oil business, and that great industry is founded largely upon the demand for gasoline created through this invention known as the automobile. A lot of people were provided work to furnish services to that industry; and as a result of that invention it did not follow, as a lot of people thought it would at that time, that a lot of people were put out of work on the railroads. That exemplifies very well the effects of technological progress.

I would like to say one more word about technological progress. I have here a chart and a table for Great Britain from 1850 to 1910, which was a 60 year period before the war, taken out of the book of Walter Layton, former editor of the London Economist, called "An Introduction to a Study of Prices," in which he presents three sets of figures:

average money wages, real wages, and average retail
302 prices which are more realistic than wholesale prices.

The real wages have been constructed out of retail prices with allowances for unemployment.

This is the picture he gets for the 60 year period from 1850: that prices moved twice upwards 25% above, then downward some 20% below the normal line, and came back almost exactly where they were 60 years before—that is, retail prices in Breat Britain; and if we take 100 as the average retail price in Great Britain in 1880, 98 is the average retail price in Great Britain in 1910. Within this same period nominal wages, money wages, moved up from 100 to 179½; in other words, almost double in the same period, while prices remained virtually in the long run the same. Real wages moved closely parallel to money wages, except that they are slightly below money wages, mainly because of the correction for unemployment.

I have said that retail prices were more realistic than wholesale prices. I meant that in connection with changes in wages, to show changes in real wages, and only for that purpose.

(Document entitled "Money Wage, Real Wage and Price Trends in Great Britain," marked Exhibit 65 for identification.)

Exhibit 65 was prepared by Mr. Layton. I have just made photostatic copies of the pages. The underlying data would be available in his book. It is "An Introduction to the Study of Prices," London, 1920, by W. T. Layton, and that book will be in every library.

Rising prices of commodities tend to stimulate production. The price can be looked on as a ratio between demand and supply, and the higher the demand, the higher the price; and the greater the supply, the lower the price. Therefore, one might conclude that that tendency toward increased production has a slightly offsetting effect on rising prices.

Assuming that the tendency to increase production will exist during the next ten or fifteen years. I am asked whether in my opinion the tendency will be of sufficient volume to offset the tendency of prices to rise. Theoretically, that is, merely calculating on paper without regard to human psychology, increase in production can go some way to offset rising prices; but even theoretically it cannot go a very long way, because, suppose prices started to rise at a time when the capacities, the productive capacities, are used only to a minor extent, say, 60% or 50% or less of the productive capacities are used, then under those circumstances price increases will meet an obstacle.

When expanded production at given wages begins to take place, there will be a falling cost, because the overhead per unit of output declines with the growth of that increase of production. The more you expand production from a low level, the less overhead at given wages and other prices pertains to a unit of your output, and therefore the cheaper you can sell, theoretically at least, your product.

But even in this theoretical consideration one must take into account that if the rise of prices continues, then very soon the limit is reached, because of the limit to
303 diminishing costs, and the plant comes under the law of rising
costs. From a certain level of using this capacity the overhead costs, instead of diminishing, rise; and when it reaches 100%, then a further rise in the volume of production is only possible when you expand the plant, which means a duplication of plant and that the whole overhead must be duplicated more or less, and then there is no more fall in overhead. As a matter of fact, since the new plant is not used 100% of its capacity, there is a higher unit overhead than there was before.

In other words, even theoretical expansion of production under the most favorable conditions leads after a while into a situation of rising cost or diminishing returns per unit of output, and therefore to a burden on production by adding to costs rather than diminishing them, except for that short period of initial increase in production.

As I say, this is a theoretical point of view. The practical point of view makes even the temporary advantage doubtful for the following reason: In a period of rising prices the psychology is likely to turn speculative in the direction of assuming further rising prices. There is no more fundamental law in the business cycle than that when prices rise people assume a further rise, and when prices fall they assume a further fall of prices. They are always going with the wave up to a certain point, which is usually too late, as experience points out.

The consequence is that with every rise of prices they do not give consideration to the possibility of diminishing returns, when they will operate or when they will not operate, but the psychological speculative element in the market is far more important than are the material factors in the plant, and speculation carries prices, when once prices start to rise, in spite of the theoretical probability or possibility that they should not be carried to that extent at that time.

I wish to add one more remark to the discussion of technological progress and its effect on prices. I refer to the figures published by Profesor Douglas in his studies of real wages. His figures also definitely indicate that for long periods, such as from 1879 to 1925, the so-called relative real earnings per worker rise parallel, exactly parallel, to what is called the relative productivity per worker. In other words, the more valuable the product that is put out per worker, the more the real wage per worker rises over longer periods. As a matter of fact, the longer the period the stronger the tendency to have more rise in the wages of workers than in their productivity. I am speaking percentage-wise, and therefore I call it relative.

My last observations were intended to support my thesis, namely that labor tends to get a greater share in the social product with rising productivity, which is in other words, greater technological progress. The question was asked why labor gets a higher share in the social product in
304 a longer period of technological progress, and I tried
to answer the question; but I did not mention another element of the situation, namely, the fact that labor tends to unionize itself, or organize itself, under modern conditions and to make the best out of its marketing possibilities, more so than it did in previous periods, which, of course, further strengthens its position.

(Document entitled "Wholesale Price Index, United States Bureau of Labor Statistics, 1926—100," marked Exhibit 66 for identification.)

Exhibit 66 was prepared by me. The chart was drawn from the figures of the Bureau of Labor. The purpose of that exhibit is merely to indicate that different sections of the price level move up and down in a fairly corresponding fashion.

As to the four lines across the chart, one is the general price level for all commodities, meaning wholesale prices, and the others are raw materials, including agricultural products, semi-manufactured, and finished products, respectively. All the commodities which the Bureau of Labor covered are included. These data are published in the monthly report of the Bureau of Labor and reprinted in the Department of Commerce monthly publication.

Cross-Examination Interposed by Mr. Slaff.

The scale is entirely different on the wholesale commodity price index of the United States Bureau of Labor Statistics in Exhibit No. 64, and on the index I used in Exhibit No. 66, and consequently, on Exhibit 64 it is compressed in a fashion for the price change to appear much steeper than on Exhibit 66. On Exhibit 64 the Bureau of Labor statistical index for 1926 is approximately 190, and for the year 1937 it is approximately 90, so if I use 1926 as 100 on Exhibit 64, the index for 1937 would be less than 50. On Exhibit 66, which uses 1926 as 100, the all commodities index is 75. I would not say whether the Bureau of Labor statistical index on Exhibit 64 is not the all commodities index on Exhibit 66 without looking into it. At first sight it would indicate it, but I would like to check on it more precisely and see what index it was. It may be that the Bureau of Labor statistical index is more comparable to the Sauerbeck index. It may be the index of the raw material group, material prices, rather than all commodity prices. I will check it.

(Exhibit 66 for identification, offered and received in evidence without objection.)

Direct Examination by Mr. Morgan Resumed.

Coming back to Exhibit 64, it shows that 100, so far as the Bureau of Labor Statistical index was concerned, was 1891 to 1900, on the average.

(Document entitled "Wages and the Price Level, 1913-1938," marked Exhibit 67 for identification.)

Exhibit 67 was prepared by me. The information set forth there was obtained from different sources. The exhibit is based partly on the so-called Snyder index of general price levels, which was prepared by Carl Snyder, previously chief statistician of the New York Federal Reserve Bank, and has been then continued from 1937 on, when Snyder discontinued it, with figures of the Bureau of Labor Statistics. That is a general price level index on the chart. Then in part it is an index of prices for commodities used by Natural Gas Pipeline Company of America. Those prices, as well as the index, have been computed by me. It
is a tentative index. The real weekly wage and public
305 utility wage are published by the Bureau of Labor and
the National Industrial Conference Board, respectively.

The lines designated as "Company's Wages" were compiled by me out of data which the Natural Gas Pipeline Company provided.

The purpose of this chart is to indicate that the long run fluctuations in prices of commodities used by the company and the wages paid by the company, respectively, and by similar companies, public utilities, are fairly in accordance with the comparable general price changes, and the real weekly wage changes.

As to the effect which the tendencies which I have testified to will have upon the operations of Natural Gas Pipeline Company of America and Texoma Natural Gas Company during the next ten or fifteen years, I would like rather to discuss the past or the present than the future in that connection. I know more about the past and the present than the future.

It appears from the data I possess and which I have collected and will present in a moment that the company uses both for operation and for construction a great many materials. It uses a range of materials which covers dozens of groups of articles, from paper containers to iron and pipes and construction material, oil and chemicals, and all sorts of materials. In other words, its raw materials budget is not restricted to any major extent to any small number of outstanding articles. It is very varied and a large number of articles enter into it. The consequence should be that if you build up an index of prices, as is tried tentatively on this chart, made out of prices of articles which will enter into the operation and construction of the property of the companies, then that index ought to be more or less similar to the general price index, since it contains a great number of articles wihch are also in the general price index, and since, as a previous chart of the Bureau of Labor Statistics indicates, the different major groups of articles move fairly parallel in their prices in the longer run, such as in a number of years. If you glance at this chart, Exhibit 67, you will find that up to 1930 the index of prices for commodities used by Natural Gas Pipeline Company of America has a greater amplitude of swings than the Snyder index has, which is the most general price index we possess, but that the direction of the swings and the timing of them fairly coincide with the general price legel index.

As to wages, it is more difficult to find comparable data. I have chosen on the one hand the public utility wages of, the Industrial Conference Board, and, on the other hand,

the real weekly wages of the Labor Bureau. The two are not precisely comparable, I admit, but it is interesting to note that there also exists a fair degree of parallelism. For the period of the history of the company, for which I do not have the complete figures for every year, but I had the figures both on wages and on prices of commodities entering into the cost of operation of the company for the beginning of the years and the ending of the years of the period 1931 to 1938, there again you find not a very
306 precise parallelism, but some amount of parallelism.

Of course, that period is not very long. The general conclusion from these charts, especially the comparison of the index of the prices of commodities used by the company with the general price level index, is that at least so far as price levels are concerned, there is a very great amount of correlation, which is theoretically and a priori most likely to be the case. If you pick out fifty articles, and fifty articles of different types, from chemicals to iron pipes and other metals, and paper containers, and put them together into an index, you will get over a longer period an index which will move very similarly to a general index of prices, and it would be a great surprise if it should not so move, because it is representative of the general price index, consisting of very different prices.

The only reason why deviations would occur is that the general price index consists only of wholesale prices, and an index such as is used for the prices of commodities applied by the company in its operations consists partly of wholesale prices and partly of retail prices; which have somewhat different behaviors over periods of years. Retail prices are more sluggish, do not move so fast, are more sticky, stay longer on a level, and sometimes even for as much as a year or two move contrary to the wholesale price tendency.

Questions by the Examiner.

—I am not sure that that would expalin the movements between the years 1933 and 1937, but it may. I did not make sufficient study of the situation of the individual prices as to why they happened to move as they did to answer the question wholly; but that could explain it.

Cross-Examination Interposed by Mr. Slaff.

The broken line in the company's price index indicates I haven't had complete figures and I disconnected the two points of the line. Therefore, that is not very indicative as to whether the price movement was similar or was not similar to the general price index, but the index previously to 1930 generally seems to indicate a general correlation in the tendency of price movement.

As to whether the movement in the index of prices for commodities used by Natural Gas Pipeline Company of America between about the middle of 1934 and the beginning of 1938 could not have been the same even generally as the movement of the general price level using the Snyder index, I do not see any reason why it could not have been generally the same.

Counsel inquires if there would not be a reason, due to the fact that at the beginning of the year 1938, the Snyder index is some 36 or 37 points above the same index in 1934, whereas the index prices for commodities used by the Natural Gas Pipeline Company of America are approximately
307 the same at the beginning of 1938 as at the middle of 1934. I will state that the Snyder index is a very curious index, and that is why I chose it. It includes everything, even security prices. It is, as I mentioned, the most comprehensive index we have in America. That period was one in which security prices went up very substantially, much more so than most commodity prices went up in this country, and that is partly the explanation for the difference. I was using that index as one of general price levels. The index for commodities used by Natural Gas Pipeline Company of America moved the same direction, upward, over the same period that the Snyder index did. There was a very substantial discrepancy; but they would be different if one moved upward and the other downward. We may not agree on the terms we use.

Questions by the Examiner.

There is a gap in the solid lines between the years 1930 and 1932 because I do not have the beginning figures or the early figures. They are not available in sufficient completeness.

As to the commodities prices used by the company, the breaks come simply due to the fact that I did not compute for that period as I did not have the complete figures, just as for the periods afterwards. I had partial figures but not complete ones.

The index figure was not given to me by the Company. They computed the figures and I computed the index. It is a weighted index. The salaries of the higher employees are not included. It includes only skilled and unskilled workers. There was a period of construction during which I did not get sufficiently comparative figures to construct an index number comparable with the following period. Therefore, I left it open, and I think it is a very good point that the two would not be even quite comparable, the two periods, because the wages meant something different in the one period than in the other period.

As to how, when I tack on to the Snyder index curve the index curve for the Bureau of Labor Statistics, I know those two curves mean the same thing, I will say, that they do not mean exactly the same thing, but are for the purpose of indicating the general price trend in this connection. The purpose of a chart like this is not to prove in percentage terms how two things correlate with each other, but just to demonstrate to the eye whether there is some general tendency in the same direction, or whether there is no such general tendency at all, and the whole arrangement refers to the longer period rather than the few years. The fact that the Snyder index includes securities does not throw you off when you begin using the Bureau of Labor, except, of course, for a short period of one or two years.

Direct Examination by Mr. Morgan, (resumed).

I find that the comparable prices on the materials used by Natural Gas Pipeline Company of America have
308 risen from 1931 to 1938, as indicated on this chart. It is a slight rise, but a visible one. I may add that while the company's wage index is a weighted index, I could not make a weighted index of the company's prices, because I could not get sufficient data as to the amounts of each commodity used in each production process.

Cross-Examination Interposed by Mr. Slaff.

I constructed the index by roughly grouping the commodities in seven major groups. After talking to the chief accountant of the company, we came to the result that those seven groups represent fairly corresponding volumes of money expenditure, and by this correspondence and by grouping them in seven groups and taking the average of the seven groups, we take a chance on getting a somewhat weighted index that is a better one than an absolutely unweighted one.

The index or the change within each group from year to year was obtained by taking the figures of each commodity within each group and giving them equal rate. I used dollar figures, the price of the commodity expressed in dollars, and then computed an index number—took the average.

The company's wage index is a weighted index constructed from an index of skilled and unskilled labor, and the two together weighted according to the amount of dollars spent on each.

I have work sheets, but they are not very readable. I can present them, but they are not in the stage in which they could be used. They would have to be rewritten, but I can show them to you.

(June 27, 1939.)

Direct Examination Resumed by Mr. Morgan.

I would like to make a statement concerning the gold coming out of industrial uses, as I have the 1937 figure on that use. The statement applies to Exhibits 60 and 61. The gold flow into industrial use amounted in 1937, net, to $3,214,393 in terms of dollars at $35.00 per fine ounce. Consequently, this means less than one hundred thousand ounces of gold absorbed by the arts.

I also wish to make a supplemental statement regarding Exhibit 64. There was some question about it yesterday and I checked it. In the first place, the remark in the legend on Exhibit 64, "1891-1900 equals 100," applies also to the Sauerbeck index. They have both been brought to the same base.

In the second place, I checked to compare the Bureau of Labor index in that exhibit with the Bureau of Labor index on Exhibit 66. There was some question yesterday about a discrepancy in the two indices. I checked that, and there is no discrepancy. When I sought to admit there was a discrepancy, I looked on Exhibit 64 at the black line instead of looking at the dotted line, an error which one easily commits on a complicated chart, especially when the room is very warm.

309 Looking at it you will see that they are exactly the same in percentage terms. For example, the Bureau of Labor index on Exhibit 66 is, for 1928, 96.7, and for 1932, 64.8. The difference is 31.9, which is 33% difference between the two dates.

On Exhibit 66, with the base 1926, when you take the year 1926 as the base year and look at the chart, you will find that for 1928 for the general commodity index, the comprehensive index of all commodities, it is 96.7; and for 1932 we have 64.8. There the difference is 31.9, as shown here, which makes 33% decline in price.

If you will look at the same period, 1928 to 1932, on Exhibit 64, where the Bureau of Labor index is brought on another base year, namely, on the last decade of the previous century, then you get for 1928, 184, and for 1932, 123, which is a difference of 61, exactly 33%.

In other words, in percentage terms the two curves, both on different bases but both brought on the same figures of the same bureau, move in exactly the same fashion. At first glance at the chart, the chart being narrowly drawn as it is, the two lines being so close together, it is easily misleading, and I was misled myself yesterday. The reason, it seems to me, is that I looked at the heavily drawn line instead of looking at the dotted line.

Questions by the Examiner.

The theoretical basis for my series of observations just made is that I think 1926 and all the other dates on Exhibit 64 refer to a common base so that a common relationship between 1926 and all the others is observed. The same figures are used on both charts. If you take such index numbers for any period, you can shift the base as you please, and if you correctly compute it you will always get exactly the same percentage relationship.

Cross-Examination by Mr. Slaff Interposed.

The index figure for the year 1926 on Exhibit 64 for the Labor Bureau index is somewhere around 185, taking the year 1926 as 100 in order to bring it comparable with Exhibit 66. It is very narrowly drawn on that chart. Over that year's period, from the beginning of 1926 to the beginning of 1927, I have eleven or twelve dots; but those dots do not represent monthly indices. They are just a dotted line.

At the beginning of the year 1926 the index begins at approximately 198. At the beginning of 1927 the index is at approximately 184. Therefore, the average index figure for the year is about 190. I wouldn't say for sure because there could be an error in drawing such a chart with dotted lines in such a narrow space, and it may be it was moved a little out because the other line was pressing over. I could not rely exactly on that; but it is approximately 185 or 190. 190 equals 100.

The index for 1937 on Exhibit 64 is about 88. 310 Translating that into the 1926 base, my index figure for last year would be about half. The price level on the all commodities index on Exhibit 66, where 1926 is used as 100, fell much less in percentage terms. Either the indices on Exhibits 64 and 66 are not the same, or else there is an error in the line on one of the two exhibits, or there is a possibility that we are both wrong again as we were yesterday. But, I would not rely on my own judgment when I look at the chart quickly, without computing them again. I should like to figure it out in an unhurried manner.

Direct Examination by Mr. Morgan Resumed.

Turning to Exhibit 67, my attention is called to a heavy black line beginning near the lefthand lower corner and extending upward rather steeply to a point near the top of the base, about at a point for the year 1920 which I have labeled "Index Price for Commodities Used by Natural Gas Pipeline Company of America." Then there is another line which I have labeled "General Price Levels, Snyder's Index." There is a sharp elevation of the solid line in the early twenties above the general price level. I think the reason for that is that the company used a great deal of materials which enter into the category of war materials, such as steel and steel products, pipes and similar articles, with the consequence that their prices went up more than the average price level did, and went down when the correction of the inflationary price situation appeared after 1921. It went down more again than the average prices went down. That looks to me like a satisfactory explanation. There may be some additional reasons for particular articles included in the Pipeline Company's price index.

Questions by the Examiner.

I made an examination of the list of commodities used by Natural Gas Pipeline Company of America; but I haven't made since yesterday any further study which would go into the price history of each individual commodity or group of commodities which would explain why in the 1920's it went down more than the average price of all articles did.

I do know that a great many of the materials used by these companies are steel, such as pipe, casing, valves, machinery, and things of that sort, and also hardware, lubricating oil, and similar materials which have been particularly in demand during the war.

In 1920 steel was extremely high, higher than the average price level had risen, as were a number of war materials. That would explain for me at first sight the whole difference; but, as I say, there may be some more reasons in particular commodity situations which I did not follow.

Direct Examination Resumed by Mr. Morgan.

I have examined and analyzed the materials and classified the materials which are used by pipeline companies in my study, because I had to construct an index number for that. Before I go into that index I wish to make a further statement. After 1922 you will see that the 311 index number on Snyder's index fluctuates rather more than the company's index does, which indicates that the great swing immediately after the war in the prices of the commodities used by the company must have been due to particular reasons prevailing at that time.

I have worked out a memorandum about the way the index numbers of the cost behavior of the company have been constructed, both for labor and material. The material prices will be a composite index number for a period 1913 to 1930—that is, previous to the company's operations. We took a simple arithmetical average of the indices of the following groups of articles as they are

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published for those groups of articles by the Labor Bureau, assuming, of course, that the articles falling within that category used by the company are just about the average net category, which is an artificial assumption; but every index number consists of little artificialities. It is only an approximation, only approximately exact. Steel pipe, hardware, lubricating oil, kerosene, lumber, building materials, and chemicals. Then with these seven groups we took the simple arithmetical average, and this line will be shown by the heavily drawn curve on Exhibit 67.

It is rather difficult to weight these averages, the amount of expenditures, the company expense on each of these categories. The company provided us with yearly lists of expenses by departments for different categories of commodities, out of which I computed their yearly expenditure for each year for each category of articles, which was rather difficult because there are possibly some articles each time that are not exactly the same as another kind of article. It took some assumptions to bring things to one denominator. Then the annual expenses for each category fluctuates greatly from year to year. In one year they might spend much more on hardware, and in other years they might spend much more on steel pipe.

At this time the lifetime of the company is rather short. Anything I would make in terms of average of those years for the lifetime of the company may not be very good for the next five years or the next thirteen years, because their expenditures may change in those years, and the expenditures within the groups here are not or may not be strictly accurate as a guide. In other words, there will not be exactly the same expenditures each year by the company, but over a longer period the differences are not very great. I think it is scientifically permissible to regard this as a fair average.

I may mention in that connection that most simple computed index numbers, such as the Sauerbeck index and the Economist Index of wholesale prices are unweighted indices; but their methods over longer periods are just as reliable as your highly refined, specialized index numbers which represent the weighting of articles, and are just as representative for the seven categories of articles from the point of view of the company's expenditures.

For the period after 1930 the history of that index
312 number is this: The company started construction in the course of the year 1930. We started computing index numbers from the middle of 1930 on the assumption that we will take in the figures of the Bureau of Labor and the actual prices paid by the company. Afterwards it turned out that during the period 1930 and 1931 the company was not in operation but was only in construction. Therefore, I do not have and could not get anything like figures on their operative materials, and I left that period blank. We didn't compute any more on the old index, and we couldn't compute yet on the new index.

In the middle of 1931, or a little after the middle of 1931, when the company opened operations, we started out to figure out this new index number for its own material price. The way we proceeded there was to get first data on the kind of materials the company uses, in detail such as we already had for the previous index; then to see what prices the company has itself or can get from its suppliers, in so far as it is possible, and where the company has no figures, to use the Bureau of Labor figures for individual articles or groups of articles. By that method we were able to compute for a few years an index number which extends from the middle of 1931 until the middle of 1934, and again for the beginning of 1938.

In the intervening period we had partial figures, but not complete ones. Since the same figures were not available as for the few years before and for the half year after, we therefore decided not to use any figures for that period in computing any index number, and we changed from the figures of the company to the figures published by the Labor Bureau.

I can give a few more details about the way we computed the index numbers of the company's material prices. Chemicals and office furniture composites were simple averages of the company's indices which are taken from the Bureau of Labor Statistics wholesale price bulletins. The base was changed from 1926 to 1937, as for all company price indices, for this computation. For valves and fittings we received data furnished by the company, price data. The quotations were averaged, unweighted, and put into an index number, by using again the 1937 base. The indices for hardware, chlorine, lubricating oil, were Bureau of Labor figures on a 1926 base transformed into a 1937 base.

The so-called composite is simply an arithmetical average of the component items as published by the Bureau of Labor. The price index is simply an unweighted aggregate of prices and quotations furnished by the company. The base again, as always, is 1937.

The composite total index which is represented by the curve, called on Exhibit 67 the company's material index, consists of the arithmetical average of the following indices: office supplies, pipe, valves and fittings, hardware, chlorine, lubricating oil, office furniture, kerosene, chemicals, lumber, building materials, red lead, storage batteries; and some of those groups consist in turn, as I mentioned, of arithmetical averages of a number of indices of component materials.

313 I don't pretend that this is a perfect picture of what happened, but it would take tremendous work, it could never possibly be done, to present an exact picture of the index number of a single firm's cost element in which there are a great number of materials of every kind which are not quoted anywhere, for which there are no indices published, and the company itself has so many data on its own purchases that it would take statistical work of several months to collect those data and organize them over a period of years andt bring them to denominators to permit the drawing of very exact index numbers. It is an approximation which has some indicative value.

Personally, I would rely more on the value of the index number for the previous period, previous to 1930, because it consists of simple data which are more comparable with the general price level index and because it covers a much longer period.

It is a very important aspect of the comparison that the data for the history of the company covers only a short period; but I still say my impression of this price study is that there is a fair correspondence in the general trend of prices of commodities used by the company and in the general trend of what is called the general price levels in the country. This is, of course, theoretically obvious.

If you spend money on these different types of commodities, ranging from office supplies to storage batteries, from red lead to lumber, pipe, fittings, building materials, you cover so many things, as I mentioned yesterday, that a priori it would be most astonishing if your index number of prices fluctuated or would be very different in trend from the general index number, and an explanation would be needed if major differences for any length of time would occur. That the trend is about the same, as a matter of fact, ought to be, a priori, more or less obvious.

As to the relation between the company's wage index and that of the real wage index set forth on Exhibit 67, I will say that the company's wage index means the index since the beginning of the company's history. Perhaps I should say something about the public utility wage index that I have on Exhibit 67. This public utility wage index is published by the National Industrial Conference Board. It is an index of hourly wages paid workers in gas manufacturing plants. It is not on the 1937 base.

This so-called public utility wage index, this N.I.C.B. index of gas workers' wages is brought up to 1930. I have the figures available until 1936. The reason I did not draw them on the same chart was the same as with the index of prices for commodities used by the company, namely, I intended to turn from 1930 on to the company's own wage index; and again the same problem arose—that it was a construction period—and we did not have proper comparable wages, so that there again we had to go to other figures. As a matter of fact, I have the figures with me now and can present them. That wage index moves very much, as to 1930, as the index of real weekly wages does on the same Exhibit 67.

314 From 1931 on we used the company's own wage index, for which I had the figures from the middle of 1931 until well into 1938. That index is a weighted, composite index of two indices, one for skilled labor used by the company and one for unskilled labor. Out of the two, by weighting in accordance with the actual expenditures in each category skilled and unskilled, I constructed this one index number which appears as the company's wage index.

Questions by the Examiner.

That is not the N.I.C.B. wage index. I know how it would compare with the company's index, and I could draw that in. Roughly, what is called the public utility wage index, N.I.C.B., first goes a little down, then goes up from 1932 on much more substantially than the company's wage index does at the beginning. I used the N.I.C.B. index for the period from 1930 to 1936. I have the figures here and will read them in later.

It goes up more steeply than the company's wage index does; but the general tendency of both, except for the year 1932, is exactly the same. In 1932 there is a substantial fall, or some fall of 10% or so, in the wages which the company paid, and there is no similar fall in the general wage level of gas workers; but the tendency of the period as a whole is the same.

Direct Examination by Mr. Morgan Resumed.

The wage index of the company, as I stated, is composed from two indices being weighted for skilled and unskilled wages. The skilled wage index was worked out by grouping the employees of the company, classifying them according to the type of work done and the wage they got, based on information given by the company. The various groups were then in turn weighted, according to the rates of pay on January 1, 1937. The difference in wages among the skilled workers over the period of some six or seven years did not vary greatly, so it made no difference which date I took for weighting them.

It was weighted according to rates of pay received on January 1, 1937. In other words, I did not add up all the wages paid to skilled workers and divide by the number of skilled workers, which would be an unweighted average; but I classified them into groups according to the type of work they did, and according to the wage they got, and then weighted the groups according to the number of people in each of them on January 1, 1937, and got therefore a weighted index of skilled workers' wages, weighted according to the number employed at the corresponding rate of pay on January 1, 1937.

The final index for the skilled group was constructed by segregating the different groups for each year or half year brought to a 1937 base by dividing that by the aggregate for 1937.

The index for unskilled labor was constructed by the same method, except it was much simpler because it
315 did not have to be classified into groups. They all had practically the same wage rate. As I mentioned before,

the two indices were again weighted into one index. I weighted the skilled and the unskilled according to the amount of pay paid to each group on January 1, 1937.

The illustrative purpose of this chart is merely to demonstrate that there is a general tendency of correlation between general price levels and the company's price level as shown by the wage levels and the company's wage index. That is to say, there is a strong tendency of similar direction in major periods, which does not exclude short-term deviations. That should be obvious.

In the case of labor, the situation is that the workers used by the company are the kind of public utility workers who would be used by any company in the utility filed, at least in the gas utility field. They are not particularly specialized workers, with few exceptions, for this kind of work. Nor is this company the only one in the field, even in the natural gas field. Consequently, for any major period the wage rate paid by the company is determined by the market, as the company is only one purchaser in the labor market, only a minor element, especially now in times of collective bargaining, minimum wages, and unionization developments tending to spread all over; so it is very unlikely that for any major length of time the company would be able to make a different trend in the development of wages, to any substantial extent from the general trend of wages, at least in its own field. The chart serves the purpose of roughly demonstrating that argumentation.

Direct Examination by Mr. Hedrick.

Referring to my Exhibit 67 and the line entitled "Public Utility Wages, N.I.C.B. Index," it will be noted that that line stops as of the first of July, 1930. I stated a moment ago that I had the figures which would extend that line over to January, 1936. I will now read them into the record by half years—that is, for January and July.

January, 1930, as the chart shows, 107.4. July, 1930, which is still on the chart, 105.7; that is, it should be. It is a little lower than it should be. Charts are never quite exact.

January, 1931,	110.5
July, 1931,	109
January, 1932,	110.7
July, 1932,	110.1
January, 1933,	111.2

July, 1933,	110.1
January, 1934,	118.2
July, 1934,	120.8
January, 1935,	121.7
July, 1935,	122.8
January, 1936,	123.5

The method of computation by the National Industrial
Conference Board has been changed by adding a great
316 number of new companies, and the Conference Board
warns the reader not to regard the new index as quite
equal to the old index, so I take their warning and do not
give the new figures.

Direct Examination by Mr. Morgan Resumed.

As a result of the analyses and studies I have made, I will give my judgment and opinion as to whether the costs of materials and labor of these two pipeline companies will be higher or lower or remain stationary over the next twelve or fifteen years.

My general conviction is that within a period as long as ten or thirteen years a major upward trend of prices as compared with the present is most likely to occur. The gold situation, the tendency toward credit expansion, the desire of mankind in the western world to take advantage of the expansion possibilities which the gold and credit system offer, the opportunities which a capitalistic system provides through rising population, technological progress, etc., together are most likely to lead into a major upturn in a period as long as that. Most likely is the only thing I can say, because, of course, nothing is ever absolutely certain in economic matters in the future; but all factors at play seem to indicate that such development would almost necessarily take place sooner or later, and ten years or more are certainly long enough, certainly in comparison with any other depression period of what we call modern capitalism, such as the last 160 years, in which we have never had a similarly long period of falling of prices without at least temporarily, such as for a number of years, returning to a substantial upward movement.

In addition, in the present situation, we have a number of what are usually referred to as artificial factors tending in the same direction. We not only have an enlarged credit base, and not only have credit machines in every country

—not only in this country—been geared to maximum potential expansions, but we also have governments doing their best to foster that expansion, and definite inflationary tendencies in a number of countries on the top of these potentialities of a more natural kind, inflationary tendencies which in most previous depressions were not at work, or not to any similar extent at work.

Taking all these elements into account and considering, as I tried to, the possibilities of interference or of inhibitions, such as by technological progress, which might reduce prices, such as expansion of production, which might offset rising prices, my conclusion would be that a period of ten to thirteen years would be more than ample to provide for the possibility and the great probability that those possible inhibitions would not work out and the factors tending to raise the price level would become effective.

As to the possibility that by further government intervention any tendency to a rise in prices might be counteracted under any existing economic situation confronting governments at this time, I will say that, of course, governments can do almost anything; but, in the first place, governmental policies tend in the longer run rather in
317 the direction of the raising of prices than in the
opposite direction. At least, that is the purpose in most countries, and certainly in this country. Certainly there is no intentional tendency to lower prices in practically any country. Of course, they may lower prices by their policies in spite of their intentions in the opposite direction. They might do so by direct monetary measures, deflationary measures, such as a revaluation of the currencies—a revaluation to a major extent—which we discussed yesterday and which I regard as extremely unlikely, if not practically impossible, in view of the unpopularity of any such deflationary measures, especially in periods of low or falling prices. They may do so unintentionally by following the course of national and international policies which work themselves out as inhibitions to investment activities and to speculation.

There is, of course, no way of exactly predicting, and that is one reason why I am reluctant to make a prediction such as saying that next year, or in ten years, prices must rise. They would rise, in my opinion, if no national or international policies would interfere with them. On the other hand, I do not believe that national or international policies can be carried any such further period in the same direction without breaking down, without being reversed or altered to such an extent as to permit or even to foster rising prices. All interests involved are so strongly focused on the upward trend of prices—all organized interests, I should say, all politically influential interests, in practically every country in the world—that I am at a loss to believe that governments could get away for a further major period with policies that would interfere with that possibility, namely, with a rising price situation.

Of course, as I say, there is no way of exactly predicting the course of government policies, but almost nothing short of changing the structure of our society, our economic society, changing it in the direction of something so radical as exists, for example, in present-day Russia, could, in my opinion, interfere for such lengths of time with the tremendous pressure in the direction of an upward surge of prices arising out of the monetary and credit situation and the related factors.

Questions by the Examiner.

As to the year base for the various indices, I do not have the wage index for gas workers here. I have not the volume of the National Bureau with me, and I have only their absolute figures present, not the index numbers computed from those. I will have to check into that and provide the data for the Commission later on cross-examination.

(EXHIBIT NO. 67 for identification, offered and received in evidence without objection.)

Cross-Examination by Mr. Booth.

I prepared these exhibits, together with an assistant, in so far as they were not reproductions of other charts published elsewhere, in which case they were checked. The Sauerbeck index is published currently in the London Statist. I reproduced it from a Belgian publication and checked on the specific data to check its correctness 318 with the Statist. I reproduced this from the study of Professor Demeure, Professor Charles S. Demeure, which appeared in the March, 1939, reports of the Belgian Society of Political Economics. Professor Demeure is an outstanding expert in the field of gold and price level studies, and I took his chart on the subject and checked on it and used it. I also took the U. S. Bureau of Labor Statistical index from that chart because he had recomputed it to the new base. I did not compute it to the 1891-1900 period; but I checked on a number of figures and found it reliable. I cannot refer to any United States Bureau of Labor publication which uses the period 1891-1900 as 100; this is recomputed from that source; I did not compute it. I used the Demeure figures and checked on them partly, and I believe, until proved to the contrary, that they are correct; but if they are not, then he carries the blame. I have here a publication of the U. S. Department of Labor, Bureau of Labor Statistics, on wholesale prices. In that volume the index number of 100 is on 1926 prices. These give the data from 1801 to 1931.

My employment with the firm of Stein & Roe was in a rather informal fashion as their adviser, especially on international matters. They asked me my opinions on developments and their potential effects on markets, which they in turn used for their customers for advising them on that subject.

I am also economist for Stifel, Nicolaus & Company in a general fashion, with two major duties. One is that I publish for them occasionally what you would call market letters, though they are not really market letters. They are letters on subjects of general economic interest, which they circulate amongst their customers. The last one was on the question "Why Gold?" and there was one on cheap money policy, and others on similar general economic subjects. The other duty is a function that consists in requesting my opinion and discussing with me general factors affecting the markets, especially from the point of view of their and their customers' interests, such as interest rates, the markets affecting the municipals in which they are particularly interested, and similar problems. I do not have copies of those market letters I prepared with me. I do not doubt that Stifel, Nicolaus & Company will be glad to furnish you with copies. I will ask them to send them to you.

Cross-Examination by Mr. Slaff.

The assistant who helped me last summer was a Mr. Lewis, who, I understand, is now with the Brookings Institute in Washington, or he was recently at least. He is familiar with a part of my methods and underlying work sheets, but not with all of them. There is no one in Chicago who is familiar with all my underlying data.

Several boys have worked with me at different times in the course of the year on different problems. Some of the sheets have been in the hands of different boys even who helped me on it. Lewis worked with me about three months on the major part of the job, but I had somebody else help me before, and two others are helping me occasionally since. None of them would be really familiar with the whole field, unless he would go into it. I would have to show him the whole thing and explain to him a lot, and I do not know which of them would be available during
319 the summer, anyway, either here or in Washington.

As to the names of the men here in Chicago who have assisted me in the preparation of these data, two of these young men are Mr. Proves and Mr. Glaser, both of whom are graduate students at the University of Chicago, in the sociology department.

I have testified before in this country. I once testified before the Interstate Commerce Commission on the problem of changing the time in Chicago, when the two newspapers fought here about the daylight saving time being extended over the whole year. They asked me to say something about the possible effect of changing hours on the financial market relations of Chicago to New York on the one hand, and to San Francisco on the other hand.

I usually do not predict price trends; and if I do, I do it in a very cautious fashion so that nobody can catch me. Well, certainly, I think our prediction as to price trends in the future as pretty much of a guess, but, seriously speaking, there are, of course, discernable underlying factors, and the moment you do not need to time your prediction precisely, there are possibilities of saying something about future probabilities.

320 CHARLES I. GALLOUP, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(June 27, 1939.)

My name is Charles I. Galloup. I live in Amarillo, Texas. I am 48 years of age.

I am field superintendent for the Texoma Natural Gas Company, which position I have occupied since January 1,

1931. Prior to that time I was in the oil and gas business, strictly in the production end. I have worked in some thirty odd fields, in Kansas, Oklahoma and Texas, over a period of 32 years. I went into the oil and gas business at about sixteen years of age. I have worked in nearly every phase of production work, drilling wells, caring for them, and keeping them on production.

Prior to becoming production superintendent for Texoma Natural Gas Company, I had something to do with the production of gas in the Mid-Continent field in the three states I have mentioned. I have worked in thirty gas fields. By a field I mean an area which is productive of gas. Among the thirty fields was the Panhandle gas field. When I was first employed by Texoma I was assigned to the duty of drilling and developing gas wells and caring for the production, and in case of non-production in a well, of plugging and abandoning it. I look after the well after it has been completed as a producer and see to it that it is kept in producing condition. I have drilled 110 wells for Texoma in the Panhandle. Some wells had been drilled prior to the time I took over the duties, and a number of wells were already on production. Since that time I have had general superintendence of the operation of all the wells that were already drilled and the drilling and operation of the wells which have been drilled since that time.

The most serious difficulty I have had to deal with in keeping the wells under my supervision down there in the Panhandle in a producing condition is salt water. Of the total number of wells belonging to that company, 26 have given me trouble with salt water. That is a condition that develops in the life of a well. The wells will salt up and become non-productive. That is the ultimate result.

When water first occurs it shows up on the orifice meter chart. By examining the meter chart I can determine that water has appeared in the well. When a chart begins to show a vibration, we go out and blow the well to determine whether it is making moisture. By "blowing a well" I mean that we close the side gate so that the gas does not enter the line leading from the well to the gathering system, and then the top valve is opened. That is a valve in the top of the casinghead on top of the well. It
321 is opened and the gas is opened to the atmospheric
pressure and allowed to blow out into the air. After you have blown the well a short time, that is, five, ten or fifteen minutes, you will see a heavy spray of moisture,

which indicates that there is water coming in the well. As a rule, you continue to blow the well until it will clear up, by which I mean until the water that is in the well bore is blown out. Then the well is closed and turned back into the line of production. That temporarily operates to relieve the condition that has resulted from the inflow of salt water into the well bore.

You have to repeat the process of blowing these wells in which salt water has shown up as often as once a week when the well is on production. That does not serve as a permanent cure for salt water trouble in every instance. It is more or less of a temporary nature. It allows you to keep the well on production longer by taking care of it and blowing it.

The ultimate result where salt water gets into a well, if it comes in large quantities, is that it will drown the well out. The water pressure will equalize with the gas pressure and there will be no volume at all. In other cases of small amounts, the well bore will salt up in some cases, and in some cases the formation will salt up. There is a difference in the salting up of a well and the drowning out of a well. I have not had wells belonging to Texoma drown out since I have been in charge of their operations down there; but I have had some of the other development called the salting up of the formations. After wells start to salt up in the formation, the salting up or the crystallizing of the gas producing formation is a pretty fast process.

As to the effect this salt water has on the producing formation, which I have termed salting up, I will explain that the flow of gas with the small amount of water tends to dry up the water, and salt crystals form in the formation around the well. The gas moving to the well bore and out of the well bore in the ordinary course of production is the gas I refer to. It brings off a part of the vapor and leaves the salt behind. The salt will then be deposited in the formation, and oftentimes in the well bore itself.

It is my opinion and my experience that if the water comes into the well from above or below instead of coming from some other place through the formation to the well, it will salt off in the well bore, oftentimes above the gas pay. The result of the formation of that salt in the well bore is that it closes off the flow of the gas. This salting off in the well bore is always above the gas flow, because the gas carries it up there.

The development of salt accumulating in the well bore above the producing formation is called a salt bridge. When a salt bridge has occurred in the well bore above the producing formation, a well on production will gradually settle out its deposits on the wall until it shuts the flow of gas completely off.

322 The salt in the bottom of the well forms only in the formation; that is, where water is coming in, traveling in the gas producing formation, sometimes it will carry a little up into the well, but it does not leave you very much to clean out in the well bore. The thing that stops the flow of gas where you have salt forming in the formation is that the salt deposits in the porous formation shut off the flow of gas. By that I mean that the vapor is evaporated off the salt water back in the formation away from the well, leaving the salt behind, back in the formation, and this closes off the porous formation through which the gas travels.

I have had such situations as salt bridging or the closing off or salting off of the production from gas wells in the Texoma wells under my supervision. I have had that occur on eight different wells. Not all of them were with salt bridges, some were a salting off in the formation; but it was one or the other.

As to when this salt water first showed up in those eight wells, I believe we had one well that showed salt water something over two years ago, and the others have started to show salt water within a year and a half. We have lost seven of those eight wells in the last year and a half.

The first well we lost was Bruce Bull No. 2-T, in Gray County. When my boys made a semi-annual test, they found that this well was dead. It would show a rock pressure, enough seepage through to show a rock pressure, but there was no volume there. That was sometime in the fore part of June, 1933, before the well was put on production or had a pipeline connection other than some lease use by the Texas Company. It was a well that had been bought from the Texas Company. We did not drill that well. We ran a measuring line to determine what had caused it. That is the cheapest way you can determine what was wrong with a well, and we found that the measuring line stopped at 1920 feet below the surface. A clean-out string of tools was then contracted for and moved on the location on November 18, 1933. We found after we had drilled enough to get a sample that it was pure crystal salt. That was a salt bridge. I believe that well was 2606 feet deep.

We found the salt some five or six hundred feet up the well bore.

We proceeded to drill the salt out just as if it were a formation. When we got 200 feet below where the top of the salt was encountered, we went through the salt bridge and it blew the tools out of the hole. This was gas which had been penned up down below which blew the tools out, along with the volume which we got back at that time. Before that well bridged up its potential capacity was twenty million. After we had drilled through that salt bridge and put it back on production, its potential was 19,300,000. It came back substantially to its original flow. That well was the Bruce Bull No. 2-T, Section 2, Block B-2, H & G N Survey, in Gray County, Texas.

This well continued to produce until in December, 1936, when it was reported off of production—that is, that it had quit producing. We went down and investigated and found that the well had no open flow and that it had a 323 rock pressure of 135 pounds per square inch. We figured that the same thing existed as had happened to the well before, so we moved a string of tools in there and cleaned the well out. This time, when we strung the tools in, we found the formation of something stopped the tools at 1910 feet, ten feet higher than it was before. We drilled far enough to get a sample and found it was the same salt condition as before, salted completely off.

We strung up eight inch tools, which was the full size of the well bore, and cleaned out to the top of the liner, but first we filled the hole full of water, because we did not want a recurrence of blowing the tools out of the hole, which is dangerous to life and the well might catch fire. Then we changed our tools from eight inch to 6⅝ inch and cleaned it out to the bottom of the liner, which was below or to the bottom of the gas pipe. Then we dried the hole up—that is, we bailed all the water out of it. There was no gas energy there to help us, so we bailed it out. We still did not have enough gas to measure. My opinion as to the reason for that and why i didn't come back on production as it did the first time is that the salt water coming into the sand had deposited the salt crystals and shut it off. The crystals had gotten far enough away from the well bore to shut it off. We found about 396 feet of salt in the bottom of the well at that time.

After we got the hole bailed out, in order to make sure to let the fresh water have a chance to dissolve the salt crystals, if they were at the well bore, we went in with a tool called a ripper and we ripped two slots in each joint six feet long in each joint, starting at the bottom and going clear to the top. Then we ran enough water in the well to cover all of the gas pays—that is, we filled the well with fresh water up above the highest of the producing formations. It was left to stand over night, and the following morning it was bailed out, and then after the water was bailed out it was recharged with water and left standing there until the evening. We were just working daytimes on the clean-out wells.

We continued this type of treatment during each twenty-four hours for five days, with no results, except that when we re-perforated that pipe we had about 1,300,000 cubic feet, but the fresh water application did not restore any more production than we had there. We found just the same situation after those five days on injecting fresh water in the well and leaving it stand for successive periods of twelve hours as we did before we started.

That is the accepted way of treating a well which has been salted off. The analysis run at our chemical laboratory at Oil City showed that fresh water was about as good an agent as anything you could use to dissolve that salt and bring it out of the well. Ordinarily, if salt is confined to the rim of the well bore at an area immediately around that rim, the result of the fresh water treatment will be to restore production.

When we bailed the fresh water out from time to time we found that the well was very salty in the bottom.
324 We found fine crystallized salt in the bottom of the bailer, and either from the friction of dumping the bailer in the dump box or from the speed of raising the bailer from the bottom, it settled in the bottom of the bailer, and oftentimes the bailer would have to be up-ended instead of being dumped in the usual manner.

I don't know of any better way to treat a well that has been salted off than to use water. That is the way we have always done.

After five days of drenching the well with fresh water, we decided to plug and abandon it. By plugging and abandoning a well, I mean we reclaim all the material, such as casing, that we can, and leave the rest of it there and abandon it. The hole is filled with mud to a change in the size of the casing, where a dry hole plug is used. A dry hole plug is a wooden block made to fit the size of the pipe or size of the hole at the point where you are going to stop the well. Then it has been our practice to dump cement on top of that plug. Then, in the other step, after that cement has had a chance to dry or set, the hole is filled with mud to the bottom of the next string of pipe, and the same steps taken, and a dry hole plug the size of the hole you are trying to stop is then run, and then it is cemented, until it reaches the ground level. When we have pulled all the casing and tubing in the well that we can get out of it, and have plugged it in these successive steps which I have described and filled it up with mud to the top of the ground, we call that a plugged and abandoned well. We never produce any more gas from that well. That is a permanent job and it takes that well out of the picture.

Mr. Peterson testified two or three weeks ago that seven wells had been plugged and abandoned by Texoma. He was not mistaken about that at that time. We have plugged one well since he presented his testimony.

The second well in which we had a similar experience in finding salted up was the G. H. Saunders No. 2-T, in Section 3, H&GN Survey, Gray County, Texas. Salt water showed up in that well some time in the latter part of 1937. We made a test of that well on May 1, 1938, and found the open flow too small to measure through a four inch opening. It had a rock pressure of 100 pounds, showing there was some seepage through the pay into the well. If a well gets into that condition and is shut down until you can get to it with cleaning out tools, there will be some gas accumulate in the well bore that will build it up to the pressure of that area if given sufficient length of time. You take your rock pressure test before the well is ever vented to the air, before it is ever opened so the gas in the well bore can get out. Then you open the well up, until the head pressure is blown off, and then you take your test after a period of thirty minutes in these cases. In this particular case it took around five or ten minutes for the gas to expel itself from the well bore. After that you could see some gas fumes coming out of the well, but there was no volume.

We moved a clean-out machine in to try to restore
325 production. We followed a similar procedure to that we had followed with the other well, but this well was not bridged. It evidently was salted off in the formation. We found a crystalline salt in the bottom. It had possibly twenty feet of stuff to clean out. We cleaned it out and

gave it a fresh water treatment as we did in the other well, at the same intervals and for the same number of days; but we were unable to increase the flow of gas, so we plugged and abandoned that well.

(Map entitled "Leases Owned by Texoma Natural Gas Company in Texas Panhandle Gas Field, January 1, 1931," marked Exhibit No. 68 for identification.)

Exhibit 68 is now before me for the purpose of locating the wells to which I have referred. Penciled rings can be put around the wells referred to.

Bruce Bull 2-T is located in Section 2, Block B-2, H&GN Survey, Gray County, Texas.

Saunders 2-T is located in Section 3, H&GN Survey, Gray County, Texas.

G. H. Saunders 3-T is located in Section 3, B&B Survey, Gray County, Texas.

G. H. Saunders 15-T is located in Section 4, Block 1, A.C.H. & B. Survey, Gray County, Texas.

Saunders 17-T is located in Section 3, Block 1, A.C.H.& B. Survey, Gray County, Texas.

Saunders No. 18-T is located in Section 3, Block 1, A.C. H.&B. Survey, in Gray County, Texas.

McLarty-Lester B-I-T is located in Section 2, B&B Survey, Gray County, Texas.

M. A. Shaw 1-T is located in Section 5, Block 1, A.C.H. &B. Survey, in Gray County, Texas.

Those wells are all located north of the straight line of the depression area in Gray County.

I have said that there were eighteen wells that had started showing water. I will read them off, starting on the east side and moving west.

H. Thut No. 1-T, Section 1, H&GN Survey, Gray County.

Saunders 13-T, Section 1, J. G. Eustis Survey, Gray County.

Saunders 12-T, Section 1, J. G. Eustis Survey, Gray County.

McLarty-Lester No. 3-T, Section 10, ACH&B Survey, Gray County.

Saunders 6-T, Section 4, Block 1, ACH&B Survey, Gray County.

Saunders 10-T, Section 1, J. G. Eustis Survey, Gray County.

Moore No. 1-P, Section 14, Block 44, H&TC Survey, Moore County.

Purvis No. 1-T, Section 151, Block B-2, H&GN Survey, Gray County.

Barrett No. 1-T, Section 131, Block 3, I&GN Survey, Gray County.

326 That takes in all of Gray County. The last two were about half way between the county line and the depression area in Gray County. The first ones were shown in the general area heretofore described. I will now list the ones in Carson County.

J. H. Urbanczyk No. 1-T, Section 25, Block 4, I&GN Survey.

N. A. Cobb No. 1-T, Section 202, Block 3, I&GN Survey.

W. E. Cobb No. 1-G, Section 202, Block 3, I&GN Survey.

Henry Schafer No. 1-T, Section 68, Block 4, I&GN Survey.

McEwen No. 1-G, Section 204, Block 3, I&GN Survey.

Burnett No. 11-G, Section 106, Block 5, I&GN Survey.

Burnett No. 19-G, Section 106, Block 5, I&GN Survey.

Burnett No. B-1-G, Section 21, Block 5, I&GN Survey.

In Moore County, in addition to Moore No. 1-P, Section 14, Block 44, H&TC Survey, which I have already listed, there are:

Troutman 1-S-P, Section 273, Block 44, H&TC Survey.

J. T. Sneed No. 1-P, Napoleon Jones Survey.

I have already given you my experience on the Bruce Bull No. 2-T and the Saunders No. 2-T. I will briefly give you the name and location of the other six wells which went dead and were plugged and abandoned.

The G. H. Saunders No. 3-T, in Section 3, B&B Survey, in Gray County, Texas, had a rock pressure of 135 pounds and an open flow too small to measure.

The G. H. Saunders 15-T, located in Section 4, Block 1, A.C.H. & B Survey, Gray County, had a rock pressure of 135 pounds and an open flow too small to measure.

G. H. Saunders No. 17-T, in Section 3, Block 1, A.C.H. & B. Survey, Gray County, had a rock pressure of 130 pounds and the volume after the work was about 300,000.

G. H. Saunders 18-T, in Section 3, Block 1, A.C.H.&B. Survey, had a rock pressure of 140 pounds, with an open flow of 150,000.

McLarty-Lester B-1-T, in Section 2, B. & B. Survey, Gray County, had a rock pressure of 100 pounds and an open flow of 500,000, after the clean-out work.

M. A. Shaw No. 1-T, Section 5, Block 1, A. C. H. & B., had a rock pressure of 145 pounds and a volume of 304,000 after the clean-out work.

The rock pressures stated by me ranged from 100 pounds to 145 pounds at the time of abandonment. Those are not the official Railroad Commission pressures to which Mr. Peterson testified when he was describing the wells which had been plugged and abandoned. These are the rock pressures that I took myself. The pressures to which he referred were the official Railroad Commission tests at
327 the last testing time prior to abandonment. If they
can get around to make them, those tests are made twice a year; if they don't they are made once a year.

I had the same kind of reports made to me in connection with each of the other six wells as the reports given in connection with the Bruce Bull and Saunders 2-T. Upon receiving the reports in the case of each well, we checked them and found they were right in every case, and we found the conditions in the well to be as stated. Each time we took the same steps that we took in connection with the two wells I have described, but with no results, and we had to plug and abandon the well in each case.

I have stated that we have eighteen other wells which are now showing water. We watch them closely to keep them blown, so that a head of water does not get in there. We do not allow the water to accumulate in the well bore. From my experience down there, I think that we can expect in time, when the pressures are considerably lower than they are now, or equal with the other parts of the field, that the same thing will happen in each of those wells as has happened with the eight wells which we have plugged and abandoned. By saying when the pressure is reduced, I mean that without the pressures it is almost impossible to keep the formations open. The fall in the pressure tends to cause water to get back into the producing formations. It seems to spread out.

In common parlance, the area where those abandoned wells are is in southeastern Gray County. The pressures in that area are low and have been low for the last two or three years, and during that time the water trouble has shown up. In my opinion, when these other 18 wells are given time, with the influence of low pressures operating along with time, they will go the same way as those eight wells.

This is only 26 wells out of a total of 161 wells. I have no idea whether the other wells may develop water trouble in the future. We did not expect it in the wells it has shown up in. It is apt to show up in any well. There is not water in all of the gas wells; but there was no water in those wells which are now showing water at the time they were completed as gas wells. Those wells which I myself drilled and which are now showing water were completed in the best known way. We drilled deep enough to get all the production; but we did not drill them deep enough to get into water. They were all stopped over the water level. When they were completed they were dry and in perfect shape. It was an average of about two and a half or three years after they were put on production before water began to show up. I don't know where the water comes from.

In drilling wells down there you run through the general formations from one end of the field to the other. You get your salt lenses and your water in the various places according to the elevation. There is water above the Big Lime in every gas well down there.

If a well be drilled down through water in the vicinity of a well belonging to Texoma, there is a possibility that water will get from the other well into the Texoma well, even
328 though the latter has not been drilled down to water. That might occur because the water rises up, and as soon as it gets to the porous formation it starts traveling. That occurrence is more likely where the pressures are reduced than where they are high. In the light of that situation, it is possible that the other 130 or 140 wells which are not showing water will make water when the pressures drop down.

I have stated that I have worked in some thirty gas fields in the States of Kansas, Oklahoma and Texas. Some of those gas fields had water conditions comparable to those obtaining in the Panhandle. I have experienced this phenomenon of having a well become so salted up in the formations that it cut off production in places other than in the Panhandle. I have experienced that same situation in the Eldorado field and the Augusta field in the State of Kansas. The same method was adopted in handling those wells there which we adopted in handling the Panhandle wells which were abandoned. Those are older fields than the Panhandle field. There are some few wells in the Augusta and Eldorado fields which are producing gas yet; but the majority of them have been plugged and abandoned. I haven't the dope on the prevailing pressures in the Augusta field; but I have seen a report recently on the Eldorado field, which was that the abandonment pressures averaged 93 pounds. I was present when some of those wells were being abandoned. They were in such a condition that they would not produce any more gas, and remedial work was unsuccessful, and they were abandoned.

Based on my experience and observations in those fields and in the Texas Panhandle field, it is my opinion that the pressure to which the Texoma wells in the Panhandle will be produced will probably be an average of 100 pounds.

Cross-Examination by Mr. Slaff.

I was never on the witness stand before in my life.

I said that I had seen a report which showed the abandonment pressures in the Eldorado field to average about 93 pounds. One of the boys I used to work with up there had a report. I don't know just how many wells he had on it, but there was quite a number of wells that had been plugged and abandoned in 1937. I couldn't say whose report that was. I imagine the field man there made the report. It probably can be obtained from somebody's report. They don't have a Commission's report in Kansas. I can find out whose report it was and advise you through counsel. I will do that.

Questions by the Examiner.

It is the uniform practice to plug and close wells that are no longer being used for production purposes. I don't know whether they have to do that under the state law, but I believe they do. The lowest pressure we have in a Texoma well today is around 140 or 130. We have no well of low pressure that is not without water conditions. We have wells with even high pressures that do show some water conditions; but it is the low pressure wells we have had the most severe trouble with and had to abandon. All
329 of the water is not salt water. Some of the wells would be comparable with water conditions where the water contains no salt at all. It is condensate. You can't acidize a salt well. They have attempted to do that, but with no results.

Redirect Examination by Mr. Morgan.

I spoke of condensation of fresh water. That is not the kind of water that is in these eighteen wells about which I have testified. That is salt water in every instance. I did not include this condensate among my list of water wells.

(Note: On July 24, 1939, EXHIBIT 86 was offered and received in evidence by defendants over objection by counsel for Illinois Commerce Commission as being hearsay. This exhibit is a report referred to by Mr. Galloup in his testimony as having been received from F. D. Frank, Superintendent of Operations of Cities Service Gas Company, dated July 6, 1939, and showing in tabulated form the open flows and rock pressures on the wells abandoned in the Eldorado and Augusta fields in Butler County, Kansas. This exhibit was offered in evidence as being that to which Mr. Galloup referred in his testimony when he said he had obtained information from other sources as to the abandonment of wells in the Eldorado field. This report was not offered as proof of anything but in compliance with a request made by counsel for the two commissions to produce the report.)

330 E. G. HAMMERSCHMIDT, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(June 27, 1939.)

My name is E. G. Hammerschmidt. I live at Fritch, Hutchinson County, Texas; at the gasoline plant and compressor station of Texoma Natural Gas Company. I am chief chemist for that company.

I received my education in the field of chemistry. I graduated from Culver Military Academy in 1917, and attended Hendricks College, Conway, Arkansas for one year, and graduated from the University of Iowa in 1923 with the degree of Bachelor in Chemical Engineering.

After graduation I was with the Cities Service Gas Company for approximately eight years, beginning in the fall of 1923, stationed at a high pressure gasoline plant for approximately two years; transferred from there into the Steel Pool in Kansas, at a casinghead gasoline plant; and transferred from there to the chemical department at Oil Hill, Kansas, near Eldorado. After about eight months I was transferred to Tallant, Oklahoma, in the chemical research department. At the termination of that period I entered the employ of Texoma Natural Gas Company at Fritch, Texas, in August, 1931.

Prior to my employment by Texoma my work was in the nature of chemical research. We were working on a process for partial oxidization of natural gas to form various constituents for four months immediately preceding my employment by Texoma. That consisted for the most part of research and development work, which resulted in the establishment of a plant at Tallant, Oklahoma.

In connection with my research I had occasion to measure gas in small quantities, and since I went with Texoma I have had occasion so to measure gas. It is a part of my routine to do that from time to time.

When I first went with Texoma there was a certain amount of control work to do in testing the gas as it goes through the station, as well as the gas and water from various stations along the line on the way to Chicago. This test is for a number of different purposes. We make some physical tests, such as for specific gravity, testing for heating value, sulphur content of the gas, and for water; and, of course, certain tests are made of the cooling system water to determine the fitness of the water for use at the stations, for corrosion possibilities, and various other factors. These routine matters involve the measurement of gas.

Since I was employed by Texoma we have always
331 had a certain amount of research and development
work to do. One of the first things was the study of gas hydrates. This is a compound of gas with water that forms a solid compound, which melts, depending upon the temperature and pressure. In general, the higher the pressure on the system, the higher the melting point; the lower the pressure, the lower the melting point.

A gas hydrate may look like ice, or it may look like snow, depending on the way it is made. In the pipeline ordinarily it has the appearance of snow. It is crystalline. It has an appearance of something like cones of a fir tree. It is a branch of crystal.

When I went to work for Texoma we did not know that hydrates existed. The gas industry had had trouble for years with freezing in the pipelines, but up until 1931 it had been attributed directly to ice accumulations in the line. It was necessary for Texoma to make special research into that field because at the time the line was built Texoma had installed a plant at the Fritch station for the purpose of removing water from the gas so as to eliminate freezing troubles in the line. This plant was so designed that the gas would be chilled and thereby condensing out the water and allowing the dry gas to go downstream, so the condensate trouble would not occur on the downstream side.

When this plant was placed in operation we found all sorts of trouble occurred in thet coils of the cooling units, and it was necessary to shut down a unit after it had been in operation for a short time, and defrost, like they do an ordinary ice box, in order to operate at its maximum capacity again.

The problem demanded original research work in connection with the operations of Texoma because they were operating at higher pressure than most other gas lines, and, as stated before, the melting point of these hydrates is higher with the higher pressures. We were obtaining melting points in the vicinity of 50 or 60 degrees Fahrenheit, instead of 32, as for water.

Prior to the building of this plant, the industry had encountered this same trouble with the higher melting point, although they did not realize it at the time. The difference in the conditions under which we proposed to operate the Texoma lines from those of the ordinary gas line was that Texoma desired to operate at a maximum pressure of 800 pounds, which was considerably higher than the usual pressure at which gas lines were operated at that time. Then the ordinary pressures at which gas lines were operated were from 150 to possibly 300 pounds, and you do not encounter an accumulation of these hydrates at pressures of 100 to 300 pounds in ordinary weather.

The accumulations in these lines which turned out to be hydrates had not been identified as hydrates at the time the Texoma plant was put in operation. They were then believed to be ordinary freezing of water in the pipelines by temperatures low enough to freeze water. In the beginning, in order to stop the freezing of its lines, Texoma in-
332 stalled a dehumidification plant at the Fritch station for the purpose of removing water. I believe that is the first plant ever installed by a natural gas pipeline in a natural gas field. The work which resulted in the identification of this substance which formed in the Company's pipe-

lines as hydrates rather than ice was done by me in the Fritch laboratory.

I have been asked to submit for publication several papers or studies in the field of gas hydrates. Those publications, the name of the article, and the date published, are as follows:

"Moisture Content of Natural Gas," published by Western Gas, December, 1933.

"Formation of Gas Hydrates in Natural Gas Transmission Lines," in Industrial Engineering Chemistry, Volume 26, pages 81 to 85, in 1934.

"Moisture in Natural Gas," presented before the Southwestern Gas Measurement Short Course at the University of Oklahoma in April, 1935, and later published in the Oil & Gas Journal, June 20, 1935.

"Gas Hydrates," presented as a paper before the American Gas Association in Dallas, May, 1936; and later published in the American Gas Association Monthly, in the July, 1936, edition.

A paper on "Preventing and Removing Gas Hydrate Formations from Natural Gas Pipelines," presented at the May meeting of the American Gas Association this year; later appearing in Gas Age, Volume 83, page 45; also in Gas for May, page 30; also in the Oil & Gas Journal for May 11, 1939, page 66.

I have been asked to describe the formation of that hydrate in a gas pipeline where the water is not removed, the behavior of the hydrate as it forms, and the result of its being formed in that formation. As the gas comes from the well and is compressed, ordinarily it is saturated—that is, it holds as much water vapor as it can. Later on, if the temperature of the line drops and there is moisture in the gas, some of the moisture will condense. If the pressure and temperature conditions are right for the formation of hydrates, this moisture will form as a hydrate instead of liquid water. That, of course, will depend upon the temperature and pressure. At about 800 pounds I think that the temperature melting point will be about 60 degrees Fahrenheit, and it decreases as the temperature of the line decreases.

With ordinary water condensation the amount of water that condenses in a pipeline will depend on the vapor pressure of the water. We have a state of equilibrium set up there, in which you get a certain amount of water condensed and therefore a certain amount of water left above the liquid water. After equilibrium has been obtained, no more can be condensed for any given pressure and temperature.

When this hydrate forms, having considerably lower
vajor pressure ~~than~~ water, additional water can be
333 absorbed, if you want to look at it as absorption, and
these hydrates in the pipeline block it up more rapidly
due to the melting factor, and also due to the factor that it is bulkier and takes up more space, as snow takes up more space. This reduces the capacity of the pipeline and may entirely shut off the flow. That experience has actually occurred, where the pipeline has been so stopped with hydrates as partly to cut off the flow or to cut it off entirely.

During the past three weeks I have been requested to conduct some tests in the field of the solubility of gas into oil down there in the Panhandle. I am familiar with a bulletin of the Bureau of Mines in which some curves are set out showing the solubility of certain gases with certain oils prepared by Dow and Calkin. I have examined that bulletin and am familiar with the curves. I know how the curves were constructed by the authors of the pamphlet and on what information they constructed it.

They had a container to which they added crude oil, among other things—they used a number of different circumstances—and above the crude oil they introduced a certain amount of natural gas at various pressures. One test would be made in this manner: They would decide on some definite pressure and temperature, and they would add gas to this cylinder until it had attained this pressure of, say, 200 pounds, and they would saturate the oil with gas; that is, they would keep adding gas to this cylinder until the pressure remained constant at, say, 200 pounds. In other words, a state of equilibrium existed between the gas and the oil at a definite pressure and temperature.

They would then liberate the pressure in this bomb and measure the gas coming out of solution, and in this manner they were able to establish one point of the gas-oil ratio curve. In this particular method of determining the gas-oil ratios they made measurements for each different pressure of any given gas and oil sample until they had established a uniform point where they could build the entire curve of pressure versus the cubic feet of gas dissolved per barrel of oil.

They took oil which no longer contained gas and dissolved gas in it by the chemical process I have described until it reached the saturation point, and then the gas was withdrawn and measured as it came out, and in that way they arrived at the quantity of gas which had been received in solution.

We made such a test in the Panhandle, using Panhandle oil and Panhandle gas. The oil was a sample from a stock tank at the Alamo refinery of the Phillips Petroleum Company, one that was a mixture of oil from Gray and Hutchinson Counties. The gas was a composite sample from Texoma's compressor station covering the area of the Panhandle field in Moore, Hutchinson, Carson, Gray and Potter Counties. With those samples we did precisely the same thing that was described by Dow and Calkin in this pamphlet we have discussed. We dissolved this gas in the oil at different pressures, and at a temperature of 90 degrees, and established a similar curve to this, showing gas-oil ratios compared with the pressure of the sample. We saturated the oil under such circumstances that we
334 were able to ascertain how much it would contain at
471 pounds absolute. At 471 pounds absolute we obtained a gas-oil ratio of 94 cubic feet per barrel, on a pressure base of 14.7 pounds; but we changed that to 16.4, which will lower it to about 85 cubic feet per barrel. We used 471 pounds as the basis for our computation because that is the initial rock pressure of the oil field in that vicinity.

We were not satisfied after having made that test that we had arrived at the correct amount in terms of cubic feet of gas to the oil in the formation at a pressure of 471 pounds in that field, because in obtaining a sample of stock tank crude oil certain of the volatile vapors have been removed from that oil. In other words, it is not the same as it was originally; and in the same way the dry natural gas which was used in this sample had some of the higher boiling constituents missing from it, so in a composite sample of this kind, with a mixed oil sample and a gas sample, there is a gap in between them.

We did not stop our investigation when we followed the same procedure that had been followed by Dow and Calkin. We went further and obtained additional information. I prepared a curve showing the results of that test, and I have the base figures from which that curve was constructed.

The tests referred to were made at the research laboratory of the Phillips Petroleum Company at Bartlesville, Oklahoma. I was present and witnessed the compositing of the samples and the later analyses that were made on the composite. The steps taken in the course of making those tests are outlined in the following statement.

We had a steel sample bomb that was first filled with mercury entirely and a crude oil sample from this stock tank. Crude was poured into this top portion of the bomb, removing an equivalent amount of mercury at the bottom, after which the gas was added from the top part of the bomb. The oil was saturated with the gas and it was necessary in this particular test to try to saturate the gas at 471 pounds. We had to take an indefinite amount of gas into this cylinder. We did not know how much, of course, and in the sample shown here on the curve sheet we actually got a great deal more gas in there than we thought we would get at 471 pounds. That was accomplished by adding gas to the top of this bomb at our cylinder pressure, which was approximately 700 pounds, and then compressing by pumping mercury into the bottom of the bomb until all of the gas had gone into solution. We did that by compressing the sample up between one and two thousand pounds to be sure all the gas had gone into solution, and at the same time we rocked this bomb, which would allow the mercury to slosh back and forth and insure thorough mixing, and then after the sample was brought into solution it was further checked by determining the vapor pressure. The highest point on this curve is the vapor pressure of that sample after the sample had been mixed up in that manner. It was then placed in a constant temperature vat held at 90 degrees Fahrenheit, still under about 2000 pounds pressure, and a very small amount of mercury was liberated from the bottom portion of this bomb, which amount was recorded, and, of course, this little
335 amount of mercury would allow a fairly large decrease in pressure, because mercury is not very compressable.

We continued that for a number of steps, until we reached a point where gas began to come out of solution. Then if we plot mercury, the amount of mercury drained out versus the pressure drop, we would get a very steep line coming down to begin with until the gas begins to break out of solution, in which case we get a very sharp break in the other direction. The point of intersection of those two lines is taken as the vapor pressure. That is the top point which we have on the curve here. It was 975 pounds in this case.

Starting from that point, then, we began to liberate gas from the bomb, measured the gas as it came off and the corresponding reduced pressure, and did that in several steps shown by the certain points on this curve, until we reached atmospheric pressure.

This sampling bomb, this container of the gas-oil mixture, is constructed so that the inside of it contains a spring, to the end of which is attached a weight, and this whole apparatus then is shaken and moved up and down so that this spring and weight will agitate the oil in the bottom. It is quite difficult to establish equilibrium conditions, as we attempted to do in making this test. We lower the pressure to a given point and measure the gas that comes off at that pressure.

We can lower it to, say, 725 pounds on this first step, shake it, and it will jump right back up nearly to the full pressure. We continue shaking that then until there is no change in pressure, thus showing that there is no more gas coming out of solution. That amount of gas, then, is the amount that is vaporized at this pressure point on the curve, and then we go down to another lower pressure point and measure the gas that comes off at that point, and when all the gas has been so evolved this gas-oil ratio here can be constructed.

The purpose of jostling or shaking that I have spoken of is this: You can liberate pressure on a mixture of gas and oil, where gas is dissolved in oil, and it will not establish equilibrium conditions immediately. In fact, there will be a long period of delay unless you speed that up by some method, such as agitating the mixture. That is what we accomplished by this spring device which I have described.

The gas goes into the solution by chemical absorption of the particles of the gas in those of the oil, and it is only the exposed part of the oil that is in touch with the gas at first when it is in a static condition. The stirring or the jostling of the oil up through the container where the gas is affects the absorbing of the particles of gas in the particles of oil by giving it a greater chance of exposure to the different portions of the oil. It is the same principle as stirring the coffee in order to absorb the sugar in it. That would be an analogy.

336 In the course of the test we agitated the oil a great deal. We were able to insure all the gas had gone into solution by compressing it to a point far beyond its vapor pressure.

(Document entitled "Solubility Curve," marked Exhibit No. 69 for identification.)

Exhibit 69 entitled, "Solubility Curve," was prepared by me, and I am now marking on it the quantity of gas that I found could be dissolved in that oil, measured on a pressure base of 16.4 pounds per square inch. The notation now made is the addition of "85 cubic feet per barrel at 16.4 pounds per square inch."

(EXHIBIT NO. 69, for identification, offered and received in evidence without objection.)

As I have said, we were not satisfied with the test as indicating the solubility of gas in oil in the formation at the original pressure in the Panhandle because of the manner in which we composited these samples of oil and gas, which did not take into consideration the effect of the vapors that had been evolved from the crude oil together with certain heavier hydro-carbon constituents that were missing from the natural gas that we might normally expect to be in equilibrium with crude oil under bottom hole pressure conditions and temperature conditions.

In an effort to find the answer to the question of how much gas could be and probably was dissolved in the crude oil in the formations in the Panhandle at original pressure, we obtained some actual bottom hole samples of Panhandle crude oil in its natural state. Through a cooperative arrangement with the Phillips Petroleum Company, which has available certain specialized equipment for obtaining these samples, we were able to take the samples at the bottom hole pressures and temperature conditions.

This equipment consists essentially of a tube that will go down into the well. It has a valve on either end, both of which valves are cocked open at the time it goes into the top of the well. The sampling tube is then lowered to the depth at which the sample is to be taken, and the sample tube is washed out by raising and lowering it in the well, after which, by a device that is controlled from the top of the well, the valves are thrown shut. The sample then is locked in this device. It is raised to the top of the well where it can be checked to be sure that no leaks have occurred, and in that way it can be transferred to a sample vessel, where it can be removed to a laboratory for further testing.

Several samples were taken. One of them we were able to lower right down on the bottom and obtain a bottom hole sample. On some of the others we came up off the bottom a little bit in order not to get any water in the sample tube. Some of the wells have water down below the oil in the well bore. Of course, we had to send a bailer down to begin with, to be sure there wasn't any water at the depth where we planned to take these samples. One of the wells showed no water at all, so we were able to go clear to the bottom of the hole.

Those samples were taken in the Panhandle oil field, in Hutchinson County, from wells of Phillips Petroleum Company. They were taken from Cockerell No. 41, in Section 6, Block M-21, which is an oil well. In this
337 particular well there was no gas. It is in the sour gas zone, however, and the oil is sour. The second well was Cockrell No. 36, in Section 3, Block M-21. The Juanita Johnson No. 4 is 320 feet north and 530 feet east of the West ½ of Section 5, Block 1, Brooks & Burleson Survey. The crude in that well smelled sour that day. The E. B. Dorset No. 1, in Section 64, Block 46, H&TC Survey, is also north of the sour gas line.

We went through the same procedure in obtaining samples from each of the other three wells. The sample bomb came out of the well full of oil under conditions so that its pressure was not reduced in the process of bringing it out. It was brought out in the original condition it was in at the bottom of the hole, and had exactly the same pressure when we got it outside of the well as it had down in the bottom of the well, unless the atmospheric temperature increased the pressure by increasing the temperature on the tube, but nothing would leak out of it.

We transferred those samples to sample containers so that they could be removed to the laboratory for further analysis. We did that in this way: This tube that I have attempted to describe has a removable head on one end. That is on the top side of a valve. I have a drawing of it here that may help a little in following that. The top portion there is unscrewed and a new type head is put on. This head has two openings, to one in which is attached a mercury pump, and to the other one is attached the sampling tube. The head is filled with mercury, as well as all the lines leading up to it. Mercury is pumped into the bomb. Of course, the bomb is full and the pressure immediately rises, and the pressure on this bomb is placed far above its vapor pressure, so there is no possibility of any gas coming out of solution of the oil during the transfer of the sample. We pumped those up to between one and two thousand pounds before the valve on the bottom hole sample tube was ever opened.

The mercury then was pumped into the sampling tube and the transfer cyclinder valve was opened, which was also full of mercury, and as the oil was brought over into the sample container the mercury was withdrawn from the bottom of this container. When a sufficient amount of sample had been withdrawn, both valves on the transfer container were closed. The lower valve then was constructed to allow some more mercury to run out, which would allow expansion space in the sample container. This, of course, would allow gas to form above the oil and mercury in the bottom, but then it is closed up, both valves are closed, and this gas was later brought back into solution when it was taken to the laboratory. After it was sealed up in that new container it was taken to the research laboratory of the Phillips Petroleum Company in Bartlesville, Oklahoma. We didn't take it to the Fritch laboratory of Texoma because the method of completing the test required specialized equipment which we did not have at Fritch, and for that reason we arranged to take it to the Phillips Petroleum Company laboratory, which did have such equipment already on hand.

That is the same kind of equipment which is commonly
338 used for the purpose of taking bottom hole samples from oil wells, and the method we employed after the samples were removed from the wells is the commonly accepted method of handling oil thus removed from the bottom of a well in order to get it to a laboratory.

As to where I learned that such a test could be made, this bomb is described in this report of investigations, No. 3212 of the Bureau of Mines, published in May, 1933.

I was out there when they began to prepare for taking the samples and stayed with them throughout all the taking of the samples, and after the last samples had been taken I put them in my car and took them to the Bartlesville laboratory. I saw every step that was taken and know that it was taken according to the accepted manner of doing it.

After we got the samples to the laboratory at Bartlesville, Oklahoma, the gas-oil ratio was established at the bottom hole temperature of each sample in this specialized piece of apparatus of which we have spoken. This was done in practically the same way as that already described, with the exception that we did not have to mix up our sample because we already had the sample mixed, and all we had to do then was to transfer it again to the testing apparatus, insert it in the constant temperature vat, and withdraw consecutive portions of gas as the gas was removed from the oil upon reduction of pressure in successive steps down to atmospheric pressure. We measured the temperature of the oil at the bottom of the well at the time the sample was taken. Cockerell No. 41 was 88 degrees Fahrenheit; Cockerell No. 36 was 89 degrees; the E. B. Dorset was 83 degrees; and the Juanita Johnson was 89 degrees.

Going back to the laboratory at Bartlesville and describing how the process of testing the content of these samples was accomplished, I will point out to start with that we established the vapor pressure of the oil sample in the same manner that has been described on this other gas-oil mixture, by withdrawing mercury in small amounts until we had reached a point where the gas began to break out of the oil. On the Cockerell No. 41 that was 425 pounds per square inch absolute at 88 degrees Fahrenheit. From that point we reduced the pressure to in the neighborhood of 325 pounds, and by continuous shaking of the apparatus we evolved all the gas that would come out of solution of the oil at that temperature and pressure.

It was necessary to shake the apparatus because it is quite a difficult matter to get all of the gas to come out of solution unless it is thoroughly agitated. It tends to supersaturate, if you want to look at it that way. You lower the pressure and instead of all that gas immediately coming out that should come out under equilibrium conditions, a good bit of it stays in the oil, so we had to agitate the oil in this container until there was no more gas evolved, as was indicated on the pressure gauges on the apparatus.

We measured that gas as the pressure came down and constructed a curve so as to determine just how much 339 gas came out of solution as the result of this test and the agitation of which I have spoken. After we had gotten all the gas out that we could at one pressure, that pressure was recorded together with the total volume of gas that had been withdrawn to obtain that pressure.

We then dropped the pressure down to obtain another point on the curve, obtaining several different points, until all of the gas had been evolved from the container, shaking it at each interval, as described before. I might add that when we got down to the lower pressures, the last set, we seemed to have more trouble in getting that gas to come out of solution than we did at the higher pressures. I do not know why it was; but we were not able to remove the last bit of that gas without agitating and shaking that container sometimes for as long as 45 minutes. There is an element of time required to get the gas out as the pressure goes down.

We went through the same process, from the taking of the sample to the completion of the test, in the case of the sample from each of the four wells.

When the pressure had gotten down to 50 pounds, we found in the case of Cockerell No. 41 that there was about 87 cubic feet per barrel remaining in solution in the oil. In the case of Cockerell No. 36 and Juanita Johnson No. 4 we had about 60 cubic feet per barrel remaining, and in the case of the E. B. Dorset about 26 cubic feet per barrel.

I have a tabulation of the data and information prepared in such a way as that it can be conveniently presented.

(Document entitled "Bottom Hole Sampling Data," marked Exhibit No. 70 for identification.)

This exhibit contains a description of the samples that were taken, the bottom hole samples, together with the bottom hole temperatures and pressures which were measured at the time the samples were taken, and the location of the samples, together with a summary of the gas-oil ratios that were found after these samples had been returned to the laboratory for analysis.

In the last line of the tabulation, before getting to the description, there is a line "Gas-Oil Ratio at 456 Gauge Cubic feet Per Barrel." 450 gauge was used because that is equivalent to 471 pounds absolute. These tests, of course, are all measured with that gauge pressure and recordings are given at gauge pressure and corrected back to 471 pounds absolute. The pressure base on which the gas was measured as it came out of the oil was 14.7 pounds. The gas-oil ratios contained in those four columns can be stated in terms of gas measured at 16.4.

We found the gas contained in the reservoir corrected to original reservoir pressure of 471 pounds, measured on a basis of 14.7, was 209 cubic feet on the Cockerell No. 41; 183 for the Cockerell No. 36; 86 for the Dorset; and 170 for the Juanita Johnson. Correcting that to a base of 16.4 pounds per square inch, we find for the Cockerell No. 41, 187; for the Cockerell No. 36, 164; for the Dorset, 77; and for the Juanita Johnson, 152. There will also be a corresponding change in the line immediately preceding that, showing the gas-oil ratio at the vapor pressure. They will be reduced in a similar fashion. All of those figures there are based on 14.7 and may be corrected to 16.4, just as I have corrected the final deduction to that basis.

340 (EXHIBIT NO. 70 for identification, offered and received in evidence without objection.)

Cross-Examination Interposed by Mr. Slaff.

"Fluid level" on Exhibit 70 means that the oil rises up into the casing to a certain depth, depending on the pressure on the well. That fluid level is where the oil rises to in the casing above the bottom of the hole. "Ca." is an abbreviation for circa, meaning approximately.

Cross-Examination Interposed by Mr. Booth.

There was a special reason for selecting these particular four wells. As I said before, the samples were taken in a cooperative arrangement with the Phillips Petroleum Company. They were able to take those wells off production and prepare them for removing the samples, and they were in the area in which we were interested, so we took those wells.

Direct Examination Resumed by Mr. Morgan.

I had nothing to do with selecting these wells myself. The Phillips Petroleum Company selected them. We did not have any oil wells down there that we could test. We made an effort to get permission to take samples from other wells in the field; but these were the only wells we could get permission to use.

I have prepared curves which set out the same results as those pictured on Exhibit 70. I will put the adjusted quantities, measured on a base of 16.4 pounds per square inch, on these curves as I did on the other.

(Document entitled "Solubility Curves," marked Exhibit No. 71 for identification.)

This set of curves is set up in the same manner as Exhibit 69, showing the relationship between pressure and solubility of the gas in the oil. There are four curves shown here, representing the four different wells which we have discussed, marked curves Nos. 1, 2, 3 and 4. This curve which is shown as a broken line and marked "Calculated" was calculated from the analysis of the crude oil sample that was removed from Cockerell No. 41, showing, I think, extremely good agreement between the calculated values and the experimental data as illustrated by Curve No. 1.

(EXHIBIT NO. 71 for identification, offered and received in evidence without objection.)

As to how I account for the difference in the gas contained in solution in the bottom of Cockerell No. 41 and the other wells used in our tests, it looks as if the oil sample that was taken in each one of these wells had a different composition—contained different amounts of gas in solution. The test data shows that the oil was not saturated to the same extent in any of the samples taken. The oil in Cockerell No. 41 was the most highly saturated of the four samples. That is sample No. 1, on the curve, Curve No. 1.

As to the selection of the equipment to conduct these
341 tests, I repeat that this is a specialized piece of equipment, and there are comparatively few places where apparatus of this type is available. That apparatus was developed by Dr. D. L. Katz, who is now at the University of Michigan, I believe, and Mr. K. H. Hachmuth. The original design was made by them for some work which was published in Industrial and Engineering Chemistry, under the subject of "Vaporization Equilibrium Constants in a Crude Oil Natural Gas System," in September, 1937. This is the equipment which is described in that publication. That is the name of the article. It is published in Industrial and Engineering Chemistry, Volume 29, page 1072.

I might also add that a certain change has been made in the apparatus which we used, as shown on this diagram in the article just referred to. They used a stirring device consisting of an electric motor within this closed cylinder.

However, in this article to which I have just referred they had a vapor space above the oil so they could put their motor in the vapor space. In the samples that we ran here it was all oil in the cylinder. They could not put an electric motor in there, and for that reason we substituted this spring device which I described earlier. Otherwise, the apparatus is exactly the same. That equipment, which is owned by Phillips Petroleum Company, is, so far as I know, the best available equipment for conducting such a test.

As to what in my judgment occurs as oil is being raised from the bottom of a well by a pump or otherwise to the mouth of the well and produced with reference to whether or not it discharges all of the gas by the time it reaches the surface and is reduced to atmospheric pressure, I think it is very unlikely that all the gas could be discharged in the manner in which the oil is brought to the surface. There is a comparatively small amount of agitation. The oil is usually sent to a separator tank where there still is very little agitation, so I cannot see that you would get anywhere near all of the gas out of solution that you would normally expect to come out if it were in equilibrium with the oil.

As to whether the oils taken from those four different wells were saturated or under-saturated with gas, we found that Cockerell No. 41 was entirely saturated with gas at bottom hole temperature and pressure; and we found that the remaining three were under-saturated with gas.

Questions by the Examiner.

I do not know what the Railroad Commission's report shows the gas-oil ratio of these wells to be.

Cross-Examination by Mr. Slaff.

I have not testified in any other cases.

342 W. F. BRAINARD, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(June 28, 1939.)

My name is W. F. Brainard. I live in Amarillo, Texas. I am a geologist for Texoma Natural Gas Company, working under Mr. Peterson.

I received my Bachelor of Science degree from Syracuse University in 1917, and my Master of Science degree from the same university in 1922.

Since the completion of my university courses, I have been employed almost entirely either with an oil company or with Texoma Natural Gas Company. My first employment was with the Empire Oil & Refining Company, at Bartlesville, Oklahoma, where I was employed as a geologist for a little more than thirteen years, beginning July 2, 1923. During that period I did my geological work in the north central division of Texas, with offices at Wichita Falls; and in the western division of Texas, with offices at San Angelo, Texas.

During those thirteen years I had occasion to do geological work in the Panhandle field. In the last two and a half months of 1924 and the first half of January, 1925, I made a sub-surface map of the Panhandle area from Potter County to the Oklahoma line. While I was with the Empire I do no other work in that field, except to keep up with it casually. For about three years after I went with the Empire we had charge of the Panhandle district from the Wichita Falls office. They did not create a district office in the Panhandle until 1926, and prior to that time the Panhandle district was handled out of our office at Wichita Falls.

I went with Texoma Natural Gas Company in November, 1936. Since that time my work for Texoma has been general geological work pertaining to the production of natural gas. I have worked in continuous association with and under the direction of Mr. Peterson.

I have had occasion to become acquainted with the geological situation in the Panhandle during the time I have been dealing with that field. I know the general formational conditions in the vicinity of the producing areas. I have been requested during the past three or four weeks to prepare some cross sections or lineal sections through a portion of the field.

(Map entitled "Texas Panhandle", marked Exhibit No. 72 for identification.)

Exhibit 72, headed "Texas Panhandle," is now presented to me. The base map was prepared by Mr. Peterson, or under his direction. It was just a plain map without any of the other data which appears upon it now. The black and red lines and the broken lines on that map were placed there under my direction.

343 The heavy black line is the 1938 Railroad Commission of Texas production boundary.

The broken blue line through this area is the oil line of the Texas Railroad Commission.

The red line marked "AA" through this area is one of the lines of cross section shown on another map.

The "BB" line, also in red, and broken, is the line on a section marked "B" on another map.

The line "CC" is a third line of cross section.

The reason for the irregular course of each of those lines is that it is utterly impossible to make a section in any area through an oil field in a perfectly straight line. You have to zigzag back and forth for your control, because in many places where you would place control if you were putting it in a straight line there are no wells from which to obtain your information. Those lines run from well to well, and at each break in the line is a point at which our data were taken.

I tried to pick out an area in which I wanted a control point, and then went through the drillers' logs, and in many instances took the first one I found in that area to secure my data from; provided, of course, the information was complete on that one. Point "A" is just a mark on the line of cross section. The end of the line in Hutchinson County near which is the letter "A" is at a well, the log of which I had before me at the time I was doing this work. The end of that line is marked with the figure "1". In the case of the CC section you will notice each log is numbered, and the numbers of those logs there are also given on Exhibit 72 along this line at each point. This map is preliminary to some other drawings which will be hereafter discussed, and the line marked "CC" is the line which locates on the ground the wells set forth in the CC section of Exhibit 73.

(Document entitled "Cross Section, Oil Area, Texas Panhandle Field, Section C-C'', marked Exhibit No. 73 for identification. Document entitled "Cross Section, Oil Area, Texas Panhandle Field, Section B-B'', marked Exhibit No. 74 for identification. Document entitled "Cross Section, Oil Area, Texas Panhandle Field, Section A-A", marked Exhibit No. 75 for Identification.)

Exhibit 74 is the section identified by the line on this map marked "BB".

The line "AA" on Exhibit 72 locates the wells used in making the cross section AA.

On Exhibits 73, 74, and 75, the wells at the northwest end of the three red lines C, B, and A, respectively, are located at the lefthand side. I have put the same numbers on Exhibit 72 at each break of those respective lines that are shown above the wells portrayed on Exhibits 73, 74, and 75, respectively.

344 Going back to Exhibit 72, I point out that the line CC is located toward the higher part of the structure to the southwest from the oil and gas contact line, as shown by the Railroad Commission, the line of section being the broken blue line. The line is located very close to the southwestern edge of the oil producing area.

Line BB zigzags back and forth across the oil and gas contact line as shown by the Railroad Commission, and is as near as it was possible to make it through the center of the oil producing area of the Panhandle field.

Line AA is between the oil-gas contact line as shown by the Railroad Commission and the side boundary of the field as shown by the Railroad Commission, and is located approximately at the outside edge of the producing oil area. The oil-gas line of the Railroad Commission does not extend as far east as my line AA. The point at which the Railroad Commission line stops is right here just south of Pampa, and I continue my line along the boundary of the field on over into western Wheeler County, approximately to the limit of the main productive area of oil for that field.

Exhibit 73 was prepared under my direction. I procure and assembled the data from which it was prepared. I used the data obtained from the drillers' logs of each of the wells shown thereon. There are 41 wells shown on that exhibit, and they are located, as I have already said, along the line CC, beginning in the northwest and moving southeasterly, on Exhibit 72.

On that exhibit I show some perpendicular double columns, which represent the position of the well itself, just the lower part of the well, the upper part having been cut off because there was no necessity for showing the entire well from the surface down. The productive oil and gas horizons are the portion of the formations penetrated by these wells. There is no area or horizon productive of oil or gas in any of the wells shown on those logs above the portion which is set forth on the exhibit.

The horizontal lines running clear across the drawing and many of them crossing the lines which represent oil wells are explained as follows: The first line shown on this section is the sea level line and is so marked. Each one of the successive lines above that sea level line represents distances of 100 feet. For instance, the first line is 100 feet above sea level, the second 200, and so on.

I show each one of the producing formations or shows, either of gas, oil or water, in connection with each well represented on Exhibit 73.

There is some lettering at the top of each of those double columns. The number at the top corresponds to the number on Exhibit 72, which we have already discussed, and then below that is the name and location of the well itself. The lettering at the righthand side of each one of those columns as you come down toward the bottom represents
345 the point from the surface at which that particular show or pay was recorded in the log. A "show" would simply be perhaps a showing of oil or of gas, but which would not be productive in commercial terms, while by "pay" I mean where you would get sufficient amount of either gas or oil to be commercially productive.

Those figures are shown on the righthand side of each well. The figures at the left are the datum planes above or below sea level, whichever the case may be, of the show or pay which is recorded in the drillers' logs.

Across those double columns which represent wells there are some lines or bands, some of them colored in red and some in green and others in black. The red color represents gas horizons, either shows or pay horizons. The green represents either oil shows or oil pays; and the black represents water horizons.

Taking well No. 1, the log shows that at a plus 450 they had two million cubic feet of gas. From a plus 305 to a plus 293 they had three and a half million cubic feet of gas. From 132 to 120 plus, they had five barrels of oil per day and one and a half million cubic feet of gas. At plus

32 to plus 25 they encountered one bailer of water per hour, the total depth being plus 6, and the well was plugged back to plus 93. By plus I mean the distance above sea level. If a well is drilled below sea level, the figures after you cross the line of sea level would be designated as a minus.

In the third producing horizon, or the horizon which showed or produced both oil and gas, I account for the presence of both oil and gas in that horizon by the fact that it is very close to the contact of the oil and gas horizons. The relation between the oil and gas as it was found in that formation is that the gas was in all probability at the top of the oil. That is an ordinary thing to find down in that field, both oil and gas in the same producing formation, when you drill a well at the approximate location of the gas-oil contact line.

Questions by the Examiner.

The length of that contact line depends on the dip and the thickness of the pay. As to giving you some illustrative distance, I do not know if I could give you an actual footage without having the thickness of the pay and the dip at which the horizon is dipping. If your horizon happened to be flat, your line would be long; and if your horizon is steeply dipping, your line is consequently going to be short.

Direct Examination Resumed by Mr. Morgan.

In the area which is productive of oil the dip varies considerably. In some parts of it you will have rather a steep dip and in other places it will be fairly flat. Where the formation dip is flat, the oil-gas line across the formation from southwest to northeast would be longer. If it
happened to be at a place where the producing forma-
346 tion dipped steeply, the line would consequently be
shorter. In addition to the incline, another factor to be considered is the thickness of the pay.

Well No. 2 is located about four miles southeast of well No. 1. In this well at a plus 274 they had a show of gas. At a plus 209 to 194 they had a million gas and a show of oil. At 154 to 149 they had an increase in gas and a show of oil. At 79 to 69 they had an increase to eight barrels of oil, and at minus 16 to a minus 24 encountered one bailer of water per hour. As to the significance in the Panhandle field of shows of oil such as were encountered in well No. 2, it is just a show and could not be classed as a productive horizon. Where the driller records a show of oil, it means that sometimes the bailer comes out with a streak of oil on it, and again when he dumps the bailer for a sample in a bucket they wash out a little show of oil on top—some little rainbow or some phenomenon such as that. That is what I mean by show.

Questions by the Examiner.

There are different types of conditions in the case of wells which would require plugging back in one case and not in another. Sometimes the volume of water would be a condition and sometimes the water might exhaust or decrease in such a way that it would not be necessary to plug back. Other times they just go back and produce it anyway. In that instance it is perhaps possible to plug back after the wells come into production if the conditions should require it. If they shot the well and had a big shot hole, they might have difficulty in plugging off the water. By that I mean if they applied nitroglycerine and blew out the bottom of the well bore so that it became enlarged. In that case there would be difficulty in plugging off the water. It would continue to come in around the plug.

The acidizing or shooting of a well is necessarily a bottom hole operation; but although it may be a bottom hole operation, they have means of placing their shot or their acid where they want it.

Direct Examination Resumed by Mr. Morgan.

Passing now to well No. 3 shown on that exhibit, at a plus 326 to 321 they had a show of gas. At a plus 266 to 256 they had an increase in gas. At 236 to 231 they had two million gas. At 163 they had a show of oil, and at 106 to plus 86 they had 300 feet of oil in the hole, and plus 81 was the total depth.

Questions by the Examiner.

As to why, if I show an increase of gas and beneath that a show of oil, the show of oil is a little wider than the increase of gas as represented by these bands, I point out that that just happens to be a case of drafting. In other words, to get both of them in there, they sometimes make one a little wider than the other to show that they are both there. There is no relationship whatever between the width of these two bands.

Direct Examination Resumed by Mr. Morgan.

I now pass to well No. 4. At a plus 231 they had a
347 show of gas. At a plus 191, they had an increase in gas. At plus 161 to 124, they had a show of heavy oil; and from a plus 121 to a plus 91 they had a show of oil. Plus 37 was the total depth. I mean by a "show of heavy oil" a case where the driller's log records a show of oil which he does not figure to be a producing oil. It is heavy and sometimes when you ~~get a~~ piece of the rock out of that well it shows more or less like a tar formation in the rock itself. It is not considered a producing formation. There are two other terms used in the field which are synonymous with a "show of heavy oil," namely, "dead oil" and "black oil."

As to each of the others of the 41 wells, the figures and bands show for themselves what was encountered in each one of them. Where I show a formation which I describe as a pay formation, the thickness is drawn to scale. A little while ago when I was talking about the thickness of the bands having no significance, I meant only where a show is recorded at a certain given foot. That show may be in a very slight thickness.

Concerning the exhibit as a whole, there is no instance shown on that exhibit along line CC where a formation which was capable of producing oil was encountered above a formation which produced gas. Nineteen of those wells were drilled within ten feet of sea level. In five of them water was encountered. The water reflected in the drawing is only the water which was encountered in the drilling of the well and, therefore, some of them were plugged back. If water occurred in any of those wells at a subsequent date the logs would not show it.

There are some other symbols on that map which I have not yet explained. There is the symbol up here, the title of the section, "Cross Section, Oil Area, Texas Panhandle Field, Section C-C," and, of course, the legend showing the oil pay colored in green; the gas measure shows colored in red; the line of cross section, northwest-southeast; vertical scale, one inch equals 100 feet, and the horizontal scale, two inches equal one mile. The term "P.D." means per day. "B.W.P.H." means bailer of water per hour. "O.I.H." means oil in the hole. "T.D." means total depth. "P.B." means plugged back. "Pr." means per. "Pr." followed by "H." means per hour.

In one or two instances it says "Spray five barrels." That means coming with the gas, spraying out as a spray per hour. It does not come as a flow; it is being driven out with the gas. With reference to well No. 8 I have a legend "Swab 300 barrels—7 hours." The well would not flow and it was necessary to go in with a swab and pull it out. A swab is a tool that they use to pull the oil out of the hole. It is fixed so that it goes down into the oil; it loads with oil, and they pull it on out. It is a sort of temporary pumping arrangement.

Exhibit 74 was prepared under my direction from the same kind of data used in the preparation of Exhibit 73. It is the same type of information on this section as that set out on the previous one. This one shows 56 wells, ranging in a northwest-southeasterly direction along BB.

The symbols, legends and drawings have the same
348 significance and meaning on this exhibit as on Exhibit 73. There is no instance along that line in any of those 56 wells in which free gas was encountered at a level below a formation which was productive of oil. Of those wells 31 were drilled approximately to sea level.

Questions by the Examiner.

The legend "Sm. show gas" just means a small show of gas. There is not much distinction between "small show" and "show." They are both pretty small. On well No. 11 where it says estimated 6,000,000 and test one, it means that the gas volume was estimated by the driller to be approximately six million but when they came to test the well it tested only 1,100,000. In other words, his estimate was considerably high. The line across the "M" indicates million. As to the significance of the term "Oil in hole," the oil rises up that many feet in the hole from the bottom. If they have 300 feet of oil in the hole, the lower 300 feet of the hole is filled with oil. If they show an oil pay and the well is drilled deeper, the oil in the hole probably increases, if they get an additional pay. The oil in the hole may be converted to show the barrels per hour by testing the well, or if their fluid rises so many feet each hour they know from the size of the pipe about how many barrels come into the hole. As to why well No. 22 shows 500 feet of oil in the hole instead of being converted into barrels, it probably was on the test, but they usually do not bother to test before completion of the well. In lots of cases they do not make tests then, but go on and complete the well and then make their Railroad Commission test.

Direct Examination Resumed by Mr. Morgan.

In an ordinary oil well when a productive formation is encountered, the oil comes into the well and rises in most instances to a certain level. That level has nothing at all to do with the quantity of oil that the well will ultimately produce. The rate at which it rises might have something to do with it; but the level is determined by the pressures prevailing around there.

Exhibit 75 was prepared under my direction from the same character of data as that used in the preparation of Exhibits 73 and 74. That exhibit corresponds as to location to the wells set forth along the red line marked "AA" on Exhibit 72, and the legends appearing on that exhibit are the same as those appearing on Exhibits 73 and 74. The drawings, symbols and lines have the same significance or meaning on this exhibit as on the two last mentioned.

39 wells are shown on Exhibit 75. In none of them was free gas encountered in productive quantities. There was no instance along that line where free gas was encountered below the highest formation which produced oil.

The logs along those lines do not represent all of the wells that were drilled along the general location of those three lines. I could have selected other logs or taken 349 logs of other wells drilled along the general location of those lines and constructed similar lines and similar cross sections. I am familiar with the logs of all the wells in that vicinity. I checked very nearly every one. Other groups of logs distributing wells along those three lines through the field would have presented the same general picture as they presented by the logs of wells shown on

Exhibits 73, 74 and 75. They would have varied only in minor details.

I don't know how many logs we have in our office; but I would say anywhere from three to five thousand. We have all the available logs of wells that have been drilled in the Panhandle, and I have studied those logs during my service there with Mr. Peterson. To my knowledge, there is no instance where any well has ever encountered free gas at a level lower than the top of the highest producing oil formation in the particular well. I do not know of any instance where free gas has been encountered in what has been referred to as the oil measures, that is, the part of the formations between the location of the oil-water line and the location of the gas-oil contact line.

Questions by the Examiner.

On wells 17, 26 and 30 there is a show of gas or some indication of the finding of gas. That is apparently just a small pocket. It does not give any thickness there. It just shows it at one particular point. It gives a thickness of ten feet on well 26. That would be an indication that there was a little gas on top of the oil in that ten feet. In well 30 there is a show of one foot. Geologically, I would account for the presence of that gas by saying it is just a little local condition.

Direct Examination by Mr. Morgan (Resumed).

The cross sections show at the top of each well the name of the owner of the well. At the top of each column is a number, which corresponds to the number on the line of cross section on Exhibit 72; then the name of the producing company, the name of the fee owner, then the footage, the location of the well from the section lines, then the section, block and survey and the county, and also the surface elevation at that point. The top name signifies the producing company or individual who owns the lease. The name right under that is the name of the fee owner on whose land the well was drilled and from whom the lease was taken.

(EXHIBITS NOS. 72, 73, 74 AND 75 for identification, offered and received in evidence without objection.)

Cross-Examination by Mr. Slaff.

I have testified one other time. I testified in a salt water suit for the Empire Oil & Refining Company. That was a suit for damages due to the pollution of a stream by salt water.

350 (EXHIBIT NO. 65 for identification, offered and received in evidence over the objection of counsel for the Federal Power Commission, to whom the Examiner granted an exception.

Document consisting of logs of wells shown on Exhibit No. 16, fourteen in all, furnished by defendants' witness Peterson at the Examiner's request, marked Exhibit No. 76 for identification. Counsel stated that Mr. Peterson had requested him to explain to the Examiner that Exhibit No. 16 represents Mr. Peterson's interpretation of these logs from the top of the Big Lime on down, and that above the Big Lime he did not pay so much attention to the details because he did not consider those formations material.

EXHIBIT NO. 76 for identification, offered and received in evidence without objection.)

351 FLOYD C. BROWN, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(June 28, 1939.)

My name is Floyd C. Brown. I live in Chicago, and have lived there since July, 1931. I am Vice President and General Manager and a member of the Board of Directors of Natural Gas Pipeline Company of America and Texoma Natural Gas Company.

I received my educational training at Stanford University, in California, receiving an A.B. degree in civil engineering in 1912 and a Master's degree in 1913. I remained in the University as an instructor in the engineering department for two years.

Following the completion of my education and my experience as an instructor, I was continuously engaged in engineering and construction work from the time I left the University until 1917. During this time I was engaged in field and office work, but it was largely construction work. I was employed by numerous companies: a subsidiary of the Great Western Power Company; Duryea & Gilman; Blakewell & Brown; Edward T. Foulkes; City of San Jose; Shell Oil Company; and during that time with contracting firms for short intervals.

In 1917 I accepted a position in Bartlesville, Oklahoma, as superintendent of construction with the Empire Companies. They were subsidiaries or affiliates of the Cities Service Company, of which Henry L. Doherty was the principal owner. In that capacity I supervised the design and the laying of oil and gas pipelines, the construction of oil refineries, gasoline plants, compressor stations, oil pump stations, and general engineering work in connection with field operations of the companies' oil and gas properties located in Texas, Oklahoma, Kansas, Missouri, Arkansas and Louisiana.

In 1919 I was advanced to the position of chief engineer, and supervised all of the engineering design and construction of the companies' mid-continent oil and gas operations. In 1920 I continued as chief engineer but was given additional responsibilities of managing and operating the companies' crude oil transportation system, and in that capacity I had charge of construction and operation of the companies' crude oil pipelines. I also handled the crude oil buying and selling, which involved supplying the companies' refineries. As I recall, the company had six refineries at that time. We also engaged in the purchase and sale of crude oil for outside companies, and handled some common carrier business through our pipelines for other concerns. I continued in that dual capacity until 1921, when I was made vice president and assistant general manager of the whole group of Empire Companies.

352 As vice president and assistant general manager of the Empire Companies, I still was concerned with the operations and the capital expenditures being made by the company, and also, as the title implies, had responsibilities of an executive nature, assisting the general manager in forming and carrying out the policies of the company. My duties comprehended both oil and gas operations.

The group of companies known as the Empire Companies were engaged in producing both oil and gas. Their activities were those that would be customary in the trade for integrated companies, and involved geological work, the taking of leases, the producing of oil and gas; then tracing the oil through from the producing wells, its gathering, transportation, refining, and marketing, to the retail gasoline consumer, as well as handling the other derivatives, such as lubricating oil, fuel oil, wax, and the hydrocarbon products made from crude oil.

On the gas end it involved the same geological work, leasing, the producing of gas, its gathering and transportation to markets, not only wholesaling to company owned distributing companies, but also to other companies, and the operation of the retail distributing outlets to the ultimate consumer.

In the same way, the natural gasoline made from casinghead and dry gas was manufactured and either sold as natural gasoline to refiners, or refined in our refineries and sold as motor fuel.

I was not relieved of the position of vice president and assistant general manager of the Empire Companies until some time in May, 1930; but I was relieved of active responsibility in that connection in September, 1929, when I was called into New York in connection with the work of Natural Gas Pipeline Company and Texoma.

During the period prior to September, 1929, when I went to New York in connection with the two companies just mentioned, I had had occasion to learn about the Texas Panhandle gas field. Under the companies' geological and leasing activities we started at a very early date—I don't recall the exact date, but my first contact in an intimate way with the field that impresses itself upon my memory was about 1926, though we had leases and vast holdings in the field prior to that time; but the development, which was primarily an oil development, had not attracted a great deal of attention, at least so far as our company was concerned.

In 1926 we were impressed with the showing of gas that was constantly resulting in a widening of the field and the area which was known to be productive of gas. We were conscious at that time that there was a field of magnitude. We didn't know how much, but each time an oil well was drilled it seemed like it resulted in a gas well, and we could see the field spreading out. We knew that there was a field of magnitude there.

This field attracted the attention of Mr. Doherty.
353 He was very much interested in gas reserves and was
anxious to try to see if it would not be possible to build a pipeline from the Texas Panhandle to the northeast,

with Chicago as a terminus. He even had in mind other markets and going farther east, but that was his principal objective at that time.

Mr. Doherty asked our engineering department in Bartlesville to undertake the geological determinations as to whether there were sufficient gas reserves to support such a pipeline; to assist the engineers of Henry L. Doherty & Company in New York in the making of market surveys, analyzing the potentialities of the markets and the price at which we might reasonably expect that natural gas could be sold in competition with coal and fuel oil in these markets; to estimate the cost of building such a pipeline and the cost of operating; and in general to analyze the economic feasibility of constructing such a line.

In pursuance of those instructions our engineering department undertook such a study. The entire problem of this study was more or less my assignment to carry through in an executive way, and in an engineering capacity to supervise this work and see that the study represented a cross section of the combined best judgment of our executive and engineering staffs. We arrived at a conclusion which we reported to Mr. Doherty. We reported adversely upon the building of a pipeline at that time, very much to Mr. Doherty's disappointment.

The adverse factors were based upon economic studies; but I think I could say that our conclusion was influenced most by our inability to obtain pipe which we deemed satisfactory for the building of a pipeline of this character, or a pipeline of the character that we felt we should have for undertaking such long distance transmission of natural gas.

Natural gas had never been transported distances of nine hundred to a thousand miles, and we recognized, or felt that we did, that we were confronted with a different set of economic conditions than that of transporting gas short distances, and the pipe was the main influencing factor in retarding our going forward at that time.

There were very many natural gas pipelines in operation at that time; but there was no pipe obtainable in a practical way outside of lap welded pipe. Lap welded pipe obtainable today is of a better type than that obtainable in 1926; but even today it is not pipe of a character that we would consider suitable for the building of a pipeline of this type. In 1926 the lap welded pipe then obtainable in commercial quantities was limited to 22 inches in diameter and very short lengths. The length was a function of the method used in its manufacture, and the very method used limited the length to around 18 to 22 feet.

In laying a pipeline, the longer the joints of pipe are, the less will be the capital cost and the laying cost in connecting those joints in a pipeline. The actual cost of joining
354 two pieces of 24 inch pipe is quite a factor, so that was an item in determining the economic study at that time.

The lap welded pipe was only obtainable with thick walls, short lengths, small diameters and low tensile strength, and from the way in which it was made it was so lacking in uniformity that there was no dependable or reliable way of determining what the joint efficiency would be. As a result of that, we had to use such low operating pressures that we were unable to take advantage of the thick walls that had gone into this pipe. In other words, you could get very little carrying capacity out of a ton of steel, as compared with thin-walled pipe of higher tensile strength which could be rolled into larger diameters to give you a great deal more carrying capacity per ton of steel.

Questions by the Examiner.

By joint efficiency I referred to the strength of the lap weld in the pipe and the strength of the steel from which it is made. Perhaps I can best explain that by outlining the method of manufacture. Lap welded pipe starts in its manufacturing operations as a strip of steel, which I think we would call a plate but in the trade it is termed a skelp; and this skelp is cut to the desired width and length and rolled to the desired thickness. Then this first plate or skelp is passed into a heating furnace which in the trade is often termed a soaking pit, and brought up to a red heat. It is removed from the furnace and passes on to a moving table, where the flat plate passes through shaping rolls and is formed into a cylinder. During the same operation, simultaneously with the shaping of the skelp into a cylinder, the edges are beveled or scarfed. The cylindrically formed skelp is then passed again into a furnace and the two edges which have been scarfed and overlapped in forming this cylinder are reheated and brought to a welding heat. As the cylinder leaves this furnace it passes over a mandrel, which is a large cylindrical bar of steel. This mandrel supports or backs up the two scarfed edges which are being welded together, on the inside. Passing on the outside are rolls which exert pressure upon the two edges, causing them to be fused together to form a welded joint.

Direct Examination Resumed by Mr. Morgan.

This would leave a seam along the full length of the cylinder, and that is the joint to which I referred when I was commenting on joint efficiency.

There was one feature of lap welded pipe which might be very objectionable for pipeline engineering, particularly if you wanted to work your steel to the highest possible stress. This was the fact that often when this pipe was brought out of the reheating furnace for the final welding operation, if there was any pause in the operation, the pipe was chilled, and the two scarfed edges might be stuck together and have every appearance of being a perfect weld, and yet upon testing you would find that this pipe was only stuck together on the two edges. You never could be sure of the safe working pressure.

There is another matter which I think might be of
355 further interest. The question arises in anyone's mind:

Why couldn't you test this pipe? We did test it, even though it was factory tested above the working pressure at which we expected to use it in the field. Upon completion of the line in the field the line was again tested, and frequently we had many, many joints of this pipe let go or fail in the lap weld. It was common practice to test our lines in oil field work well above the pressures at which we expected to operate, and so after the line was completed we tested it with water.

After the line had been tested and the breaks successfully repaired, we found that this line often would fail, or joints would fail, at pressures materially below that at which it stood a test, when these joints did not fail. This phenomenon we could not explain, and we are not able to explain it today. It may be due to oil being practically incompressible, due to what we term a hammer, corresponding to what we term a water hammer or impulse as the reciprocating pump might throw a surge against the line, and incidentally cause higher internal pressure than the static pressure that was created in testing it with water. But that was a condition that confronted us in the use of this pipe.

Similar difficulties have been encountered with this lap welded pipe in the operation of gas pipelines for short distances and after the line had been tested; but we had this condition, we could not set a factor of safety upon which to design without going way below the normal stress at which the steel should be worked.

There are other factors in this lap welded pipe which influenced our judgment materially at that time. Lap welded pipe was seldom, if ever, uniform in its wall thickness. It was not concentric, it was not round; and the tolerance or the variations in the external diameter measurements were so irregular as to cause extreme difficulty in the welding of the two joints end to end, field welding. Then if the line was to be coupled with what was termed a steel and rubber coupling—there are various types of coupling on the market but they all rely upon a rubber gasket for sealing the pipe and giving you tightness against leakage—as a result of the wide variation in the external diameter, or lack of tolerance as it is termed in the trade, it was necessary to purchase couplings sufficiently large to receive the largest of these joints of pipe through lack of any external diameter uniformity. The result was that the other pipe being joined, being of smaller diameter, would rattle around in the coupling, leaving an excessive strain upon the rubber gasket, which was apt to blow out and give excessive leakage.

This pipe had been used for shorter lines. Under my direction, we built for the Empire a line from the Panhandle field to Wichita, Kansas, in the latter part of 1927. We built a 20 inch pipeline out of the Amarillo field and constructed it out of this pipe, and it gave us plenty of trouble, with the various difficulties I have outlined.

Back in 1926 and during that period up to 1929 there was no accepted standard of pressure ordinarily used by pipelines in transporting gas. It depended upon local conditions and the needs of the people constructing the
line; but I would say that the pressures varied
356 from 150 to 300. There might have been lines operat-
ing at 350, but I don't recall any at this time. 300
was about the top pressure.

In 1926, when we were making this study, it was our view that it would be necessary to transport the gas at higher pressures over such distances as from the Panhandle field to Chicago. That was really fundamental in our unwillingness to accept lap welded pipe. We felt that to transport gas a distance of 950 miles, and to meet the competition to which we knew we would be subjected, would of necessity carry us into higher pressures than had ever theretofore been used. We felt that it was an economic necessity. We simply could not build the pipeline under the old customary practices, and it was necessary for us to deviate and get out into a field practically unexplored if we were to build a pipeline from the Texas Panhandle to Chicago.

In 1926 the prices of pipe fluctuated, but at that time the market price on lap welded pipe was in excess of $100 per ton. The fact that the walls of this lap welded pipe were very thick entered into the construction of the pipeline at prices of that character for distances of 900 to 1000 miles. The thickness of the pipe was naturally a function of the carrying capacity in thousands of cubic feet per ton of steel. In other words, if the thick-walled pipe of the smaller diameter was so constructed and of such a character that it was not possible or practical to make use of those thick walls in stressing the steel somewhere near its elastic limit, then obviously the cost of transporting a thousand cubic feet of gas would be influenced by the wall thickness and the price per ton of steel. That was a very important problem in this economic study. We could see that in a study of this problem we had to get the greatest possible amount of gas through pipe constructed from a ton of steel if we were to reduce our fixed charges, our overhead charges, to a minimum, and inject transportation economies into this project in a way that pipelines had never theretofore been designed, constructed or operated.

The character of fuel competition in the Chicago area, our principal objective, had a great deal to do with the economics confronting us. We felt that our market studies fairly well disclosed the potential possibilities of the markets and the competitive prices at which natural gas would have to be sold. But here we were coming in and invading a market served by other fuels. Natural gas was not available in the Chicago area. The fuel requirements of these markets were being served, and well served, by coal from local fields and fuel oil transported by pipeline from nearby fields in adjoining states, and that fuel oil was seeking its market or its outlet in these markets. And coal from local fields was being marketed here. It was that sort of competition that we had to be able to meet, and that of necessity materially affected the economics and the feasibility of building a pipeline from this distant gas field.

Therefore, the character of the pipe which was then
available in the dimensions we required, the cost of that
pipe, and the economic conditions involved in the com-
petition which confronted us in the area where we hoped
to market our gas all combined to prompt us to make
357 an adverse report to Mr. Doherty. Mr. Doherty
accepted our judgment reluctantly, but not finally.
I am not sure that he agreed with all our conclusions.
I think perhaps he was a little more optimistic than we
who had been concerned with the preparation of the
figures.

He instructed us quite firmly and quite definitely to continue our studies of the gas reserves, the influence of oil and water upon gas as it was being produced, the character of the gas wells, and to satisfy ourselves as to our judgment that the reserves were dependable. He instructed us to continue our cooperative assistance with the New York engineers of Henry L. Doherty & Company in keeping abreast of market developments in the Chicago territory; and, above everything else, to establish and maintain contacts with the steel mills, with the thought that a better pipe could be constructed; that if a better pipe was to be constructed it would be only by the pressure exerted from the trade; and that so long as the trade was willing to accept the pipe then made, that was the type of pipe we would get.

Without speaking disparagingly of the steel mills, they were interested in selling tons of steel, for which they were obtaining a high price. They were not interested in nor receptive to our suggestion that the pipe be made of thin walls, higher carbon steel that would withstand higher stresses, or larger diameter, all of which would result in the sale of less tonnage. Now, that was natural, and I don't wish to be disparaging, because later we had excellent cooperation from the steel mills.

In response to those directions from Mr. Doherty, we did just what he asked us to do. We carried out those instructions. We continued our geological studies in the field. We continued our engineering and economic studies. We worked with engineers in analyzing the potentialities of the markets. We continued our studies of the fluctuations, the changing conditions, in competitive fuels as we found them in the period which transpired between 1926 and 1930, when construction of this line developed. This was most fortunate, because it did give us an opportunity of learning a great deal more about engineering principles which we had belief in but knew little about in a practical way. Also we knew more about market conditions and more about the field, and were better prepared to go forward at that later date.

At the time I went to New York about September, 1929, for the purpose of devoting my entire time to these projects, there had been quite a little change in the situation with reference to the price of pipe and the character of the available pipe. Part of this I am sure was the result of the competitive situation in the steel mills. The A. O. Smith Corporation of Milwaukee had developed an arc welded plate pipe, which was obtainable in 1929, and pipe could then be obtained as a result of that development by Smith in thin walls, large diameters—even up to 26 inch, and longer lengths. The price had dropped from $100 and over to $70 or $75 per ton, as I recall, in 1929 and the early part of 1930.

There was a difference in the knowledge which we
358 had in 1929 as compared with 1926 as to the extent
of the gas reserves in the Texas Panhandle. This
resulted from continuous development from 1926 to 1929.
We had a great deal more information at that later date.

When in 1926 Mr. Doherty caused the first study and report to be made, there was no thought but that it would be a Cities Service project, or a Doherty project. He contemplated the undertaking of the building of a line as his own company's enterprise. That circumstance entered into the adverse recommendation which we made back in 1926. We felt that even though the pipe conditions had been different, it was a hazardous undertaking and an enterprise of such magnitude, with so many factors unknown and undeveloped, in transporting gas 950 miles into these competitive markets, with the millions of dollars involved, that it was more of an undertaking and a more hazardous enterprise than any single company should undertake.

There had been a change in the attitude of Mr. Doherty on this point by the time he called me to New York in 1929. As a result of our intermittent conferences on this subject of a pipeline from the Panhandle to Chicago and our discussion of the economic points involved, Mr. Doherty concluded that when and as the pipeline was built, it would be best to spread the risk between a number of substantial, reliable and experienced companies. That decision was followed up and others were invited into the project by the time I went to New York in 1929. A number of companies were invited to participate, including Standard of New Jersey, and the Chicago utilities as a group, and by that statement I refer to Peoples Gas Light & Coke Company, Public Service Company of Northern Illinois, Western United Gas & Electric Company. They represented the group of utilities serving manufactured gas to the Chicago metropolitan district. I have mentioned two groups: Standard and the Chicago utilities. Others were invited, including the Texas Corporation, Phillips Petroleum Company, Skelly Oil Company, and Columbian Carbon Company.

There was a reason for asking each of these companies to participate. In the case of Standard, it was a strong company, experienced in natural gas production, transportation and distribution. Standard had a call upon the gas from the largest singly owned reserve in the Texas Panhandle field, which is commonly called the Canadian River gas reserve. We were extremely anxious to have this supply of gas back of our pipeline, and although there was a prior call upon this reserve, it nevertheless was of such extent and magnitude that with an option for certain quantities over and above the requirements of the other pipeline, it would represent a very substantial reserve supply behind our pipeline.

In the case of the Chicago utility companies, they had acquired from the Gulf Production Company vast reserves in the Texas Panhandle which we were anxious to obtain possession of, and they were the logical marketers of natural gas in the Chicago area. It was our feeling, since they had distributing systems serving the domestic consumers in this vast area and were in position quite logically to serve the industrial consumers, that they were the logical ones to market an appreciable quantity of
359 the capacity of our pipeline. It was felt that as a

partner these utility companies would be more aggressive in the development of the markets, and that they would assist the owners of the pipeline company in more rapidly developing the load for the pipeline.

In the case of the Texas Corporation, Phillips Petroleum Company, Skelly Oil Company, and Columbian Carbon Company, we had a group of oil and gas companies experienced in the business—primarily as oil companies, but not lacking experience in gas—and who were the owners of very substantial gas reserves in the Texas Panhandle. These companies were all financially responsible and able to carry their part of the load, and they were looked upon as being eligible for participation in the project.

When I was called to New York to begin work on the project I was delegated the responsibility of representing the entire group. The group of participants had not at that time agreed that the project was feasible. They were awaiting the results of our studies, and by "our" studies I refer to the group of engineers whose activities I was supervising. There was seldom a day or a week or a month went by that new assumptions were not made, new factors imposed, and new conditions considered. This was such a sizable undertaking, with the engineering features so totally untried, that there was a great deal of time spent in discussing the soundness of our recommendations and as to whether we were safe in undertaking the building of a pipeline which might turn out to be an experimental failure.

The group reached the definite decision that they would go forward with the project about May, 1930. I had then been in New York about eight months.

I have heretofore referred to an improvement in the pipe situation, which I referred to as an improvement in the method of welding the seam, the thinning of the wall, and the adding of carbon content so as to make it practicable to produce a thin-wall pipe of large dimensions which was an improvement over the old lap weld pipe, which I described in some detail. I referred to the method of making arc welded pipe from plate as employed by the A. O. Smith Corporation of Milwaukee in 1929, which method was essentially as follows:

A plate of steel of the desired thickness, length and width, which could be shaped by pressing into a cylinder to form a piece of pipe of the desired diameter and length, was the first step in the operation. Prior to the forming of the plate into a cylinder, the edges were scarfed. This scarfing was not a beveled scarf, but described as the quadrant of a circle, so that when the two edges of the plate were brought together they formed a semi-circular groove. It was into this groove that the foreign metal was deposited through electric welding.

That is essentially the whole operation; but I would like to explain that this represented a vast improvement over lap welded pipe because you could get the pipe to any desired thickness of wall and you could get lengths at that time up to 30 and 35 feet as against the old
360 18 and 22 feet of lap weld, and the joint efficiency which I have described in this arc welded plate pipe was vastly superior. By this I mean the longitudinal seam. It is that joint which forms the two edges of the plate into a pipe from the cylinder which was formed from the plate. This joint, however, while it was a vast improvement, was not homogeneous. It was the result of deposition of a foreign metal fused with the base metal of the plate, and it contained what we termed blow holes, gas pockets. There were slag inclusions and there was still some question as to whether the method of manufacturing resulted in producing a pipe the longitudinal joint of which could be relied upon to develop the strength of the steel, so the Smith Corporation set about to develop a new method of welding the two edges of the plate together.

We think that our engineers and myself had something to do with this new effort; but our work was that of expressing our dissatisfaction with the old pipe and expressing such knowledge as we had gained about electric welding and pipe from working with their engineers. I think maybe we had a little to do with it; but much credit is due that organization for the ingenuity and the diligent way in which they went about to solve this problem. I would not detract a bit from giving them full credit for the way in which it was developed, but we were keeping up with it step by step very closely.

The new method, very briefly described, was that the plate was still formed in much the same method, except that the two edges were left plain, sharp square edges. They were brought together in a press, leaving a gap of approximately 1/16 inch, and to each side of the gap was attached the electric current, and through electrical resistance the two edges were brought to a fusing heat. While in that molten state the presses were closed, or brought more closely together, forcing the two edges of the plate to form what is termed in the trade a butt weld. This resulted in some of the molten metal being icicled, projected inside and some outside, but through a press and tooling arrangement these edges were squared up and the molten metal formed into a solid bead, which increased the thickness of the base metal at that point.

Attention should be drawn to the fact that we now had a piece of pipe formed from one piece of metal with no foreign welding rod included. We had a homogeneous piece of metal throughout its entire circumference. This pipe developed the characteristics we were seeking.

The development of that pipe resulted in further progress in the production of pipe suitable to an undertaking of this kind. Although our tests on the Smith pipe indicated that vast improvements had been made, we were still desirous of obtaining, if possible, a seamless steel pipe. A seamless steel pipe had been made by a number of the pipe manufacturers prior to 1929, but none had ever attempted to manufacture a 24 inch seamless pipe, or pipe as large in diameter as 24 inches, so we set about to try to accelerate and stimulate the interest of the steel companies in making a large diameter seamless pipe. That is a complicated process. They were not equipped with tools or
361 machinery to start the work, and some delay was experienced in getting them to work on the problem; but early in 1930 the National Tube Company, a subsidiary of the United States Steel Company, had equipped three of their plants to make 24 inch seamless pipe.

That was a very large undertaking. It was an expensive undertaking for that company; but I feel that they recognized as a result of the Smith competition that if they were to enjoy any further business on the big diameter pipelines they must of necessity at that time start immediate work in the building of plants to turn out this seamless pipe.

The process of development was slow. They were soon able to make a 24 inch seamless pipe, but it was thick walled and irregular in wall thickness. It was not uniform. They could not get long lengths, and the diameter tolerances were bad. About half of this pipeline, the Natural Gas Pipeline Company of America and Texoma's line, is constructed from National Tube seamless pipe, and the rejects by our inspectors of seamless pipe I would say would cover a ten acre tract at least ten feet high. I only express that to explain the diligent way in which the steel company worked and the expense to which they were placed in trying to develop a satisfactory pipe; but they did accomplish it and they did finally turn out a very excellent seamless pipe.

As I say, about half of our line was constructed from that seamless pipe. I do not know the exact figure. The remainder was constructed from A. O. Smith pipe, so that in part of our line the seamless pipe was used and in the remainder the electrically welded plate pipe which had been developed by the A. O. Smith Corporation.

By May, 1930, we felt that this pipe had been developed to the point where we could see our way clear to go forward with the projection of this pipeline. At any rate, we were ready to go forward.

There were other engineering principles involved in the building and putting into operation of this line in addition to those I have mentioned in connection with the pipe. When we started to try to secure a better pipe, we felt that much could be gained by changing the metallurgical characteristics of the steel, and we sought to get a satisfactory pipe from a higher carbon steel. Both the plate welded pipe produced by Smith and the seamless pipe of which I have been talking have been developed as a thin wall pipe.

There was the problem, of course, of field bending in the laying of a pipeline over a rough terrain. This pipe has to be bent, and to bend a thin wall pipe of that large diameter is perhaps comparable to trying to bend a piece of stovepipe over your knee. Our job was to try to bend that pipe in such a way that it would not flatten, or, as we term it, become egg-shaped, so that we would not so collapse the pipe as to give it a point of weakness, sort of a hinge point for any contraction or expansion that might be absorbed in the pipeline at that point.

We had the difficulty of trying to weld high carbon
362 steel. The carbon content had not been changed essentially, but it was changed enough to throw out completely and make obsolete the electric and acetylene methods that had heretofore been used, so we started out with the electric welding people and the acetylene concerns to try to get what is termed a coated rod. It is a flux that is applied to the rod which helps to produce a more homogeneous and uniform weld. We made suggestions in developing that part of it, and we developed a maximum strength for the transverse joint in connecting two contiguous pieces of pipe in the field. We could satisfactorily weld that, but it lacked ductility. The welded joint was just as brittle as glass.

So that is only one of the difficulties that we had to try to overcome before we were able to start in a commercial way to lay this pipe that we had developed. We had the pipe but we were not sure we could get it in the ground and make it stay together.

There were other factors in developing the proper spacement of our compressor stations and as to whether we should employ the old compression ratios which had formerly been used, and we deviated materially from the former practice in the development of the design and the spacing of our compressor stations. This required special study in design and testing and experimentation to arrive at the proper spacing of our compressor stations. It was a part of our economic study to try to ascertain what intake pressures should be used to go with the discharge pressures.

I think I have failed to state that we had designed this line, or we were designing it, for an internal working pressure of 800 pounds, whereas the former practice had probably not exceeded 300 or possibly 350, so if we were to operate our compressor stations at 800 pounds, we again found ourselves in a new field.

The large compressor manufacturers had developed a 1250 horsepower engine, capable of meeting our requirements, but the compressors had not been developed, and this took us into a new stage of development to make available suitable compressors, and that involved considerable work in replacing the castings which, for the most part, had been of cast iron and now had to be of cast steel. The bearings all had to be lengthened and redesigned to get the proper bearings for those pressures.

The compression ratio I started to discuss might be termed the relationship of the absolute discharge pressure to the absolute intake pressure. By discharge pressure I refer to the pressure at which the gas leaves one station in its path of travel toward the next station in the direction of the markets, and the pressure at which the gas is received at that next station is termed the intake pressure. The relationship of the discharge to the intake pressure is termed compression ratio. The compression ratio formerly used had been in the neighborhood of three to one; that is, dealing in absolute pressures, it would go out from one compressor station at three times as high a pressure as it would reach the other compressor station.

It was our conviction, as a result of our economic
363 studies, that this compression ratio should be reduced
to approximately one and a half to one. There is nothing sacred about a compression ratio of one and a half to one. That merely represented, under the conditions which we had imposed regarding the quantity of gas we sought to deliver and the size of pipe that was available, the pressures at which we expected to work throughout the distance it was being transported. That represented in our judgment the most economical compression ratio, to hold to a minimum the capital expenditures in pipe and compressor stations and still accomplish the maximum carrying capacity.

There were other engineering and physical problems involved in the transportation of gas at high pressure which were not encountered in the ordinary natural gas pipelines at that time. We had a problem which was accentuated by high pressures, but which nevertheless was present at lower pressures. That was the formation of gas hydrates. As Mr. Hammerschmidt explained yesterday, the formation of gas hydrates is a function of the temperature and pressure. Hydrates had formed in these old pipelines carrying moist gas at pressures of from 150 to 300 pounds. In the Mid-Continent field, in my own experience with the Cities Service Gas Company, which was one of the Empire group I spoke of, we had the experience of having these lines actually plugged, completely shutting off the flow of gas. On the removal of the pipe joints which were plugged, we found this ice formation, which to me resembles dry ice. It has a good deal of the same characteristics, such as smoking and fuming when it is released to atmospheric pressure.

We found those lines completely plugged. We recognized that there was something different about it than plain ice, but we did not know exactly its cause. All we knew was the effect, and that was very damaging. We knew that it had occurred in the presence of moisture. We had also determined that there was a relationship of pressure, but we did not understand the problem. We did not understand it, although we were working on it, when we built the pipeline. However, we knew that we were dealing with a gas saturated with moisture as it left the wells, and at the elevated pressures at which we expected to work we were going to have this freezing problem, so we set about to develop a dehydration plant for removing moisture. This was described briefly yesterday by Mr. Hammerschmidt.

It worked quite effectively in removing this moisture and we had no trouble in the pipeline while it was operating; but much to our surprise, these gas hydrates started forming in the refrigeration plant because it was working at elevated pressures, about 730 or 735 pounds. So our problem was transferred from the pipeline into the refrigeration plant, and we had to do considerable work in improving the type of our refrigeration plant to overcome that difficulty.

In the meantime Mr. Hammerschmidt's research work was accelerated in trying to understand this hydrate problem better. It was largely the result of his efforts that the problem was solved. We have had some hydrate problems with the line since the dehydration plant was perfected and
placed in use; but in one case it was the result of our
364 not completely understanding the problem. In an ef-
fort to economize, we shut down the dehydration plant one summer. We felt that during the warm temperatures we could operate this pipeline satisfactorily without the dehydration plant, and we shut it down. But when winter came we found that during the summer enough moisture had accumulated in the pipeline because of that shutdown to give us considerable difficulty, and it did give us considerable difficulty; so we have been using the dehydration plant since that time as an all year round operation, one which cannot be neglected for even a month at any time.

We have had hydrate trouble as a result of water getting into the lines through breaks. As I recall it, it was in February of last year that we had a failure of our pipeline. By failure I mean the line parted, pulled apart in one of these couplings. I have failed to tell you that the pipeline is constructed with alternate welded and coupled joints. But in one of these places where the two double joints were connected together with a rubber gasketed steel coupling, the water table rose until the ground was saturated to the surface, causing the pipe to float up and to pull apart. In getting the line back into place, some of this surface water, which we had attempted to blow out by blowing the pipeline from both directions, was left in the sags or low places, to which it had traveled down the pipeline, and this caused us a great deal of difficulty. It was a period of over two weeks before we were able completely to resume full time service.

I have described in some detail the pains to which we went in developing or recommending to the manufacturers the development of a pipe that was suitable, and the different types of machinery, such as compressors, engines and things of that sort which were suitable to our operations. We then took steps to see to it that the pipeline was constructed with the kind of pipe and equipped with the kind of machinery, such as engines, compressors, etc., that we had determined would be suitable. To start with, we realized that we were imposing upon this pipeline through these engineering features more rigid and severe conditions than had ever been imposed before, so we tried to make doubly sure that we were on safe ground, and therefore we wrote the most rigid specifications of which we were capable.

We prepared unusually careful detailed drawings—that is, much more care was exercised than we had ever used in any of our former pipeline experience or practice; and in the making or the manufacture of this material, whether it be pipe, compressor cylinders, valves, fittings, or assembled manifolds, or whatever it might be, we placed our inspectors in the factories and in the shops to see that the proper material, the material as specified, and the workmanship that was designated went into these facilities. After the material was manufactured, made or assembled, we used extreme care in factory testing before the material ever left the factory or was loaded on the cars.

I case of pipe, although we had watched the manufacturer in the development of the pipe, we still recognized that this one thing, above all else, had to stand the 365 test; so we selected at random approximately one joint out of very hundred that was manufactured—and by joint I mean a full length commercial piece of pipe approximately 40 feet long, 24 inches in diameter, with the same characteristics as embodied in the same pipe that we expected to place in the ground. These specimens, selected at random, were hydrostatically tested. We carried this test by progressive steps, raising the pressure from zero on up through the yield point, or the elastic limit of the steel, to the point of failure; watching and determining the characteristics of all parts of the pipe. We were anxious to see whether or not the points of failure were uniform, whether the pipe was going to develop a weakness in the joint or contiguous to it, as a result of the heat from electric welding in the case of the Smith pipe. We wanted to try to determine whether the defects were of such uniform characteristics that we could ascertain safely what factor of safety or what margin of safety we could work to without the risk of having weak joints show up which would cause expensive failures.

This same practice was followed in testing the seamless pipe supplied by the National Tube Company. In National seamless pipe we did not have a longitudinal joint. Seamless, as the same implies, carries no joints or seams; it is just one continuous piece of steel. In the method of manufacturing seamless pipe they start with a solid piece of steel, termed a billet; and if there should be any irregularities upon the surface of this billet, they had to be carefully removed or they might show up in the piece of finished pipe in what we term cold seams or what might be termed cold laps or imperfections, which would extend from the surface halfway through the pipe, or clear through. We were equally anxious to determine the uniformity of the quality of the seamless pipe, and to check our design and make sure that we were on the side of safety.

In addition to the bursting tests, as these were termed, we also tested every joint of pipe before it was laid to a hydrostatic pressure of 800 pounds in the mill. That method of testing pipe naturally resulted in the rejection of some of the pipe. I described or attempted to tell you briefly this morning of the rejection of seamless pipe; and even after operations had been perfected to the point where they were in commercial production, we found it necessary to reject a great deal of pipe. On the Smith welded pipe their operation was a little more uniform in character, but we had heavy rejects of that pipe.

We made the same careful inspection and carried out the same careful tests on the other equipment, such as compressors, etc. We found it necessary to reject many cast steel castings which were employed in the fabrication of the compressors. The cast steel heads often came from the foundries in a porous nature, with sand inclusion or blow holes, and we arranged to test those to destruction to ascertain their qualities.

In the same way we tested the valves and fittings. We tested our couplings too. The 24 inch couplings were then being made, as had been designed, 24 inches in diameter to withstand these pressures. Every step that we

made took us into a new unexplored field, and we tested
366 the materials to an extent that they had never been
tested before. That was the thing that bothered us
from the beginning. We were not afraid of our theory or
our engineering principles. We were sure of them; but
we were not sure how this line was going to act.

To reassure ourselves on this point, in addition to the physical tests which were conducted, we laid ten miles of experimental lines; and this was, as I have already indicated, primarily to familiarize ourselves with the technique of welding transverse joints of high carbon steel. We felt that we could weld it better by cutting coupons from the pipe and developing a joint efficiency on that line, but the joints were so brittle and lacking in ductility that they would break as we tried to lower the pipe in the trench. That was one of our problems. It is fortunate that we did this experimental work because even though by the other tests the joints seemed to have the proper strength, they would not stand the expansion and contraction to which a line of this size would be subjected; but those problems were rather materially solved at the end of that experimental work. We felt we were at least better prepared to go ahead with our pipeline work.

I think we laid our first pipe along in August, 1930. Of course, there was a lot of preliminary work necessary, even after the final decision had been reached to go forward.

We then had to determine, when we finally decided upon the project, how it was going to be built, what we were going to do to get out the drawings, write specifications and place our bids. Practically every dollar of material that went into the pipeline represented competitive bidding for that material and the laying of the line, so there was a long period—I say long, but it was comparatively short considering the magnitude of the undertaking—between the time we decided to go forward and the time we actually got to laying the pipe, of probably three months.

In the meantime we had encountered the problem of where to lay our line, after it was decided what kind of line to lay. Although we had been working on that problem concurrently with others, we were considerably puzzled as to the best route for a pipeline from the Panhandle to Chicago. We were familiar with the area traversed from the Panhandle to Wichita, having laid that line for the Cities Service Gas Company in 1927, and we knew that

territory fairly well. By saying fairly well, I mean we knew the territory rather intimately, the soil conditions, topography, the nature of the streams to be crossed. But from the mid-point we were in doubt, and it was from there on where we experienced the greatest difficulties in finding a suitable location for a pipeline. It was not just as feasible to lay it in one place as another between the Panhandle and Chicago. We would have liked to have for the minimizing of the length, and economizing on the length of the line, the opportunity to lay a straight line from the Panhandle to Chicago; but it was not difficult to determine that such a location was impractical, because it would carry us through the flint hills of Missouri and the flood valleys of the Illinois and Mississippi Rivers, and though those two obstacles were not insurmountable,
367 we deemed such a route decidedly impractical.

The hills, termed the flint hills of Missouri, across which we would have had to lay our pipe had we followed a straight line, have outcroppings of limestone coming to the surface. It would have meant that the pipeline trench would have had to be shot or dynamited for long distances: I would not attempt to say how long, but it would be in excess of 100 miles. This pipeline trench had a minimum depth of five feet and a minimum width of 32 inches. At many places, because of the topography, to minimize sags and over-bends in the line, the pipeline trench was excavated twelve to fifteen feet deep. Obviously, if it is in rock, or if there is a caving formation, the trench is correspondingly wider at the top. That impressed us as being an obstacle of no small moment.

Looking further to the north and east we encountered these flood valleys of the Mississippi and Illinois Rivers, and from our search of government records we found that those valleys are not infrequently flooded for a period of thirty to sixty days, and it was across these flood valleys that it would have been necessary for us to lay our pipe if we had followed a straight line routing. Had a failure occurred through those flood valleys at a time when the water was high, it might have been 60 to 90 days before we could have resumed service; so we were impressed with the necessity of avoiding those physical conditions. We were then led to try to find a location to the north.

There was another difficulty along the straight route from the Panhandle to Chicago in addition to these flint hills and flood valleys, and that was in the use of crossings under the Missouri River. When I was with the Cities Service Gas Company we had tried to cross the Missouri River north of Kansas City to serve our market at St. Joe, Missouri. The Missouri River is a treacherous stream at that point. It is subject to channel change, shifting of the channel; and the river at times, following thaws in the springtime, is subject to heavy scouring from ice gorges coming down the river, and twice we lost our river line across the Missouri River serving St. Joe.

Questions by the Examiner.

I probably did not make my statement clear. The city of St. Joe was served by the Cities Service Pipeline Company, and the experience I was reciting was during the time I was with the Empire and Cities Service Company in Bartlesville. That was off the line which was served by the pipeline from the Texas Panhandle to Wichita. When I said Wichita was the midway point, I meant it was approximately halfway the distance of the pipeline. As a matter of fact, it is a little less than half way.

Direct Examination Resumed by Mr. Morgan.

I was speaking of an experience I had had myself before we entered upon this project, and that is one reason I didn't want to put another major pipeline across the river at that point. They were finally able to work out of that difficulty by getting permission to put the line across a highway bridge. For the Natural Gas Pipeline Company we started looking for a crossing or a routing farther north.

368 We determined that the Missouri and Mississippi Rivers were such important streams that first of all we would have to determine the points where suitable crossings could be made with the pipeline. Those would become control points. In doing this work we used airplane and land reconnaissance work, and we made use of the government records, trying to study channel changes, high water records, and other factors which would assist us in determining the constancy of the stream, and whether some point which looked attractive at that time had maintained such characteristics in the past as to justify us in considering it a satisfactory crossing for the future.

Those studies revealed two suitable points on the Missouri River; one at Plattsmouth, just below Omaha, a distance, I should judge, of thirty miles, which would not be far off; and another north of Plattsmouth at a point called Rulo. That more southerly routing or crossing at Plattsmouth seemed to meet our requirements and was temporarily accepted.

We started then to make similar studies of the Mississippi River, and found what we considered a satisfactory crossing at a point known as Muscatine, which is south and a little west of the Tri-Cities, Davenport, Rock Island and Moline. Those two crossings then came to be the control points from which to work.

We started from the Panhandle field working towards Plattsmouth, and were assisted in the route from mile to mile through the aid of aerial surveys. We made aerial maps of a three-mile strip, which was the result of a paper location and field reconnaissance. Having made this preliminary ground location, we then, flying at ten thousand feet, photographed a three-mile strip; and with the aid of features developed by the aerial photography people, which brings into relief the topography of the country and the streams, etc., we were able to make a very satisfactory paper location, and we were able to project long distances ahead so as to miss cemeteries, churches, small municipalities, farm buildings, and so forth. By a three-mile strip I mean a strip three miles wide along the entire course of the pipeline.

(Map entitled "Relief Map Showing a Portion of Central United States", marked Exhibit No. 77 for identification.)

Exhibit 77 is a relief map, which I have caused to be prepared, showing the nature of the streams and waterways traversed by the pipeline originating in the Texas Panhandle and terminating at Joliet, Illinois. It shows the location of those streams and the names of some of them. The rather heavy reddish line going from a point in the southwest, or the lower left-hand corner of the map, in the Texas Panhandle, in a northeasterly direction and then in a general easterly direction over to a point near Chicago represents the route followed by the pipeline of Texoma Natural Gas Company and Natural Gas Pipeline Company of America from the Panhandle to Joliet.

Across the northwest portion of Missouri are flint hills in limestone. The State of Missouri is bounded on the

west by the Missouri River, and the point between Kansas City and St. Joe represents that point along the Missouri River across which a pipeline would have to be
369 placed if it were laid in a straight line from the Panhandle field of Texas to Joliet. It is in the northwestern part of Missouri, in the area which would be traversed by a straight line between Fritch, Texas, and Joliet, Illinois.

The flood valleys of which I spoke can best be visualized by the color legend on this map. This zone in yellow represents elevations from sea level to five hundred feet, and the color contiguous to that is five hundred to a thousand feet. The Mississippi River flood valley covers the portion indicated and this area shown in yellow. In the same way along the Illinois River there are times of the year during which much of that area shown is under water. We would have encountered the flood valleys of both of those streams had we gone in a straight line.

There are thirty-one streams of the magnitude that designates them as rivers between Fritch, Texas, and Joliet, Illinois. Some of them are called creeks, but they are more dangerous and hazardous from the point of view of pipeline crossings than others which bear the name of river. Some of the worst streams we cross are practically dry during periods of drought and are raging torrents during the flood season.

When I say thirty-one rivers, I mean that there are thirty-one rivers along the line as actually located. If we had gone in a straight line we would have encountered more rivers and they would have presented more difficult engineering problems. It will be noted that the route of this line carries us back nearer the head waters of these various streams, which converge down in this area I am indicating across which a straight line would have carried us. Also, as noted by the colored area on the map, we are back on higher ground, less subject to overflow. These streams are smaller and nearer the head waters than we would have had to cross using the straight line routing.

I have mentioned the engineering advantages of routing our line as we finally routed it. From the standpoint of capital expenditures, consideration of the type of construction, and the conditions which would be encountered, we were led to believe that a more circuitous route did not represent any greater capital expenditure than a straight line routing. We were further convinced that there would be less interruption of service and lower maintenance and operating expense by getting back on high ground and out of these river valleys and following the routing as shown by the red line on this exhibit.

(EXHIBIT NO. 77 for identification, offered and received in evidence without objection.)

In speaking of our studies to determine the most practical and economical routing of our pipeline from the Panhandle field to Joliet, I spoke about familiarity with that area from the Panhandle field to Wichita, a point to which we constructed a pipeline for the Cities Service Gas Company in 1927, and termed Wichita as about the midway point. Obviously, that is confusing as a midway point because I did not state it as a midway point between what stations. It is about a midway point between the field and Kansas City, which was our destination at the time we were building the line for the Cities Service Gas Company; and it is that area
from the Texas Panhandle to Kansas City with which
370 we were in 1929 most familiar. That area is across
Kansas, Oklahoma and Texas, representing an area across which we had laid oil lines and gas lines, and had gas and oil operations, so that we were familiar with the streams and the soil conditions and the general topography from the Panhandle field through Wichita to Kansas City. Kansas City, in terms of the Chicago pipeline, represents approximately the halfway point between the Panhandle field and Chicago; and Wichita is approximately the halfway point between the Panhandle field and Kansas City.

I have told about the preliminary surveys, studies, experiments and tests, etc., in order to get the right kind of pipe and the right kind of machinery and equipment of different kinds, and of the pains to which we went in determining just where we thought it desirable to lay this line. Having done all that, there was the other troublesome step of procuring an easement or right of way from the land owners along the routing we had determined to be the one best suited for our purpose.

I would hesitate to say how many land owners we encountered along that route; but I will make a guess at it and say probably between 2500 and 3000. It was not just a matter of getting to these land owners. In the first place, the land owner does not look with favor upon a pipeline 24 inches in diameter coming across his land and digging a trench from five to ten or twelve feet deep, and the aspect of the surface soil being disturbed, and a barren strip across his land resulting from the construction of a pipeline; and that is usually about what happens, in spite of our conscientious efforts to replace the top soil. It takes a number of years for that area to become again productive.

These farmers on the south end of that line have seen pipelines built and they know the effect it has upon the land. That is not true to the same degree on the north end of the line, but there are even greater difficulties encountered on the north end of the line which I will describe very briefly in a moment.

On the south end the farmers were antagonistic to a pipeline crossing their farmlands. It means that when that easement is granted there always must be granted the right of ingress and egress for the maintenance and repair of the pipelines, and that means that the trucks of the company must frequently be driven upon their land and across their crops, regardless of the state or growing condition of the crops, and that the company's pipeline walkers must patrol this line at least once a week and parts of it daily. So they do not look with favor upon the granting of a pipeline easement.

We found that the farmers in many communities had banded together, and it was just next to impossible to find a way through or around them. In many instances we resorted to options. We optioned as many as three lines. We found that we could make a certain distance in a troublesome area and we would get up to a dead end alley, so to speak, and we could not get any farther. We couldn't get around or through, and we would have to back out and start another line or another route around this troublesome area.

371 We also had the problem of starting the pipeline in advance of having obtained the easements throughout its entire length, with the hope that if there were any difficulties we could get them straightened out before we got to that point and that they would be cleaned up and time would cure them; but it did not always work out that way. We had some troublesome times getting our pipeline route worked out so as to follow as nearly as possible the paper location of the route we had selected.

On the north end of the line we encountered a more difficult problem, and that was that most of the land from the Missouri River east is drained with tile. This is a method the farmers use and speak of as preventing their soil from getting sour or waterlogged. It seems there is an impervious strata a short distance below the surface which the water cannot seep off or through; and the water seeps to that point and soaks the land; so the land is all drained with this tile.

Our pipeline was buried at such a depth that it cut right across these tile drains, and to build this pipeline it was a job for the company to replace those drains and for a time thereafter to take care of them satisfactorily for the farmers. and to protect them from the company's failure properly to install and relocate the drains, all of which, of course, was written into the easements.

That, in brief, is the right of way problem, but does not begin to explain the right of way difficulties we encountered. Farm organizations leagued together to prevent the building of the pipeline. There was always difficulty getting across railroads. Railroads do not look with favor upon the building of a pipeline in this area, which might mean the replacement of coal and affect their freight revenues from coal. Those are part of the right of way problems, the difficulties in obtaining easements upon which to build a pipeline.

In the course of that 950 miles we crossed a great many public roads. In getting permission to take our line along or across public roads we had to deal, of course, with the county commissioners and state highway commissioners; and in crossing all streams which are termed navigable streams we had to obtain permits from the War Department.

The first physical work in the laying of the pipeline was August 2, 1930, and the first pipe was actually laid August 22, 1930. As to whether the line was constructed by our organization under my supervision or let out by contract, it was a combination of those conditions. The physical work for the most part was performed by contractors. We contracted with them for the labor of actually laying the line. The company, through its mass purchasing power, purchased material and supplied it to the contractors, the contractors furnishing the labor, machinery and equipment with which to do the work. I couldn't say how many contracting firms we dealt directly with in the laying of that pipeline and in the construction of the compressor stations and other plant equipment. We dealt with many. Every bit of work was let upon specifications and drawing 372 under competitive bidding. It is my recollection that the laying of the pipeline resulted in our employing five different contracting firms, and there were many other firms employed by those contractors in sub letting a part of the work. In some instances the main contractor would sublet the hauling to some teaming contractor equipped with trucks, tractors and equipment for getting the material on the ground. In other cases the main contractor might sublet the welding of the pipe or he might sublet the painting of the pipe; so that in laying the pipeline proper there were many sub-contractors used in addition to the main contractors bidding upon the different schedules or sections of the line.

I perhaps could make more clear the point or the method in which the work was contracted by saying that we divided the line into sections every 80 to 100 miles. That, we felt, represented a unit of work which a contractor could properly supervise, and if provided with the right kind of an organization and machinery that he could handle 100 miles satisfactorily. We were trying to spread the work so as to take advantage of all the capable contractors with efficient organizations and good machinery in order to construct the line in a minimum length of time and get it into operation.

The stations were constructed in the same way. We contracted for the buildings, the steel, corrugated iron, and the erection of the machinery itself, and then contracted to labor contractors the work of erecting the buildings and installing the machinery. There were very heavy foundations involving a great deal of mass concrete under those 1250 horsepower gas-driven engine compressors, and these contractors at times would sublet the erection of steel, the buildings, or they might contract the excavation work for the foundations, sublet the contract for the concrete or sublet the work of erecting the machinery or doing the pipe work.

In the same way the company houses were contracted, the company purchasing the material which was used.

Questions by the Examiner.

We supplied the material for the stations in the same way. We tried to take advantage of our purchasing power in buying all the material and then to get the best possible deal on labor by letting that through competitive bidding. Once we had entered into a contract with the contractor who was constructing our line sections, we had to make a good many alterations. We had to make more than a few; and we had provided in the contract for the payment of extras to the contractor if the changes which we initiated resulted in the contractor's being placed to additional expense, and that brings up one of the unpleasant features which we experienced in the construction of the work.

We had to deal with contractors who, in the first place, had organizations experienced in this kind of work. We had to select contractors who were financially responsible and had the type of machinery which was necessary to lay a pipeline of this large diameter.

373 It will perhaps better illustrate the type of machinery that is employed when we visualize that a joint of 24 inch pipe 40 feet long, of the thickness we were using, weighs in the neighborhood of two tons.

As I have tried to explain, the pipe was alternately welded and coupled, and the welding took place on the surface of the ground over the pipe trench in which it was to be lowered, so when the pipe was lowered into the trench some machinery had to deal with joints welded together weighing in the neighborhood of four tons each. Therefore, it took heavy machinery, and it took specially designed machinery, with booms, drag lines, caterpillars, especially equipped to do this type of work, and there were not many in the United States qualified and equipped at that time to build this sort of pipeline.

For that reason we divided the line up, as I have described, and then we set about trying to draw specifications and to provide detailed drawings which would leave no doubt as to the meeting of minds between the company and the contractors as to what was intended by the inspection we expected to impose upon those contractors when this pipeline was constructed. Nevertheless, these contractors had not had the experience of building pipelines which would be subjected to these high pressures or to the close inspection and the tolerances to which we felt it necessary to work, and in spite of our warning at the time the contractors were bidding upon the work, it was evident as the work progressed that our inspection was far more rigid than they had anticipated.

As a result, two of the contractors made claims for losses approaching $300,000 each, and one contractor actually sued us for a sum of money slightly in excess of a million dollars for extras which he claimed he had not anticipated at the time he was bidding on the pipeline. In this case, which actually went to trial in the Federal Court in Tulsa, Oklahoma, the judge directed a jury verdict in the company's favor and the claims were completely disallowed. In the other two cases settlements were made after this trial suit had been brought against the company and lost. Settlements were paid on these two claims for nominal sums, which, as I recall, were around thirty to sixty thousand dollars.

Direct Examination Resumed by Mr. Morgan.

There were special engineering problems involved from our standpoint and that of the contractor in getting this pipeline across these 31 streams between Fritch, Texas, and Joliet, Illinois. Every stream represented a separate problem. I do not think there are ever any two streams that are quite similar. Each one has to be separately studied and receive its own particular treatment best suited to the conditions found there.

In getting a pipeline across a river there are two generally accepted methods in use today. One is termed the overhead suspension bridge type of crossing and the other is the multiple line submerged crossing. There have been in a few instances tunnels actually driven under the river and the pipeline carried through a tunnel under the stream; but the two methods most generally used in oil and
374 gas pipeline construction are the overhead suspension bridge and the multiple submerged line.

(Photograph bearing the designation "No. 1", marked Exhibit No. 78 for identification.)

Exhibit 78 is now presented to me. That is a picture showing the assembly of two 18 inch diameter gas lines upon a suspension bridge across the Big Blue River in Moore County, Texas. That is a photograph of a part of our pipeline system. It is not visible or discernible from the exhibit, but the 24 inch pipeline has been through a valve header reduced to two 18 inch lines. These two 18 inch lines are used for safety, ease and convenience in crossing the river on the bridge. At the other side of the river they converge again through this same type of valve header back into the single 24 inch line. That point on the Big Blue River is north of Fritch, Texas, north of the Canadian River, in Moore County.

This was not the first crossing we built over that stream. We first had a submerged crossing, but that was one case where our analysis of the stream bed proved in error. We were completely deceived by the shifting nature of the channel and lost this pipeline twice, and finally had to resort to this overhead crossing. I might explain that this river was never considered sufficiently treacherous in the first instance and we were not convinced by the first failure that we could not lick it with a submerged crossing. We hesitated to go to the overhead crossing because of what we felt was a bad abutment condition on the north side of the river. On the south side we had good abutments, good location for bridge purposes, but on the north side it was not considered favorable. To date our efforts have prevailed. The bridge is still in place and seems to be standing up very, very well. The photograph is taken from a point looking north. In the forefront you see the south abutment. This is typical of what I have described as the suspension type of river crossing. It is a specially designed pipeline suspension bridge.

(EXHIBIT NO. 78 for identification, offered and received in evidence without objection.

Document consisting of two photographs bearing the designations "392" and "544", respectively, marked Exhibit No. 79 for identification.)

Exhibit 79 is now called to my attention. This exhibit carries two photographs. The one at the top, designated as photograph No. 392, is of the Canadian River in Hutchinson County, Texas, at the point where Texoma Natural Gas Company's main line crosses enroute to Gray, Oklahoma—or Gray Junction, Oklahoma. This picture shows a typical submerged pipeline crossing under construction. The 24 inch main line has been reduced through a valve manifold header to connect with six 12 inch lines which are laid in the stream bed.

375 This lower picture is typical of many manifolds used in constructing submerged river crossings by Texoma and Natural Gas Pipeline Company, but does not cover another type where 18 inch lines emanate from a 24, the two 18 inch lines going into separate headers from which emanate three 12 inch lines each, so that the result is finally that the 24 inch line is broken down into six 12

inch lines which are laid in the stream bed. This type of crossing is used where the banks of the stream are not sharp bluffs, but where there are flood valleys on each side of the normal stream bed. In that instance the 24 inch line is stopped on high ground above the flood area. It is broken into two 18 inch lines by this valve header which I have described, and they traverse the flood valley. When they approach the river bank each of the 18 inch lines through a header construction is reduced to three 12 inch lines, or a total of six 12 inch lines altogether, and the 12 inch lines are then laid in the stream bed.

There are two very important reasons why we don't just lay our 24 inch line down across the flood valley and across the bed of the river instead of breaking it first into two 18 inch lines and each one of those into three 12 inch lines. One is safety and the other is the difficulty of handling a 24 inch line under those conditions where you are trying to dredge a trench in the bottom of a flowing stream and get your pipe down below the normal stream bed.

If there is no rock in the stream bed, the problem of getting the pipe down below the normal stream bed where a stream is filled with water is comparatively simple. You can go in with a drag line, and a drag line might be described in an elementary way as a shovel attached to cables operated from the boom of a tractor which rests on a barge or on the bank of a stream. The trench is dredged across the stream at the point where the submerged crossing is to be laid and the pipe is then lowered into this trench and an attempt is made to get it below the contour of the stream bed and sufficiently low that any channel change will not cause the line to become exposed and subject to being damaged by ice gorges or drifting tree stumps, which might result in the line being pulled out.

If there is rock in the stream bed, as you often encounter, then it is a case of drilling the stream bed and injecting or using dynamite in shooting a trench across.

The streams that were navigable streams had government inspectors from the War Department inspecting that work as it went in, to make sure that these pipelines were well below the stream bed and would not interfere with the use of barges or boats that might be passing on those streams.

When we got to such large streams as the Missouri River and the Mississippi River, those drag lines were operated from barges. They installed the tractor and
the cranes on the barge and floated across the river
376 and opened a trench by the means I have just
described.

I spoke of the safety involved in reducing the line from one 24 inch line, leaving off at the high point of the river bank, going across the flood valley, if there happened to be one at the crossing, to two 18 inch lines, and then reducing each of those to three 12 inch lines. The safety factor involved in that sort of an arrangement is expressed in one way by the statement that there is safety in numbers. The theory involved is that through the flood valley, if you should lose one 18 inch line, there is a possibility that the other may remain in service. If you lose one 18 inch line and the other remains in service and is not lost, you still have an opportunity of maintaining some sort of service for your domestic customers. Continuity of service is an all-important element in transporting natural gas into a metropolitan district, such as Chicago, where over three million people are dependent for their comfort and convenience upon the heat which is supplied by the distributing companies from natural gas.

There is a great deal of buoyancy in a 24 inch pipeline. Even these 18 inch lines have to be loaded, anchored or weighted across these flood valleys. There is always the danger that those lines may float up and be washed out as a result of drift wood or trees. During the flood period there is always a lot of drift lodging against these lines and breaking them; so the lines, even the 18 inch lines, are thoroughly loaded and weighted across the flood valleys, and when we pass from the 18 inch to the 12 inch, these 12 inch lines are always anchored with heavy cast iron river clamps, which you can see in picture 392 at the top of Exhibit 79. Those little dots which appear on those lines in the stream bed are heavy cast iron river clamps which are installed upon the pipe to help hold it down to prevent it from floating up. Those river clamps are also installed over the transverse weld which connects two contiguous joints of pipe, and tend to reinforce the welded joint at that point.

The upper photograph on Exhibit 79 shows that we got away from the old geometric principle that a straight line is the shortest distance between two points, but there is a reason for this. This picture No. 392 shows the six 12 inch lines being laid in the stream bed, not exactly with the arc of a circle—it is more nearly a catenary. It is a curve upstream so that the force of the stream will tend to place the pipe and the welded joints in compression rather than in tension. If the lines were laid straight across the stream or curved downstream, the pressure of the water against the pipes would throw the pipelines in tension and the welded joints would be subject to a greater strain than they are where the lines are curved upstream. That is not a practice peculiar to the Canadian River crossing, but is that generally followed in the laying of these river crossing lines.

In looking at the picture, just in order that the defects of the picture may be made more clear, I would like to call attention to the fact that—we are standing on the north bank as we look at the picture and viewing the south bank—on the south bank you see two of the six 12 inch lines trenched and coming up the bluffs. The other
377 four lines may have been laid and back filled, but it
is my conclusion from looking at the picture that they have not yet been trenched and carried up the bluffs. In the foreground, standing on the north bank, we see four trenches, and here I am quite sure that two of the six 12 inch lines are already in and back filled. By back filled I mean where the trench has been again filled with earth. This crossing is one where the banks of the stream are sufficiently high and there is no flood area adjoining the stream, so it is unnecessary to resort here to 18 inch lines. The 24 inch line through manifolded header connections goes directly into the six 12 inch lines.

My attention is called to the fact that in viewing the picture of that part of the system of lines as they go across the river there are but four lines which appear clearly in the foreground, and I have been speaking of six. If you look closely, I think you can see at about the maximum point of curvature in the bends two lines on the inside part of the curve there which have been practically covered. This Canadian River is, I think, perhaps the most treacherous river we have on the entire system, and yet that stream here is almost dry, and at times of the year you can actually drive across the stream bed and yet at other times during flood season we actually know that the sand in the stream bed had been a churning mass of sand for a depth of 25 feet. Bridge piers from the loss of bridges on that stream have indicated that the surface materials have been carried down to that depth in that churning sand, so that during that period of high water, when there is a high head and high hydrostatic pressure exerted on these lines, they are subjected to tremendous strains.

This is one crossing that might ultimately have to be spanned with a bridge. We have been watching these lines most closely. Soundings on the lines have indicated that the shifting of the sands has caused these lines to depart materially from the original contour to which they were laid, and for the past two years we have included in our construction budget a sum of money for putting a suspension bridge across the river. That suspension bridge would cost in the neighborhood of $200,000 to $225,000, and the only reason it has not been constructed to date is that we are still placing our faith in this submerged crossing and hoping we can defer making the expenditure for a while longer; but that is a condition which would result in complete paralyzing of the pipeline if that crossing were lost.

Questions by the Examiner.

We did not attempt to get below the river bed there. I do not think, truthfully, that we knew the characteristics of that stream. In fact, I know we did not. We did not know the characteristics of that stream as thoroughly then as we do now. We have now had about ten years in which to observe them; and in that connection we cross quite near the Rock Island Railroad bridge, which I believe has been lost three times and rebuilt. The Canadian River Gas Company has lost its river crossings not far from our line. They have washed out. The Phillips Petroleum Company has gas lines across there in connection with their carbon black operations, and their lines have been lost.

378 This is probably a more treacherous stream today than the Mississippi River, and, odd as it may seem, the Missouri River is considered by us to be more treacherous than the Mississippi, and yet the Mississippi crossing

may be the next one that we will lose; but those are conditions that we cannot foretell, and it simply means that constant vigilance is required, and each year we take soundings on all these stream beds to try to see where our lines are and see where the changing of the channels of the stream is causing those lines to shift, and whether they are getting into serious tension.

As a point of engineering interest, just this last fall we discovered a leak in the Canadian River bed during a period of low water. Gas was bubbling up through the sandy stream bed, and a sounding of our line showed that the river lines had shifted materially; so on the north bank we cut one line, one of the 12 inch lines, just to try to measure the stress and ascertain to what extent these lines had passed from a position of being in compression to that of being in stress, and the line jumped apart. I have forgotten the exact distance, but I think it was six to 8 inches that the line jumped apart, showing that the line had passed from the original state of being in compression to that of being in tension. But that is something we have to watch and watch very closely, to make sure when they are getting into such a dangerous condition that some remedial work has to be done.

My attention is called to the white line in the left-hand trench on the near shore. At that time the line was painted with coal tar paint. It is a paint made from a coal tar base, and although it is a high melting point compound, it nevertheless has a tendency to soften under the heat which it absorbs during the hot summer days, in which this line was being laid, and there is a coating of whitewash put on top merely to lessen the amount of heat that is absorbed and to try to maintain the paint or enamel in a stiffer condition, or cause it to become less plastic. The whitewash is used just where the line is exposed during the hot summer days and there is some delay in getting the pipe into the ground.

As to the difference in loading an 18 inch line and using river clamps on a 12 inch line, there are a number of different methods. 12 inch river clamps are quite conveniently installed for lowering into submerged position through the use of cast iron. With the 18 inch lines which are laid across the flood valleys, we are naturally working, at the time the pipeline is laid, under favorable conditions; at least, presumably we are, and we are not work-

ing under water. Therefore, in those cases it is entirely possible to use a cheaper form of loading, which may be a pre-cast concrete block, or it may be cast in place, or in some cases where the soil is of such a texture that it will hold a pipe clamp, we have been able to resort to a pipe clamp or anchor which consists of a large auger, not dissimilar in its construction or design to a wood auger but obviously very much larger in diameter. It may be eight or ten inches in diameter. That is screwed down to a depth of ten or twelve feet, and the handle disconnected and a cable inserted into an eye of this anchor, and this comes up and then laps over the pipe, the
379 pipe being properly protected, and serves as an
anchor to hold the pipe down. But in the stream beds the cast iron clamp represents the most practical way of giving added weight to the line.

Direct Examination Resumed by Mr. Morgan.

As between a 12 inch line and an 18 inch line, it is obvious that the smaller the diameter the more flexible the pipe. The smaller line is easier to bend and lay to an irregularly contoured stream bed than would be a stiff 18 or 24 inch pipe. It is necessary to have that many 12 inch lines in order to get the gas from one end of the 24 inch line over to where the 24 inch line is resumed on the other side of the stream because, in the first place, you do not want to retard your flow needlessly by providing less cross sectional area than you have in your 24 inch pipe, so an attempt is made to strike a practical balance between the cross sectional flowing area of your 24 inch line and your smaller lines into which you break it down.

You can not take as much gas through two 12 inch lines as through one 24 inch line at the same pressure. There is more space in a 24 inch diameter than there is in two twelves. I haven't the exact figure. My recollection is when we struck upon six 12 inch lines that we were approaching very, very closely the cross sectional area of one 24 inch line. As to whether it is slightly more or slightly less I do not remember, but it is not difficult to determine. The Examiner states that he has just figured it out in round numbers, and that, using pi as 3, the six 12 inch pipes would give about 648 square inches cross sectional area. One 24 inch line would have 432 square inches cross sectional area.

There is no uniformity in reducing the 24 inch line to six 12 inch lines in these river crossings. There have been a few instances, where we felt that the stream conditions were sufficiently stable, that we crossed those streams with two 18 inch lines. There was one other case, and that is the Missouri River, where we were fearful that six 12 inch lines might not best serve our requirements or the conditions imposed by the river, and we resorted there to ten 10 inch lines.

(EXHIBIT NO. 79 for identification, offered and received in evidence without objection.)

(June 29, 1939)

In commenting upon the failure of the submerged crossing across the Big Blue River in Moore County, Texas, attention was directed to the fact that two failures had occurred. I find upon reviewing our records that on May 17, 1935, one of the 18 inch submerged lines failed during a period of flood and high water. If the record did not clearly disclose the nature of this submerged crossing, I would like to state that in this instance two 18 inch lines were used in the river bed. On each side of the river these two 18 inch lines were manifolded through header connections into a single 24 inch line, as was discussed yesterday.

Again on August 1, 1935, one of the 18 inch lines was so
misplaced and disabled as a result of another flood as
380 to make it unsafe for continued operation. As a result
of these two experiences, it was deemed impractical to
make further expenditures upon the submerged line, and an overhead bridge type of crossing was resorted to. The overhead suspension pipeline bridge was started in September, 1935, and completed in December, 1935.

On reviewing the record I find that some of the statements regarding the routing of the line were not made entirely clear yesterday, and I will attempt this morning to restate those parts which I think were not made clear.

The record reveals that I stated that a crossing was found at Rulo, and that Rulo was north of Plattsmouth, the point at which the pipeline actually crossed. This was an inadvertent error. Rulo is south of Plattsmouth. It is located in the southeast portion of Nebraska, about where I am indicating on Exhibit 77.

In discussing the circuitous routing actually followed, an attempt was made to outline the difficulties of following a more direct course, something more nearly approximating a straight line. I think it was quite clearly stated that our difficulties with gas pipelines from experiences gained with the Cities Service Gas Company prior to 1929 convinced us that it was impractical to try to cross the river between Kansas City and St. Joe, other things being equal, and if it had been considered a desirable routing to cross the river at that point.

There were other considerations, however, which were pointed out in reference to the flint hills in northeastern Kansas and the north central part of Missouri, as well as the flood valleys of the Mississippi and Illinois Rivers; so we started working north from St. Joe up the Missouri River, seeking a suitable crossing. Rulo had some possibilities as a crossing and was quite seriously considered for some time. However, we considered Plattsmouth far superior, not only as a river crossing, but the nature of the stream, the terrain and the topography from Plattsmouth east presented better conditions than from Rulo east. The only two crossings which were deemed at all suitable were the Rulo and the Plattsmouth crossings on the Missouri River.

In response to the question as to the difference in the length of a direct line and the routing of the line as actually laid, I would point out that the theoretically shortest distance in a straight line was never seriously considered, because a paper study indicated very definitely that this would encounter difficulties from the Missouri River on east and north to Joliet that would make such a line not only impractical but prohibitive from the standpoint of first cost and maintenance and upkeep in the later years of operation. We did consider quite seriously the cost of a line routed through Rulo and from Rulo east, but selected the more northerly point at Plattsmouth for the reasons I have already outlined.

The difference between the length of the line as laid and
the length of the line had it been laid through Rulo
381 from the field to Joliet is a distance of approximately
25 miles. It varies between 25 and 30.

Our studies did not always start from Fritch. At one time we were considering starting from Dumas, in Moore County. So, depending upon the point of origin and the terminus of the line, and certain irregularities and deviations which were necessary to consider in getting across these various rivers, the difference between the line as laid and the line had it been laid through Rulo is a distance of 25 to 30 miles.

This line is not obviously as straight as it is shown on this map. There are many little detours which are necessary because of right of way difficulties, topography, stream crossings, etc., which made it follow more or less an irregular course which it is not possible to portray on a map of this scale.

Had it been possible to run a line on a theoretically straight line routing, that distance would have been approximately 50 miles less than the routing of the line as laid.

I have the difference in flowing capacity of a 24 inch line, six 12 inch lines and two 18 inch lines. The flowing capacity of six 12 inch lines used in the stream bed of multiple river crossings is approximately 4% in excess of the flowing capacity of a single 24 inch line. Two 18 inch lines, frequently used by this company cross flood valleys, have a combined flowing capacity of approximately 9% less than a single 24 inch line.

In locating the stations, the slight pressure drop which would result from the use of two 18 inch lines in place of a single 24 inch line is taken into account, if there is enough 18 inch line laid between stations to cause an appreciable amount of pressure drop. Obviously, it is impossible to obtain in commercial sizes an exact balance between the multiple lines used when crossing rivers, so that the two 18 inch lines, with a slightly lesser flowing capacity than a 24, imposed no practical difficulty.

We have been talking about the 24 inch line and the various steps we took to try to obtain the right sort of pipe, and to test it, and to see that that character of pipe was finally installed in the pipeline; and we have talked about river crossings and other difficulties in connection with the construction of the pipeline. My testimony on that subject applies to all of our 24 inch lines, including the line of Texoma from Fritch to Gray Junction and the main gathering lines of Texoma, and we even went beyond that. We were no less diligent in our specifications and supervision of construction of the smaller lines. They all received the same degree of attention.

By smaller lines I meant the gathering lines. The company has in the field a main 24 inch gathering system, and then radiating from that are smaller sized trunk lines, and then the individual wells may connect with pipe as small as six or eight inch.

382 There has been something said in my testimony about compressor stations. The gas leaving the wells has an initial pressure imparted by nature, which we term rock pressure. As the gas flows from the well through the pipeline, this pressure is dissipated as a result of friction within the line; and when the initial rock pressure has been dissipated to the point where the gas can be no longer propelled through the line in economic quantities, it is necessary to again elevate that pressure through artificial means.

A compressor station is often referred to as a pump station, and the pumping of gas for all practical purposes is no different than the pumping of any other fluid, except that your pump is termed a compressor.

In transporting gas from the Texas Panhandle field to Chicago we were able in the early years to depend upon the rock pressure of the wells to transport the gas through the field gathering system to the initial compressor station located at Fritch, Texas. As the rock pressure recedes, we have to put in field boosters or compressors or pumps to elevate the pressure in order that it may arrive at the intake side of the Fritch station at an economic pressure for pumping from Fritch to the next station on the line in the direction of Chicago.

Some of the pressures have declined in our wells to a point where we have found it necessary to install compressor stations. We have already started to install field compressor stations; but our program was somewhat retarded through being able to make a fortunate exchange agreement with another company which enabled us to trade the gas from some of our low pressure wells to another company and in return we were able to get some high pressure gas delivered into our Fritch station. That fortunate turn of events, however, is only for a short time, and we anticipate in future years that it will be necessary to boost the gas from every well in the field. We have one station installed; but others are being installed by other companies who have experienced this same difficulty. That problem will confront all the pipelines.

Cross-Examination Interposed by Mr. Slaff.

That exchange agreement was made with the Phillips Petroleum Company, and the period of the agreement was originally for five years and there are three and one-half years left to run. The consideration of the contract is primarily the exchange of equal quantities of gas. The quantity varies, as it of necessity must in the operation of such a contract involving wells; but I think the amount averages about twelve million cubic feet per day. I am advised that the maximum was eighteen. At the present time it has been averaging quite a little less than that. I do not think that contract is filed with the Federal Power Commission but it can be made available to you at any time.

In connection with my statement regarding the care the company took in designing and the taking of the necessary steps with respect to the Texoma property and the gathering lines, I did not mean to infer that the gathering
383 system was designed for 800 pounds pressure.

Direct Examination Resumed by Mr. Morgan.

Including the initial station at Fritch, we have a total of ten compressor stations on our main line. They are located at intervals of approximately 90 miles. The station west of Joliet is located at Geneseo, Illinois, and I think the distance from Joliet is 110 miles, but I would not be sure.

In these compressor stations, we have first the main units, and these are gas engine driven compressors, each of which is driven by 1250 horse power engines, and in each of the main line stations there are five such units, with the following exceptions: Station No. 1 has fifteen such units, and Stations 2, 3 and 9 have six such units. One of those units weighs about 400,000 pounds. There is a total in the ten stations of sixty-three of these big main line units.

In addition to the main line units there are auxiliary units, and these auxiliary units provide electric current through gas engine driven generators for doing the pumping of water, circulating water, that is needed in the plant for the operation of the compressor, the air compressors for providing starting air for the units, for operating the machine shop in connection with each one of these stations, and otherwise providing auxiliary power around the plant.

The other facilities around the station include water wells and water tanks, cottages for the employees, and such facilities as would be needed for the comfort and convenience of the thirty to thirty-five employees operating each one of those stations.

For the most part those stations are remotely located from any cities of any size. That is a condition over which we have no control, as the pipeline design dictates the location of the stations and it is impossible to locate the stations at the points that might be most convenient with reference to obtaining labor and maintaining satisfactory labor relations.

The number of men employed in station work at each one of those stations varies slightly, depending upon local conditions, but in general the number will vary from 27 to 35. We try to provide living quarters for those men who are employed in these stations. In the absence of our providing them, there are no convenient living quarters available at those stations or very near them. The men have had to live at farm houses, and some of them with their own cars travel distances of 25 to 40 miles. Living quarters near the stations are not plentiful.

We have tried to provide suitable housing facilities and living quarters for our key men. We have to keep at the station at all times, 24 hours a day and seven days a week, a staff capable of maintaining the station in an operating condition and to take care of emergency repairs; so we have found it necessary, not only as an operating necessity, to provide housing facilities, but more and more as the
384 trend of conditions between employer and employee
has changed, we have found it necessary to provide an increased number of houses. To maintain satisfactory relationships with the employees we have each year tried to meet the current conditions and have added the minimum number of houses which we felt were required to meet this condition; but each year we are building more, and ultimately, and in the not distant future, we expect that each one of our stations will have sufficient houses to take care of our complete personnel. Obviously, if we cannot take care of all the men there is dissension created through the feeling that, as the result of partiality or seniority, or some other condition that the employee does not fully understand, he is being discriminated against if he does not get a company house, and ultimately that housing program will be carried through. Each year we are adding additional houses.

In addition to that, on this subject of public relations, which is near and dear to my heart, we are trying to take care of the welfare of the employees with recreation facilities, for the children as well as the grown-ups, because of the isolated nature of the location of the places at which they are forced to live, and we have not lost sight of the relationship which depends upon the attitude of the employee toward the employer.

When I spoke of the number of men employed at each station as being from 27 to 35, that does not apply to our Fritch Station. The Fritch station is the largest station of the system and has often been referred to as the largest compressor station in the world. I think, though, that some other company has challenged that, and probably rightly. There may be one larger than that; but this Fritch station, if probably not the largest, is the second largest station in the world, and requires a staff of about 70 men. The number varies from 65 to 70 men to operate the station, and then at that station, as was described yesterday, we have located the gasoline plant, and that requires an additional 30 men. Then the refrigeration plant is also located there, and that takes five to ten men for the operation of that plant. By refrigeration plant I mean the dehydrating plant. Then there are also at that station the men operating and maintaining the field pipeline gathering system and the main line north to Gray Junction, Oklahoma. I think there are about 45 or 50 men in the pipeline division.

Fritch station is designated as No. 1, and then the stations are numbered progressively from Fritch toward Joliet, 2, 3, 4, 5, 6, and so on. Station No. 10, as referred to, is at Geneseo, Illinois, and that is the last station on the terminus end of the line.

I have heretofore been discussing the problems we encountered and the efforts we made to solve those problems having to do with the finding of proper pipe and these various other matters. I have now located the pipeline, obtained the right of way, and described how the pipeline was built; but I have not said anything about the gas to be transported through that pipeline. Problems concerning that subject presented themselves in the beginning of this project.

After the line was completed we then started to test
385 it, and just preceding the testing the line was purged.

At intervals of about ten miles the line was opened at the point of a coupling and what is termed as a blowing unit was installed. This is a connection for conveying through a nozzle the gas from the end of the pipeline up into the air as pressure is applied from the field end. In this method the mill scale and any sand or foreign matter that might have been left in the pipeline during the period of construction was blown out of the line, and as each successive ten mile section was purged, the line was again connected where the blowing unit had been removed, and then the line was tested under pressure up to 800 pounds to determine whether the transverse welding developed leaks, or whether the couplings were ironbound; that is to say, whether the rubber gasket had been pinched, thus permitting gas to leak through the coupling, or whether there were any defects in the valves or the swage drains which were used for draining off any moisture that might accumulate and get past the dehydration plant. In other words, the testing of the line was to determine mechanical or material defects in the construction.

In the same way the engines and compressors were put through performance tests before acceptance from the manufacturer to ascertain that they would meet the specified requirements; and every facility to be used in the operation of the line was tested after the line was completed.

The gas used in blowing the line and in making those tests was obtained from the Canadian River or the Colorado Interstate Gas Company. They caused it to be furnished from Canadian River. The Colorado Interstate Gas Company is the company which I said we were successful in getting to commit a part of our pipeline requirements in connection with my discussion of the participants.

At the time we completed our pipeline we had acquired gas reserves of our own, to which we acquired title August 21, 1931.

Going back to the year 1929 when I went to New York for the purpose of devoting my entire time to the problems of organizing this pipeline project and putting it into operation, I spent a great deal of time in considering the subject of reserves from the time I first went to New York. By that time we had learned that there was a gas field of magnitude in the Texas Panhandle; but we did not know at that time the extent of that gas reservoir and the magnitude of the reserves contained within that reservoir as we know it now.

I stated yesterday that we knew more about it than we did in 1926, and we know more about it today in 1939 than we did in 1929; but in 1929, 1930 and 1931 we knew there was a field there of magnitude but there was no way then of determining from geological information, based on what authentic well logs we had, the accurate boundaries of the field. There was no way of knowing the extent of sweet

gas or the line of demarcation between sweet and sour gas. We knew that some portions of the field were productive of sour gas and others sweet. We knew that some portions of the field were capable of producing very
386 prolific wells and others dry holes and non-commercial
wells. We knew that there were certain portions of the field which were productive of oil, but as to the extent of the oil and to what extent the field might be butchered up by oil production we had no way of definitely knowing. I am speaking from the standpoint of a gas man now, and not an oil man. I use the term "butchered up" because one of the things that frightened us most about the Panhandle field as a dependable gas reserve for a pipeline of this magnitude was our lack of knowledge as to the extent of the oil production.

That was important for a number of reasons. The local markets had already been served with natural gas and were inadequate to provide a market for any appreciable quantity of the gas which was known to be available, and no pipelines had been built to distant markets, such as Chicago, so that gas did not appear to the State or the oil producers to have any particular value. The State had not made any attempt to enforce a rigid conservation policy, and the oil producers were only concerned with natural gas as a by-product or a means of helping them to lift their oil. The use in casinghead plants was just a by-product and wasn't a major consideration with the oil producer. The oil producer was intent upon getting the maximum amount of oil possible, and if gas was encountered above the oil it was the usual practice to rip the casing or to raise the casing seat so as to let the upper gas in as a means of helping to flow the oil well.

This practice was so prevalent that even in the early days it was apparent that the pressures in the oil area of the field were going to be rapidly dissipated, and any opportunity of depending upon gas leases in that territory as a dependable reserve was lessened by the failure of the State to enforce oil-gas ratios or a rigid conservation policy with reference to trying to preserve the gas; and the extent of those oil fields was one of our major worries. If our leases turned out to be near an oil field, the consequence under the practices in the oil field was that the gas would not be preserved for future use of the pipeline, but would be rapidly drained from under our lease through the oil development.

In selecting our reserves of gas throughout the field we had to rely upon the best information available in trying to select our acreage and our reserves as intelligently as we could in the light of the facts as they then existed. To begin with, we had to take into account the outer boundaries of the field. We had a general feeling that we knew something about the boundaries of the field; but it later developed that we did not, or at least, not all about it. I think we knew something about it; but we did not know as much about it as we thought the data at that time warranted us in determining or accepting as the boundaries, and we did get some of our acreage too far out. We also had some information regarding what we thought was the line of demarcation between the sweet and the sour gas parts of the field; but that line was based upon long distance interpolations between the wells which had been drilled. We might find a sour gas well and it would be ten miles to the nearest well, which might be sweet. Some place in between in that ten mile gap we felt pretty sure
the sweet gas line would pass, but as to whether it
387 was a mile from the sweet gas well, or five miles
away, there was no way of determining except by interpolation, and interpolation was to a large extent based on the sulphur content in the sour well, the degree of sourness, so that was another factor.

We were also conscious that some dry holes had been drilled. Those were the areas to be avoided as far as possible. There were other areas where small non-commercial wells had been drilled, and others where very large productive wells had been drilled; and then, of course, as I stated, we tried as far as we could to avoid those areas which our geologists said were most likely to be productive of oil, geologically, based upon the information they had.

There was nothing very definite. In retrospect, there was not anything as definite as we thought to guide us in the selection of our acreage.

At the time we were studying our problem of assembling gas reserves to put back of this pipeline project, the situation in the Panhandle was that practically all of the mineral rights, the oil and gas leases, had been contracted to large companies and lease brokers, and they were out of the hands of the lessor, the landowner. The field had been practically leased in its entirety, solidly leased, and because of the lack of knowledge as to the boundaries of the field, much of the surrounding countryside for miles outside the field was also under lease. There had been some leasing going on there for ten or fifteen years, but the activity was greatest from 1926 to 1930.

As to the terms of an ordinary oil and gas lease providing for keeping it alive after it is executed, of course, leases vary some; but in general they were quite uniform in their terms, and the way in which the lease might be kept alive was through the payment of rentals which were called delay rentals, either on an annual or semi-annual basis, and the reason they were termed delay rentals was that the rental was a payment in lieu of development, or the drilling of a well. The lease as a usual thing provided that the lessee, or the party to whom the land owner granted the mineral rights, should have the lease on the minerals for a primary term of five to ten years—that term varied in different leases—for the consideration of an annual rental payment or the drilling of a well. If the well resulted in production, the usual lease provided that the rentals would cease and that the lessee would enjoy the privileges of producing the minerals under stipulated royalty conditions, so long as oil or gas might be produced thereafter in commercial quantities.

Those leases, having been taken prior to 1930, mostly in 1926, had been kept alive for the most part over the great territory included in the field and around the field by the payment of rentals. The usual rental is $1.00 an acre, although I recall back in the very early days with the Empire Gas & Fuel Company we had leases out there that called for a rental of ten cents an acre; but that was so far in advance of the development of that field and our knowledge of what was contained there that much of that acreage we had under lease was allowed to lapse at the
388 end of the primary term, and a condition of one of
those leases that has just been described is that at the end of the primary term, if the lease has not been drilled, all rights of the lessee lapse as of the expiration date of the primary term and he no longer has any privileges. The lease then reverts to the land owner or the lessor, and he is then privileged to make another contract with somebody else who may be interested in paying a premium or a bonus for the privilege of entering into a lease agreement such as I have just described.

(Map entitled "Texas Panhandle, Oil and Gas Leases in Effect, August, 1930", marked Exhibit No. 80 for identification.

Map entitled "Leases Owned by the Texoma Natural Gas Company in Texas Panhandle Gas Field, August 1, 1931," marked Exhibit No. 81 for identification.)

While we took the title to our reserves in August, 1931, commitments had been made for those reserves about 60 or 90 days, or perhaps longer than that, prior to that time. Some commitments had been made during the year 1930.

Exhibit 80 was prepared under my direction. The heavy black line is the boundary line as conceived by the Texas Railroad Commission in 1937. The areas colored in red represent the lands under lease in August, 1930. I have said those leases belonged to large companies. For the most part they were large oil companies. There were some gas leases in there that were held as gas reserves, such as those held by the Canadian River Gas Company, to which we referred yesterday. For the most part, however, the leases were held by large oil companies. The white patches throughout the field on the remaining part of the map represent the lands which were not at that time under lease.

At the time we were considering the question of assembling reserves for our pipeline, our prime motive was to be sure that we got an adequate supply of gas to take care of this pipeline project. Under the conditions which I have described as to the location of oil fields that were then known, as well as those which might be developed which were unknown as to their location, the fact that some portions of the field were highly productive and others nonproductive or productive only to a comparatively small extent, and the uncertainty as to the limits of the field and the location of the sour gas line, it was our judgment that the safest way of acquiring our acreage would be to get a widespread play—I term it widespread—meaning to try to scatter our play through the various areas, and by the term "scatter" I do not mean we were seeking scattered tracts, but to spread our play throughout the different areas so as to eliminate the possibility of getting our eggs all in one basket and having our entire gas reserve destroyed through a lack of judgment in locating the points at which it was to be selected, or finding later that the points which we had selected might turn out to be an oil pool or a sour gas field or a barren spot, though we had upon the information then available considered such points to be the more prolific part of the field.

When I spoke of having an oil pool right in the midst of it, I was thinking about further development of oil, which meant the dissipation of the gas reserves and the destroying of that reserve for a pipeline. Continuing 389 exploration for the discovery of oil in that field was being carried on at that time and is continuing today. New oil pools and new areas producing oil have been discovered since we acquired our reserves, and some of them turned out to be in the vicinity of the reserves which we had acquired.

It would not have been possible for us to block up our gas reserves in one place in that field under the conditions that then existed; but that did not disturb us because we did not know of any single spot into which we wanted to concentrate our entire holdings.

I have spoken of the participants in this project, the Texas Company, the Phillips Petroleum Company, the Skelly Oil Company, and the Columbian Carbon Company, as owning substantial reserves of gas in that field. Each one of them had a wide spread over a vast part of the field. The strategy which they employed in assembling their holdings was not greatly different from ours. They did not have any more information than we did about the oil or the gas, so they were taking spreads in the same way. One other reason is that while there are some large ranches in Texas, there are very few of them that have been retained in a solid block or retained intact. Many of them are broken down and have been leased to many different operators. The Burke Burnett ranch, which was acquired almost in its entirety by the Cities Service Gas Company, has many spots in it which were leased to the Gulf Production Company, the Texas Company, the Phillips Petroleum Company, and Skelly Oil Company, so that, although there were large ranches, even those large ranches were frequently broken down into smaller tracts and leased to different companies, and it was impossible to get any big solidly blocked lease in any part of the field, with very few exceptions.

We did not start out to buy the gas at the wells from the then owners of the leases. We were definitely committed to a policy of owning or controlling our own gas reserves, our own leases. We regarded that as the more desirable course to pursue because we had had years of experience in the midcontinent field with Cities Service Gas Company, and we knew the operating ills and difficulties of a gas purchase policy in trying to supply a pipeline with purchased gas, and we also appreciated the advantages of owning and controlling the leases on which we could control our own production and drilling program and the production from those wells to maintain a constant and adequate supply for our pipeline. Based upon that experience we were definitely committed when we entered into this project, as were all the participants, that the project should own its own reserves, and we were equally firm in our conviction against the purchase of gas.

In the midcontinent field Cities Service Gas Company had attempted to operate by the purchase of gas, and they are still today buying some gas in that field.

We did not buy a part of the Canadian River gas reserve on which I have stated the Standard through some of its connections had a call; but we were successful in negotiating a contract for placing behind this pipeline
*390 a call for 25% of our pipeline's requirements from that reserve.

I would not construe that as pursuing the policy of purchasing gas, because there in that case we had a call upon a reserve which was being developed by a substantial company for pipeline use. Their primary interest was the development of that reserve for the Colorado Interstate pipeline going to Denver and lines emanating from that same reserve and working south. We did not look upon that contract as having the same evils that we would be faced with in purchasing promiscuously from small lease owners who might drill one well or ten wells and whose primary interest was not in the pipeline. Their primary interests might not be in selling gas. It might be just a side play, and when we were in need of additional open flow for our pipeline, it might be that the financial necessities of that man or that company might be such that they would not be particularly concerned with drilling more wells.

Another thing, we had the experience in the midcontinent field with the Cities Service Company that producers from whom we purchased gas took less interest in the maintaining of their wells in a good operating condition. As the result of inflow of water or caving formations falling down into the open hole, the flow from the well might be almost completely plugged off.

There are other instances where in the winter time when the gas is most needed by the pipeline that due to moisture in the well, the well or the connections to the well might freeze up. The average producer does not concern himself about that. It is not a matter of great moment to him. If he does not get his well operating today, maybe he will tomorrow; but with the pipeline it is a matter of continuous flow, and during those cold weather periods, the very existence of the pipeline, continuity of service, depends upon our having control of those wells and knowing that every hour of the day we are going to be able to depend upon that supply.

So we just felt that we could not under these conditions depend upon anything other than our full control of every phase of our operation. This gas does not flow from the Texas Panhandle to Chicago in an hour. It is a period of over three days from the time the gas leaves the Texas Panhandle until it reaches the Chicago markets, and it is not possible for us to successfully handle the production from these wells unless we have control of every facility.

The acquiring of these reserves was a matter of negotiation. We had in mind the spreading of our play throughout the field. We selected the acreage that we felt was best suited for our requirements and then it was a matter of negotiation in trying to get the best price possible.

In addition to the acreage which was held by the participants, which we hoped to acquire and did acquire through negotiations, we were also interested in additional acreage which was not owned or controlled by anybody
391 interested in the pipeline or in any manner affiliated
with any of the participants, and one very good example of that is the Magnolia block in Moore County which was owned by the Magnolia Petroleum Company, an oil company down in Texas. They also had some acreage in Carson County which we thought at the time was favorably located, and has since proven to be. In the case of those purchases we entered into negotiations with the officials of the Magnolia Petroleum Company and arranged for the purchase of their gas leases in the Texas Panhandle field. They had a little over 50,000 acres down there, partly in Moore County and partly in Carson County. The Moore County acreage is that large red block which you see almost in the center of Moore County on Exhibit 81. The most of that comprises the Magnolia acreage in Moore County. That is the largest single block of acreage we have under a common ownership.

The other acreage acquired from the Magnolia in Carson County was a block of eight sections located in the northeastern part of Carson County, which is shown as almost a solid block here at this point on Exhibit 81.

They had a few scattered tracts which were not embodied in these blocks and they were tendered to us at the same time. We undertook to negotiate with them for the purchase of these two large tracts and exclude the other acreage. We tried to select that acreage which we felt represented choice acreage, which we were most desirous of obtaining; but they were not interested in allowing us to hand pick or sort over their acreage. They were willing to negotiate a sale at their price for their gas rights in the Panhandle; and the price of all their rights was two million dollars.

We explained to them that some of their acreage was not well located, and we were not interested in it; but we were very firmly informed that we could take or leave such parts as we wished, but that the price for that which we did take would be two million dollars. We took it all. We had no choice. They were unwilling to let us select the acreage and leave with them the culls which we thought had little value. And if we thought so, they knew it, as it was a matter of common knowledge at that time, and it would leave them without a sale to somebody else.

In purchasing this 50,000 acres from the Magonlia Petroleum Company we were not thinking in terms of the number of acres embraced within the entire purchase. We were thinking of gas reserves and an adequate supply of gas for this entire pipeline project. I think we are often confused in speaking of acres when we deal with reserves of gas for a pipeline, unless when we use the term "acre" we associate with it the average quantity of gas still in place or that is recoverable, or we go beyond the mere designation of acres. Acres is merely a surface unit of measurement and has nothing to do necessarily with the quantity of gas which may be in the reserve under a given number of acres. To that extent I think the term acreage in figuring on gas reserves is something of a misnomer. We were after a supply of gas for our gas pipeline company.

392 At the time we made this purchase from the Magnolia Company, for example, we did not expect to retain permanently and produce from all of the acreage that we purchased from it. We knew that some of it, or we felt we knew that part of it, would not be worth paying rentals on and carrying, and as soon as we could determine such

parts of the acreage as we thought were of little or no value, they would be discarded as a means of stopping rentals, taxes and fixed charges on them.

We did not know at the time we purchased those large tracts which portions would be discarded or which we would ultimately retain. We were relying on the development of those tracts and the drilling of wells by others to guide us in our policy of sorting over and eliminating and acquiring additional acreage to keep our reserves rounded out.

Texoma Natural Gas Company was organized May 26, 1930, and was in existence at the time the title was taken to the acreage on August 21, 1931. Texoma, as I recall, was not in existence at the time the title was taken to the Magnolia block. That was taken in my name as trustee and later transferred to Texoma when that corporation was created.

(At this point counsel for defendants, in reply to questions of the Examiner, stated that the Magnolia Company is the Magnolia Petroleum Company, an oil and gas company which operates in the State of Texas; that it is a major oil company and is a subsidiary of Standard Oil Company of New York; and is still in operation.)

There was no affiliation or relation between the Magnolia Petroleum Company and this pipeline company, and it was not interested directly or indirectly in this pipeline. The fact that it is a subsidiary of the Standard of New York should not in any way confuse it as having any connection with the participant, Standard of New Jersey.

As a matter of fact, the Magnolia Petroleum Company has probably been one of our most troublesome lessors, and has repeatedly threatened damage litigation for what they claim is failure to provide for adequate development and taking care of drainage from that lease; so that they are not only not interested in the company, but they are perhaps one of our least cooperative lessors. They are lessors of ours in that they own some of the land in fee, so they are land owners and own the mineral rights to part of the acreage. They own the fee to the acreage which was obtained in Carson County; but to the acreage held in Moore County they do not own the fee. We have an operating agreement with them as to the lands held in Moore County. They retain the oil rights and we the gas rights on acreage which was owned in fee by third parties. In other words, we purchased from them only the gas

393 rights and not the oil rights. In this land which they owned in fee they own the royalty to the gas rights, and on the land in which they owned a leasehold interest only, they retained the oil rights. They have drilled wells to get oil and we have drilled wells to get gas; so we had to have an understanding and an agreement concerning our relative operations there, each in his own field. That is what I was talking about when I spoke about the contractual arrangement as between their rights in the oil and ours in the gas.

There were other tracts of land in the field which were large, not in the sense of being in a solid block but in the sense that they embraced substantial quantities of acreage, except that owned by the Magnolia and those owned by the companies which I have described as participants in this pipeline. There was another block of acreage in Moore County on which we looked with favor, which was owned by the Shamrock Oil & Gas Company. This block, however, was eliminated from our negotiations because of the high price at which the gas rights were held. The Shamrock Company was unwilling to dispose of their gas rights for less than $100 per acre, and we felt that this price was excessive in consideration of the prices at which leases were then selling, and relying too upon our ability to obtain our necessary additional requirements at a lesser price, so we did not take on that acreage.

We purchased acreage from the other participants in the pipeline company, and by other, I mean other than the Standard Oil Company, which did not own any reserves there but had a call on some. I wish to make it clear that we did not acquire any acreage from the Standard, but entered into a contract with them to obtain 25% of our requirements from reserves upon which they had a call but which were owned by Canadian River Gas Company. That gas was delivered to us at Gray Junction, Oklahoma. We obtained gas reserves from all of the other participants in the project; and their ownership of these gas reserves was an important factor in our consideration of inviting them to participate in the project.

Cross-Examination Interposed by Mr. Slaff.

When I say "in our consideration" and "we obtained reserves," the "we" and "our" refer to the management of this company. When I say "their ownership of these reserves was an important factor in our consideration of inviting them to participate in the project," I mean by the expression "our inviting them" the executives of the project. At that time and in the early development no corporate distinction had been made between the producing company and the transporting company. When I speak of this collective action of acquiring reserves, I am speaking of that group of men representing these companies who had gotten together and by mutual consent deemed that this project was a feasible one, and then started out to see what could be done in bringing the lease owners together.

Direct Examination Resumed by Mr. Morgan.

It was Mr. Henry L. Doherty who invited the Standard Oil and the other companies to participate in this project. When the acreage was acquired, however, I was 394
in charge of the company's operations, and when I say "we" I am referring to the management which had been centered in me.

We conducted negotiations with the participants for the purchase of their acreage which became part of the reserve back of this project. That negotiation was not any different from negotiations with the non-affiliated owners of acreage in the field, except that I believe our negotiations were a little more prolonged and a little more strenuous than they were with some of the non-participating owners of acreage.

In the negotiation of the purchase of acreage from the Texas Company or any of those from whom we acquired acreage, it was, of course, just a matter of locating their acreage, getting a description of it, putting it on the map, and trying to see how it would fit in with other acreage we had in mind trying to acquire. Then it was simply a case of trying to negotiate the best possible price with that owner. We argued very much with the Texas Company about the price it wanted for its acreage, and also about how much acreage we would be required to purchase if we purchased any, and things of that sort. Some of those arguments were rather protracted and heated. That was true of the Cities Service, the Chicago utilities, and the others. It was no different with Cities Service than with any of the others.

As to the position in which I found myself and regarded myself at the time I negotiated for the purchase of these reserves, I will state that the entire activity imposed upon me or in me was one of trust, in which I of necessity had to deal impartially with all the participants. There was to be no act that I could possibly perform that would reflect favoritism upon one participant to the detriment of another. That charge I respected and attempted to carry out to the best of my ability, and have to this date.

I made individual purchases or negotiations with each of the companies and fought it out with them as we did with the Magnolia Petroleum Company. However, those efforts were both individual and collective: I might meet with the Texas Company, with their geologists or construction engineers or their executives one day, and perhaps with the Phillips Petroleum men and Skelly and others in an effort to try to get a cross section of opinion as to what could be done. In the meantime we were compiling the acreage on the map, the acreage of all of the different groups, trying to see to what extent it could fit together and help work out efficient drilling units. We didn't consider it desirable to drill a well upon a 60 acre tract or an 80 acre tract; but that tract might have equal value to a full section if some of the participants had acreage contiguous to it or adjoining, so a larger unit could be worked out. That was part of our study in analyzing and appraising the usefulness of the acreage to us.

Then after getting a cross section of opinion, and finding that opinion varied, I met with the representatives of
these companies in an effort to try to reach a settle-
395 ment on acreage values. The prices ranged consider-
ably. The Texas Company felt that they would hold out for $55 per acre. As I recall, Phillips and Skelly felt that the acreage should command a price of at least $50. There was no real market value fixed in the field. Acreage was being acquired by lease brokers, and you were never able to determine exactly for whom they were purchasing. Title would be taken in their name as agent and might be held for a period of a month before it was assigned to the real party in interest.

Competition in the purchase of acreage at that time was a feature that really complicated the negotiations. About that time, in fact, almost simultaneously, three pipelines started from the Panhandle field in a northerly and northeasterly direction. The three major companies were the Northern Natural Gas Company, the Panhandle Eastern, and the Chicago pipeline which we are discussing, the Natural Gas Pipeline Company of America. These companies were all interested in acquiring gas reserves in the Texas Panhandle field, and almost overnight these gas reserves, which had been looked upon as having little or no value except as by-product plays for oil operations, suddenly developed to have considerable value, and the market changed with equal rapidity from a buyer's market to a seller's market and the prices during that period of negotiation rose rapidly.

I don't know what the Shamrock would have sold their reserves for six months or a year earlier. I don't know what Magnolia would have asked for their reserves. My judgment is that it would have been less than the price asked or paid at this time in 1930 and 1931; but that was the situation which developed and which has characterized every play in an oil pool. In a new field, when a discovery well is brought in, almost overnight values go up because of the competitive purchasing, and the same type of leasing which takes place. Companies will rush in and take spreads in all directions without regard to geological information, with the view of letting their less desirable acreage go as they find that the geological information disproves its value.

We were not placed in quite that same situation because we had more idea of what we were trying to accomplish; but at the same time we did not have control of the market situation. We had to negotiate in competition with these other purchasers of leases in the field. These fluctuating values complicated our negotiations with the Texas Company, Phillips, Skelly, and others. There was not an established market price, but it was a matter of negotiation.

We finally settled upon a price of $45 an acre; and this was not a price satisfactory to the Texas Company, Phillips or Skelly. They felt that the market value of their acreage was more than that. They realized, however, if they were to enjoy any participation in the project they could not take their acreage and sell it to the Northern Natural, or the Panhandle Eastern, and still have a position in this project; so to that extent in negotiating a price we did have a negotiating advantage which we did not have with Magnolia.

We did not pay the same price for the acreage we ac-
396 quired from the Chicago utilities. There again was a dif-
ferent situation. The Chicago utilities had caused to be purchased for their account holdings of gas reserves of the

Gulf Production Company in the Panhandle field for which reserves they had contracted to pay a sum of five million dollars. We were desirous of procuring those reserves and opened negotiations with the Chicago utilities' representatives in an effort to acquire those reserves. The utilities' owners took the position that they were willing to turn over to the project their contract of purchase for this acreage at the same price they had paid. They did not ask a profit, but they were unwilling to take a loss. We did acquire reserves from Texas, Cities Service, Phillips, Skelly, Columbian and the others at a lesser price; but it was not possible to procure the Gulf Production leases for a lesser price than the utilities had paid. They had acquired those reserves prior to their being invited to take a participation in the pipeline, and they were unwilling to take a loss. We wanted the acreage and we paid that price.

Questions by the Examiner.

As to how much the price per acre was, the acreage obtained was never accurately determined, but it was in the neighborhood of 108,000 acres, and at the price paid it was roughly in the neighborhood of $50 an acre.

Cross-Examination Interposed by Mr. Slaff.

That acreage was scattered from Moore County to Wheeler County, right down through the center of the field.

Direct Examination Resumed by Mr. Morgan.

When we took title to the acreage on August 21, 1931, we did not take title to the 108,000 acres of Gulf acreage. Some of this Gulf acreage which we felt was not worth retaining for future development fell somewhat in the same category as the Magnolia acreage which we rejected, but took title to and finally disposed of. Under this agreement with the Chicago utilities to take over that acreage, they retained administration of the contract until we had organized and were in a position actually to take over the administration of it. At that time we did not have our Amarillo office open, and we were not set up to take charge of the payment of the rentals and to watch lease expirations and development; so they took care of that until we were in position to take the contract over actively and administer it.

During that intervening period the rental on some of these leases fell due, and rather than to pay the rentals, or to pay renewals if they expired on acreage which we thought was of less value or no value, we surrendered them; so when it came to us on August 21, 1931, some portion of that acreage had been released, and we voluntarily, when we took title on August 21, combed it over to try to eliminate book work of taking over acreage which we thought had no value. We discarded part of it during the period when it was being administered by the utilities, and
then when it came to us we dropped more at that time.
397 108,000 acres was not the amount of acreage that we
ultimately kept. That was the original purchase by the utilities. In other words, they had contracted for the purchase of some 108,000 acres, and we had the right to acquire all of it, but some we discarded before it was assigned because we didn't think it was worth paying rental on and keeping it alive. We could have had every bit of the 108,000 acres. In fact, we took an assignment of their purchase contract. They did not make an outright purchase of acreage at all. It was on a payment of a million dollars a year; so we took over their contract to purchase, but felt in the interest of economy there was no need of taking title to acreage which would have no value to us later. It cost us more than $50 an acre when you consider the eliminations. We paid $5,000,000 for the right to take it all, and we got the acreage which was actually assigned for that $5,000,000, and that ran the price up to more than $50 for that to which we actually took title.

We regarded the acreage acquired from the Chicago utilities, and which they had acquired from the Gulf Production Company, as being worth the price which we agreed to pay and finally did pay for that acreage. We were extremely desirous of procuring that Gulf Acreage and felt that it was worth that; but when the eliminations were taken into consideration, the fact that that acreage was costing us more than we had paid Phillips, Cities Service, or Texas, was a matter of considerable contention because the other participants were not getting as much as was paid for the Gulf acreage. Nevertheless, we would have paid more for the Texas acreage and that of the others if it had been necessary, as we did for the Magnolia. It was a case of making the best possible deal for getting a supply of gas and acreage which fitted into our project.

We did not pay the Texas Company all that it wanted for its acreage. We have had other occasions and opportunities to make trades with the Texas Company for the things it sold and for the things which were needed by this project. We have had other negotiations with that company and other participating companies for commodities other than acreage which were needed in our operations. The very nature of the operation of these companies has brought us into contact. At the time the pipeline was constructed one of our research and engineering problems was that of selecting a suitable pipe coating. We had some rather definite ideas about pipe coating from our experience in the midcontinent field; but when we started in to make definite plans for the building of this line, we realized, because of the variety of the soil conditions which we would encounter, with its corrosive nature and all, that we should recheck all of our studies and try to make sure that we obtained the best possible pipe and coating obtainable.

Our judgment finally was that a coal tar base was the 398 proper base for the pipeline paint. Two of our participants were engaged in the manufacture and sale of asphalt pipe paint, and a natural amount of pressure was exerted upon me to buy asphalt pipe paint for the line.

It was our considered judgment, however, that this was not the type of paint which was best suited for our need, and we purchased, at an expense of some $700,000, pipe paint from a disinterested outside concern.

I think that other dealings that we have had with the participants might illustrate the extent to which the affairs of this company have been kept separate and clear from the payment of high prices through lack of negotiations or through the throwing of business to one participant to the detriment of others. For instance, we use 35 to 40 carloads of salt each year in our water treating plant. One of our participants is a producer of salt and has striven for years to obtain that business from this company. To date they have not been able to meet the competitive price at which we can buy salt from outside disinterested concerns, so we are continuing to buy from a non-participating company.

When we started in to obtain quotations for rubber gaskets to be used with the couplings in constructing the line, one of our participants mentioned the reciprocal relations which they enjoyed with a rubber company, and urged that we give consideration to this rubber company in the purchase of our rubber gaskets. The relation between that participating company and this rubber company was that they were supplying the rubber company with carbon black. Carbon black goes into the manufacture of gaskets and other rubber materials like automobile tires and things like that. These rubber gaskets which we were purchasing cost in the neighborhood of $100,000. This incident comes to my mind as I am telling of it. I can't today tell you whether the particular rubber company mentioned was the successful bidder or not; but that did not enter into our letting of the contract for the purchase of these rubber gaskets. I started to tell it; but I don't remember now whether that rubber company was the successful bidder or not, but the reciprocal trade relations enjoyed by this participating company with the rubber company did not influence our purchase of rubber gaskets. I remember that incident merely because I had been importuned by one of the participants. That is the type of relationship that has existed from the day this project was conceived down to the present time.

Something of that character has also arisen in connection with the disposition of our natural gasoline which we extract from the gas down at Fritch. Naturally, these oil companies which are participants in this project have been interested in procuring the gasoline output of our Fritch gasoline station. Our production from that plant runs in the neighborhood of 25,000,000 gallons of gasoline per year. The refiners and oil companies use the natural gasoline for blending in motor fuel, and with the connections they have through their sales organizations for selling natural gasoline to outsiders they have been interested in handling the output of this plant. However, the output of the plant has been sold under competitive bidding. At the present
399 time the Phillips Petroleum Company, which was at one time associated in this project but is no longer, is taking one-half of the output and the other half is going to the Columbian Gasoline Company, an affiliate of Columbian Carbon Company, which is a participating company. We do not favor the Columbian over the Phillips. The sales price to each of the companies, participating and nonparticipating, is the same and the contracts are on exactly the same basis.

A few gas wells had been drilled on the Gulf acreage at the time the Chicago utilities acquired it. I think there were eight, and those eight wells were included in the purchase price and tended to give you some index of the producing capacity of that acreage. They came in with the contract to purchase acreage and it was all in the price of $5,000,000. Some of the other acreage which we acquired, like that of Texas, Cities Service, Phillips and Skelly, was already proven up by wells which had been drilled and which were conveyed to us at the same time. The Magnolia acreage in Moore County had no well on it, and it is my recollection that there was none in Carson County. I believe there were no wells on the Magnolia acreage at all.

The fact that some of the other blocks of acreage had wells already drilled on them gave us a better index to their value from the standpoint of actual production than that concerning the Magnolia acreage. In the first place, we had some index as to the reserves in place, as to whether or not the acreage was as good as we might have anticipated without that information. If the well was drilled we had a definite index as to the reserves and the value of the acreage. Further than that, the drilling of the well prevented the risk which we would undertake of getting a non-commercial well, a dry hole, or a sour gas well, so that did give quite a definite value by virtue of those wells having been drilled.

I have not dealt with the participating companies in the matter of acquiring acreage or in the matter of buying and selling any commodity which I had to buy, or which we had to sell, like gasoline, on any other basis than I did other people I negotiated with or who were negotiating with us concerning such operations. I can without hesitation say that there has never been one dollar of this company's money expended, or one transaction of any size ever entered into, which has not been for the best interests of the company, regardless of the detrimental effect it might have upon some participants in the company. If in my judgment the expenditure or the transaction was for the best interests of the company I represented, then that is the procedure that was followed, regardless of its effect upon participating companies.

I have in mind a fight that developed down in the State of Texas before the legislature of that State concerning this wastage of gas about which there has been testimony in the record. We took a very definite position of trying to protect our gas reserves and to oppose any statutes or commission orders which we felt were detrimental to the preservation of our gas reserves and to the conservation of

natural gas in the field. This developed a fight on the
400 subject of what is commonly called down there proration, or the question of whether or not we should divide our markets with others who did not have them in the field. That fight really turned on that point. The activity was always one of trying to force these pipeline companies, which had at considerable expense and hazard gone out and expended their money and created a market, to spread their gathering lines all over the field and buy promiscuously from everybody and create a market on a ratable basis. We ran into conflicting interests of some of our participants in that situation. I don't know that the oil companies which were participating in the project were ever fully satisfied that the interests of Texoma were consistent with the best interests of the oil companies. Nevertheless, we had only one course to pursue, and that was to fight for the best interests of Texoma.

One of our oil company participants actually sent their representative into the hearings in Austin before the Committee dealing with this legislation, and took a position diametrically opposed to the representatives of Texoma. He stated to me, and other officials of that company stated to me, that they felt that their oil interests were apt to be injured by the position that Texoma was taking—so injured that they felt they had better, as they expressed it, throw their interest in the pipeline project out of the window and take the position of trying to protect their oil properties and let the gas go.

Cross-Examination Interposed by Mr. Slaff.

Mr. Slaff has inquired the name of that company. In answering this question my own reluctance in disclosing the name is because of the very cordial relationships I have always enjoyed with this company. I can truthfully say that of the group which have participated none has given me greater support and shown greater confidence in me that this company, the Texas Company.

In this particular instance, Colonel Klein of the Texas Company, its chief counsel, said that he felt terribly embarrassed because of the position they had to take; but their interests were so great, their oil interests, not only in the Texas Panhandle but in other parts of Texas where this legislation and litigation which was pending might be used, and their oil interests might be so impaired, that they felt they could better afford to throw their interest in Texas out the window and get out and try to protect their oil properties. The Texas Company took this position because the legislation or the policy of conservation for which we were striving was diametrically opposed to their best interests, namely, the taking of unlimited quantities of gas to be produced with the oil, the raping of these gas reserves, which was done by the oil operators. The Texas Company, however, was not the worst in the field. In fact, I would say that it is one of the best oil operating companies down there. But the things we were urging for the conservation of this gas, the cementing of the casing and stopping the wastage of this gas by stripping, were all opposed to their position, and therefore they had to take the position they did.

Direct Examination Resumed by Mr. Morgan.

So that the basis of their opposition might be made clear, they explained to me that their position was that this
401 wastage and dissipation of the gas, which would render much of their oil unrecoverable, could not be stopped unless the pipelines were required to purchase gas from all owners. This would have cost us a lot of money and we felt that such cost was unjustified and we had to take an opposite position. Those objections were frankly discussed. Colonel Klein said that he had no quarrel with me at all; that he recognized the position in which I found myself, and there was nothing that I could do. He did not urge me to change my position. He said he hoped there was some way of modifying our course and reaching some agreement which would prevent destroying the protection they were seeking for their oil properties.

Representatives of that company did go down and appear before the committee and defend this feature of prorating, in opposition to our legislative position. A bill was enacted which incorporated the provisions we opposed. We lost in the legislature but finally prevailed in the courts.

(At this point counsel for defendants, in reply to questions of the Examiner, stated that this legislative fight to which the witness referred was in the spring of 1935. There was a four months session of the legislature, and the court fight continued for over a year and was finally decided by the Supreme Court on February 1, 1937, in the case reported in 300 U. S., which has been frequently referred to.)

The total acreage transferred to Texoma about August 21, 1931, was approximately 316,000 acres.

Exhibit 81 is a map which I have caused to be prepared showing the location of this acreage. It shows the principal counties of that portion of the Texas Panhandle embracing the gas and oil development generally known as the Texas Panhandle field. The boundary is according to the Railroad Commission's 1937 conception of the extent of the field and is shown by that heavy black line. The red colored areas represent the lands upon which Texoma acquired gas leases as of August 21, 1931. The date shown on the map is August 1, but it should be August 21. As of August 1 there may have been a few leases which were held for the account of Texoma which were surrendered before August 21; but they did not represent any appreciable quantity of leases.

(EXHIBIT NO. 80 for identification, offered and received in evidence without objection.)

At the time Texoma actually took the legal title to its leases, for which I have already stated it had made its commitments some time before, all of the original participants were not still in the project. As of that date Phillips Petroleum Company and Skelly Oil Company withdrew from the project. Phillips Petroleum Company had made a prior agreement with the Texas Company under which they were permitted to sell their participation to the Texas Company. It seems that Phillips was not entirely satisfied with the negotiations which were developing in connection with the sales contract with the Chicago District Pipeline Company, and made some agreement with the Texas Company in the event they might want to dispose
of their participation and get out. The Texas Com-
402 pany advised that if that developed, they would like
to have an option or call upon Phillips' interest, and that agreement was reached between the two participants independent of the other owners.

Skelly Oil Company, of which Mr. Skelly was president, expressed a desire to sell their interest in the project and asked me to see if the other participants were interested in acquiring control of their participation before they offered it elsewhere. In fact, the Phillips representatives came to me and expressed a desire to withdraw from the project, and made known their agreement with the Texas Company, and asked me in the capacity in which I was then serving if I would take these matters up with the interested parties. That I did, and arrangements were made for the acquirement of the Phillips and Skelly interests in the project.

The trouble so far as they were concerned with the rate contract which we had negotiated with Chicago District Pipeline Company was with respect to the contract of July 25, 1931, which is one of the contracts filed with the Federal Power Commission as a part of our rate schedule. It is the contract under which a very large proportion of the pipeline capacity is sold here in Chicago to the Chicago District Pipeline Company, which in turn serves the three distributing companies to which I referred yesterday, whose lines serve the Chicago metropolitan district.

Counsel has asked what was the trouble with the contract so far as Phillips and Skelly were concerned which made them want to withdraw from the project. They stated their objections to me. During these negotiations in working out the terms of the contract of July 25, 1931, with the Chicago District Pipeline Company, there was a violent disagreement between the representatives of Chicago District Pipeline Company on the one hand and the pipeline interests on the other. The disagreements were of such proportions and the negotiations so long and protracted, extending over a period of twelve months and more, that finally one or two representatives of each of the contracting parties were asked to withdraw separate and apart from the remainder of the parties and see if some sort of a compromise could be effected. This was done and the resultant price which was written into this contract was so unsatisfactory to the interests represented by Phillips and Skelly that they felt the earnings possibilities were disproportionate with the risks and hazards involved, and asked me to see if negotiations could be made for disposing of their interests to the others before they took their interests elsewhere in an attempt to sell them.

The point I was trying to make is that our negotiations had failed to result in an agreement, so Chicago District Pipeline Company appointed possibly two representatives to meet with two representatives appointed by the group representing Natural Gas Pipeline Company. I am not sure whether Chicago District had one or two representatives in that conference; but those three or four men met as representatives of the two contracting parties to try to see if some sort of a compromise agreement could be reached to reconcile our differences, and that was done.

The man appointed by Chicago District Pipeline 403 Company was Mr. George F. Mitchell, and perhaps he had an assistant with him or he may not have had. I would prefer not to attempt to name the other representative because I cannot be sure that he had one, and if so, which of the number of men who were assisting him in these contract negotiations it might have been. On the pipeline side were Mr. H. O. Caster, who was at the time associated with Cities Service Company, and Mr. R. W. Gallagher, who was associated with Standard Oil of New Jersey.

I have stated that I succeeded in disposing of Skelly's interest to the other participants, or that I was instrumental in bringing about such a disposition, and that the Texas Company acquired the interest of Phillips Petroleum Company. Those interests were disposed of within less than thirty days after the contract of July 25, 1931. Settlement was made for acquiring their interests on August 21, 1931.

As to the acreage which we had agreed to acquire from those two companies, we acquired their acreage at the same price paid for the acreage of the surviving participants, namely, $45 an acre, and they were reimbursed dollar for dollar for all the cash which they had advanced for the construction of the line and the other expenses incidental to the completion of the project, with interest to the date of their withdrawal. This consideration of $45 an acre was paid to Phillips Petroleum Company and Skelly Oil Company, and subsequently the recipient of the Skelly interests merely stepped into the Skelly shoes, and the recipient of the Phillips interests merely took the Phillips place; but that was all after the consideration was paid. It just tended to increase the participation of the survivors. The Skelly interest was divided among the surviving interests on the basis of their prior participation ratably. In other words, the participation of the Texas Company was increased by having the participation of the Phillips Petroleum Company added to it. It had a greater participation by the participation formerly had of the Phillips Petroleum Company. The participation of the Skelly Oil Company was disposed of to all the remaining participants in proportion to the ownership of those participants as of the time they acquired Skelly's interests.

Back in the summer of 1930 the Standard Oil Company of New Jersey sold a half interest in its participation to the Southwestern Development Company—that is, half of its interest in the pipeline company—and Southwestern Development Company acquired Standard's entire participation in Texoma Company. I do not have the exact date.

We were not ready to commence producing gas from this acreage and transport it through the pipeline on August 21, 1931, when we acquired the title to the acreage. We had not at that time completed our gathering system, and while that was in the process of being constructed we were not ready to start operations. The physical work on the pipeline was completed August 5, 1931; but before it was put in operation there was the testing of the line, as I explained this morning, and the completing of many odd pieces of work. The equipment in the stations had not been fully tested; but we were able upon the completion of the test of the line to start moving gas through the pipeline.

404 Our first delivery of gas was made to the town of Indianola, Iowa, on September 2, 1931. Our next delivery was on September 24, to the city of Glasco, Kansas, and another little town of Winterset, which is also in Iowa. On October 16, 1931, we made the first delivery of gas to the Chicago District under the contract of July 25, 1931. Prior to that time we had made some small deliveries for the purging of Chicago District's line, the testing of their line, filling their holders with natural gas in lieu of manufactured gas; but the first official delivery under the contract of July 25, 1931, was on October 16, 1931.

The entire project was not then complete and in final form to get on a permanent operating basis. We had a great deal of work yet to do in completing the construction work. I would judge that at that time fully 90% of our field forces were still engaged on construction work, and not more than 10% engaged in the physical operation involved in moving gas from the Panhandle to Chicago. The back fill over the line where the soil had been replaced in the trench over the pipe was fresh filled dirt and was subject to settlement, and after the contractors had moved on and had been paid, it was a part of the company's routine construction work in finishing up the job to come along and see that this back fill was maintained, as after each rain there would be heavy settlements; so there was a period until the end of the year that this work of rounding out and completing the construction work was going on. The banks of the rivers where cut in laying the submerged line had to be rocked, riprapped with rocks, to prevent cutting of the currents, so we were engaged primarily with the job of completing the construction work and finishing up the odds and ends until the end of 1931.

As to when we got out of the preliminary stages and got on a fairly permanent basis of operation, we selected January 1, 1932, as the date of terminating construction, and on that date stopped charging work of this character to our capital account and started them to charge work of this character to operating expense. The date was obviously somewhat arbitrary. It was selected as a convenient calendar date. We continued to do a great deal of that work right on in 1932, work which could probably have been charged to construction, or to capital account; but we had to make some decision as to the date of completing the construction and starting operations, and selected January 1, 1932, as being an appropriate convenient date for making that change.

At that time we were producing gas from our own leases and supplying three-fourths of the pipeline's requirements from those leases, and one-fourth from gas acquired from the Colorado Interstate Gas Company, which came from the reserves of the Canadian River Gas Company.

We did not know with certainty what quantity of gas we had acquired through the acquisition of the reserves about which I have testified. There was no way of knowing. We tried, in the light of the information available, to estimate the probable amount of gas that we had under our acreage. I remember there were various estimates by geologists familiar with the field, and we felt that a fair average figure for the field would be about eight million cubic feet per acre as the quantity of gas in place.

405 We did know that there was lack of uniformity in the content on an acreage basis in different portions of the field. I tried to make it clear in my statement this morning that while we were fully conscious that there were areas of low porosity, lean and barren areas, we also recognized that there were other areas of high porosity which would be productive of good wells, but often these areas seemed so closely associated as to leave considerable confusion as to what the underground conditions might be. It is entirely possible to have a 90 million well within a distance of two or three miles of a two million well. That led to confusion in our minds as to where our most desirable acreage was going to be, or where best to select it. In retrospect,

as I look at it today, although we were using the best information available then, the results are probably attributable as much to good luck as to good judgment that we turned out with the valuable acreage that we have.

We acquired a little over 1,000 separate leases. Had we kept all of those leases in force beyond the five or ten year primary term of which I spoke in my testimony this morning, it would have been necessary for us to drill on those leases a minimum of 1,000 wells. Some of those leases were so situated and the terms of the leases were such that the implied covenant in the lease would never have made it possible to hold the lease with one well. A thousand wells would have held the leases temporarily but not permanently.

At the time we acquired these leases we knew we would not drill and develop the entire 1,000 leases and produce gas from them.

I have referred to implied covenants. In the standard form of lease that is used for the conveying of mineral rights from the land owner to the lessee or gas operator, there is what the courts have construed to be an implied covenant for adequate development of a lease. It is not possible for the lessee to take and enjoy the privileges of a large block of acreage by the mere drilling of one producing well upon that lease, which would have the effect, in the absence of any specific terms to the contrary, of stpoping all rentals. It is, therefore, the obligation of the lessee to drill that lease diligently, to protect the lease against drainage by offsets, and to otherwise drill and produce the lease as would a prudent operator under those circumstances.

In other words, notwithstanding the fact that the lease contains the language that it should continue in full force and effect for a period of five years, or ten years, or whatever the primary term may happen to be, and as long thereafter as oil or gas is being produced from the premises in paying quantities, varying according to the particular contract, that does not suffice to continue the lease so long as oil or gas is produced, unless it be in reasonable quantity. That is a provision the Texas courts have written in the Texas oil and gas leases which does not appear in the language of the lease itself, and that is what I was talking about when I mentioned implied covenants.

At the time we acquired these leases, or at any time thereafter, it was never our thought that we would drill a

well on each of those leases and a sufficient number of
406 wells on the larger ones so as to produce gas from all
of those leases. Our thought was simply that because of the necessity of having an adequate reserve to protect the pipeline, the safe way for us to protect this part of our investment was to acquire sufficient acreage so spread throughout the field that we would be in the end protected against faulty selection of acreage which might be in less productive, less porous parts of the field, and when the story had been written by the records of wells, we would still have sufficient good acreage to provide the pipeline project with adequate reserves of gas. We knew that some of our selections would be bad because the information was not sufficiently complete that we could be sure, and some of the acreage which we thought best has since turned out to be not the best. Some of it has turned out to be barren. Some of the acreage that we thought would be most productive has resulted in dry holes, and some of the acreage we thought would be fairly protected against oil drainage has been subject to oil drainage.

These were the conditions against which we tried to protect ourselves, and our acreage selection and acreage play took all of these factors into account. It was our purpose at the time the total acreage was acquired to select from that acreage and develop and retain a sufficient part thereof to constitute a safe and reasonable reserve to take care of the requirements of the pipeline system. That is what we sought at that time to do, and we have never deviated from that policy.

We knew at that time that a large portion of the total leases, stated in terms of acres, would be discarded and never developed; but we didn't know how much and we didn't know which ones. We were merely exercising our best judgment in the hope that finally we would wind up with an adequate supply of gas, whether it be 200,000 acres, 100,000 acres or 50,000 acres. We didn't know what it would be. We were seeking an adequate supply of gas for the project, and this combing process is one which has gone on continuously in the light of information obtained from day to day, from week to week, and from year to year. As additional wells were drilled, the boundary lines of the field have been changed, the sulphur lines have been changed and the ideas of the geologists with reference to the area of high and low porosity have changed. Now the information is narrowing down each year as additional wells have been drilled and the control points resulting from this information have reached a point where there is less hazard and less guess today than obviously existed ten years ago.

From my own knowledge and experience in the oil and gas business, the procedure which we followed is not at all dissimilar to the practice then in effect by oil and gas companies, and in effect today. In any new field, when oil and gas is discovered, as it has been down through the Central Illinois basin immediately south of Chicago, vast areas are leased in the light of the best information available. Competitive prices exist, and those prices are paid on very meager information, with a complete knowledge that much of that acreage is going to have to be surrendered; but they can't tell which acreage until drilling has disclosed the more productive parts.

Texoma has been acquiring and combing over these leases ever since August 21, 1931. We have acquired some additional acreage. We have surrendered over half of the original acreage we acquired, and we have in the meantime added other acreage, and we have traded acreage with other producers to try to round out these smaller tracts into suitable drilling units.

We have also consolidated leases so as to minimize the amount of drilling. By consolidation I mean that we have taken a number of tracts, each of which would require development, and validated these consolidated tracts by the drilling of a single well. Validating means curing the lease against further rental payments so that one well holds the lease for Texoma as long as oil or gas is produced in paying quantities.

There have been greater eliminations from our original purchases than from additional leases acquired later. In the original purchases under the terms of our negotiations and the competitive conditions under which we were dealing, and the unwillingness of the companies to let us hand pick and select the acreage which we thought most desirable, we took some acreage which we felt at that time we would immediately release rather than pay rental and taxes on it.

Since August 21, 1931, we have acquired only those selected tracts which were adjoining, nearby or contiguous to acreage already held by Texoma and which would round out our acreage into valuable economic drilling units. That acreage has been carefully selected. We have gone bad on some of it, but for the most part we have been a little more discriminating, due to the fact that we were just picking up small tracts which might be near a proven lease which a well had shown to be good territory. Then we would go in and try to round out our leases at that point.

Direct Examination Resumed by Mr. Morgan.

I know of instances in which other companies have acquired acreage and then released a part of it in the course of their normal and ordinary operations. That is the very ordinary and usual procedure. I had access to the records of the Cities Service Company while I was an officer of that company. I am familiar with their practice and policies and their records, and I have caused to be taken from their records a certain statement. In similar manner I have had access to the records of the United Gas Company and its subsidiaries, and have caused to be taken from their books and records a similar statement. That company operates throughout central south and southwest Texas, Arkansas and Louisiana.

(Document entitled "Gas Acreage Controlled", marked Exhibit No. 82 for identification.)

Exhibit 82 was prepared under my direction. It shows the comparative acreage acquirements, releases, and volumes of gas handled by Texoma Natural Gas Company, Cities Service Gas Company, and United Gas Pipeline Company. In the extreme left-hand vertical column are listed the years to which the figures refer.

408 In the first section of figures the acreage records of Texoma have been shown; and reading across horizontally from 1932 we find in the second vertical column that Texoma held on January 1, 1932, 278,000 acres plus; that during the year 1932 new acquisitions to the extent of 2300 acres were made; that during the year 1932, 39,250.01 acres were surrendered; so that the resultant acreage retained by Texoma as of December 31, 1932, was 241,884.18 acres.

In the second vertical column from the right hand side of Exhibit 82 is shown the total acreage controlled by the company as of December 31, 1932, and that figure does not differ from the last mentioned figure in this instance. Purely for the sake of comparison, the last vertical column to the right shows the sales of the pipeline system from this acreage, which is 21,334,259 MCF.

As of January 1, 1932, the Cities Service Gas Company held 1,171,521 acres. They acquired during the year 1932, 138,196 acres, and surrendered during that year 221,100 acres, holding on December 31, 1932, 1,088,617 acres. That company also held gas purchase contracts as of December 31, 1932, upon 1,012,306 acres, so that the company either owned or controlled gas reserves of 2,100,923 acres, and had a pipeline requirement from that acreage of 49,269,014 MCF, and this pipeline requirement was the annual withdrawal from that acreage.

The Texoma requirement set down in the last column which I first read, 21 million and so on MCF, is the total pipeline requirements which came from Texoma reserves; so with an outlet of a little more than twice as much as Texoma, we find at the end of 1932 that Cities Service owned almost eight times as many acres of gas reserves as did Texoma.

The Cities Service reserves are not all in the Panhandle, and my guess would be that they have about 70,000 acres in the Panhandle. Counsel states that the figure is 104,000. I will check the quantity and be sure of it.

Cities Service does not rely on the Texas Panhandle as does Texoma. On Exhibit 82 I was referring to its entire gas system and its entire gas rights in the midcontinent field, and these figures are not confined to the Panhandle field as to either Cities Service acreage or pipeline requirements.

As to the United Gas Pipeline Company, it has some producing companies along with its pipeline company, just as Texoma is the producing company for this pipeline. In the year 1932 the United and its affiliated companies held, as of January 1, 1932, 1,117,737 acres. They acquired during that year 7,333 acres, and surrendered during that year 109,657 acres; so that as of December 31, 1932, they held 1,015,413 acres. They held gas purchase contracts as of December 31, 1932, upon 80,306 acres. Therefore, the total acreage owned or controlled was 1,095,719 acres, from which they supplied their pipeline system with 148,183,544 MCF.

That same comparison may be made for the years 1932, 1933, 1934, 1935, 1936, 1937 and 1938. 1938 is not shown on the figures for Cities Service and the United because those records were not available to me at that time.

409 By "United sales on various bases" I mean that the United Gas Company, as is the case with many companies, does not happen to have a uniform pressure base upon which their measurements are made for sales, and rather than to try to convert those quantities, we merely took from the records those quantities, some of which were on a 4 ounce base and some on a 2 pound base. A 2 pound base and a 4 ounce base is the amount on which the pressures above atmosphere are computed, and no attempt was made to convert those to a common pressure base.

(EXHIBIT NO. 82 for identification, offered and received in evidence over the objections of counsel for each of the two Commissions, to whom the Examiner granted exceptions.)

We deemed it important to the pipeline that it provide itself with an adequate reserve of gas because there were certain disadvantages in being dependent upon other people to drill the wells as they were needed and to operate them so as to get an adequate flow of gas in the pipeline. The experience which we had witnessed in the financial failure of pipelines which had not been adequately supplied with natural gas reserves was one of the strong motivating impulses which caused us to look with unusual care to the securing of adequate reserves.

Through my experience with the Empire Companies in Bartlesville and the experience of Doherty as the principal owner of Cities Service Company, we had very vividly impressed on our memories the experiences through which those companies had passed in trying to maintain adequate reserves of gas behind the pipelines.

The life of the average gas field is not long. Perhaps the two most outstanding fields today are the Monroe and Texas Panhandle fields. In the mid-continent, and by mid-continent I refer to the area of Texas, Oklahoma, Arkansas, Louisiana and Kansas and such general areas through there, we knew that the Cities Service Company had had necessarily to be continually seeking new sources of supply. Most of those fields were the result of oil exploration work. The drilling of an oil well might result in the bringing in of a gas well. Other wells were drilled due to the presence of gas, it being a geological indication that the presence of oil might be found nearby.

As a result of this oil exploration work many new pools were opened up, and the Cities Service Company was continually laying its lines into one field after another as the old fields were exhausted. Many of these fields did not last more than from three to five years.

Perhaps the most alarming experience was that of the Kansas Natural Gas Company which Doherty acquired in 1916. When he acquired this company it was in receivership, serving a good population and with adequate markets, but having no gas. The same was true with respect to the Wichita pipeline, the Quapaw Gas Company, and the Wichita Gas Company, which were also acquired by Doherty. They were all in the same position of being without adequate gas reserves, and the earnings of the companies had declined to the point that the companies were bankrupt.

This experience was one we were trying to ward against in providing ample gas reserves for this project. We also found that the local utility companies in Chicago were perhaps as much concerned, but for different reasons than
410 the owners of the pipeline company with the adequacy
of those gas reserves.

In the early days, about 1890, three pipelines were built from the fields of southern Indiana to Chicago, with an expenditure in excess of $10,000,000, to bring natural gas to Chicago. At the time these pipelines were constructed there was every evidence that there was an ample supply of gas to justify the pipeline expenditure; but that supply of gas was so rapidly exhausted within a period of about five years as to cause a tremendous loss to the pipeline company, and placed the distributing companies at a great deal of inconvenience, and it had a detrimental effect upon their public relations because of the character of service they were forced to render during the period of change from manufactured gas to natural gas, and from natural gas back to manufactured gas, all of which required an adjustment of the consumers' appliances and burners.

If possible, I would say that the utilities, as the principal purchasers of the output of this line, were, if anything, more concerned with the adequacy of this supply than the other owners of the pipeline.

Therefore, everything considered, it was our feeling that while there were many, many hazards with which we were to be confronted, the greatest blunder we could possibly subject ourselves to was to put millions of dollars into a pipeline and develop markets, only to find we were without an adequate supply of gas. It was a matter of very great concern to us to make sure that we had an ample supply. In blocking up this acreage, we were not thinking in terms of acreage, we were thinking of gas.

Exhibit 82 reveals how our people were constantly thinking in terms of reserves. There is no other way of expressing on the record what Cities Service and United are buying and what they are surrendering. They lacked geological reserve reports. Those we didn't have access to; but this is the method of expressing their acreage transactions in trying to keep pace with the exhaustion of their gas reserves. Some of this acreage may be good, some may be bad. Much of it is a disappointment, as indicated by the amount which is being surrendered each year; but they are trying constantly to make replacements and keep a proper reserve behind their pipeline at all times to the point where they feel that service will be assured.

Other purchasers were concerned with the reserves besides the Chicago purchasers. The United Light & Power Company, through its subsidiaries, acquired natural gas for introduction into its distribution systems for Rock Island, Davenport, Moline, Cedar Rapids, Iowa City, Ottumwa, Red Oak, and Shenandoah. They have a number of towns in which they own the gas distribution systems across Iowa and Illinois. They were equally insistent—in fact, they were more insistent than the Chicago utilities—and were even demanding that we write into our contract that we would not have the right to cancel a single lease without first obtaining their consent. They were so concerned with the supply of gas, for fear that we might not be properly diligent in the securing of an
adequate supply for the gas line, that they were de-
411 manding that we obtain their approval before sur-
rendering any acreage; but we could not submit to that. The acquiring of adequate reserves was an absolute essential entering into our ability to make contracts for the sale of gas at wholesale to those who were distributors and users of gas.

As a result of the policies which we pursued in the acquiring of our reserves and the consolidation of those reserves, selecting and retaining some and the elimination and surrender of others, we feel now that we have an adequate reserve behind this pipeline. We feel much more content with our reserves today than we did when we had twice as much acreage. We feel that we have so handled our original purchases and our subsequent transactions that our reserves today offer us an adequate protection for the pipeline so long as the policies of the State with reference to conservation and the permitting of stripping, etc., do not accelerate the rate of withdrawals from the field.

If the rate of withdrawal from the field is accelerated, it is our judgment that we would not be able to continue to produce gas in the Panhandle and transport it to market any longer if we had retained our surrendered acreage than we will from the acreage which we now retain. I think we have gotten it down to the best selected acreage. We are in position now, no matter what takes place, where we will get the pipeline requirements until the supply in the field is exhausted.

The total production from the field is what is going to determine the life of the Texoma properties. You must, of course, take into account all economic factors which have a bearing upon Texoma's ability to stay in or being forced to quit before the last foot of gas has been withdrawn from the field. Whenever it is that we will be brought down to an economic point where we will have to quit is going to be determined by the total production from the field, including that of Texoma, without regard to whether we are going to produce from the acreage we now have or whether we produced from all acreage which we had.

Extra costs would have been involved in producing gas from the surrendered part of the acreage. We would have had the carrying charges, the rentals, the taxes, and the expenses of keeping records on that acreage which was surrendered. In the interest of economy, we have saved a considerable amount of money on that, though I don't know just how much.

We have also saved in the matter of drilling wells. Most of the leases would have expired under their primary terms unless we had drilled wells on the surrendered acreage. On August 21, 1931, most of those leases had a life in their primary term of only a few years, and those would naturally have expired by their own terms and renewal expenses would have been necessary to keep them alive. We would not have been able to produce any more gas if we had drilled a thousand wells than we have from the wells we did drill. The pipeline capacity and the market requirements represent the total needs of the system.

I have referred to the hazards and risks involved in the operation of this project. There are extraordinary 412 and unusual risks involved in projects of this character as compared with an ordinary business. Of course, the oil and gas business is known to be a hazardous, speculative form of business; and of necessity, because of the nature of those hazards, banking institutions and people interested in the lending of funds, necessarily as a matter of protection, are not interested unless those companies can show that their rate of return is commensurate with the hazards which they are assuming.

As to the hazards I have had in mind, I briefly mentioned gas reserves; but so far as hazards are concerned more can be said on that subject.

The vacillating conservation policy of the State of Texas in regard to conservation has much to do with the length of life of this field.

Natural gas competition with other fuels in its principal markets is a hazard which must be reckoned with.

The fluctuating demand for natural gas, due to industrial depressions or economic conditions, is a factor to be reckoned with, regardless of competitive prices at which those other fuels may be sold.

Local gas fields, and by local gas fields I mean gas fields which are discovered in closer proximity to the principal markets than the fields from which the pipeline originates, is one of the elements which the financial sponsors of a pipeline must take into consideration. Those local fields are the ones which are completed after the pipeline is constructed, and that one thing is a hazard which has been the constant fear of the natural gas pipeline industry since its inception. Whether the pipeline be fifty miles long, five hundred, or a thousand, any time that a field is completed nearer the market it has a possibility of completely wrecking the original pipeline.

We have as a consideration the necessity for additional capital expenditures, even after the original pipeline is constructed and reserves are required. The project, I might say, turns sour; the earnings are disappointing. Nevertheless, if the project is to be kept alive and continued in operation, additional capital must be continually poured in or an attempt made to liquidate the property and avoid further losses. The first capital expenditure is not the last. Almost to the last day that the pipeline operates, new money must be continually poured into the project for drilling wells and other types of expenditure which I will attempt to explain more fully later.

There is always a hazard as to whether you will be confronted with increased operation and maintenance expenses in the future. In a project such as this, where the principal income of the pipeline is contracted for over a long period of years at a fixed price, in terms of a fixed dollar value, there is the possibility of increased operating expenses, labor and material, which may result in a profitable venture turning into one of loss.

Inflation represents a hazard, and that was touched
413 upon quite fully by Dr. Palyi in the early part of the
week.

There is a hazard of ever-increasing taxation, and increased regulatory expenses.

Then there is always the unpredictable hazard which represents a loss of earnings from pipeline breaks and failures.

I think each one of those subjects is of such importance that it might be worth while to spend just a little more time in more fully explaining why we consider each of these subjects to represent a hazard and concern to financial sponsors of a long distance high pressure pipeline.

Taking these hazards up one by one, and taking first the hazard involved in the matter of gas reserves, I wish to elaborate some on that point. During this hearing there has been considerable testimony bearing upon the influence of water upon the life of the field. That story has not been fully told. We are trying to keep pace with the water conditions in the field. That is a hazard which we were not able to fully appraise at the time the pipeline was built, and I doubt today if we are able to fully appraise the extent of this hazard.

We do know and we are fully conscious that as the pressure is going down water is appearing in these wells. These wells which were absolutely free of liquid moisture at the times the wells were completed are commencing to show water in many parts of the field. It is most concentrated in the Lefors area. We were hoping that it might be localized and that that was the only point which would be troublesome; but in recent months we have had this appearance of water in other parts of the field. It has become troublesome. The extent to which it may influence the life of the field in drowning out the reserves is only a matter of speculation. We can only guess. We may be unduly pessimistic, or we may be unduly optimistic. That is something that only the future can tell.

As to the influence of salt from this water intrusion, that is a matter that may have a very, very serious effect upon the abandonment pressure of this field.

Other economic factors may make it possible for us to go below 100 pounds pressure, so far as operating expenses and maintenance and sales prices of the gas to the market outlets might indicate that we could go to lower pressures, and yet, as I say, the formations might be salted up and the pores of the producing sands blocked with salt. It has happened with other fields in the midcontinent, and it is not a new phenomenon which we are looking upon as a ghost. The extent to which it will influence our economic life in the Panhandle is a hazard and is unknown. It has caused us to plug eight wells already.

The protection of our leases against activities of the oil operators is something that we are trying to
414 accomplish by working with the operators and the
Railroad Commission, but most of our efforts have been in the nature of litigation since we have been unable to obtain any cooperation from the State in the direction of conservation.

Everything that has been attempted in the way of unit development or through cooperative methods which have been used in other places in the United States apparently have not taken root in the Texas Panhandle field. Probably the reason is that there has been such a vast quantity of gas which is out there in the barren plateau plains of Texas, remote from any big markets. If the field were more closely located to the big centers of population and big industries, I don't care whether it was Texas or whatever the State might be, an effort would be made to conserve that natural resource; but in Texas it has not received the same attention it would receive under different geographic conditions.

Therefore, that is a hazard that is ever in front of us. Texas has never looked kindly upon foreign corporations coming into that State, and these pipelines, for the most part, are taking a Texas natural resource to Chicago, Denver, Omaha, Kansas City, and foreign markets for the benefit and comport and convenience of people outside the State of Texas, and conservation does not receive the same careful consideration as it would if that gas were being marketed within the boundaries of Texas.

This is not said in any attempt to be unnecessarily critical; but these are the facts, and the records of the litigation which has followed the development of that field will bear out the statement that Texas has completely disregarded the conservation of a valuable natural resource.

To date, in spite of all our efforts to provide the pipeline with adequate reserves and to protect those reserves by drilling and seeing that the leases are properly protected against drainage, and by the development of our markets to the best of our ability, only 40% of the gas withdrawn from under Texoma's leases has been produced through the wells of Texoma, the other 60% having been lost through drainage.

So as we go down through the years, in looking to the future requirements of this pipeline, we are constantly confronted with that hazard, as to whether we will be able fully to protect the pipeline with its requirements from this acreage. We think and we hope we will. As to whether we can or not is a matter largely dependent upon the way in which the State permits the oil operators, the gasoline plant and carbon black operators, to withdraw the gas, and as to whether it may be stripped for gasoline, as it was for two years, and the residue blown to the air.

I have heretofore mentioned proration and the efforts of the State to enforce statutes and regulations requiring us to buy gas from others, notwithstanding the fact that we had invested our money in our own reserves. That confronts us as a hazard or a risk involving our business. It is a very great hazard. To date we have been able
to forestall the efforts of the State to bring about
415 legalized proration of production in the field. This
attempt on the part of the State I touched upon previously this morning.

As these pipelines have undertaken the financial risks and responsibilities of creating markets, the State has attempted through legislation and through the orders of its regulatory commission, the Railroad Commission, to force the pipeline companies to extend their lines over the field and purchase from all producers ratably in order that they may have an outlet for their gas and share in the pipeline's markets.

I have tried to make it clear why we felt, before we ever built the pipeline or entered the field, that this would be a dangerous policy for the company to follow. We felt that it would be perhaps not suicidal, but it would materially increase the hazards to which we would be subjected if we were forced to depend for our supply upon purchased gas.

Therefore, having gone in and expended our money and provided ourselves with adequate reserves, and having injured none, the gas being withdrawn from under our leases and not drained from others, we have not felt kindly disposed to the State's efforts to force us to buy gas from others and share our markets to the economic disadvantage of having to see more gas drained from under our leases and possibly be produced through neighboring wells, and force us to purchase that gas and provide it with a market through our pipeline. That is a fight that has not yet ended.

It would naturally cost us money, aside from the gas drained out from under our leases, if we were forced to purchase that gas and provide it with a market through our pipeline. We would not be able to fully develop or take advantage of our own gas reserves, and we would have to pay out new money for gas which we would purchase from others. We would probably have to pay for that gas around 4½ cents per MCF at the mouth of the well.

This possibility of having to purchase gas is one of the hazards that we have not yet licked. Some of these things which loomed up as dangerous hazards at the time we were making the initial investment have reached the point where we feel somewhat reconciled to the fact that they are not going to be as bad as they first appeared; but in the meantime others have appeared to take their place, some of which look even more hazardous than the original ones with which we were concerned. This question of having to buy gas is one that we have fought through the courts and each time to date we have been successful in maintaining the soundness of our position; but the legislature of Texas, which adjourned just last week, I think it was June 21, experienced another bitter fight between the opponents and proponents of this activity on the part of the State to try to force the pipelines to buy gas.

Without trying to quote the legal decisions, the Federal Courts have made perfectly clear, we think, that there is possibly a way in which the State can so pass regu-
416 latory laws as to finally force the pipelines to buy
gas. To date, however, the legislature has not been able to pass such a valid law, and the orders of the Commission in their attempt to force by one means or another the purchase of gas have failed. These orders have all been stricken down or withdrawn by the Commission after a hearing in the Federal Court. (Objection by Commission Counsel to foregoing testimony overruled.)

In the recent session of the legislature the bill that was aimed to accomplish the desired result passed the Senate and was finally defeated in the House. It is not my view that the matter will rest there. The proponents of the measure have indicated that they expect to continue the fight, and there has seldom been a regular or special session of the Texas Legislature that this agitation has not been one of the paramount issues.

There is a risk or hazard involved in the situation that we succeeded in getting behind this pipeline the reserves of Canadian River Gas Company to the extent of 25% of our pipeline's requirements. While that is a vast reserve, the pipelines of the Red River Gas Company, the Colorado Interstate, and, I think, the South Plains Pipeline Company, all have a prior call on the gas from this reserve ahead of Natural Gas Pipeline Company's contract for 25% of its requirements to be furnished by the Colorado Interstate.

As the pressures decline and the drilling of these wells becomes less profitable under that contract, and under the contracts for reserve requirements of these pipelines which have prior call to ours, there is the uncertainty as to whether Colorado Interstate will be interested in continuing to supply 25% of this company's requirements, and, if not, in what year that might occur.

If during the course of our project's life they were to serve notice on us that they would no longer furnish us that 25%, we would have to get it from our own acreage, and that would naturally require the drilling of additional wells to those we have to drill to get ¾ of our requirements.

(Document consisting of Agreement between Canadian River Gas Company and Colorado Interstate Gas Company, dated January 3, 1928, marked Exhibit No. 83 for identification.)

Exhibit 83 is a true copy of the agreement between the Canadian River Gas Company and the Colorado Interstate Gas Company. It is a photostatic copy of a conformed certified copy which we have in our files.

(EXHIBIT NO. 83 for identification, offered and received in evidence, without objection.

Contract between Colorado Interstate Gas Company and Natural Gas Pipeline Company of America, which is on file with the Federal Power Commission, incorporated in the record by reference.)

I wish to add to what I have said about the vacillating policies of the State of Texas as one of the hazards to which I have referred. This so-called vacillating policy on the part of the State of Texas dates back to October 12, 1931, which was in that preliminary period or that twilight zone of completing our construction work and getting started with the operation of this pipeline, so that it is a difficulty with which we have been confronted since the pipeline has been completed and placed in operation.

417 I would suggest for the record, rather than to outline the details of each of these activities on the part of the State and the Railroad Commission, we merely refer to the first of them as the "Common Purchaser Act," which was effective October 12, 1931, and was enjoned by Texoma on November 5, 1931, and on June 8, 1932, was permanently enjoined by a three-judge Federal Court.

Following that we had the attempt of the Commission, on September 6, 1932, to force proration through what was termed as a "shut-down order." This order called for complete closing down in certain areas of the producing wells and limiting others to 4% of the open flow. It was for the purpose of forcing the pipeline companies to take through purchases a part of their requirements from areas which were not then served by pipelines. Texoma and Cities Service secured temporary restraining orders on September 17, 1932, and on December 23, 1932, a three-judge Federal Court declared the Commission's shut-down order void and enjoined its enforcement.

That was followed on November 12, 1932, by a legislative act entitled "The Market Demand Statute". On December 30, 1932, the Commission issued an order under this statute restricting gas production to the pipeline market requirements for light and fuel, and this order was based upon a production unit of 160 acres per well. There were other provisions of the order which I believe are not relevant. On January 1, 1933, Texoma secured a temporary restraining order, and on June 22, 1933, a three-judge court declared the Commission's market demand order void.

Every attempt of the Railroad Commission up to January, 1933, had failed to force the pipeline companies to purchase gas. Since it did not appear that a valid order could be drawn or enforced, the Railroad Commission then started issuing permits for the stripping of dry gas, the effect of which was to permit the gasoline to be extracted from the dry gas and the wasteful dissipation of the residue gas to the air.

Naturally, if this practice continued, the reserve upon which the pipeline companies were dependent for their supply would be rapidly dissipated and their projects doomed to failure, and yet they were not willing to compromise their position and purchase gas in an attempt to eliminate stripping.

That began in January, 1933. The first permit was issued to Hagy, Harrington & Marsh, a firm of producers in the Panhandle who had assisted and sponsored the prior legislation in trying to force the pipeline companies to purchase gas. After this first permit was issued to Hagy, Harrington & Marsh, which would permit the stripping of the gasoline from the dry gas and the wasting of the residue to the air, by March 7, 1933, 34 companies had made similar applications, and by July, 1933, 36 such permits had been issued covering 320 wells with an aggregate open flow of three and a half billion cubic feet.

That was followed on September 1, 1933, by the Texas legislative act known as the "Sour Gas Act," but the effect of which applied to both sweet and sour gas alike. It started out as a statute authorizing the stripping of sour gas, and afterwards by amendment it was changed to include all gas, including sweet gas, but it continued to carry the name "Sour Gas Act".

This statute was attacked in March, 1934, by several
418 of the royalty owners who sought to enjoin six of
those companies which had received permits for stripping gasoline and wasting the residue to the air, and their suit was to enjoin those companies from the operation of their stripping plants. On July 27, 1934, Federal Judge Kennerly sustained the defendants and dismissed the injunctions. On March 28, 1935, a three-judge court sustained Judge Kennerly's decision, and stripping operations were continued at an accelerated rate.

I think it is not difficult to visualize the position in which the pipelines then found themselves, with the State having passed an act legalizing the stripping of dry gas and wasting the residue to the air and that act having been sustained by the Federal Courts. It looked like the life of the field was doomed to be extremely short. However, public sentiment was so strong against the wasteful dissipation of these natural resources that the stories were carried from one end of the continent to the other, so that it caused considerable commotion in Washington, in Congressional circles. The Department of the Interior was very much concerned with the way the State of Texas had legalized the wasteful dissipation of natural gas.

Sentiment was so strong that in May, 1935, the Texas Legislature passed House Bill 266, which repealed stripping and limited the use of sweet gas for pipeline purposes. However, under the guise of protecting correlative rights and eliminating waste, the Commission entered an order for the proration of gas for pipeline purposes, based upon 50% open flow and 50% acreage factors for determining the amount to be allocated to each well.

On September 19, 1935, Texoma obtained a temporary injunction against this order, and on March 31, 1936, a three-judge Federal Court declared the Commission's order void. On May 28, 1936, the State appealed the three-judge decision to the United States Supreme Court, and on February 1, 1937, the Supreme Court sustained the lower court's decision.

On May 20, 1937, the Texas Legislature passed Senate Bill 407, which was generally known as the "Sour Gas Law". This law limited the use of sour gas to carbon black and fixed the amount which could be utilized to 750,000,000 cubic feet per day as a limit. On July 23, 1938 the Federal Court sustained the validity of this act.

On November 27, 1937, the Railroad Commission issued a proration order for prorating sweet gas in the East Panhandle field under House Bill 266. The East Field, I think, has already been sufficiently defined in this record as being that portion of the Texas Panhandle field east of a north and south line passing approximately through the town of Lefors. It is an arbitrary designation of an area by the Railroad Commission for that part of the southeastern portion of the field as contrasted with that to the north and west of that dividing line, which the Commission has termed the West field.

The Consolidated Gas Utilities Corporation sought to restrain the Commission's enforcement of the order in the
East Panhandle Field, and this was followed by cross
419 action on the part of the State to enjoin the Consoli-
dated Company from violating its orders. The case was removed to the Federal Court and remanded to the State court, but it was never heard.

On December 16, 1938, the Commission issued an order applicable to the West field in effect the same as that which had been applied to the East field, except for minor details, and stated in its order that it was to become effective January 1, 1939, and was for the purpose of stopping drainage. The effect of the order was to prorate gas in the West Panhandle field, which would cause Texoma to purchase an appreciable percentage of its pipeline requirements.

On December 23, 1938, Texoma obtained a temporary restraining order, which was followed on January 6, 1939, by a three-judge decision which held that House Bill 266 did not authorize the Commission to enter a proration order based on drainage.

I have already previously referred to the recent legislative activity during the session which adjourned on June 21. It was on May 2, 1939, that the Texas Senate passed a statute authorizing the Commission to prorate sweet gas production if they found that by so doing it would retard, prevent or minimize waste and drainage. This bill as defeated in the House on June 1.

The intention of those who have sponsored this fight, the avowed intention, is still to try to pass some such legislation. As to whether they will be successful, we can only speculate. If they are successful, it will naturally force Texoma into a most hazardous and uneconomic position of having to produce less of its gas from its own reserves and purchase, in effect, its own gas coming from under its own leases through surrounding wells of others. It will have to build pipelines out to those wells and install meters. I would say that that is a very, very strong hazard that has been ever present, and there is no prospect to date that we are going to be free of it.

(At this point counsel for defendants, at the request of the Examiner, pointed out Paragraphs 1, 3, and 22 of Exhibit No. 83 as forming the basis of the prior call on the reserves of Canadian River Gas Company ahead of Natural Gas Pipeline Company of America's contract for 25% of its requirements to be received from Colorado Interstate Gas Company, as testified to by defendants' witness Floyd C. Brown at pages 2146 and 2147 of the record.)

(June 30, 1939)

The third hazard or risk which I enumerated is that of natural gas competition with other fuels, and the fourth risk is that of fluctuating demands for natural gas. They are somewhat related and may be discussed together.

The competition of coal, fuel oil and other fuels is an influence which creates a hazard upon the earnings of the pipeline company. A pipeline transporting gas from fields 950 miles distant from the markets, such as Natural Gas Pipeline Company, cannot exist alone upon the revenue from the sale of domestic gas. It must rely upon the revenue which it derives from the sale of industrial gas to
round out its earnings; and conversely, such a pipeline
420 could not prosper through the sale alone of industrial
gas.

It is through the revenue derived from industrial sales that the pipeline is able to maintain reasonable domestic rates; and to the extent that the revenue from the sale of industrial gas fluctuates, or to the extent that there is lack of uniformity over a period of years in this revenue, the owners of a pipeline company are unable to forecast with any degree of definiteness what the pipeline earnings will be.

Industrial consumers of natural gas are not as a usual thing inclined to rely upon getting their fuel requirements from a pipeline unless there is a possibility of obtaining continuity of service. This pipeline cannot offer such service for two reasons. First of all, it is definitely committed by policy and contract to give preferred service to the domestic consumers. By this I mean to the distributors, who in turn serve directly the ultimate consumers. Secondly, it would be impossible to guarantee continuous service to industrial consumers because of the physical conditions under which gas is transported. The pipeline is subject to interruptions and breaks, so that it would not be possible for an industry to contract for a positive assured supply of gas from such a line as is serving Chicago.

Therefore, the industry, if interested at all in natural gas, must be on something better than a straight competitive b. t. u. basis, because if they convert their plant to natural gas and the nature of the operation of that industry is such that they have furnaces, such as a glass plant, or blast furnaces, or any type of furnace that is damaged because of sudden curtailment of fuel supply, or if the nature of the industry or factory consuming this fuel is such that they are under contract to supply the output of their plant under specified time limits, etc., they must know definitely that this fuel supply is going to be continuous.

Therefore, to offset their inability to obtain a definite, assured, continuous supply of natural gas, they must provide standby equipment, either by storage of fuel oil or arrange for a quick transfer to powdered coal, or some other type of fuel which can be injected into the same furnace which is designed to operate on natural gas.

So natural gas, which is sold by this company on an interruptible basis to these industries, is not in a position to compete on a straight B. t. u. basis, unless the natural gas should have, because of its characteristics, some superior value to that particular industry. In boiler plants and furnaces of that type gas does not possess such superior qualities as to demand a premium, or such a premium as to offset these other features which tend to detract from its value.

Again, the industry is subject to fluctuating economic conditions, and even though it were possible for the pipeline to offer a continuous non-interruptible supply, the industry would not be willing, and never is willing, to contract with the pipeline upon a firm basis of take or pay; and obviously, they are only interested in taking that part of their requirements which serves to meet their needs.

421 An industry must be free temporarily to suspend, curtail or completely shut down its plant if the prod-

uct it is manufacturing is not in demand, due to recessions, or whatever the conditions may be. If it is necessary for them to suspend, curtail or completely discontinue operations, naturally they are not interested in the supply of gas.

This gas moving through the pipelines cannot be stored. There is no practical means of storing natural gas. It moves in a continuous stream from the wells through the gathering systems to the compressor stations and through the pipelines to the burners of the industry consuming it. This fluctuating demand, regulated only by the desire and demand of the industry, has to be met by the pipeline standing by as a shock absorber to meet those fluctuating requirements.

Therefore, the earnings derived by a pipeline, such as Natural Gas Pipeline Company, from the sale of natural gas are not uniform. In 1938 we experienced a decline in the sale of natural gas for industrial purposes as compared with 1937, a decline or decrease of over $700,000. It was unanticipated. There was no way of forecasting that the industries would not consume as much or more in 1938 than they did in 1937.

So this represents one of the fluctuating sources of revenue which a pipeline is unable to anticipate, and yet it must be prepared at all times to meet the requirements of that industry through the drilling of wells and the maintenance of service in its pipeline; otherwise, the value of its fuel would be even less than under the conditions which I have already outlined.

Questions by the Examiner.

As to whether we lost industrial customers or whether our industrial customers simply took less gas, in 1938 the loss in revenue was attributable largely to reduced consumption. There were some few industries which suspended operations, or may have gone to some other fuel; but for the most part it was, in 1938, the result of reduced operations, lessening consumption.

The point you have raised, however, is an important one. These contracts with industrial consumers, because of the fluctuating nature of their requirements, are really optional contracts. We can't ask them to take or pay, or to pay a demand charge if they fail to take, because, after all, the gas has to meet these other competitions. If it has some superior utilization value which will enable you to demand a premium for it, then in some few industries you might get that industry to pay a demand charge; and it may suspend and only pay the demand charge and not pay the commodity charge if they are unable to take gas due to industrial conditions forcing them to shut their plant down. Under those conditions they might continue to pay the demand charge; but that is not the usual thing. So an industry, in buying natural gas, in effect buys upon an option.

Here is another thing that influences the volume of gas sold by the pipeline company to that industry. 422 Seldom, if ever, will they contract for their total fuel requirements. There is practically no way of depriving them of the privilege or right to use some other fuel such as oil or powdered coal in their plant, if, due to the change in the market price of these competing fuels, they can get another fuel at a lower price. We cannot insist upon the exclusive use of our fuel, because we are not in a position to supply their firm total requirements. That forces us to permit them the flexibility of bringing in other fuels, not only as a standby, but in the event of a lower price to take these other fuels in lieu of gas.

So the pipeline is more or less of a shock absorber, and must do the best it can in deriving revenue from the sale of industrial gas on a strictly interruptible basis.

As to the average relative importance of our industrial sales against the total business of the company, industrial sales in 1937 were roughly three million seven out of a total gross of approximately fifteen million dollars. In 1938 the total revenue to the pipeline company decreased approximately $1,300,000, and of that amount over $700,000 was attributable to loss of revenue from the sale of industrial gas.

Cross-Examination Interposed by Mr. Booth.

When I speak of the sales of gas to industrial consumers I am referring to the separate contracts which the Chicago District or Natural Gas Pipeline Company has with industrial consumers, and not the sales that the Peoples Gas Light & Coke Company or the Public Service or Western United may have. To make that a little more clear, I would like to explain that under the base contract of July 25, 1931, with the Chicago District Pipeline Company, the supply of gas is sold for domestic use primarily. That amounts to a quantity for the domestic use of 120,000,000 cubic feet per day. The distributing companies receiving this supply of gas from the Chicago District Pipeline Company are privileged to sell it in turn to such shops or industries as are known in the trade as commercial customers. They may be restaurants, barber shops, beauty parlors, bakeries, hotels for hot water heating in the summer time, and other selected small consumers who are really different than a domestic consumer but of such a commercial character that they can afford to pay rates approximating the domestic rates. They do not fall in the category of the class which I have chosen to call, and the industry thinks of, as industrial consumers.

The term industrial consumer as I am using it here refers to such companies as the steel companies, power plants, and such plants as American Can, Libby, Owens & Ford, Owens-Illinois Glass, and industries of that type, which are not known in the trade as commercial consumers.

Direct Examination Resumed by Mr. Morgan.

The Peoples and the other distributing utilities ordinarily take the gas and supply the gas which they buy for industrial consumers through the Chicago District
423 Pipeline Company, or if farther down the pipeline, directly buy from our pipeline company; but the quantity of gas that they take from us for that purpose is dependent upon what the industry wants and what the industry being supplied requires. We are just omitting the routine of the Chicago District Pipeline Company, which in turn distributes to the three distributors, and going to the industry because industry constitutes the ultimate demand for gas. When they do not require it, those who directly supply it do not require it of us.

I would like to amplify that in order that my prior statement may be perfectly clear. When I have commented upon sales to industrial consumers, I intend that my remarks should refer to pipeline sales of Natural Gas Pipeline Company to Chicago District Pipeline Company under special contracts for resale by either the Chicago District or the distributing companies direct to the industrial consumers.

There are a few instances where the Natural Gas Pipeline Company sells direct to industrial consumers. In Illinois we have one customer, the New Jersey Zinc Company. In Iowa we have one consumer that comes to my mind which we term an industrial consumer, which is a sand drying plant. So when I have spoken of sales to industrial consumers, my comments are intended to refer to the Natural Gas Pipeline Company's special contracts with the Chicago District or other utilities for resale to the industrial consumers. My remarks would also apply to those few industrial consumers to whom we sell direct.

Speaking of this fluctuating demand, on June 10 the Division of Department Reports at the State Capitol at Springfield reported that sales to industrial consumers under interruptible service rates in the State during 1938 decreased 18% under 1937. I only mention that figure as being indicative of the condition which I have described as one which applied to Natural Gas Pipeline Company in 1938, and to show that that condition was not peculiar to our own situation.

Questions by the Examiner.

The 18% refers to the sale of natural gas to industrial consumers served on an interruptible supply basis in Illinois in 1938 by our company and other companies. Our company's sales would undoubtedly be included in there. Our company's sales would include the utilities which distribute our gas, and I presume that the term "and other companies" would mean other main transmission pipeline companies which also come into the State and make industrial sales. I have no way of knowing the extent to which this bureau has included sales by other pipeline companies; but since this report was issued by the State, covering state-wide activities, I naturally assume that it would include them all.

Cross-Examination Interposed by Mr. Slaff.

The date of that report was June 10, 1939. It was just the bulletin which was issued by this department for release to the press. No special point is made of it, ex-
424 cept to show that the trend of industrial conditions in
1938, as shown by this bulletin for the statewide conditions, was not different from those which we experienced.

Direct Examination Resumed by Mr. Morgan.

During the year 1937 our interruptible sales were $3,785,000. The corresponding figure for 1938 was, roughly, $3,069,000, a difference of something over $700,000.

There is one other factor in the offing which may have a very material effect upon the revenues of this pipeline company as derived from the sale of industrial gas, and that is the result of a bill which has been introduced in Congress upon the recommendation of the President following a report to the President by a specially appointed committee. The bill, which is known as Senate Bill 19, recommends the creation of a natural resource board to formulate plans for conservation of natural resources. It is the recommendation of this committee and the intent of this bill that natural gas should be replaced by coal and lower forms of fuel. It is an emergency defense measure. I mean as industrial fuel. The passage or enactment of such legislation would, for the duration of the period deemed advisable by the committee or department charged with the enforcement of such an act, naturally have a very detrimental effect by lessening the revenue of the pipeline company from its sale of industrial gas.

Question by the Examiner.

As to what the report stated as the basis for such recommendation, I think it was more a conservation measure than anything else.

(Mr. Morgan here commented that Senate Bill 19 does not apply merely to gas but applies to all the natural resources devoted to fuel and power, namely, coal, oil, natural gas and water power, and the underlying ostensible object was to control the use of those fuels, requiring the use of the lower order of fuels and reserving the higher order of fuels and power resources for more important uses; that it is probably related to the agitation going on in Congress and many of the legislatures to require and bring about conditions that would require the use of coal for industrial purposes, on the ground that the use of other fuels might be affecting labor conditions in the coal mines, or railroad revenues for transporting coal, and things of that sort.)

Direct Examination Resumed by Mr. Morgan.

There is one other factor that has an important bearing upon the use of natural gas by these industries, and that is in addition to the economic conditions or those factors which may influence generally one or more industries; that is, that although you may have a depressed condition in the automotive industry, nevertheless it does not necessarily follow that all other industries will be depressed during that particular time. In the same way we may have a vast over-production of crude oil at a time when other industries are prospering, and we will experience very severe depression or depressed set of conditions in the oil industry, with the result that the crude oil and fuel oil prices may recede to very, very low levels. When this situation arises it naturally has its effect upon natural gas.

425 I do not mean to imply that if crude oil today were cut to 40 cents per barrel in the field that we would immediately feel the influence of that reduction in price of crude oil and the resultant effect on fuel oil in our industrial markets; but it does have its influence and those industries which are equipped to burn fuel oil do take advantage of such opportunities when the swings in prices come.

In looking back over the fluctuating prices of fuel oil, we see some wide swings from 1929 to 1939 in the midcontinent field price of crude oil. Taking the entire average for light, heavy and all grades of crude oil in the midcontenint field—and these are public posted prices—the average price in 1929 was $1.36; in 1930 it was $1.22; and in 1931 it dropped to 60 cents, less than 50% of the field price in 1929. In 1932 it came back up to 84 cents. in 1933 it dropped to 62 cents. In 1934 it came back to $1.00. It was $1.00 in 1935; $1.10 in 1936; $1.21 in 1937; and $1.17 in 1938. Looking back to 1931, although the average was 60 cents a barrel for the year, a low price was reached in June and July. In June the price per barrel of crude oil was 33 cents, and in July 27 cents. In May, 1933, it reached a low of 28 cents. These prices are indicative of the swings which influence competitive values of fuel oil.

Another thing I would like to make clear in order that the statement may not appear exaggerated is that the price of fuel oil does not always bear the same fixed relation to the price of crude oil. You may have periods when the fuel oil, after removing the gasoline, kerosene, lubricating oil, and other derivatives, may still sell for almost the same as the crude oil; but as a usual thing, when you have an over-production of crude oil which depresses the market price of crude oil, it only naturally follows that your price of fuel oil also recedes, because it becomes a drug on the market. You cannot have an over-production of crude oil for very long without having your market flooded with cheap fuel oil.

As to whether we are confronted with any immediate situation of that character at this time, we have such a situation here in the near vicinity of Chicago, Southern Illinois, and over in Central Michigan. We have seen the central and southern Illinois crude oil fields increase their production in a period of two years from almost nothing, until today the production in that field exceeds 225,000 barrels per day. The market price has receded and the quoted price, unless it has changed within recent days and has not come to my attention, today is $1.15 per barrel; but this posted price is not the price at which that oil is moving in most cases. In many cases the price as what the producer can obtain if he is not provided with a pipeline. Much oil is actually selling today in that field for 30 cents per barrel, although the posted price represents the market price posted by the larger companies.

That crude oil is moving in big quantities into these Chicago refineries, and that cheap crude oil when refined will result in vast quantities of fuel oil, which, naturally, will seek its markets near at hand. Under present refining methods, 225,000 barrels of crude oil would probably result in 100,000 barrels of fuel oil.

426 The contracts which I have termed contracts for interruptible sales give the consumer the absolute right to decline to take any gas on certain days, and likewise leave us the liberty, when we need the capacity for our domestic requirements, to decline to deliver them any gas.

The contracts between Natural Gas Pipeline Company and Chicago District Pipeline Company, and the contracts in turn with the industries, are what I would term more nearly desire contracts, and by desire I mean that there is no obligation upon the Pipeline Company to deliver any of the capacity of its line or such reduced capacity as it may have in the event of a break or lessened ability to deliver if the Pipeline Company elects to serve that gas to the domestic consumers, or for any other reason desires to reduce the delivery to the industrial consumer, it is privileged to do so. The industry in turn has the same flexibility.

If the Pipeline Company were in position to offer firm, uninterruptible service, it naturally could demand more for its gas and insist upon the industry's entering into some firmer type of contract; but our inability to render that service of necessity leaves the industry even greater flexibility because they do not need to take our gas. They can go to other fuels. They can just tune up to the crude oil burner that week or that month.

Questions by the Examiner.

I think I would say that this 225,000 barrels coming in from southern or central Illinois is presently a serious situation, and the extent to which that production may ultimately go is quite unknown. I would not attempt to state the number of wells that are today being drilled and the new fields which are being explored through wildcat development. Wildcat is a term that is used for wells that are drilled remote from production, where they are attempting to determine or locate new fields. The volume of the oil being produced, however, is having such an influence upon the price structure throughout the entire United States that it is viewed by the industry with alarm, and attempts have been made by the major companies to influence legislation in Springfield to bring about conservation or to prorate the production so as to hold back this flush production, which is apt to be wastefully utilized.

To date the legislature in Springfield has not seen fit to pass conservation laws or to try to prorate the production of the State, and, if it is admissible, I would like to state that the expression of Lieutenant Governor Stelle has been to the effect that the State of Illinois has not heretofore enjoyed the revenue and prosperity from oil field production in large quantities, and it was his feeling that if there was an over-production of crude oil, some of the States older in terms of oil production should be the ones to retard their production materially and not ask that the State of Illinois hold back its fresh flush fields; that

Illinois is behind in its opportunity to produce and
427 enjoy the revenues, and that he was not favorable to
the passage of legislation which would restrict the
output of these fields. So to date there has been no legislation passed to curb the production of fields or to circumscribe the amount of drilling which is being done.

I think my statement might have been misleading to some extent. I do not wish to imply that the 225,000 barrels is all moving into the Chicago district. It isn't. Many of these refineries in Chicago, however, which were formerly operating upon crude oil transported from distant fields in Oklahoma, Kansas and Texas, are now curtailing their takes from those fields and obtaining their requirements from the nearby local fields, and the amount of this oil which is moving into the Chicago district, by which I mean Chicago and the refineries around Indiana Harbor and the Gary basin, from these Illinois pools I do not know, and I doubt if it is a determinable quantity. I happen to know enough of the operation of some of these refineries to know that is taking place; but the amount of it I do not know. It is only natural, however, that these refineries would avail themselves of the cheap crude and the lessened transportation cost to get it into their plants, if possible.

Direct Examination Resumed by Mr. Morgan.

The fifth risk or hazard which we have confronting us, namely, the possibility of discovering gas fields nearer to our market and the results should such possibilities materialize, was touched upon rather briefly yesterday, and it seems to me to follow quite logically our discussion of these Illinois pools.

A pipeline transporting natural gas from the Texas Panhandle field, a distance of 950 miles, must of necessity underwrite the risks which it assumes when it transports gas those distances, the risks against local gas fields being discovered in closer proximity to the markets.

It is quite obvious that if gas fields of any size were to be opened up in these southern Illinois oil pools, where so much drilling and wildcat development is taking place in the exploration for oil, naturally, the Chicago market would be attractive. If gas should come into these markets, then the only thing that Natural Gas Pipeline Company could do would be to meet that destructive competition from these local companies, with lesser pipeline investment, transportation and operating expenses or suffer the loss of its business. In either event, it would mean virtual destruction of the pipeline.

We have a similar situation in central Michigan; but, fortunately for Natural Gas Pipeline Company, neither of those fields to date has produced any appreciable amount of natural gas.

There is a small gas field opened in southern Illinois; but to date it has not been sufficient to attract attention or 428 cause a pipeline to be built out of the field except to nearby local markets. There is not sufficient gas to justify a big pipeline out of the field; but experience has shown that where there are large accumulations of oil, there are very frequently large accumulations of gas. It has happened in our Texas Panhandle field, and it has happened in practically all fields in the midcontinent that where oil has been discovered, gas has been found in formations nearby. There may not be any gas discovered in that field. However, some deep tests are being drilled and there is a possibility that gas in appreciable quantities may be discovered, if not in the present Illinois field, in the Michigan field, or perhaps in others.

There is what is termed in the industry a big land leasing play now taking place in the Forest City basin. It is a large geological basin extending from near St. Joe, Missouri, north to Omaha, Nebraska, and in that big geological basin the major companies are leasing in all directions, taking oil and gas leases. To date no development has taken place; but the fact that the major oil companies are interested in that play indicates that it is not a geological or land-selling promotion. They think enough of it that they are putting real money in there and buying leases.

That area may not produce any oil, it may not produce any gas, and yet it is one of those potential hazards with which the pipeline is confronted, and which means the virtual destruction of the pipeline if a big field comes in. It simply means the gas from those fields is going to seek these markets.

(Map entitled "Rand McNally, Loose Leaf Outline Map, United States" with certain gas fields, namely, the Texas Panhandle field, the Illinois field, and the Michigan field, pointed out and lines drawn showing the distances from those fields to Chicago, marked Exhibit 84 for identification.)

In response to a statement by Mr. Booth in which he took exception to my statement that if natural gas were produced in large quantities in the Illinois pool it would result in the destruction of Natural Gas Pipeline Company, and his statement that the record clearly shows we have a long term contract with Chicago District Pipeline Company which is guaranteed by Peoples Gas Light & Coke Company, and that under the Illinois Act and the Natural Gas Act no new line can be constructed without the consent of either the State or the Federal regulatory authorities, I would like to offer this observation:

In the first place, there is no prohibition against pipelines moving into the Indiana territory and serving Indiana industries with gas which were originally served with gas by Natural Gas Pipeline Company. That is outside the jurisdiction of the Illinois Commerce Commission, but it would fall under the jurisdiction of the Natural Gas Act, being interstate. On the other hand, those industries in Illinois utilizing gas from this pipeline could derive gas from an intrastate line which would fall outside the jurisdiction of the Natural Gas Act. It would be under the jurisdiction of the Illinois Commission, and we would hope to derive the protection of the Illinois Commerce Commission.

429 On the other hand, if any part of the revenue from this industrial sale of gas is lost to this pipeline, the pipeline cannot survive upon that guaranteed base load contract of July 25, 1931. The revenue provided by that contract does not enable this company to live. It must have its industrial revenue. The guarantee in that contract is for only a part of our consumption. We have a contract of guarantee on these other industrial contracts; but they are very short term contracts, the most of which expire December 31 of this year, and some of which are being currently extended. Any time the industries concerned under those contracts cut off our gas and bought cheaper gas, there would be nothing to guarantee. The contracts in which those guarantees are contained are in evidence.

Exhibit 84 shows the location of the oil fields in Michigan. There is one little gas field right on the edge, near the Indiana state line; but this map was not intended to do more than show the comparative distances from Chicago to these oil pools as compared with the Texas Panhandle field.

Contrary to the statement just made, gas is being produced and transported from both the Illinois and Michigan fields —not to Chicago, but to other markets. The statement was made that none is being transported from those fields. Gas in appreciable quantities is being transported from the Michigan field and some is being transported from the Illinois field.

(EXHIBIT NO. 84 for identification, offered and received in evidence over the objections of counsel for each of the two commissions, to whom the Examiner granted exceptions.)

I have noted as additional risks or uncertainties the increased capital expenditures and the increased operation or maintenance expenses or costs in the future. Those are more or less related topics, and I think I can cover them together.

I touched briefly yesterday upon the obligation which financial sponsors of such a pipeline as the Natural Gas Pipeline Company underwrite when they make their original expenditure. The original capital expenditure of necessity must take into account certain hazards and risks, some of which are known and some of which are unknown; but once that expenditure has been made, whether gas is able to compete successfully with other fuels or not is perhaps beside the question, because if that pipeline is still to operate and it loses certain markets which it has for some years enjoyed, it may have to spend additional sums of money to seek other markets to avoid the abandonment of its investment before it has been amortized.

Of necessity, even though its operations are successful, it must continue putting in new money each year, and new money in increased quantities each year.

To start with the pipeline does not have a full load. Over a period of years it is successful in developing its markets and does attain the full load. During a certain period of time its drilling operations and expenditures for gathering lines are comparatively low, because of the high open flow and rock pressure in the field, and it takes less wells to meet its requirements; but as the rock pressures decline it 430 is necessary for the pipeline to drill an increasing number of wells each year to supply the required open flow. Each of those wells must be connected through extensions to the gathering system. Meters, regulators, drips, and facilities of this type are all necessary each time a well is drilled.

In addition to the capital expenditure for providing for the requirements of gas, the pipeline is confronted from time to time with additional capital expenditures to safeguard its earnings and the service it is attempting to render to its customers. Each year this company has found it necessary to lay additional loop lines to strengthen its lines through places which its experience has shown to be unusually dangerous, or to reinforce its river crossings, or to add additional facilities in and around the compressor stations as standby equipment, when experience has shown that the dependability or the amount of equipment available is not consistent with the load it is carrying or is not in proper balance, and these new facilities from time to time, as the conditions develop, call for the expenditure of added sums of money.

I touched briefly yesterday upon our housing program. The amount of money is not perhaps big in terms of millions; but each year this company is finding it necessary to spend sums of money approximating forty to fifty thousand dollars for the providing of housing facilities. That expenditure will not be constant nor will it be continuous every year for the next ten years; but it is an expenditure which has not yet been completed and which must be taken care of. We hope in the next few years we will have completed that program.

I have already said something about field compressor stations. As the pressures decline in the field it will be necessary to install field booster stations to boost this gas to the initial station located at Fritch. The type of station is not important, so far as this discussion is concerned; but it will perhaps be impressive for me to tell you that the program contemplates the installing of a compressor at each and every well in the field before this project is abandoned.

We have made careful engineering studies to try to determine the economics of centrally located field stations, ten, fifteen, or twenty miles apart, as against the installation of automatically remote controlled individual compressors at each well. That is what our program now contemplates, and that program is being started.

Questions by the Examiner.

A part of the research and experimental work which this company has undertaken has been designing those compressors, and one unit is successfully operating on our system in the field today. The pressure of that well is down to just a little over 200 pounds.

Cross-Examination Interposed by Mr. Slaff.

The intake pressure of those field compressors will
431 vary as the pressure goes down. From time to time
we will find it necessary to change the cylinders or cylinder sizes or to put in additional capacity.

Direct Examination Resumed by Mr. Morgan.

Answering your question as to what intake pressure those field compressors have been designed for, it will have to fluctuate or change as the field pressures go down.

That, as I says, is not important; but I think it does impressively reflect the extent to which these expenditures are going to have to be made from here on throughout, practically until the day this project is abandoned.

With reference to increased operating expenses and maintenance, when you consider the installation of these field compresor stations, although it is intended that they will be operated by remote control or are virtually automatic, nevertheless there will be maintenance. There will be a certain amount of operation necessary in connection with the units. We will probably provide for a roving field supervisor in certain districts to supervise a certain number of wells and compressors and attend to lubricating, oiling, and the checking of the bearings and water connections, for all those things will require some attendance.

These compressors will be operated on gas fuel, but that will be an added expense to the operation. Those are items which have not yet appeared upon our books. They are items of expense with which this company is denfinitely confronted and definitely committed if it is to go on through to the end of the economic life of the field.

We have other factors involving increased labor and maintenance expense as a result of corrosion and deterioration of the pipeline itself. Inspection of the pipeline today reveals the pipeline to be in remarkably good condition. There is some pitting, and there is some corrosion. We do not view it with any alarm today, and yet the coating on the pipe, which we think was well applied and there was probably none better obtainable at that time, is nevertheless showing signs of deterioration, and it is our considered judgment that some of those corrosive areas, which are termed by the industry as hot spots, will so affect the strength of the pipe as to make it necessary for the company to operate at materially reduced pressures, and decrease its volume and its revenue from the sale of gas, or to loop those portions of the line or replace the pipe itself.

In the replacement of pipe in a pipeline which is continually operating and serving 210 million cubic feet each day, the line cannot be taken out of service for long intervals to replace joints of corroded pipe, and the program of installing sections of new lines, while that will involve certain interruptions, nevertheless will be the cheapest way of maintaining the line in service in order that it may carry these volumes of gas and maintain potential earnings. This
is accomplished by the looping of those portions of the
432 line which become so weakened by corrosion that it is
unsafe to carry these prevailing pressures.

The well casings out in the field will become a problem as the wells age, but I think one which, as we view it, will depend more upon the pressures at which the wells are abandoned. Once the casing in a well becomes so badly corroded that top water from the upper formations is leaking in and drowing out the gas, salt formations or salt crystals are formed, and it is a good deal like creeping paralysis. The water is filling these formations and depositing these crystals, and before you are hardly aware of it your well has been destroyed; and while in some instances it is possible to wash the well with fresh water and bring it back and a new casing can be installed, as a usual thing that well whose casing has reached that corroded condition is a well that is ready for abandonment. So that, I would say, becomes more nearly a problem involving the economic abandonment pressure of the field than one of increased maintenance, although there will be cases where recasing the well will be justified.

We will have to have special equipment to provide for blowing the water out of these wells. That will be either a capital expenditure or an increased maintenance item. As these wells develop water, whether it be from the lower formations or from above, it is the customary practice in the gas fields to install what is termed a liner or tubing. It is a string of pipe of smaller diameter than the casing, which excludes or holds out the formations through which the well has been drilled, and that tubing, being smaller in diameter, offers a means of lightening the column of water so that the reduced gas pressures can lift it and blow it from the well through an unloading device, as they term it. You can lighten the column of water and blow the water from the well with this reduced gas pressure. As the pressure goes down and water intrudes on the formations, there is the probability that not 50% of the wells and not 60% of the wells, but probably 90% of the wells, will have to be either lined or tubed to take care of the water condition.

These are all expenditures. Whether capital or maintenance, they represent an outlay of cash which must come out of the earnings of this pipeline and be recouped, if possible, by the date of its abandonment.

I think I could summarize this item of increased maintenance of the pipeline system best by comparing it with an automobile, a piece of machinery with which we are all familiar. During the early life of an automobile it operates smoothly and needs very little care. The maintenance costs are low; and yet as that automobile is operated over a period of years, just as these engines and compressors are operated, and will be, the wear and tear calls for an increased amount of maintenance, an increased number of repair parts, and an increased number of men to take care of that maintenance. So we are operating this automobile of ours in that stage where it is commencing to take a lot of care to keep it running. Our maintenance costs are going up, but we have not yet by any means reached that point in the life of this project where we are going to suffer the greatest maintenance to keep it operating.

I have caused studies to be prepared, and they will 433 be produced here for the record and for the consideration of the Examiner, of the additional costs in capital investment and maintenance and operating costs which we now feel certain will have to be encountered. These studies have not been completed; but they will be ready, we hope, for presentation at the next session of our hearing, and in that connection I would like to offer this observation: The studies which we are preparing represent studies which are being brought down to date. They represent the best judgment of the engineers, operating men, and executives of this company, predicated upon our knowledge and experience, not only gained from several years' operation of this project, but experience in the operation of other gas fields and pipelines of shorter length and lower pressures. We have here a different set of conditions to deal with.

These studies, which are being brought down to date, are predicated upon our earlier studies before the Natural Gas Act was passed and before there was any thought that these pipelines would be subject to regulation. We wanted to know ourselves what we were headed for and the amount of money we were going to have to expend, not only upon capital expenditures, but also the extent to which our earnings would of necessity be depleted through increased operation and maintenance. Those studies represent our best judgment and will be in such shape that I hope they will be illuminating upon the points which I have tried to make clear here this morning.

Naturally, we cannot be certain that those figures which will be brought in here cover all the additional expenditures we will make; but we have tried to include those items only which we felt we could safely predict as representing the occurrences which would take place. There are many items which we can visualize may happen, and there is a probability that they may; but if the likelihood is remote we have not included those items. We have tried to include only those which we feel represent a reasonable degree of certainty that they cannot be avoided.

Commenting briefly on the remaining hazards, namely, inflation, taxation, increasing regulatory expense, and the item of pipeline failures, I think I will not take time to more than mention the topic of inflation, since that was covered by Dr. Palyi. The point from a management point of view that disturbs us regarding the possible influence of inflation is the fact that our contracts are based upon fixed sales prices—at least our domestic gas—for long periods of time, and the influence of inflation upon the labor and maintenance items could be so effective as almost to destroy completely our earnings before any relief could be obtained through regulatory proceedings. It is a factor which tends to increase until something disastrous happens, and it seems from history never to decrease. There is a lag prior to the time when a company can show that its earnings are so impaired that it is entitled to relief, and that is a factor which worries the management of this company considerably.

The question of taxation is speculative as to how far increased taxation is going to go and the influence it may have upon the earnings of this company. We only know that since starting the operation of this company we have been confronted with new and increased forms of taxation which have had the effect of increasing the tax pay-
434 ments of all kinds by this company from a sum of $300,000 per year, approximately, in 1932 to a payment of over $1,000,000 a year. The difference, $700,000, may not appear large, but it is an appreciable part of the entire gross earnings of this company.

I would not attempt to go into detail, but I think that we will ask our tax counsel or secretary to furnish details regarding the increase which has taken place in the amount of state income tax, which was non-existent in 1930 and 1929, excess profits tax, capital stock tax, unemployment and old age benefits, sales tax, etc.

There is one very serious tax which looms up every year, and that is the increased production tax in Texas. The present production tax amounts to three per cent of the field value of the gas at the mouth of the well. The total sum of money is not large. I think Texoma's production tax does not at the present time exceed $60,000 a year; but efforts have been made every session, special and regular, of the Texas Legislature to increase that tax from 100% to 1000%, and only by the most vigorous fight has that tax been held down.

In Illinois we have even a worse condition. Since this pipeline entered the State of Illinois it has never been free from attempts, and I say punitive attempts, at taxation. The coal people have sponsored each attempt of the legislature to place destructive legislation on natural gas, and that would affect not only Natural Gas Pipeline Company but the other natural gas companies entering the state.

At the first special session of the 58th General Assembly of 1933, Senator Baker introduced Senate Bill No. 10, proposing a tax of 25 cents per thousand cubic feet on all natural gas sold in Illinois. Our boiler fuel gas sold for industrial purposes grosses this company ten and one-half cents; so obviously it would completely destroy the sale of all gas for boiler fuel. I think I might as well say that that tax would have completely destroyed the sale of every foot of natural gas in the state for industrial use.

Cross-Examination Interposed by Mr. Slaff.

That bill was introduced in 1933, the 58th General Assembly. It was defeated and was not enacted into law. Almost every session of the Illinois legislature has made attempts, and a similar bill did pass the Senate. No law has been enacted; but every legislature has attempted to enact, so the threat is still there. (Motion by Commission Counsel to strike testimony with reference to Bill introduced by Senator Baker denied.)

Direct Examination Resumed by Mr. Morgan.

In the third special session of the same General Assembly, Senate Bill 39 proposed a tax of 15 cents. In the regular session of the 59th General Assembly of 1935, Senate Bill 184 by Baker proposed a tax of 10 cents. Senate Bill 272 by Monroe proposed a tax of five cents per thousand cubic feet. Even the passage of a five cent tax on natural gas, which cuts revenue from boiler fuel virtually in two, would completely destroy that revenue and the sale of gas for that purpose.

435 Senate Bill 272 was proposed in 1935. In that same session House Bill 223, by Koehler and Powell, proposed a tax of 10 cents. House Bill 693, by Stewart, and another, House Bill 740, by Lewis, proposed a tax of five cents each.

In the second special session of the same General Assembly House Bill 60 by Koehler and Powell proposed a tax of 10 cents.

In the regular session of the 60th General Assembly in 1937 Senate Bill 30, by Monroe, and Senate Bill 129, by Tuttle, each proposed a tax of five cents. House Bill 65 by Powell likewise proposed a tax of five cents per thousand. Senate Bill 39, which was introduced in 1933, to which I referred, is the one which I mentioned which passed the Senate and failed to pass the House.

In this session of the legislature two bills have been pending, each of which are five cent gas tax bills. Neither has passed; but the fact that they have not passed does not give us any assurance or confidence that the renewal of these attempts in future sessions, with the influence of the coal miners and coal operators, will not result disastrously upon the revenue derived from the sale of industrial gas.

Cross-Examination Interposed by Mr. Booth.

I cannot state approximately the total amount of taxes which Natural Gas Pipeline Company has paid to the State of Illinois since entering the state. I would not say that it is a very nominal figure. The data can be obtained.

Questions by the Examiner.

Senate Bill 30, by Monroe, in 1937 and Senate Bill 129, by Tuttle, each proposed a tax of five cents. The two bills that were pending in this 1939 session are still resting in the committee, and it is our judgment and our hope that nothing will be done with those. The tax there proposed is five cents.

I would like to observe, however, that the amount of taxes paid by the Natural Gas Pipeline Company to the State of Illinois bears no relation to the loss of earnings which this company would suffer if a punitive charge were imposed upon the sale of natural gas for either industrial or domestic purposes. I say there is no relationship existing between the two.

Cross-Examination Interposed by Mr. Slaff.

I said our taxes increased from approximately $305,000
in 1932 to approximately $1,100,000 in 1938. I haven't the
figures before me, but I will accept your word that our
436 gross earnings from operations have increased from
$5,857,000 in 1932 to $14,374,000 in 1938. You ask me
if it is not correct that, comparing the year 1938 with the
year 1937, we had a reduction in our gross earnings from
operations of approximately seven to eight per cent, and a
reduction in taxes paid of approximately twenty per cent.
I would not attempt to say without taking more time. I
will say for the purpose of trying to answer your question,
without agreeing or disagreeing with your final conclusion,
that I will accept that as correct.

Direct Examination Resumed by Mr. Morgan.

The reason taxation has been raised as a topic worthy of consideration in this proceeding is that our taxes are constantly increasing, and there is no indication that the ceiling has been reached. The trend, however, is in the other direction with the pipeline's earnings. The capacity of the pipeline has been reached. There is every evidence, every indication that the expenses of the company aside from taxes are on the increase. So, if the gross earnings of the company are not subject to material increase, and expenses are on the increase, then obviously such a factor influencing the earnings of the company as taxation, which is continuing to mount, is an item which the management views with concern.

The next item is that of increased regulatory expense. This is an item of expense confronting the company. Hearings of this nature are necessarily items of expense which have not been contemplated, and the frequency with which they may recur in the future is a factor beyond the control of the company, and it is not possible for the management even to estimate the amount of that future expense or the frequency with which they may be called upon to defend rates and earnings.

Under the Natural Gas Act as passed, any consumer, any municipality, large or small, may subject the company to the same expensive type of hearing as the complaint brought by the Illinois Commerce Commission. So it is an item of expense with which the company will in the future be confronted.

There are other types of regulatory expense which we must not overlook but which are difficult to anticipate or estimate. One of them involves the relation of the company with its employees and the relation of the management with the National Labor Relations Board and the Andrews Administration of the Wage and Hour Act. To date we haven't had any difficulty or disturbance with our employees. So far as we know, we hope at least, they are contented and happy. We feel that our salaries are not out of line. We may not be paying the highest, but certainly we are not paying the lowest. But even today labor organizers are attempting to organize the force of the Panhandle Eastern Pipeline and have announced their intention of starting on the employees of Texoma and Natural Gas Pipeline Company as soon as they complete their work with the Panhandle Eastern.

They may or may not succeed; but it is not the intention of the company to contest their efforts. The employees
437 have the right to speak for themselves. But as to the outcome, as to increased wages, or what the company may find itself involved in as a result of a decision of the

N. L. R. B. is an item we are not able to anticipate but which must be taken into account.

We have one other item, and this last item to which I refer is a hazard from which we have suffered, and it is one from which we may suffer with increased frequency as the equipment in this line deteriorates through wear and tear or corrosion, and that is the failures of the pipeline and the explosion, burning or loss of compressor stations. We are dealing at high pressure with a highly inflammable and explosive material. On July 4, 1936, as a result of the bursting of a defective joint of pipe in Iowa, which was followed by fire, the company was placed to considerable expense and some loss of revenue in making repairs to the main line.

Again, in February of 1938 the main line failed at approximately 85 miles west of Joliet in Illinois. This failure was due to high water, and caused curtailed deliveries to these interruptible industries for a period of over two weeks before the line was restored to full operation. It resulted in a loss of revenue and expense of making repairs in a total amount of $248,875.

Again, on August 20, 1938, the line failed in central Iowa from causes unknown; but after conferring with the experts of General Electric, Westinghouse, American Telephone, and numerous electrical authorities, it was the cross section of opinion that the explosion might have been caused from lightning. We are not clear on what caused the explosion, but the pipe was not defective. The pipe failed in the steel, but it did not fail in a weld or in a coupling. The grain structure of the metal gave every indication that the steel was in perfect condition, and the conclusion was reached that it probably was lightning.

Mention is made of these failures to show the different types and causes which may result in the company's being placed to extraordinary expense and loss of revenue from reduced sales of gas.

We are confronted with this same serious hazard at each of the 31 rivers which are crossed. They represent potential hazards from which the company will never be free.

Whether the line fails in a flood valley, whether it fails in a river, whether it fails on high, dry ground, there is that possibility that the loss of revenue before service can be resumed may be a very appreciable amount of the company's annual earnings. As to how frequently these breaks may occur, we only hope that they may never happen; but they will be a potential hazard.

Our compressor stations, operating as they are at high pressures, with a yard full of valves, fittings, welded connections, always offer a potential fire hazard. There seems to be a phenomenon which exists but which has never been fully confirmed, and that is the sudden releasing of nat-
438 ural gas under certain temparture conditions at high pressures results in a flashing or fire following an explosion. It has not been confirmed, but it almost always happens. In fact, I know of no instance where a high pressure gas line has failed without fire following the explosion. Low pressure lines sometimes do.

If on the discharge side of our compressor station, where the highest pressure exists at any point on the line, an explosion should take place as a result of the crystallization of the manifold piping from the vibration that is set up, or as a result of a defective valve or fitting, the tremendous quantity of gas which is being poured into the station would cause a fire which would burn that station down in spite of everything that could possibly be done.

The company has spent considerable money in an attempt to invent or devise automatic main line valves to automatically shut off the main line, instead of the manually controlled valves which take at the best, with the men on the ground, twenty to thirty minutes to shut that gas fully off. Such a device would also reduce the hazards to our employees.

The company has spent a considerable amount of time with Crane, Walworth, and the Merco Valve Company in devising some sort of valve which can be closed instantly by pushing a button, or closed by a sudden drop in pressure, trying to find some way of protecting our stations against the hazard of fire which would probably mean the crippling of the pipeline and its service for a period, not of thirty days or sixty days, but at least six months, before we could get the line back in service again.

Our concern over the possibility of fire and explosion at our stations is not a passing fancy. I am sure Mr. Claude Brown, with his experience in natural gas fields and the knowledge of what it means to operate at these pressures, will not minimize what I have said about these hazards.

(Series of photographs entitled "Photographs of Scenes at Pipeline Break Near Sheffield, Illinois, February, 1938", marked Exhibit No. 85 for identification.)

Exhibit 85 consists of a series of photographs, numbered consecutively from 1 to 10, portraying activities and views at the scene of a pipeline break near Sheffield, Illinois, in February, 1938. That is the break which I said put us on partial inability to deliver for a period of about two weeks.

(EXHIBIT NO. 85 for identification, offered and received in evidence without objection.)

Cross-Examination by Mr. Booth.

I do not recall saying anything about a committee representing each of the interested companies working out a contract with Chicago District Pipeline Company. I did not say that the drafting of the agreement was referred to Mr. Gallagher. I said that the price was determined by that set of representatives: Mitchell, Gallagher and Caster. There was no formal committee which worked out the details of this project as well as the contract with the Chicago District. There was a committee, the membership of
which varied from time to time, who did sit and con-
439 sider the feasibility of the project and reviewed the
comments and recommendations of the engineers as a
result of their study and estimates; but that committee was not a committee that functioned without change. At times all of the participants sat with the committee. At other times all members of the committee were not present. It was purely the formation of a body to try to keep the negotiations moving, and the committee drafting the contract involved a group of additional men.

Mr. Mitchell represented the Chicago interest, or the Chicago District. Mr. Rudd was with him at times; but I don't know upon whom he relied as formally representing him. I met with Mr. Mitchell representing the Chicago companies. I did not meet with Mr. Insull. I think Mr. Doherty met with Mr. Insull even before I reached New York in 1929. Mr. Doherty and Mr. Insull were very good friends, and I am not sure but that each time Mr. Doherty came to Chicago he called on Mr. Insull, and each time Mr. Insull came to New York he called on Mr. Doherty. They were both heads of two big utility companies, and as such were very good friends.

Mr. Caster represented the Cities Service, and Mr. Gallagher represented the Standard of New Jersey. There were other men representing the other interested companies, but they varied. For instance, take the Phillips

Petroleum Company. At times Frank Phillips, the president of the company, was there.. At other times Mr. Clyde Alexander, vice president in charge of operations, would be there; and at other times W. H. Davis, another vice president; and another time John Kane, executive vice president. It was the same with Skelly Oil Company. Mr. Skelly would be there at times, and at other times he designated the vice president, Mr. Herndon..

I do not recall who the early officers of the company were in addition to myself. There was only one active officer of the company, and by active I mean executive. We had assistant secretries and treasurers and so forth. Mr. H. O. Caster was president of the company; but in that capacity he was not serving as an active officer: I was serving as the active head of the company. Mr. W. A. Jones is president of Natural Gas Pipeline Company today.

Mr. Caster was elected president at the time the company was formed. Subject to confirmation I am willing to try to name the directors at that time from memory. As I recall, they were Caster, Frueauff, representing Cities Service; Christy Payne, Standard of New Jersey; Gallagher may have been or may not but I think he was; Judge Ames of the Texas Company, now deceased, and Judge Caster is also deceased; Reid L. Carr, Columbian Carbon; George Mitchell, Chicago District Pipeline Company; W. G. Rudd, Chicago District. My recollection is that we had eight directors at that time. Jones filled the vacancy created by the death of Caster, and my recollection is that either Colonel Harry T. Klein or Mr. O'Garrio of the Texas Company filled the vacancy caused by the death of Judge Ames.

The board must have approved the entire project and
investment which was required for the building of a
440 line, although I don't recall that any formal action was
taken. Obviously, six or eight companies would not
get together and start, without agreeing. I don't recall that there was any formal agreement at that time. They did execute contracts with the Chicago District Pipeline Company. They formed a company in which all of these participating companies had an interest, and when this company was formed through the participation of these various interested companies, officers were elected and contracts were signed, and authority delegated to the active officers to construct and build a pipeline.

Mr. Gallagher was manager of one of the gas properties of the Standard of New Jersey—the East Ohio Gas Company, in Cleveland. I think he was president of it. He spent some time in working with us and the other members in working out the details of this project; but I would not say he spent any more time than any others in the group.

Cross-Examination by Mr. Slaff.

I testified that in 1926, after making studies at Mr. Doherty's request as to the feasibility of building a pipeline from the Texas Panhandle to Chicago, or to the northeast, with Chicago as a terminus, I arrived at a conclusion and reported that conclusion to Mr. Doherty. I don't believe that report was ever typed. Our conclusion, and by "our" I mean the staff of engineers whose efforts I was directing, left us no doubt, and we were so convinced of our position in the matter that we did not have to go very far to recommend against the project at that time. My recollection is that when we advised Mr. Doherty that we were ready to report our conclusion, my superior, Mr. Straight, general manager of the Empire Gas & Fuel Company, and I were called to New York by Mr. Doherty to discuss the project. Mr. Doherty was and is a very keen engineer, and he wanted to sit down and discuss the engineering principles. He was more concerned with the principles involved than the figures as to what the operations might show.

I couldn't say for sure, but my recollection is that the subject was disposed of orally and not by a written report. During the interim between now and the next hearing I will determine to my satisfaction whether an oral report or a written report was given at that time.

In that connection we made underlying studies to determine whether or not the project seemed feasible. Naturally, we had to analyze the potentialities of the field and try to estimate the cost of pipe, the laying of the line, and so forth: We didn't just carry those figures and conclusions around in our heads; but Mr. Doherty was not interested in those details.

I don't know that those studies of ours leading up to our ultimate conclusion were reduced to writing and in tabular, typewritten form. If they were, I don't know that they are available today. The study had served its purpose when the project was condemned, and we had no further use for those figures. Those figures were obsolete in six months, so were the figures on the cost of laying the 441 pipe, and also the pipe quotations. In fact, I will say in much less time than that. They were of no value in three months after the study was made. Conditions were changing too rapidly, both as to price of material and conditions in the field. I will be glad to determine between now and the next hearing whether the underlying studies were made and reduced to writing and whether they are available.

At the time it was finally decided in 1930 to go ahead with the project, we made reports, but very few were typed. In our negotiations and our studies to determine the feasibility of the project under a given or assumed set of conditions, I had with me in New York our staff of engineers; but those studies were made from day to day and explained to the interested executives of these companies who later took a participation in the project. Almost as rapidly as one set of figures was reviewed, somebody in the group would suggest compiling figures to see how the results would look under a different set of conditions. In most instances the figures were brought in and explained from penciled work sheets, purely for the purpose of explaining the results to these interested executives who were trying to determine whether they were interested in putting money into this project.

In June, 1930, we transferred our activities from New York to offices which were opened in Kansas City. These were the construction offices of the Continental Construction Corporation, and in these offices we kept our construction files and reports and such preliminary papers as had been retained from the work in New York. When we got ready to leave Kansas City on July 1, 1931, the line was nearing completion, and these studies and files had all served their purpose. When we moved from Kansas City everything except the skeleton records on the construction of the line was disposed of. We even disposed of the pencil figures bearing upon the preliminry studies. They were of no value to us. The decision had been made to build the line, and the pipeline was built, or nearing completion. We did retain specifications, contracts, bills of material, purchase requisitions, vouchers, and those details which would be needed as a permanent record to show the cost of the line and expenditures under classified accounts. We have those records.

I did not say that no formal report was made about

May, 1930, with respect to the feasibility of such a line. One may have been made. If it was, I haven't a copy of it. I will try to determine whether such a report was made. I don't know right now where I would find out. I know I haven't one in my files. I will be glad to ascertain whether such a written report was made. If you know of such a report it would help me in locating one if I knew the date of it. I will also determine whether any of the underlying studies are available.

Redirect Examination by Mr. Morgan.

Without knowing the exact number, but knowing that I am not exaggerating, I would say that there were in excess of one hundred of those preliminary studies made by our engineering corps and given to these executives. Whenever any single study came in before these executives there were at least half a dozen suggestions made as to trying something else, such as let's see how this will look if
442 you are operating at 600 instead of 800; what will the line cost if you use 3/8 instead of 11/32 pipe; how much additional steel will be required, etc. There were some members who thought that we were using too light steel, that we were putting too much stress on the steel with these pressures. We made studies at 300, 400, 450 and up to 800 pounds, and even studies of 1000 pounds pressure. These studies took every possible turn and form before the final recommendation was made.

I doubt if there is a record in anybody's files as to whether it was definitely determined whether this line was going to operate at 500 pounds, 600 pounds, or 700 pounds, but it was designed for a maximum of 800 pounds. That is what we decided it would be. Those studies took every possible turn and form, trying to see what the most economical operation would be.

Cross-Examination by Mr. Booth.

I am not sure that I can state that I testified before any regulatory body regarding this project, except the Railroad Commission of Texas by affidavit. I have mentioned that because of its being initiated by a regulatory body; but it was in court as the result of an order issued by the Texas Railroad Commission.

I did not testify in the Chicago District litigation, either by affidavit or in any other form. I did not testify in the Chicago District Pipeline litigation before the Illinois Commerce Commission or the Federal Court. I did present a statement before the Committee on Interstate and Foreign Commerce in connection with the Natural Gas Act some time ago.

(EXHIBIT NO. 55 for identification, offered and received in evidence without objection, subject to the qualification that counsel, relying upon any part of the exhibit, must refer to that part and explain its pertinency.)

Counsel for defendants, in accordance with the Examiner's qualification relating to Exhibit No. 55, referred to the following portions of said exhibit and called the particular attention of the Examiner thereto.

The first page to which I wish to call attention is the fifth sheet in this report, including the caption page, and over a few pages further there is a page with the following caption at the top: "Coltexo Gasoline Corporation, July, 1932." It is just a few pages past the fifth page.

443 I wish to call particular attention to lines 5 and 6 from the lower horizontal line clear across the page near the top, "Shamrock Oil and Gas Company, Lincoln-Saunders, Well No. 5, potential—" and I am sure the Examiner understands what that means; it is the capacity of the well to produce—"ten; allowable, ten; water, 800." That means 800 barrels of water and 10 barrels of oil; total fluid, 810. Daily gas production, 256,000. Ratio G/F—that means gas-fluid ratio rather than gas-oil ratio; they add the water in with the oil, if I may be permitted to explain.

The next line shows Well No. 3 of the Panhandle Refining Company, with a potential of 40 barrels, an allowable of 40 barrels of oil, 1,000 barrels of water, and a production of gas of 1,755,000 cubic feet.

On the next page I will call attention to the fourth line from the bottom under the classification "One million and above, Gulf Production Company, Saunders No. 1; potential, 1 barrel; allowable, 1 barrel; no water; total fluid, 1 barrel; daily gas production, 1,503,000 cubic feet," and the gas-fluid ratio, the same as the total production.

A few pages over there is another page, "Empire Oil and Refining Company, July, 1932," the second line from the bottom, under the classification 17,500 to 20,000. Magnolia Petroleum Company Well No. 4, potential 93; allowable, 93; water, 800; total fluid, 893; total production of gas, 17,606,000 cubic feet, and a gas-fluid ratio of 19,715.

A few pages over, "Forest E. Gilmore Company of Texas, Pampa Plant, July, 1932," fourth line from the bottom, under the classification "One million and above," operators, R. & P. Company, Vaniman Well No. 1; potential, 1 barrel; allowable, 1 barrel; no water; total fluid, 1 barrel; daily gas production, 3,997,000 cubic feet; gas-fluid ratio, the same number.

Nine pages further over, another page captioned, "National Supply Company, Shamrock Plant, July, 1932," under the classification 70,000 to 80,000, Gibson Oil Corporation, Bentley No. 4; potential, one barrel; allowable, one barrel; water, 20 barrels; total fluid, 21 barrels; daily gas production, 1,605,000 cubic feet; gas-fluid ratio, 76,428.

The second page over from that, captioned "Pacific-American Gasoline Corporation," the eighth line from the bottom, under the classification "One million and above," J. M. Huber Petroleum Company, Dumas 1; potential, 1 barrel; oil allowable, 1 barrel; no water; total fluid, 1 barrel; daily gas production, 8,631,000; and the same gas-oil ratio.

Now, it must be twelve pages over there is another caption, "Skelly Oil Company, Panhandle Plant," and in parentheses, "4", July, 1932. I read from the line immediately above the second horizontal line from the bottom, under the classification, "One million and above," Empire Oil and Refining, Weatherly No. 6; potential, one-half barrel; allowable, one-half barrel; water, one barrel; total fluid, one and a half; daily gas production, 1,528,000; gas-fluid ratio, 1,018,666.

It must be twenty-one pages over, I call attention to
another page, "Standish Oil Company, July, 1932." It is
a group of figures beginning three lines from the bot-
444 tom and continuing through that block of figures, under
the caption, "One million and above," Gulf Production, Johnson No. 14; potential, 1 barrel; allowable, 1 barrel; no water; total fluid, 1 barrel; daily gas production, 5,381,000; and the same gas fluid ratio, which, of course, means gas-oil ratio in this case.

Phillips Petroleum Company, B. Daves No. 1; potential, one barrel; allowable, one barrel; no water; fluid, total, one barrel; gas production, 3,885,000, and the same gas-fluid ratio.

Phillips Petroleum Company B. Daves No. 2; potential, one barrel; allowable, one barrel; total fluid, one barrel; daily gas production, 1,337,000, and the same gas-fluid ratio.

Phillips-Prairie, Johnson "A" No. 69; potential, one barrel; allowable, one barrel; no water; total fluid, one barrel; daily gas production, 5,015,000 cubic feet, and the same gas-fluid ratio.

I think there is one other, over some ten pages further on, under the caption, "Standish Oil Company, Rock Creek, 1932, page 3." It is the group of figures above the lowest horizontal line, under the caption, "One million and above;" Derby Oil Company, Keaton No. 2; potential, 2 barrels; allowable, 2 barrels; no water; daily gas production, 6,437,000 cubic feet; gas-fluid ratio, 3,218,500 cubic feet.

Derby Oil, Keaton No. 4; potential, 2 barrels; allowable, 2 barrels; total fluid, 2 barrels; daily gas production, 3,309,000; gas-fluid ratio, 1,654,500.

Hudson Drilling Company, Johnson No. 1; potential, one barrel; allowable, one barrel; no water; total fluid, one barrel; daily gas production, 4,489,000; gas-fluid ratio, the same.

Mark Fenston, Peterson No. 1; potential, one barrel; allowable, one; water, one; total fluid, two; daily gas production, 4,252,000; gas-fluid ratio, 2,126,000.

Phillips Petroleum Company, Gowland No. 1; potential, two barrels; allowable, two barrels; no water; total fluid, two; daily gas production, 4,516,000; gas-fluid ratio, 2,258,000.)

445 J. G. DICKINSON, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(June 30, 1939.)

My name is J. G. Dickinson. I live in Amarillo, Texas. I have lived there since 1931, and I also lived there one year in 1926. Since August, 1930, I have been general superintendent of gas production of Texoma Natural Gas Company.

I received a degree of Bachelor of Science in electrical engineering at the University of Alabama in 1917, and immediately after leaving the university I was employed by the Toledo Railway & Light Company on constructive work, and in the latter part of 1917 I enlisted in the army during the war. While in the army I received technical training at the Massachusetts Institute of Technology, in aviation work. After the training I was transferred to Carruthers Field in Fort Worth, Texas, where I had charge of the maintenance and repair of approximately 75 planes. I stayed in the army until the early part of 1919, when I was employed by the Empire Gas & Fuel Company, at Bartlesville, Oklahoma, and remained in the service of that company until August, 1930, when I went to the Continental Construction Corporation and later to Texoma.

In 1919 I first went to work for Empire Gas & Fuel Company in their central office, and later was transferred to Eldorado, Kansas, where I worked on the first large scale adaptation of electricity to oil field operations, and during that period I supervised the drilling of the first oil well in the midcontinent field to be drilled by electricity.

I remained in the Kansas field until 1923, when I was transferred to the central office in Bartlesville, where I did engineering work for the manager of oil production, and during the same year was made division superintendent of oil production for northern Oklahoma. In 1924 I was made superintendent of oil production for eastern Kansas. In 1925 I became superintendent of oil production for north Texas.

In 1926 I was made superintendent of oil production for the Texas Panhandle, and I opened a division office for Empire Gas & Fuel Company in Amarillo, Texas, in 1926, in which office we had geological, land, lease and production activities. At that time I remained in Amarillo one year.

I then went to Eldorado, Kansas, where I became superintendent of production for the State of Kansas. During this assignment we had the operation and maintenance of approximately 60 gas wells in addition to oil field operations.

446 During the interval between 1926 and 1930 I followed the development in the Texas Panhandle very closely. The Panhandle field was quite active in its development and I followed the history of that development very closely.

When I first went with the Continental Construction

Corporation in July, 1930, I lived in Kansas City, Missouri. I remained there until August, 1931, when I went to Amarillo and opened an office for Texoma. We established production, geological, land and lease activities to be administered from Amarillo. I have been in charge of that office for Texoma and have administered the duties of those departments since I went there in 1931.

When I first went with Continental Construction Corporation, predecessor of Texoma, I organized the land and lease, geological and production departments, and with Mr. Peterson made a study of the gas reserves in the Texas Panhandle field. At that time I informed myself concerning the situation in that field as to whether or not the lands were under oil and gas leases. Practically all the field was leased up when I went to Amarillo.

I am acquainted with Exhibit 80. That exhibit shows in red the lands that were covered by oil and gas leases as of August, 1930. The heavy black line represents the Texas Railroad Commission's boundary as of 1937. Some of those leases were taken as early as 1919 or 1920; but the principal amount of leasing took place in 1926, or about the time active oil development started.

I am familiar with oil and gas leases and how they are kept alive. An ordinary oil and gas lease conveys title to the oil and gas in the land described in the lease usually for five or ten years. Those leases provide that they shall continue in full force and effect for a period of five years, ten years, or some term of years, and as long thereafter as oil or gas is produced in paying quantities, or in some instances as long as oil or gas is produced. They also contain a provision that they will terminate at the end of a given period, usually one year, sometimes six months, unless a well be commenced in the meantime or a rental of a certain amount be paid on or before the expiration of that period.

Most of the leases outside of the oil fields and outside of a few localities where gas wells had been drilled were kept alive between the period when they were executed and August, 1930, by the payment of rentals. The usual rental payments are $1.00 per acre per year. Probably 90% of the leases in the field carry that provision.

The number of leases, some of which were entirely outside the field, ~~which were being~~ carried on a rental basis as late as August 1, 1930, is accounted for to some extent by the fact that the boundary of the field was not definitely known at that time. There was considerable lack of information as to the extent of the field then.

It is the usual practice of oil and gas companies and others who are in the oil and gas business, when a discovery of oil in large quantities is made, such as was
447 developed in the Panhandle in 1926, to try to buy
some acreage close to the well, for which they usually had to pay a high price, and in addition they usually bought spreads of acreage. By spreads of acreage I mean acreage located in different tracts, separated from the well by as much as four to six miles. The reason for this is that definite information concerning the extent of the discovery is not available to the operators, and the operators like to protect themselves with acreage in the vicinity.

As late as 1930 there was so much uncertainty about the field that those who had oil and gas leases, or were dealing in oil and gas leases, did not know every time when they were in the field. There was considerable uncertainty as to the potentialities of certain areas in the field. We had cases where large wells were close to small wells; and very little drilling had been done in Moore County at that time.

It was known in 1930 that there was sour gas and also sour oil in that field. It was generally known that sour gas prevailed in southern Hutchinson County and northeastern Carson County, and that part of Gray County west of Pampa, close to the north line of the field; but it was not known how far down in Carson, Gray and Hutchinson Counties that sour gas extended. The sour gas was known to be in the oil field area, and that is about as much as we knew at that time. There is no visible barrier on the top of the ground which separates the sour gas from the sweet gas areas in that field, nor is there any barrier below the ground which separates them. As a matter of fact, the formations that produce sour gas in parts of the field produce sweet gas in other parts. In other words, the same formation, beginning on the lower or northeast flank of the field and extending up structure toward the granite ridge which we have heard mentioned in this hearing, will bear sour gas to a certain point, and then the gas will become sweet in that same formation.

In 1930 we did not know where that line which divided sour and sweet gas was located. We did know that wells to the north produced sour gas and that wells toward the south end of the field produced sweet gas. In some cases we had sulphur tests of the wells that produced sour gas, and we did have some idea from that as to where the dividing line was. We had to interpolate between wells. In some cases it would be eight to ten miles between them; but with the aid of the sulphur tests and the knowledge that some gas was sweet, we did make an effort to locate that sour gas line.

That rather tentative location of that line did not apply to the full length of the field. At that time no sour gas was reported in Moore County. One or two wells had been drilled, but they had been reported as sweet gas wells. As far as we knew, the whole of Moore County was in the sweet gas area.

I had something to do with the assembling of blocks of acreage which were afterwards acquired by Texoma, and with appraising them, not in terms of dollars but for prospective production. We made a study of the acreage situation, and we received from various acreage holders their statements of their oil and gas leases, and we made a study of the acreage held in the field by all the owners in the field.

448 There was practically no acreage at that time which was not under lease. The owners of the oil and gas rights at that time were principally the oil companies operating in the field. Some of the oil companies operating in the field and which had large blocks of acreage productive of gas were the Humble Oil & Refining Company, Gulf Production Company, Texas Company, Phillips Petroleum Company, Skelly Oil Company, Shamrock Oil & Gas Company, Canadian River Gas Company, Red River Gas Company, Empire Gas & Fuel Company, Columbian Carbon Company, Magnolia Petroleum Company, Piney Oil & Gas Company. There was also a large number of independent operators, such as Cree & Hoover and Wilcox Oil & Gas Company. I don't recall the others at this time.

I referred to the Gulf Production Company acreage. It did not own that acreage in 1930. It had been purchased at that time by the Chicago utilities. As to the acreage owned by Canadian River and Red River Gas

Companies and the Cities Service Company, the gas rights had been acquired by those companies and the acreage had been dedicated for gas pipeline use. They were not for sale to another pipeline. The blocks of acreage which were avalable for purchase to put behind this project were principally those held by the oil companies.

We considered all the larger blocks of acreage in connection with this project. We paid particular attention to the large blocks of acreage because we felt it necessary to provide the pipeline with adequate reserves. We also felt, after making a study of the situation, that it was going to be necessary to acquire practically all the large blocks that were available, and some of the other acreage in addition. We thought that was necessary because, after making a study of the field, we felt we should acquire reserves, and we were conscious that the oil operations were going to bring about an enormous production of gas in particular parts of the field, and we not only felt that we needed large amounts of acreage, but we felt that we needed to have it distributed rather widely over the field.

We needed to have it scattered over the field because we had seen that several areas in the field after the development of oil were producing enormous quantities of gas, and a great deal of it would be wasted to the air. Since oil could be produced on a flank of the structure, we felt that other oil areas would be opened up in the field, and we did not know to what extent gas withdrawals would be concentrated in this particular area.

There had already been substantial oil production in the Borger area. There had also been a few wells drilled in northeastern Carson County. There was an area south of Pampa in Gray County which had developed oil. One oil well had been drilled in central Gray County near the north line. One or two oil wells had been drilled in the northwestern parts of Wheeler County. One well had been drilled across the river in Hutchinson County; and a small area had been developed on the Burnett estate in Carson County. There was then a continuing exploration by the drilling of wells, and we expected that this exploration would probably develop other similar situations.

449 The thing which caused us to think about the oil fields in connection with acquiring reserves was that

in the early days it was the custom of the operators to let those wells blow, if they produced gas, for days and days, in the hope that they would blow into oil wells. There were some wells drilled near the oil-gas contact line which, after blowing for some period, started to produce oil. In general, there was an utter disregard for the value of the gas on the part of the oil operators. This practice had resulted in the development of low pressure areas in the oil area, and it was obvious that the waste of gas was going to cause drainage into the oil field areas from the gas areas. I am familiar with the subsequent history of that field, and our fears along that line were well founded.

There are now forty oil pools in the field, and those oil pools have uniformly resulted in the formation of low pressure areas, with the exception of the dolomite area, which is outside of the gas area. Those developments have caused waste of gas, with the exception of the dolomite wells. The dolomite area is along the northeast flank of the field and is outside of the area that produces gas.

Texoma acquired acreage from the Magnolia Petroleum Company on April 12, 1930. It also acquired acreage from the Texas Company, the Phillips Petroleum Company, Skelly Oil Company and Piney Oil & Gas Company. We acquired the Gulf Production acreage from the Chicago utilities, and acreage from the Cities Service Company.

The Piney Oil & Gas Company was a subsidiary of the Columbian Carbon Company. The Delmar Oil Company is a subsidiary of the Indian Territory Illuminating Oil Company, which is a subsidiary of Cities Service.

Texoma acquired approximately 316,000 acres. The effective date of the transfer of this acreage to Texoma was August 1, 1931, but the settlement for the leases was made as soon thereafter as it was practical, and by August 21, 1931.

Exhibit 81, styled "Leases Owned by Texoma Natural Gas Company in Texas Panhandle Gas Field, August 1, 1931," was prepared in our office at Amarillo. The date August 1 was used instead of August 21 because the effective date of the transfer was August 1, 1931. The assignments bore that date. After that there was the question of the delivery of the assignments and the payment of the moneys, but the leases were ours from August 1, 1931.

Title was taken August 1, and settlement and the exchange of necessary papers was made subsequent to that, as of August 21, but the title relates back to August 1, 1931.

(EXHIBIT 81 for identification, offered and received in evidence without objection.)

In these transfers in August, 1931, Texoma acquired 1,009 leases. Under the terms of those leases 1,009 wells, including those already drilled, would have been required to keep those leases in force. It was not my thought, as general superintendent of production in charge of Texoma's acreage down there, that all of those 1,009 wells
450 would be drilled and developed to produce natural
gas. We were certain at the time the leases were acquired that we would not drill them all; but it was necessary to acquire a great deal of acreage that we knew we would not keep in order to get the acreage that we wanted to keep. We did not know at that time what we wanted to keep and what we did not want to keep. In the first place, we did not know the extent of the field. We did not know very much about what areas would be most productive of gas. We did not know the extent of the oil field operations with its continuing waste of gas, and we did not know definitely the location of the sour gas line.

That is not an unusual difficulty confronting a pipeline company or an oil company in acquiring acreage in a developing field. It is a usual difficulty. When an oil company goes out to drill prospective locations, it is customary for them to take a spread of acreage, or a heavy block of acreage covering more than they know or have any idea will definitely be productive.

I will illustrate that this way: although they may have geological information concerning the value of a particular area, when they get down 2500 or 3000 feet in the ground the same conditions may not prevail there as prevail on the surface, and it is customary to take acreage in spreads with the idea that they will only eventually keep the good part of it.

It would not have been possible at the time I went to Amarillo, or at the time I became superintendent of production, to have gone through the Panhandle field and picked out 150,000 acres of land that could be bought and which we were certain would be productive of gas. We could not have bought 150,000 acres and picked it out that would have been as productive of sweet gas as the acreage Texoma has now, because we did not know enough about it. You couldn't have bought it in that manner anyway. We bought all we could, and then we, with selectivity, kept the best part of it, and we now have the 150,000 acres, so it is obvious that we couldn't have done it with less acreage than we started out with.

What we were interested in was acquiring a gas reserve, and we were conscious at the time we went into the field that it was going to be necessary to select out of the acreage that we did acquire that part of it which would be suitable for supplying the needs of the pipeline. In different portions of the field some wells had been completed with initial open-flows of as much as 100,000,000 cubic feet per day. There had been a number of dry holes drilled in the field, and quite a few wells with two or three million cubic foot capacity.

We would have liked to pick out the acreage close to the 100,000,000 cubic foot wells and to have kept as far away from the two and three million cubic foot wells as we could in buying the 150,000 acres. As a matter of fact, we did try to select acreage that we wanted, but we found that we were not able to buy the best part of the acreage because the companies would not sell it that way.

Another thing is that those leases in the better areas might be held by quite a number of companies; but
451 probably the principal reason was that we didn't know where those areas were at that time. Some of the acreage we thought at that time was going to be among the best has turned out to be not so good, and several areas that we did not think much of have turned out to be very prolific.

We could not have traded with the Magnolia, for instance, on the basis of picking out what we thought was the best acreage they had and buying it for $50.00 or $40.00 an acre. They demanded $2,000,000 for their acreage. They were willing for us to take what we wanted of it, but that is what it would cost. We would have all of it for that or just a part of it for that.

That was not an unusual situation to find in the field at that time among those who had large blocks of acreage to sell. The oil companies were not willing to sell their choice acreage and have left on their hands the other part. When they sold gas acreage in the field, they sold all of it.

As to how we intended to handle the 1,009 tracts of land which were embraced within the 1,009 leases we first acquired to determine which we would keep and which we would surrender, we drilled wells on some of it ourselves. There were already 69 wells on this acreage, and we purchased them when we bought the acreage. We drilled some wells ourselves. Subsequent drilling by others has also given us information on which we base our acreage policy.

We started out to improve the situation so far as drilling obligations were concerned by trading or consolidating our acreage into desirable blocks. We knew in the beginning that we were not going to drill all of the 1,009 leases; but since most of the leases which we acquired were term leases, that is, they would expire in periods of from one to ten years, we knew that unless we made some consolidations of leases we would be confronted with an excessive drilling program early in the life of the project when those wells would not be needed.

So we made efforts to combine the leases which we acquired from various oil companies into large units, which we termed consolidations. Those consolidated agreements provided that one well would be adequate development for a large tract of land and that offsetting wells would not be required. We were able to make agreements of this kind because we prorated our gas production on the basis of the open flow of the wells and the acreage upon which the wells were located. By making consolidation agreements of this character, we were able to defer a considerable amount of drilling until the wells were required for the pipeline to supply its daily needs.

In making these consolidation agreements we acquired new acreage by purchase or by the drilling of wells, and we traded acreage in the sour gas area for acreage in the sweet gas area. We not only made consolidation agreements on the land of a single land owner, but we made agreements covering the lands of several land owners, apportioning the royalty in proportion to the land which they held and the open flow of the wells which might be drilled on the unit.

452 Instead of having to drill a minimum of a thousand wells, we now have 163 wells. We don't know how many wells we are going to have to drill; but I am sure it will not be half as many as the 1,009 we would have been required to drill.

On Exhibit 81 the tracts colored in pink or red represent the leases in the Panhandle field acquired by Texoma as of August 1, 1931. Other leases had been discarded by Texoma after the commitments were made and before title passed. After the commitments were made some developments indicated that some of the acreage might be outside the proven area or in the sour gas area, and prior to our actually taking title we recommended the surrender of some acreage to keep from paying rental and to keep from having the expense of putting it on our books and then having to let it go.

Several reasons entered into the surrender of acreage from time to time. Some of it was in an area which was non-productive. Some was located in an area of low rock pressure. Some acreage was too far from the pipeline, consideration being given to the potentialities of the area which was deemed to be too far away to be practical to connect to the line. Some of it was released on account of lease expirations. Some was released to avoid offsetting drilling requirements. Some was released because the acreage was in small tracts which we did not consider economical for drilling units.

In cases where we could, we consolidated those small tracts and made large ones out of them. In a good many instances we were not able to consolidate them.

Taking into account all of the acreage which we released, that which we received in exchange and that which we conveyed away in exchange, and the new purchases from time to time, Texoma owned and retained as of January 1, 1939, approximately 154,000 acres. That acreage is located along Texoma's gathering system and generally in what we consider the best part of the field, consideration being given to open flow and rock pressure. Approximately 316,000 acres are portrayed on Exhibit 81. In other words, we retained approximately half of the acreage which we acquired.

Exhibit 68 is a map of the Texas Panhandle field on which has been colored in red the acreage owned by Texoma as of January 1, 1939. This map was prepared in our Amarillo office under my direction, and correctly represents as to its location the acreage Texoma owned as of that date. All of that acreage is under lease to Texoma and Natural Gas Pipeline Company, and out of that 154,000 acres approximately 100,000 acres is covered by consolidation agreements.

There are 360 acres colored on that map on which Texoma does not own the gas rights but owns only the oil rights. This is because of two oil and gas leases which we acquired in trades or purchase and on which we traded the gas rights for other gas rights better located with respect to our 453 other acreage, and retained the oil rights. One of those tracts is located in southeastern Moore County, being the southeast 1/4 of Section 34, Block 6-T, containing 160 acres. The other 200 acres is located in Section 145, Block B-2, H. & G. N. Survey, in Gray County. Texoma now owns the gas rights on 154,155 acres, less 360 acres.

The responsibility of culling over and ferreting out those tracts of land which are less desirable for the uses of the pipeline, and recommending the surrender of those tracts, has been mine. I have followed the details of that work of selecting and rejecting acreage from that originally acquired throughout the history of this company.

If we had retained all of the 1009 leases which we originally acquired, and drilled wells on each of them, we would not have been able to produce any more gas from the Panhandle field down to date than we have produced and carried away to market through our pipeline. If we had wells on all of those leases now, we would not be able to produce and market over the future life of the field any more gas than we will be able to market from the wells which we propose to drill on the acreage which we have retained.

My statement that we can produce and market as much gas from the 154,000 acres as we could have from twice that number of acres is based on the fact that the amount of gas which Texoma will market is going to be determined by the life of the Panhandle field as a whole. By that I mean that Texoma will reach the same point, where it becomes economically necessary for it to abandon its operations and leave the field, by taking its gas from its retained acreage as from taking it over the acreage which it first acquired, and it will do that at a great deal less expense.

By reducing the number of acres retained we have eliminated the payment of rentals, taxes, expense of drilling a large number of unnecessary wells, and the expense of gathering lines, meters and compressor stations. The drilling of unnecessary wells would involve the laying of unnecessary gathering lines and installing unnecessary meters.

In the early days we had a geological estimate that the average production of gas per acre would be approximately 8,000,000 cubic feet. Mr. Peterson's current estimates approximate 17,000,000 as the original reserve on the present acreage, so that we have about as much gas now as we thought we had when we bought all this acreage.

The Cities Service Gas Company owns approximately 103,900 acres in the Texas Panhandle.

(EXHIBIT 68 for identification, offered and received in evidence without objection.)

Cross-Examination by Mr. Booth.

Before we took title on August 1, 1931, to the acreage in Moore County which had been taken over by the Chicago interests, there had been some indication of sour gas in Moore County. That information was indefinite, but we did know there was some sour gas in Moore County at that time.

454 In the preparation of reports or negotiations leading up to the acquisition of this acreage in the Panhandle by Natural Gas Pipeline Company or Texoma, my part was to advise Mr. Brown concerning our thoughts with reference to the field. I took no other part in the negotiations. I worked for Mr. Brown from August, 1930. At that time the acreage was not primarily of a sour gas character. It is true that some of the acreage acquired from the Chicago interests or the Insull company turned out to be sour; but at the time I was consulting with Mr. Brown about that it appeared that a comparatively small part of it would be sour. My studies in 1930 did not disclose that 50% of it was of a sour gas character. In 1930 we thought about 20% was sour. I don't think more than 35% of it was ever found to be sour.

I don't have the figures in my mind as to how much of that acreage we relinquished. I don't know what Mr. Brown thought in 1930. I think it was my thought at the time that this Gulf acreage that we acquired through the Insull interests was partly sour. The information we had at that time was not definite, however. By the latter part of 1930 we knew that some acreage was outside of the productive area and we knew that some was sour. In considering the purchase of the acreage we were guided principally by the fact that they had a considerable amount of sweet gas acreage. As far as we knew in 1930, before the acreage was turned over, we considered about 20% of it sour at that time.

Redirect Examination by Mr. Morgan.

Sour gas is not outside the range of use by pipelines. It can be treated, and during the early considerations having to do with acreage reserves, we derived some satisfaction out of the thought that if it was necessary we could treat this sour gas and use it. We did not turn it loose until we knew definitely what character of sweet gas land we had. That was done only after we found we had an adequate reserve of sweet gas.

The treatment of sour gas to make it useful for pipeline purposes is chiefly absorbing the hydrogen sulphide elements in an absorbing medium, and the generation of that medium, and using it over and over again. The cost in a central treating plant would be about half a cent a thousand. I know of instances where sour gas is being thus treated and used for ordinary pipeline purposes, where they have no sweet gas available. One instance of that is the gas that goes into El Paso, which is treated in southeastern New Mexico. There are several sulphur treating plants, one operated by the Northern Natural Gas Company in the Otis field, and one by the Cities Service Company near Wichita. In fact, they are rather numerous throughout the country. If the acreage owned by Texoma which turned out to be sweet gas areas had turned out not to have been an adequate reserve of gas, we would undoubtedly have treated the sour gas and used it.

So that the record will show the total quantity of
455 acreage acquired from each of the companies from
which Texoma bought its original block, totalling 316,104.79 acres, I will read the following names of companies
and the acreage acquired from each:

Cities Service Company,	59,388.87	acres
Columbian Carbon Company,	10,687	"
Delmar Oil Company	2,877.90	"
Chicago utilities	82,441.02	"
Magnolia Petroleum Company	50,069.70	"
Phillips Petroleum Company	34,621.34	"
Skelly Oil Company	26,956.50	"
Texas Company	49,062.46	"

Questions by the Examiner.

I do not have with me a tabulation of those eight sources of acreage showing the amount of acreage remaining today from each source. I might say that from the begininng we have handled this acreage proposition as a whole, without consideration as to where it came from, and I do not have in mind what that situation would be.

Redirect Examination by Mr. Morgan Resumed.

We think in terms of our whole holdings, rather than from whom we bought it.

I keep up with the operating problems in connection with the production of gas from Texoma's wells. We have operating complications and troubles in connection with the production from gas wells such as occur in the case of oil wells. We have a similar condition. Shale caving occurs in both oil and gas wells. By that I mean that in drilling the producing formations it is the usual case that shale lenses and shale layers occur between the producing formations. This occurs in the open hole down below the seat of the casing.

The kind of problem that creates is that usually in the operation of a well there is some moisture from the very beginning which is saturated in the gas that drops out immediately upon the release of the pressure. This moisture gets on the sides of the walls of the hole and causes the shale particularly to slough off and drop down into the hole. It has some influence also on the lime in making it drop off. Sometimes these cavings form in a bridge and completely stop the flow of gas. On these occasions it is necessary to move in tools and drill this bridge out. If a bridge does not form and the shale caves and falls in small particles to the bottom of the well, and a considerable portion of your production comes from the bottom of the hole, it will shut that part of the production off, and then we have to clean it out. That requires a drilling machine, or what we call a cleanout machine, which consists of a portable mast and machinery to spool wire lines on, and it requires the services of a man versed in the handling of cleanout jobs, as well as the crew that works on the well.

We have also encountered other operating problems
456 besides these cleaning difficulties. In wells that produce any appreciable amount of salt water, it is neces-

sary to install tubing in order to get this water off of the producing horizon satisfactorily. This tubing restricts the area of flow. The tubing which we use in gas field operations is usually two inch pipe, whereas the diameter of the hole is approximately 8¼ inches. This tubing is run to the bottom of the hole or to the gas pay horizon, and when the well is blown it is blown through the tubing, so that the area of flow is restricted and the bubbles of gas reduce the weight of a column of water to such an extent that it can be blown out with a smaller amount of gas and a smaller pressure than if you were blowing out the water in the big hole. That is a practical and generally used device for the purpose of assisting in the removal of water.

We have, I believe, 26 wells now making water. Not all of those are still on production. We have abandoned eight of them, leaving 18 wells still on production and making water. It is becoming more apparent that water is going to affect the production of gas wells in the future, and that will require increased use of these provisions for removing water as time goes on.

Cross-Examination by Mr. Slaff.

The acreage in central Moore County was acquired from a number of sources: Phillips Petroleum Company, Magnolia, Cities Service and Chicago utilities. Mr. Brown said there were 30,000 acres acquired from Magnolia in that area in Moore County, southeast of Dumas. In addition to the block of 30,000 acres in there, we also acquired considerable acreage from other companies that fitted in around this other block. There is a good deal more than 30,000 acres represented by this central block of acreage.

The solid block of acreage represented on Exhibit 81 in the southeasterly portion of Moore County came principally from Phillips Petroleum Company. Another comparatively solid block of acreage is shown in the northeasterly portion of Carson County. Some of that came from the Chicago utilities, some from Magnolia, some from Skelly, and some from Cities Service Company. I do not know approximately how much came from each.

United Gas Pipeline Company has some acreage in the Texas Panhandle field. I do not know how much, but I think it is a comparatively small amount.

(July 24, 1939)

(Document entitled "Statement of Open Flows and Rock Pressures on Date Wells Were Abandoned, Eldorado and August Fields, Butler County, Kansas. Charles I. Galloup, Witness.", marked Exhibit 86 for identification.

EXHIBIT 86 for identification, offered and received in evidence over the objection of counsel for complainant as being hearsay to whom the Examiner granted an exception. The exhibit was not offered as proof of anything but as in compliance with the request made by counsel for the two commissions to produce the report. Company counsel did not represent its truthfulness.)

457 J. G. DICKINSON, a witness for defendant, recalled, testified as follows:

Direct Examination by Mr. Morgan.

(July 24, 1939.)

In meeting the duties and responsibilities of my position as general superintendent of production for Texoma Natural Gas Company, I have made it my business to keep informed as to the quantity of gas withdrawn from that field and the uses to which that gas is put.. I have done this for several reasons. One is that the withdrawals of gas from the entire field affect the life of the field and this information is vital to Texoma. Another reason is that we have had considerable litigation with the Railroad Commission of Texas which made it necessary for me to keep up with the entire history of the field. A third reason is that information as to withdrawals of gas in the field is necessary in the handling of Texoma's acreage.

The withdrawals of gas at different points in the field affect the pressures in the field, and information as to the pressures is important in consideration of Texoma's development program, and we give considerable importance to our knowledge of withdrawals in determining what leases of Texoma's will be retained and what leases will be surrendered.

I have informed myself concerning the different groups which are withdrawing gas from that field and the requirements of those groups at the present and in prospect. There are nine pipelines with lines 14 inches in diameter or larger which take gas from the Panhandle field. In addition to those nine, there are a number of lines serving local areas in the field.

Others than pipelines are taking gas from the field. Gas is withdrawn from the field for processing in casinghead gasoline plants, some of the residue of which goes to the manufacture of carbon black. Gas is utilized in the drilling of wells for fuel and is blown to the air and wasted in the process of drilling wells.

I have used the expression "casinghead gasoline plants." That is a popular designation in Texas which I think is a misnomer, because those plants process not only casinghead gas but a majority of dry gas. All of the sour gas produced there goes to these plants.

One other sort of gas withdrawal which I have not covered is gas produced from oil wells which are not connected to casinghead gasoline plants. That gas is blown to the air and wasted.

I will name the nine larger pipelines which I mentioned a moment ago.

Texoma Natural Gas Company serves principally the Chicago area and its vicinity.

458 Canadian River Gas Company supplies cities and towns in New Mexico and Colorado. Its principal outlets are Denver, Colorado Springs and Pueblo. When I mention the Canadian River as having those outlets, I mean the system to which it belongs. It delivers gas to Colorado Interstate Pipeline Company, which in turn serves the area I mentioned. Canadian River Gas Company also has a local line which serves the city of Amarillo.

Panhandle Eastern Pipeline Company serves towns and cities in Missouri, Illinois, Indiana, Ohio and Michigan. Its principal outlet is Detroit and vicinity.

Northern Natural Gas Company supplies markets in Nebraska, South Dakota, Iowa and Minnesota. Its principal outlets are Des Moines, St. Paul and Minneapolis and vicinity.

Cities Service Gas Company supplies towns and cities in Oklahoma, Kansas and Missouri. The principal outlets are Wichita, Kansas, and the Kansas City, Missouri, area.

Lone Star Gas Company supplies numerous towns and cities in northern Texas. Its principal outlets are Fort Worth and Dallas.

North Texas Utilities Company supplies an area in north Texas, the principal outlet being Wichita Falls and vicinity.

Consolidated Gas Utilities Corporation, heretofore known as Texas Panhandle Gas Company, supplies towns and cities in Oklahoma and Kansas, the terminus of the line being near Wichita, Kansas.

The South Plains Pipeline Company, sometimes designated as the West Texas Gas Company, supplies a large area in West Texas. The principal towns served are Plainview, Lubbock, Big Springs, San Angelo, and others.

In addition to these nine pipelines, I will enumerate the principal smaller lines I mentioned a while ago. I have already mentioned a local line serving the city of Amarillo. There is a line serving Pampa, Texas; Panhandle, Texas; Borger, and a group of towns in Wheeler County, the principal one being Shamrock, Texas. There is a local line that runs to Stinnett and Spearman, Texas.

Most of these pipelines produce a large proportion of their withdrawals from their own reserves. Some of them purchase some gas. The companies which purchase substantial quantities of gas in that field are the Lone Star Gas Company, North Texas Utilities Company, Panhandle Eastern Pipeline Company, and Northern Natural Gas Company.

The average price at which those pipelines purchase their gas and pay for it at the well or in the field is a little over four cents per thousand cubic feet. Settlement of Texoma's royalty payments is now being made on the basis of four cents per thousand cubic feet, and that basis of payment continues until December 31, 1939, when the price becomes four and one-half cents per thousand cubic feet.

459 The price at which we settle with our royalty owners has not always been four cents down to and including the present year. In the beginning, when Texoma first started operations in the Panhandle field, the field price paid by a number of companies was two cents per thousand cubic feet, and that was the basis of the first royalty settlements of Texoma. This was later changed to three and a half cents. The three and a half cent period covered three years, when the price of four cents was adopted. This rate continued for five years, which ends December 31 of this year. The four and a half cent price which will prevail after December 31, 1939, will continue for a five year period, and this price is recited in Texoma's division orders which it executes with the royalty owners. This is a contractual price fixed between Texoma and its various roy-

alty owners. I don't remember the exact number, but we have several hundred royalty owners down there. At the expiration of five years from January 1, 1940, the price becomes 5¢ per thousand cubic feet, and continues at that price for the remainder of the life of the field.

The reason for stepping up the price from two cents in the beginning, next to three and a half cents, then to four, next to four and a half, and finally to five cents, is because it is generally recognized that as pressures decline in a gas field the cost of producing gas increases. This is due to the necessity of drilling additional wells in order to provide the open flow required, and the additional cost of operating wells at low pressures.

The price paid by those purchasing gas at the well for pipeline uses has progressed along with these royalty schedules. I recently had occasion to make an analysis of prices paid for gas in the field. The average is slightly above four cents, which vindicates our judgment in establishing the four cent price in our royalty division order. It is my judgment that as the pressures go down and the cost of producing gas goes up, the field price of gas will continue to increase, and on that basis we have contracted with our royalty owners to pay them at the increased schedules of prices.

I have made a study and a computation of the past, present and future withdrawals of gas by the different pipeline companies taking gas from that field. With respect to their past production and their present rate of withdrawal, I obtained some information from the companies themselves and additional information was obtained from the records of the Texas Railroad Commission. In determining the probable future withdrawals by the pipeline companies, I have given consideration to the supply of gas available, to the capacity of the pipeline under consideration, and to the markets which are available to these lines.

Taking first Texoma's pipeline, it is our judgment that the withdrawals of Texoma will not be larger than they have been in the past, because Texoma is now operating about at its capacity. There will be some increase of gas withdrawn from the field on account of increased use of fuel by field compressor stations. The capacity of the pipeline is not estimated to change over what it has been for the past three years.

460 By "field compressor stations" I mean what are commonly called booster stations. We have already installed one booster station, and we will install others at the points where they are needed as the pressures in the field decline. That is for the purpose of boosting the gas into the Fritch gasoline plant and on into the main pipeline. In other words, Fritch station does not have the capacity to take gas at low pressures and to boost it to 710 pounds pipeline operating pressure. We will have to maintain a certain level of pressure at Fritch, and this level will be maintained by these field booster stations. The engines driving these field compressors will be fired by gas, which is what I meant by increased use of gas. This additional fuel requirement is the only increased use of gas which we contemplate so far as Texoma is concerned. We estimate that in 1943 Texoma will produce 52,452,326,000 cubic feet of gas, and that the production will continue approximately the same during the period from then on.

The Canadian River Gas Company supplies 25% of Natural Gas Pipeline Company's requirements, and the same conditions will apply to their withdrawals as those discussed concerning Texoma. In 1943 Canadian River will supply 17,229,985,000 cubic feet. That is supplied to the Natural Gas Pipeline Company and is not included in the 52 billion.

I have also made a study concerning the problem of future withdrawals of Canadian River Gas Company outside of those it will supply to Natural Gas Pipeline Company. Canadian River's Denver line and the local line have a combined capacity of 56 billion cubic feet annually. In the past, in 1932, these lines withdrew approximately 15 billion cubic feet. This declined to something over 13 billion cubic feet in 1933, and then gradually increased to more than 23 billion in 1937. In 1938 something over 21 billion was produced, and we estimate that by 1941 something over 23 billion will be produced annually.

(Document entitled "Withdrawals of Gas," marked Exhibit 87 for identification.)

In considering the withdrawals of Canadian River Gas Company, we have estimated no increase in load for the Denver line over its record for the past three years. However, we do estimate a small increase in use by the city of Amarillo, due principally to the continued growth of this town.

Exhibit 87 is now presented to me. The chart shown on the first page shows the withdrawal of gas by years in billions of cubic feet. The solid black line shows the actual withdrawals from 1932 to 1938, and the dotted line shows the estimated withdrawals from that point forward. Also on the chart is a solid black line showing the capacity of the pipeline in billions of cubic feet annually.

The figures along the left side of that chart represent the withdrawals in billions of cubic feet per year at 16.4 pounds pressure base. The figures along the bottom of the chart represent the years, starting in 1932.

My figures were obtained largely from records of the pipeline companies themselves and were supplemented by information from the Texas Railroad Commission, from reports which were filed by these companies as to their actual production. The Railroad Commission records would show, for example, in the year 1937, the actual production by Canadian River Gas Company. It was
461 necessary for us to consult the Railroad Commission
records because some of the records of the pipe line companies in the earlier years were not available, and we had to use both sources of information. They are identical, however.

I have estimated the future load of Canadian River Gas Company in conjunction with the Colorado Interstate Pipeline Company to be only a little over 22 billion cubic feet annually, although it has a capacity to handle 56,575,000,000 cubic feet annually, because the withdrawals of this pipeline are going to be determined by its market, and an analysis of its market situation indicates that there won't be any substantial increase in load because the territory which they serve is very well occupied at the present time and has no particular indication at this time of appreciable growth. So far as their immediate prospects are concerned, I do not believe they will be able to fill that line with gas to those market outlets.

The Colorado Interstate Gas Company is the correct name, not Colorado Interstate Pipeline Company. It is the same company from which Natural Gas Pipeline Company buys one-fourth of its market requirements.

On page 2 of Exhibit 87 are two charts. The first chart, occupying the upper half of the page, portrays the actual and estimated withdrawals of the Lone Star Gas Company. This pipe line serves principally the north Texas area around Fort Worth and Dallas. It has a capacity of 18,250,000,000 cubic feet annually. In 1932 it withdrew a little over seven billion. This declined in 1933 to about six billion, and then increased to eight billion for 1934 and 1935; declined in 1936 to a little over seven billion, and then has shown a gradual increase since that time. We estimate that future withdrawals of the Lone Star will amount to 10,500,000,000 cubic feet annually. This increase in withdrawals will be necessary on account of the growth of the area served by the pipeline. Good labor conditions and favorable fuel conditions have increased the industrial development of this particular area and these towns have grown considerably since 1936.

There has been an uptrend during the last two years, as shown on the chart. This estimated withdrawal is almost eight billion cubic feet annually below the capacity of that line, and it is serving the important cities of Dallas and Fort Worth in northern Texas.

The figures along the left side and bottom of that chart have the same meaning that they do on the chart on page 1; and that is also true of the other charts that have to do with pipelines in the first six pages of this exhibit.

The chart at the bottom of that page shows the actual and estimated withdrawals of West Texas Gas Company. That is the company which delivers gas to a large area in west Texas south of Amarillo. It includes the towns of Plainview, Lubbock, Big Springs and San Angelo. You will notice from the chart that this pipeline has steadily increased its withdrawals since 1933. We estimate that this trend will continue until 1942, and that future withdrawals by the West Texas Gas Company will amount
462 to eight billion cubic feet annually. The capacity of
the line is 12,775,000,000 cubic feet annually. My judgment is that the requirements of that line will not exceed 8 billion of its capacity of 12,775,000,000 cubic feet annually.

The chart on page 3 of this exhibit shows the withdrawals of Cities Service Company, actual and estimated. This pipe line during 1938 operated very closely to its capacity and we do not estimate that the future withdrawals will increase appreciably. In other words, we estimate that the future annual withdrawals will be 42 billion compared to a capacity of the pipeline of 45,625,000,000, leaving a margin in that line of about 3,600,000,000.

When I speak of capacity on the first six pages of Exhibit 87, I refer to a 100% load factor.

Page 4 represents the actual and estimated withdrawals of Panhandle Eastern Pipeline Company. This pipeline serves towns and cities in Missouri, Illinois, Indiana, Ohio and Michigan. Its principal outlet will be the Detroit area. You will note from the chart that there has been a steady and consistent increase in withdrawals by this pipeline. During recent years this company has looped its pipeline system one-half the distance between compressor stations from Liberal, Kansas, to the Indiana line, and we estimate that this trend of increase in production will continue until 1942, when total withdrawals will reach 44 billion cubic feet annually. The capacity of the pipeline system is 54,750,000,000. We consider that the Panhandle Eastern Pipeline Company has one of the best opportunities of any pipeline for increasing its load, principally ~~on~~ account of the industrial business that is available ~~in~~ the Detroit area and vicinity. That line has not been in Detroit since 1932. I believe it has been in there about a year.

Questions by the Examiner.

When I make the estimate in my market study, for example, with reference to the Detroit area, it includes possibilities in addition to the Detroit area. I mentioned it as having the best opportunities. That line has a possibility of serving Indianapolis. It has just recently tied to a number of towns in northwestern Ohio, and is extending its service to southern Michigan, I believe to Grand Rapids, and a number of those towns in the southern part of the peninsula there. It has possibilities for increase in load both for domestic and industrial. I considered all those factors, including the possible extension of lines. When Panhandle Eastern loop this line they increase their capacity 25%. The completion of the looping, which will cost just the same as the amount of looping they have done now, will increase that capacity 75% more; so you can visualize that they will go ahead and complete the looping of the line. It is almost an economic necessity. That 54,750,000,000 does not consider the looping.

Direct Examination Resumed by Mr. Morgan.

As to whether it is my view that 44 billion cubic feet annually is the limit of its possibility, it is possible for this pipeline to produce more gas than this. I have taken into account the fact that the load factor will have some bearing on the total withdrawals. It could with any improvement

in that condition carry right on through to larger amounts, and I have given weight to the question of capacity, the
463 potentialities of those markets, and the very perceptible upward trend that has prevailed with respect to this pipeline from the beginning. Another important point on this estimate of withdrawals from the Panhandle is that Panhandle Eastern takes about 25% of its requirements from the Hugoton field and 75% from the Texas Panhandle. This exhibit shows just the withdrawal from the Panhandle.

Turning now to page 5 of this same exhibit, Northern Natural Gas Company has a capacity of 47,450,000,000 cubic feet annually. This line serves towns in Nebraska, Iowa, South Dakota, and Minnesota. Its principal outlets are Omaha, Lincoln, Des Moines and the St. Paul and Minneapolis area. This line was just recently extended to the St. Paul-Minneapolis area, and you will note from the chart that there has been a consistent increase in load with a slight falling off in 1935, then the trend of increase continues to 1938. We think that this pipeline has very good possibilities for continued growth, particularly in the St. Paul-Minneapolis area. An evidence of this fact is that this company is now building a 16 inch line from Sioux City, Iowa, to the St. Paul-Minneapolis area. That is an additional line, and we estimate that by 1942 this line will withdraw from the Panhandle field 36,500,000,000 cubic feet annually. I had in mind the possibilities of more production than this, but I recently had occasion to consult with the engineers who are making an investigation for the financing of this new line, and they have placed the withdrawal estimate from the Panhandle field at the figure of 36,500,000,000 cubic feet annually, and I have adopted that figure. That figure includes the new line in question. The new line only increases the capacity at the upper end. It does not affect the total capacity of the system. They have a larger capacity part of the way up.

Cross-Examination Interposed by Mr. Slaff.

Northern Natural also withdraws from the Hugoton field. I don't have the figures as to the percentage of their requirements which they take from the Hugoton field. The connected open flow in Hugoton is about half of the connected open flow in the Panhandle, but I do not have in mind the percentage of withdrawal figures. I believe that they withdraw about 65% from the Panhandle and 35% from Hugoton. I don't know whether they contemplate maintaining substantially the same portions in the future. I think the possibilities are that they will increase the percentage from the Texas Panhandle. The estimate I have made on withdrawals covers just what they will take from the Panhandle field.

Direct Examination Resumed by Mr. Morgan.

The past withdrawals reflected by this chart have to do with the Panhandle annual withdrawals only.

Page 6 of this exhibit shows two charts. The first chart shows the estimated and actual withdrawals of the Texas Panhandle Gas Company, which is now known as Consolidated Gas Utilities Corporation. This line serves towns in Oklahoma and Kansas, and has a capacity of 12,775,000,000 cubic feet annually. The chart indicates that this pipe line has had larger takes in past years than it has at present. We estimate that there will be no increase in takes over the average for the last three years. As a matter of fact, we estimate the load will 464 decline somewhat. The withdrawals of this line will be governed primarily by its market outlet. It has plenty of capacity but not the market.

The Northern Texas Utilities Company is shown on the chart at the bottom of the same page. This line has a capacity of 15,330,000,000 cubic feet annually. Its withdrawals have shown a gradual and a consistent growth, which we estimate will continue until about 1940. This line serves Wichita Falls and vicinity. There has been a large development of deep oil production in the vicinity of Wichita Falls which has affected the growth of this community. This oil production is encountered without the presence of any marketable gas and there has been a good deal of gas sold for drilling operations, and it will continue to be sold for that purpose, and the growth of the general area has increased the domestic consumption of gas. I think it will level off at about eight billion for the remainder of the life of the field, with a capacity of fifteen and a third billion annually.

All of these pipelines and those who produce gas and sell to these pipelines are confronted with the necessity of utilizing additional fuel gas in the operation of booster stations, just like Texoma. Some of them, Cities Service, Lone Star and North Texas Utilities, have already installed booster stations and have them in operation now.

I have tabulated these estimated withdrawals of gas by the pipe lines in addition to the information reflected by the charts on the first six pages of this exhibit.

(Document entitled "Texas Panhandle Field; Estimated Future Withdrawals of Gas," marked Exhibit 88 for identification.)

Exhibit 88 is a tabulation prepared by me of the pipeline companies, and shows by years from 1939 to 1943 the estimated withdrawals of gas. Those are the same withdrawals reflected on these charts for the companies for which the charts have been prepared.

Where I have "Local, 890,000 MCF annually," that designates a local gas company serving the eastern part of the Panhandle field. The town of Shamrock is included in its market. I do not predict any increase for that company and other local companies. The 890,000 MCF for local companies represents their present withdrawals.

I did not extend beyond 1943 in the tabulation and charts because this estimate of withdrawals is expected to cover the period of growth in the pipeline companies' markets, and we anticipate that production will level off at about the year 1943. We do not anticipate and have not provided in our estimates for any increase beyond that year. Then I think they will continue to produce that quantity from the field as long as that quantity is available to them. There is some reason to believe that these quantities may increase beyond that period, but we have taken a conservative view of it, and have assumed a continuation of the rate we believe will prevail at that time for such period as we believe the gas will be available.

The chart on page 7 of Exhibit 87 shows the gas
465 used by gasoline plants and carbon black plants in
the Texas Panhandle field. The withdrawals of gas to gasoline plants is determined in large measure by the withdrawals of gas for use in the manufacture of carbon black. That has not always been the case. By reference to the chart you will notice that during 1933 to 1936 a very large withdrawal of gas was made to gasoline plants that is not reflected in the use of gas for carbon black. It was due to the excessive stripping of gas for gasoline

content and blowing the residue to the air. The chart shows that there has been gradual increase in the use of gas for carbon black from 1932 to 1938 with a peak demand for gas for this use in 1937. During 1937 carbon black stocks were built up and we considered it an abnormal year on that account. Stocks have been reduced during 1938, and the trend during the early part of this year indicates a resumption of the upward demand for gas for this use, and we estimate that by 1941 the demand for carbon black will reach a little over 280,000,000,000 cubic feet annually.

The total capacity of the existing carbon black plants in the Panhandle field is 321,000,000,000 cubic feet annually. During the last three years a number of plants have been built in the Panhandle, and some of the existing plants as of three years ago have been increased in capacity. I have no reason to think that there will not be other plants constructed down there. I think the construction of plants will be governed largely by the demand for carbon black. There is ample gas available under the law in the field for the expansion of the carbon black industry, beyond the figures which I have estimated.

Questions by the Examiner.

The principal use of carbon black is in the manufacture of automobile tires. Possibly 90% is for that use. Possibly 6% is used for the manufacture of ink, and there is a small amount that goes into paints and some miscellaneous uses. The principal outlet is for automobile tires. It is also used for rubber goods in general, belts, garden hose, overshoes, etc. It has the quality of increasing the elasticity and resisting qualities of the rubber. As compared with the old white tire we used to use prior to the introduction of carbon black into that fabric, an automobile tire now will last about four times as long, and this quality is largely due to the inclusion of carbon black in its manufacture. The rubber industry for the same purpose use a different kind of carbon black. It is still a product of similar quality, and comes from gas. Apparently there is not any substitute for it that they know of now.

Direct Examination Resumed by Mr. Morgan.

The future increase in the production of gas to gasoline plants, as appears on this chart, is approximately the same as the increase in the demand for gas to be used in the manufacture of carbon black. All of the gas processed by gasoline plants is not available to carbon black plants for the manufacture of carbon black because some gas is used up in the manufacture of gasoline. Some gas is used for fuel for the gasoline plants, and a considerable quantity of gas is returned to the leases for lease fuel, and it is the residue that is left that is available for carbon black, and there will always be more gas run to gasoline plants than is used by carbon black plants.

466 In the Panhandle, where you find a gasoline plant you will find a carbon black plant close beside it, or a pipeline. This pipeline gas is also processed, but that is not included in my figures. They are not mutually inconsistent by-products in any way. You can take gasoline out and then take the carbon black out.

Counsel has suggested that there are only certain kinds of gas, namely, casinghead gas in oil wells and sour gas, which under the laws in Texas may be used in the manufacture of carbon black, and that is the thing that limits the run to the kind of gasoline plant we are talking about here to that quantity of gas which is burned in the manufacture of carbon black, plus the plant loss and the quantity used for fuel purposes and things of that sort. Taking gasoline out of natural gas has the effect of reducing the carbon black recovery, but the gasoline is a more important product financially than the carbon black manufacture.

I have been asked to explain the relationship between the users of gas for carbon black and those who operate gasoline plants. The gas is processed for its gasoline content in the gasoline plants before any residue is delivered to the carbon black plants. This processing of the natural gas for gasoline is a more profitable operation than use of the same amount of gas for the manufacture of carbon black, and the Texas statutes require that the gasoline be extracted before the gas is used for the manufacture of carbon black. The residue gas which is delivered to the carbon black plants is burned in an atmosphere which is deficient in oxygen. This has the effect of forming lamp black, the same principle as when the old kerosene lamp would form a black on the chimney. This lamp black or carbon black, after it has been deposited in the channels, is scraped off and collected for shipment. The process of manufacturing carbon black from natural gas entirely consumes the residue gas.

There is a possibility of an increased efficiency in the production of carbon black which would require a smaller volume of gas. There is a process for manufacturing black which is more efficient than the channel process, but the qualities of the black manufactured are not the same. The tire manufacturers and the rubber manufacturers still require black made by the channel process, although there is a market for some of the other black which I have mentioned, which is marketed under the name of Gas-tex.

There is a limited market for the product that is more efficiently recovered, that is, recovered in larger quantities for volume of gas consumed.

(At this point, in response to a question by the Examiner, counsel for defendants stated that under the Texas statutes the two industries referred to are necessarily related; that the gasoline plant cannot process for gasoline unless it has an outlet for carbon black because they won't allow this residue to be popped to the air any more, and the carbon black manufacturer is not allowed to use this gas unless he first strips the gasoline out of it, and, therefore, they are inseparably tied together from both ends, and each must have the other one to do business.)

467 In connection with what I have said I would like to add one more statement, and that is, as the field becomes older the gas which is returned for lease fuel will probably increase due to the aging of the field fuel lines and the consequent leakage of gas that occurs in lines which have been laid as these lines are laid—usually out of second-hand pipe and usually put in under the stress of rapid developing operations. This gas returned for lease fuel is not charged for, and there is no particular incentive on the part of the field operators to keep these field lines in condition. I have not added anything to my estimates on account of that situation.

On Exhibit 88 I have shown the quantity of gas which will probably be used by gasoline plants, a portion of which is run to carbon black plants, as reflected on page 7 of Exhibit 87. We show that in 1939 the gas to gasoline plants will amount of 341,384,800,000 cubic feet annually.

The gasoline extraction process doesn't change the gas itself except that it reduces some of the heavier hydrocarbons—I mean some of the hydrocarbons that decrease the quantity of the gas by the amount that those hydrocarbons represent. Theoretically, the natural gas would be stripped for gasoline even though it is in the dry state in the non-oil bearing part of the field. The dry gas in the Panhandle field has a gasoline content of one-third of a gallon per thousand cubic feet, and that is worth trying to extract. Normally, casinghead gas contains above a gallon per thousand cubic feet. That was the reason for this upturn of the curve of gas running to gasoline plants in 1934 and 1935. They were stripping gasoline from dry gas and blowing the residue to the air. It was quite profitable when consideration was given to the volumes that were used at that time.

This estimate of gas for 1939 compares with 318,498,051,000 in 1938 and 345,298,466,000 in 1937. We estimate an increase yearly of use of gas by gasoline plants until 1941, when 384,057,000,000 cubic feet will be used. That quantity is projected on through the period when it would be available according to my estimates. I select that as a top figure because it is controlled principally by what we think the top figure in the use of gas for carbon black will be, and that is still well below the present carbon black capacity.

That is in effect merely following the upward trend on gas used for carbon black which has obtained from 1932 to the end of 1938, on through three more years. As I explained this morning, in 1937 an excessive amount of gas was used for the manufacture of carbon black. This is indicated by the curves, and this excessive use of gas resulted in a substantial increase in carbon black stocks. This had the effect of bringing about a reduction in the price of carbon black and curtailment in the use of gas for its manufacture in 1938. During this period carbon black stocks were reduced, and the trend of use of gas for carbon black manufacture during 1939 is again upward and there is a consistent increase in the use of gas for carbon black manufacture since 1932 to the present time. Aside from the
468 gable or hump extending up through the year 1937 and slightly downward in 1938, this main projected line for the next three years represents a mere continuation of the

trend, the upward trend, of that character of consumption of natural gas that has been occurring for the past several years.

In addition to the gas used by pipelines and that used by gasoline plants and carbon black plants, I have included on Exhibit 88 two other uses.

One is the casinghead gas blown to the air from oil wells not connected to gasoline plants. This estimate is based on the number of oil wells not connected to gasoline plants, and we estimate it to be five billion cubic feet annually. That is the same as the withdrawal at the present time for that item. It is a good deal smaller now than it has been, due to the fact that the gasoline plants have connected through to all the wells that it is economically feasible to connect. The amount of gas used or withdrawn under this classification in 1932 we estimate was 32 billion; 1933, 25 billion; 1934, 33 billion; 1935, 28 billion; 1936, 15 billion; 1937, six billion; and in 1938, 5,075,000,000. That figure has been coming down because the gasoline plants have connected more and more wells that were economically feasible to connect, and a great number of the wells that are connected are located along the marginal area between the oil and gas zones. My figures are based entirely on estimates, as none of this gas is measured. They are Mr. Peterson's estimates, made under my direction, and taken from his Exhibit 25.

The other use of gas which I include is gas used for fuel and wastage through the air from drilling wells. This estimate is based on 1938 withdrawals for this purpose and consideration was given past experience. We estimate approximately twelve billion cubic feet annually will be withdrawn in this manner. In 1932 approximately four billion was used in this manner; and in 1933 the same. This was during the depression when approximately no drilling was going on and that figure would obviously be low. In 1934 it was 21 billion; 1935, 26 billion; 1936, 30 billion; 1937, 29 billion; and in 1938, 12,268,267,000.

This estimate on gas used for this purpose was based on a study by Mr. Peterson of the scout reports. He tabulated the number of wells drilling, the number of days drilling, and the number of days drilling in the pay horizon, consideration being given to the open flow of the wells as reported by the scout reports. It was a very carefully prepared estimate and I think it is fairly reliable.

In my judgment, the total gas withdrawals or requirements of the various pipelines, gasoline plants, and other needs and uses covered by Exhibit 88 will probably level off by the year 1942 at 651 billion cubic feet annually. The same reason obtains for not projecting this total on to the future as that stated with reference to the pipelines. It is my view the requirements will equal those quantities as long as the gas is available for them.

On the last page of Exhibit 87 there is still another 469 chart, captioned "Total Past and Future Production from Texas Panhandle Gas Field." This chart represents on the vertical scale at the left the withdrawal of gas in trillions of cubic feet at 16.4 pounds pressure base. At the bottom of the sheet are designated the years beginning in 1926, which is the time the field broke out in earnest. The legends or expressions showing reserves to zero pounds abandonment, to 25 pounds abandonment, and so on, in the upper left hand corner of the chart represent Mr. Peterson's estimate of the reserves in the field at different abandonment pressures. They are plotted on the scale of trillions of cubic feet of gas annually. The figures are Mr. Peterson's estimates after he applied a 90% recovery factor to his estimate of the original reserves in place.

The oblique line, which is solid a part of the way and broken the remainder of the way, from the lower left hand corner across to a point near the upper right hand corner of the chart, represents the actual accumulated production from the Panhandle field by years through 1938 where the line is solid, and the dotted line represents the projection of our annual estimates of future gas withdrawals from the field.

To the accumulated production down to and through 1938 I added the estimated gas withdrawals for 1939, as reflected on Exhibit 88, and in that way built up annually on across the page by adding to the production as of the end of one year my estimate of the production for the following year. That line naturally shows an increase in volume at the end of each year. That is substantially a projection of the actual withdrawals from year to year all across the page.

Following that projected line on to the right and upward in its course, the accumulated withdrawals will use up all of the recoverable gas down to 100 pounds assumed abandonment pressure early in the year 1948.

According to my judgment, the estimated withdrawals will use up all the recoverable gas to an assumed abandonment pressure of 75 pounds late in 1949. Those withdrawals would use up all the recoverable gas to an assumed abandonment pressure of 50 pounds early in 1951. They would use up the recoverable gas to an assumed abandonment pressure of 25 pounds late in 1952. The total recoverable gas down to an assumed abandonment pressure of zero pounds, if it were possible to withdraw it down to that point, would be consumed early in 1954.

The four broken heavy lines across the top of the page are based on Mr. C. J. Peterson's estimates of recoverable reserves, and the solid line representing the accumulated production is based on Mr. Peterson's estimates. Those are the estimates reflected in Exhibits 28 and 25 respectively.

Questions by the Examiner.

In connection with Exhibit 87 I explained what the data for the actual withdrawals for the Canadian River Gas Company were based on. That is the same type of data used in connection with each of the other graphs, the Lone Star Gas Company, and so on. In other words, I used
470 the reports of the Texas Railroad Commission plus the data I got from each of the producing companies. It would include the total amount of gas from the field, the data being obtained either from the companies themselves or from the Texas Railroad Commission. It includes the gas produced and also the gas purchased by those companies, if they produced and purchased both.

The figures for the Canadian River Company and West Texas, and so forth, on Exhibit 88 are the same as I drafted for Exhibit 87 in each case.

(EXHIBITS 87 and 88 for identification, offered and received in evidence without objection.)

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VOLUME II.

TRANSCRIPT OF RECORD

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1941

No. 265

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, PETITIONERS

vs.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY

No. 268

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, PETITIONERS

vs.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT

Petitions for certiorari filed July 12, 1941, July 14, 1941

Certiorari granted October 13, 1941

IN THE

United States Circuit Court of Appeals
For the Seventh Circuit

No. 7454

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND TEXOMA NATURAL GAS COMPANY,
Petitioners,

vs.

FEDERAL POWER COMMISSION AND ILLINOIS
COMMERCE COMMISSION,
Respondents.

Petition for Review of Interim Order of the Federal Power Commission.

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471 E. V. KESINGER, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(July 24, 1939.)

My name is E. V. Kesinger. I live in Highland Park, Illinois. I am general superintendent of Natural Gas Pipeline Company of America and Texoma Natural Gas Company.

I graduated from Kansas State College with a B.S. degree in electrical engineering in 1917.

In June of 1917 I was employed by the Empire Companies of Bartlesville, Oklahoma. My first job was in a repair crew of a gas compressor station at Big Heart, Oklahoma. With the exception of the time that I was in the army, I remained with the Empire Companies until I joined the Continental Construction Corporation, the predecessor of the two companies with which I am now employed, in June of 1930.

While in the army, I was in the infantry for a few months, following which I went into the artillery officers' training camp and was commissioned as second lieutenant. My army service extended from October, 1917, until May of 1919. Following my discharge from the army I returned to the general engineering department of the Empire Companies at Bartlesville, Oklahoma, in July of 1919.

The Empire Companies of Bartlesville, Oklahoma, operated a general engineering department that performed and designed engineering and construction work for a number of affiliated Empire Companies. During the latter half of 1919 and the year 1920, I was in this general engineering department, during which time I was doing general clerical and engineering work.

In the year 1921 I was made resident engineer in charge of construction and oil refinery that the Empire had at Ponca City, Oklahoma. While at Ponca City I also supervised the construction of an oil pump station at Arkansas City, Kansas.

In the beginning of 1922 I returned to the general engineering office of the Empire Companies at Bartlesville. About the middle of 1922 I was a member of a party of three engineers delegated to investigate and make a valuation of some refinery and other properties owned by the New England Oil & Refining Company, Fall River, Massachusetts. When this work was completed I returned to the general engineering department of the Empire Companies at Bartlesville. I spent the remaining portion of 1922 and the year 1923 in the Bartlesville office, concerning myself with the design of various facilities pertaining to refineries, oil pump stations, gas compressor stations, and oil pipe lines.

472 In the year 1924 I was resident engineer in charge of construction work at the refinery that the Cities Service Company had purchased at Fall River, Mass. This work consisted of rearranging a number of facilities in the plant and the installation of two cracking units. That was the same property that I had been assigned to examine and value a couple of years before. Following our valuation the negotiations to purchase consumed considerable time, and when Cities Service finally bought the property I was delegated as the engineer in charge to rearrange the facilities and install the cracking units and start the plant up. That work required the year 1924, and upon its completion I returned to the general engineering department of the Empire Companies at Bartlesville.

During the years 1925, 1926 and 1927, I remained in this general engineering department, during which time I was occupied with the development of design and the supervision of construction of various facilities and properties for the Empire Companies. This work involved oil refineries, gas compressor stations, gas pipe lines, oil pipe lines, and oil pump stations.

The main project on gas properties that was carried out in 1927 was the construction of 250 miles of 20 inch gas pipe line from Pampa, Texas, to Wichita, Kansas, and as I recall, there were about three compressor stations on the line. There was also involved the construction of a complete field gathering system to go with the project. That gathering system was down in the Texas Panhandle, and it is now the gathering system operated by the Cities Service Gas Company. This 20 inch line from Pampa, Texas, to Wichita, Kansas, was later extended to Ottawa, Kansas, by the construction of 122 miles of 20 inch pipeline. I supervised the development of the design and supervised the construction of the extension, the same as I had the original line from Wichita to Pampa, Texas.

During the years 1928 and the early part of 1929, a large part of my time was used in investigations in regard to the location of a refinery and the development of the designs to be used and employed during the construction of this refinery. This plant is now in operation by the Cities Service Oil Company at East Chicago, Indiana.

During the period that I was concerned with gas and oil properties, running from 1923 to 1929, I supervised the design or supervised the construction of over 1800 miles of oil and gas pipelines.

About the middle of 1929 I was relieved of my routine duties that I was carrying on for the various Empire Companies, and told to prepare myself for the construction of a major gas pipeline. We had various matters that we wanted to investigate before we built another project of that type. I understood in general at that time that this was to be a pipe line constructed under the guidance of Henry L. Doherty, and that it would run from the Texas Panhandle to the Chicago area.

As the result of a large amount of oil and gas pipeline work that I had been supervising for the Empire Companies, there were a number of facilities that we wanted
473 to improve before we launched another project of this type. Consequently I concentrated my time on the investigation of some of these problems and I also supplemented my own efforts with a corps of engineers.

A few of the things we wished to investigate were that we wanted to perfect a better gate valve for use in gas pipelines. We were not satisfied with the design and the type of couplings that were then on the market for use in gas pipe lines, and we wanted to improve this facility. We also wanted to work out the fabricating designs for the construction of river headers and drips and other facilities that involve the use of fabricated pipe in gas pipeline projects.

We were not at all satisfied with the control methods and the procedures available for the use of electric welding and acetylene welding and applying these two methods for the construction of gas pipe lines in the field. We wanted to investigate the properties of some of the coatings that were then on the market and supposed to have the property of protecting underground pipe lines. We also wanted to perfect means of standardizing and controlling the application of these coatings to obtain better results with them.

Above all, we wanted to press for a better quality pipe that would be commercially available and would have uniform dimensions, uniform properties, so that we could build a more reliable gas pipe line.

We also investigated various compressor stations that had been constructed in the Midcontinent field by other gas pipeline companies. This compressor station work was done by other engineers under my supervision.

I personally visited many of the midcontinent pipe lines and some of the gas pipe lines on the west coast for the purpose of learning of any developments in regard to the design or the laying of the gas pipe lines that might have been brought about by these other companies.

We also carried on and continued our efforts to find out or understand the peculiar phenomena that caused the formation of solids in gas pipe lines under certain pressure conditions. These solids are now known as gas hydrates, and that is the same phenomenon that Mr. Hammerschmidt testified about here, and also Mr. F. C. Brown. Mr. Hammerschmidt was one of the engineers involved in that investigation work while we were on the properties of the Empire Companies; but it was not until after Texoma Natural Gas Company had been formed and Mr. Hammerschmidt transferred to that company that we finally developed the theory that disclosed to us the real phenomena that brought about the formation of these solids and enabled us to handle them in better fashion.

When I was assigned to this work I have just been outlining, I do not recall that anything was said to me about the pressures at which this contemplated line would be operated; but we had been working for years trying to get into a position of utilizing steel at higher stresses and, 474 of course, one way of accomplishing that would be to operate the pipe line at higher pressures, and I had been a member of the group of engineers that had been discussing this phase of the matter for some time. As a matter of fact, late in 1929 or early in 1930, we constructed about ten miles of 24 inch gas pipe line in which we incorporated some of the theories and principles that we had been developing simply to check where we were with the development work, trying out in practice the principles which we thought we had evolved from the theoretical standpoint.

We had different kinds of pipe in that line. We wanted to find out what problems there were in welding, how it would act after it was welded, how it would handle in the field, and various things about it that we wanted to know as to how it would be from a practical viewpoint in addition to a theoretical viewpoint.

I have said that we wanted to improve the quality of the pipe that was being used in the operation of gas pipe lines. We had been using lap welded pipe in the construction of gas pipe lines. This pipe came in short lengths. We wanted, if possible, to obtain pipe in longer lengths in order to eliminate field joints and decrease the cost of the completed line. We also wanted a pipe that was more uniform in its dimensions. Lap weld pipe has a tendency to run overweight or underweight, or it will be thick at one end and thin at the other end. The main defect in the lap welded pipe was the erratic nature and inefficiency of the longitudinal seam that runs through this pipe.

Also we were constantly pressing the pipe manufacturers for pipe of larger diameter, and due to the particular way this pipe is made they were handicapped in manufacturing the wall thickness that we wanted as the diameter increased. The tendency was to supply us with pipe of heavier wall than we wanted.

The objection to having the heavy wall pipe or a thick wall pipe from the standpoint of one who is contemplating the building of a pipe line is that we wanted to work the steel in this pipe at a safe stress, but we wanted to be able to work it uniformly at that stress and we did not want any excess weight in the pipe unless it was accomplishing some good.

The objection to that was that this pipe was costing us in the neighborhood of $100 or $103 a ton. Besides the cost of the pipe you have the extra cost of handling it in the field, and you have the extra cost of welding it. To illustrate, if the wall thickness was running 25% heavier than it need be from a stress standpoint, the final cost of the line was affected materially by the extra weight that was in the wall of the pipe, both by extra tonnage and by extra cost of handling in the laying of the pipe line.

I had a corps of engineers under me varying in number, but occasionally running up in the neighborhood of fifty, and we were concentrating on these various problems the last half of 1929 and all of 1930, and a few of them carried over into 1931, and the hydrate followed even later than that.

475 *Questions by the Examiner.*

At this time I was not stationed at any one place. I was in New York occasionally during that period. Between the middle of 1929 and the middle of 1930 I was in New York a number of times. I was working during that year out of the Bartlesville, Oklahoma, office and out of the New York office. I was actually spending an awful lot of time in aeroplanes and on trains, and I had engineers at various points working at different things.

The Examiner states that there has been some suggestion of studies and reports made and submitted at this time, and inquires whether I am familiar with that. I know about those matters in general. As I recall the testimony, it pertained to reports that started in 1926. This matter of building a gas pipe line from the Texas Panhandle to Chicago was suggested by Mr. Henry L. Doherty back there sometime. From 1926 on the Empire Companies had a group of engineers that did make analyses, geological studies, and calculations that were directed toward determining whether or not this project was feasible. I was not a member of that engineering group or that particular body of men. During those years I was quite busy spending money, rather than pushing a pencil, and the engineers that made those earlier estimates were a separate group that were used almost entirely for investigating the feasibility of various projects, not only the line to Chicago, but there were many studies made back through those days based on various size lines and various pressures and all kinds of combinations for both oil and gas lines.

As to whether there would be a number of groups studying different problems and each group would do its own calculating, as I recall, the men who were making these studies varied in number from four to twelve, and they were usually working on some oil pipe line project, and when they got that report done there would be some other suggestion, "let's investigate this pipe line project," and this next time it might be three or four weeks' work or it might be a month's work at some refinery.

Take, for instance, this location of the Cities Service Oil Company refinery out here at East Chicago. That plant had ahead of it many reports. There was a group of engineers that investigated the freight structure, breaking points and freight rates, etc., and there was another group of engineers that investigated the market outlets. By that I mean what market outlets Cities Service might be able to acquire or control. Those theoretical things were carried on by other engineers. By that I mean a coordinating group of engineers who called on the other groups for certain results.

In the case of the refinery problem, part of the refinery staff of the Empire Companies was in Tulsa, Oklahoma. The engineering part of that staff was in Bartlesville, Oklahoma. As far as markets were concerned, the information would have to be compiled in Tulsa and come up to the engineers in Bartlesville, who were dealing with freight rates or dealing with costs of pipe lines or matters of that
476 kind. I was not involved in that problem until they had reached the point that they had concluded that there

was an economic possibility of locating an oil refinery in one of these northern areas and building an oil pipe line up here.

I feel quite sure there is no tendency to keep a library of such studies. I know we do not do it even in our current work. We make the study to get the answer, and having obtained the answer, we usually do something about it and then we have the property, and I personally do not keep for any very long period theoretical analyses of things of that kind that are done for me. I either use them or discard them, and if I use them I do no longer need them.

Direct Examination by Mr. Morgan Resumed.

We started constructing the line in August, 1930, and by that time we had some of these things perfected and some of them were not perfected. I was made chief engineer of Continental Construction Corporation in June of 1930. In that position I was to report direct to Mr. Floyd C. Brown, who was to be vice president and general manager of the corporation, and I was to have charge of the selection of the personnel, the development of the field surveys, the securing of bids, the contracting of the construction of the property, the development of the design, and the drawings that might be necessary in the purchase of materials. I was to have charge of the inspection of the materials as they were manufactured, to have charge of the field construction work, inspection of that construction work, and I was to have charge of the cleaning and the purging and testing of the line.

My title at that time was chief engineer. I continued as chief engineer in charge of construction for the Continental Construction Corporation until January 1, 1932. In the meantime, the name of Continental Construction Corporation had been changed to Natural Gas Pipeline Company of America on December 10, 1931. Texoma Natural Gas Company was organized May 26, 1930, and I was made chief engineer of that company when it was organized. I continued as chief engineer of both of these companies during the period of construction until January 1, 1932.

At the time I was made chief engineer of these companies and charged with the several duties I have mentioned in connection with the planning, designing and construction of this pipeline and its various properties, it was not known to me that I would become general superintendent of these two companies. The original discussion was confined to the design and construction of the line, and nothing was said to me as to whether or not I would be involved in its operation or who would operate it.

I have referred to field surveys, the designing of materials and other work of design, the making of specifications, etc. We had constructed a line from Pampa, Texas, to Wichita, Kansas, and had some knowledge of the Panhandle field due to our experience down there in 1926 and 1927.

We were also fairly familiar with the general territory 477 in the Texas Panhandle, the Panhandle of the State of Oklahoma, and the State of Kansas, but these field surveys were necessary in order to secure detailed information on certain control points, such as river crossings, or anything else that might result in difficulties during construction or might result in heavy maintenance after the line was constructed, or might prevent the restoring of service promptly after it was constructed.

These field surveys were sometimes made by civil engineers and sometimes by pipe line engineers or operating men. It depended on the nature of the problem. We went to the points we suspected as being dangerous or difficult to handle and collected whatever information we needed to guide us as to whether or not we wanted to cross there, or wanted to try to cross there, or whether we wanted to look for some other place. That problem had to do with the general location of the line, the general course of the routing, and that work was done under my supervision.

The field surveys were made by men under my direction, these being pipe line men or civil engineers that I had known or had used in other jobs. After the general scouting of some of these control points was completed, we went to work on the United States topography maps. We sketched the general course of the line on these maps and made a very careful study of the difficulties that would be encountered, judging the situation from contours.

After the general contours had been worked out on these topography maps, we then had aerial surveys made of the more important points on the line, particularly the Missouri River and the Mississippi River, and the Canadian River, and features of this kind. We had separate aerial surveys made of quite a stretch up and down the rivers. After these aerial surveys were in we were able to study the question more completely and make a more definite location as to where we would want to cross some of these hazards.

Having the general location of the line and having made sure that the various control points were worked out with a degree of nicety, we then proceeded and had an aerial survey made of the entire suggested location. We wanted this aerial survey to check our judgment as to the location of the line in total, and we also wanted to use the aerial survey as the base map in our various construction activities, such as contracts, etc. I worked out this field survey and made the final recommendation to Mr. Brown and the management as to the final location of the line.

When we started out to determine upon the location of the line we had in mind that we were starting to serve a major market that would be approximately 900 miles from the field or the source of supply of the gas, and consequently continuity of service was always emphasized and stressed. Also we wanted the location to be such that we would have the cheapest line not only from the standpoint of its original cost but from that of the over-all cost, including the operation and maintenance of the line, and we were careful in locating the line to so locate it that it could be so maintained.

The pipeline was built along the line which I selected
478 and recommended to the general manager, with certain minor changes in the location in areas and certain little variations in some detail. We frequently found it necessary to change the general course of the line maybe a mile or half a mile, or some such matter as that, in order to miss farms where we were unable to purchase rights of way. Those were just minor changes that were made from time to time to take care of those local features or handicaps that we were unable to overcome.

Afert having made my recommendations as to the location of the line, it became necessary to me, as chief engineer of the project, to assemble an organization to carry out these functions. Obviously, I did not perform all of them myself. The thing we had to get done was to develop designs and drawings where they were necessary for the securing of bids for the furnishing of material. When these matters were ready they were submitted to the various manufacturers in order to secure competitive bids for furnishing the quantity of material and the quality that we required.

The major items included in the material would cover such things as 24 inch pipe, 18 inch pipe, 16 inch pipe, pipe of smaller diameters, the coating for that pipe, 24 inch main line gate valves, couplings for the 24 inch line, buildings for the sales meters and for the various functions in the gas compressor stations, the main compressor units to be installed in the compressor stations, the auxiliary gas engine driven electric generators to furnish electricity for light and power for the compressor stations, various machine shop equipment to be used in the stations, etc. That is not one-hundredth of them, but those are the main ones.

All of those things and other material that went into the construction of this pipe line were purchased on specifications. We did not just go to the manufacturer of pipe and tell him we wanted so many feet and so many tons of pipe of a certain dimension. It depended on what the material was, but in many cases we not only prepared specifications but we made drawings or designs, and along with these drawings we wrote specifications, and when these were assembled we submitted them to various manufacturers and asked them for their prices. This would apply to such things as fabricated river headers, drips, fabricated piping to be used around stations, etc.

Fabricated materials, in the way that I use that term, refers to the taking of one or more materials as they come in their natural state from the original manufacturer and by cutting or assembling you make these materials into a unit of a different kind. For instance, in the fabrication of a river header you would obtain pipe of two or three different sizes and various lengths and you cut this material into the proper lengths. You would obtain welding heads, welding pipe saddles, nipples, valves, etc., and by assembling these various pieces in the proper manner you would eventually fabricate a river header.

We had other things to do in addition to designing the material of the various units of pipe, machinery, etc., which was to be utilized before we could construct a pipe line.
479 We had to obtain the rights of way upon which to construct the pipeline. We pushed this right of way purchase activity along as fast as we possibly could. We had to purchase or make arrangements for purchase of all of the materials, some of which I have named. We had to prepare specifications, contract forms for obtaining bids from contractors for assembling these materials in the field. We had to inspect the manufacture of the materials. We had to arrange for the delivery of the materials to the

various contractors at the points where and when they were needed, and we had to inspect the execution of the assembly of these materials, the performing of the work in the field.

All of this work was coordinated. Naturally, some of the things preceded the other, and as fast as various phases of the work would clear up and the necessary items were coordinated, we would release the contracts.

I never did count the number of different contractors with whom we had contractual relations. The number of contractors bidding on the various kinds of work to be performed was quite large. Occasionally some of the work was sub-contracted. We controlled this feature of the contracts, and some of the work was sub-contracted and some of it was not. For instance, hauling was generally sub-contracted. In some cases we permitted the sub-contracting of welding, and there may have been other sub-contracts, but I have not refreshed my mind on these recently.

In those instances where our contractors let a part of their work to sub-contractors we were not relieved of our inspection duty. In fact, it did not change our relationship with the original contractor or his obligations to us. We held the general contractor liable for the contract even though he did sub-contract some of the work. Our inspection of the performance of the work was supplied in the field without regard to whether or not it was sub-contracted.

We found it necessary to do some work in determining with whom we ought to make contracts before letting these contracts. When this project was announced we were flooded with requests from contractors all over the United States that wanted to build pipe lines or build compressor stations or build the telephone line for us, and we soon found that it was going to be necessary for us to use extreme caution in the way we awarded these contracts. All of the contracts were to be awarded on competitive bidding, and we exercised the prerogative of submitting bidding specifications to contractors that we felt were qualified to build the pipe line proper, for instance, and we were careful to give bidding forms to contractors capable of building compressor stations when we were asking for bids on stations. The same principle was applied in the cottages and the telephone, and in the case of some rivers we guarded against the inclusion of contractors that were not qualified through experience and did not have the equipment or personnel to perform the work that we scheduled in the contract.

We also concerned ourselves with the financial ability of the contractor to perform the size of contract that we were contemplating awarding. In other words, in so far as possible we wanted contractors bidding on the pipe line proper
that had the personnel and the equipment suitable for
480 executing the work that was to be performed under
that contract, and the same thing applied for the contractors bidding on the compressor stations or the telephone line or the cottage, or things of that kind.

I do not recall that there was any advertising of bidding except by word of mouth. The fact that this work was going on seemed to spread like wildfire, and the contractors were always crowding us to let them have the specifications.

However, after submitting the bidding forms to the contractors and receiving their bids for performing the work, we analyzed the bids to determine which contractor had submitted the lowest bid, and then we made a final check as to what work this contractor was performing for other companies and what equipment and personnel he had available. If the situation looked sound we submitted the data to Mr. Floyd C. Brown with our recommendation as to who should receive the contract.

(Statement by Commission counsel that testimony purely repetitions of Mr. Floyd C. Brown's and suggesting that Mr. Brown's testimony be adopted with reference to the above matters. Examiner permitted testimony to proceed.)

The specifications for material, for the construction of the line, and for the compressor stations and other properties were very detailed. They were very specific and very severe. The specifications pertaining to the construction of the field work, particularly the main 24 inch trunk pipe line, were considered so severe by at least one of the participating companies that they were fearful that the contractors would not accept the contract to operate under those specifications.

It has been stated that this pipeline construction work was let by sections to different contractors who contracted to build 80 or 100 or 120 miles of pipe line; but that does not mean that the contractors who obtained the contract to build a certain section of pipeline would build everything on the pipe line within that section.

We divided the main 24 inch transmission system into sections of various lengths, and then when we awarded the contract for the construction of a section, that contract would be confined to the construction of the 24 inch pipe line proper. If that section happened to include a compressor station, that would not be in the contract awarded to the pipe line contractor but would be in a separate contract awarded to another contractor to construct the compressor station. The dividing of the line into sections, and dividing the other facilities up into smaller units, enabled us to keep the size of those jobs such that we had ample competition in the competitive bidding. We guarded against having a pending contract that would involve sums of money that might restrict the bidding to one or two large contractors.

It also enabled us to prepare specifications that covered in detail and more specifically the contract work to be performed under that contract. For instance, 100 miles of the main 24 inch pipe line might contain no river. The next 80 mile section might contain two rivers. The specifications for the 100 mile section of pipe line would treat with the problems and features to be constructed in that section, and that same thing is true of the other sections.

481 *Questions by the Examiner.*

As to whether we let the river crossings separately or as part of our sections, the river crossings that were of sufficient size and required highly specialized equipment were separated out and awarded under separate contracts. That applies for the Missouri River and the Mississippi River. For the rivers that we crossed on the south end of the line, the type of work to be performed and the equipment required was not particularly different from what the usual pipe line contractor has, nor was it out of the ordinary line of work that he had been doing but in the case of the Missouri River and the Mississippi River the equipment required was entirely different. Those are submerged crossings. The only suspension crossing we have is the line across the Big Blue River in the Texas Panhandle.

Direct Examination Resumed by Mr. Morgan.

As these various contractors started executing the field construction work under the various contracts, we attempted to supervise the execution of this work by placing inspectors in the field at the points where this work was being performed. These inspectors were men selected for this particular duty and trained in the requirements of the specifications and the type of construction that we required. These inspectors were working under my supervision and direction.

We had rejections in the various plants over the country where this material was manufactured. As I recall, in gate valves we rejected about 4½%, of the compression cylinder heads about 12%, on 24 inch pipe the rejects ran quite heavy, particularly from Gary, Indiana, and McKeesport, Pennsylvania. At one time we had at least fifty miles of 24 inch pipe piled up in those yards rejected as not qualifying under our specifications.

The inspection of the field work was quite severe. The effective inspection was rather a heavy burden on all of the contractors, heavier than most of them expected. The result was that the work cost them more money than they anticipated. Three of the main pipe line contractors claimed that they lost large sums of money as a result of our inspection. One of the three sued us for about a million dollars.

I have stated that the actual construction of the pipeline was commenced in August, 1930. It was completed in August, 1931. By that I mean that we had the pipe in the ground, the pipe covered, and were up to the point of cleaning, purging and testing the line, and we had some of the station work fully completed and we had other station work yet to execute.

By cleaning, purging and testing the line I mean that regardless of the care that is used in laying a line, when it is finished it is advisable to free it of all foreign materials and remove the air, and to test the line to some elevated pressures. These materials that are in the line after it is completed are mill scale, sand, rabbits, dinner buckets and other items. The air and the foreign materials are removed by permitting gas to enter the pipe and allowing the gas to rush through a ten or twenty mile section of the line, carrying these foreign materials and
482 the air out.

After this is finished, you can apply pressure tests to that particular section or proceed to the next section and clean and purge that section and allow the pressure test to follow. As we completed the line it was tested at a pressure of 800 pounds. That high pressure was applied to this line in order to locate any structural weaknesses or defects and to enable us to operate the line more safely at the elevated pressure that we had in mind.

The compressor stations were being constructed as the pipeline was being constructed. We carried all of these operations on together, attempting to finish them in a coordinated manner; but at the time the pipeline was finished and we were testing the pipeline, the station work at some points was lagging materially, particularly at Station 1. That is the station owned and operated by Texoma Natural Gas Company at Fritch, Texas.

It was necessary to utilize these compressor stations in testing the pipeline under pressure. We did not need the compressor stations for the purpose of cleaning and purging the lines, but we did need them, or at least some of the engines in the stations, in order to supply the 800 pound gas with which we wished to test the line.

The compressor stations, of course, had to be cleaned of foreign materials and the air removed in the same manner as the pipeline, and we did this when the station work permitted, as we brought the pipeline pressure testing along. We also put pressure tests on all of the piping and facilities in the compressor station, and having arrived at this stage we were then confronted with the necessity of operating the main compressor units for the purpose of adjusting and balancing those units for the purpose of getting them in condition to carry their full rated horse power.

As a result of this testing of the pipeline and compressor stations we found some defects before the pipeline was put into permanent operation. In the case of the pipeline proper, we found a considerable number of minor defects. We also found one major defect. We had a point near Ford, Kansas, where the 24 inch pipeline failed, a joint of 24 inch pipe left the ditch, tore into several pieces, at a time when we had a gas pressure of 800 pounds on that section of the line.

The testing of the stations brought out a few minor defects and two defects that might be termed major. We operated these units as much as we could and as soon as we could in conjunction with the testing of the line, but we did not accumulate many operating hours over any one main compressor unit before we learned that the gaskets in the exhaust valves were entirely unsuitable for the duty that they were to perform, and a little later we discovered that the design of the pistons in the power cylinders of these compressor units was faulty and the pistons started cracking on us after running from 50 to 600 operating hours.

The first piston failed, as I recall, about December 5,
1931, and it appeared to us at that time that this was
483 a major defect, rather than just an accidental break
of one piston. Consequently, we immediately contacted the manufacturer of the equipment and went into a lengthy investigation to determine the defect in the design we were using and how this defect could be corrected. It was about April of 1932 before we had the new design ready, and we then started obtaining new pistons from the manufacturer and proceeded to replace all of the pistons that were originally installed in the main units. We completed this piston replacement work on September 27, 1932. We had the main 24 inch pipe line tested from Station No. 1 at Fritch, Texas, to Joliet, Illinois, by August 28, 1931.

There was other work of that character which had to be done before we could put the pipeline into operation, after we got the line tested and purged through to Joliet, Illinois. The Chicago District Pipeline Company had constructed approximately 100 miles of 24 inch pipeline from Joliet into two points of delivery in Chicago. It was necessary to clean and purge this pipeline system. It was also necessary to fill certain holders with natural gas in this area. It was necessary to adjust certain appliances in the plants where this natural gas was going to be mixed with coke oven gas or manufactured gas, as the case may be.

We delivered gas to the Chicago District Pipeline Company for this purging and testing operation from August 19 to August 24, 1931. We delivered them some gas later, on September 24, 1931; at which time they completed their pressure tests. We then started making small deliveries to the Chicago District Pipeline Company for the purpose of tuning up our system and their system, on October 5, 1931.

In the meantime we experienced some difficulties. From

October 5 to October 15, 1931, we were making small deliveries of natural gas to Chicago District Pipeline Company. On October 10, 1931, we experienced a heavy rain in Bureau County, Illinois, in an area crossed by our main 24 inch pipeline. As a result of this rain, the back fill washed off the line. The pipe floated in the ditch, pulled out of the coupling, and we were faced with our first major failure of the pipeline transmission system.

We made the first delivery of gas under the contract of July 25, 1931, with Chicago District Pipeline Company on October 16, 1931. At that time our pipeline system was not completed. We had enough facilities completed that we could deliver gas, but we had many other things to do before the project was completed. For instance, at that time we had only eight wells delivering gas into the gathering system of Texoma Natural Gas Company. We were constructing lateral lines to the other wells to be connected, and finished this work on November 14, 1931.

We had a number of other things to do, such as installing repeaters on the telephone system, build pipe racks along the pipe line and store pipe, couplings and sleeves at these pipe racks for the purpose of making emergency repairs. We had to install highway markers where the pipeline crossed the various highways. We were erecting 484 anchor warning signs on the major rivers. We had a large amount of riprap work to do on the river banks and other points where we had made heavy excavations.

We were constructing drainage ditches and cross drains in order to take care of cross drainage, surface drainage, across the pipeline. We were also doing various work, such as finishing roads, walks, landscaping, water treating plants, and items of this kind around the compressor stations.

We were continuing with the work of getting the main compressor units into condition so that they would operate. As I have previously mentioned, this consisted largely of the replacement of the pistons and in the necessary operation of the unit in order to adjust the timing of the mixing valves to the various power cylinders.

We were building sales meters at Knoxville and Greenfield, Iowa. We started the construction of the Muscatine, Iowa, sales meter on October 31, 1931. We finished the sales meter at Wedron, Illinois, late in October, and we were building the Joliet sales meter at Joliet, Illinois.

We were delivering gas to Chicago District Pipeline Company before we had the Joliet sales meter constructed because we encountered delay in the construction of this meter setting due to difficulty in reaching an agreement with the Chicago District Pipeline Company as to the design of the meter station. Consequently we constructed a 16 inch by-pass line around the particular site that this meter station was to occupy, installed a 16 inch pair of metering flanges over this line, and metered the gas that was delivered to the Chicago District Pipeline through this by-pass line, while the main Joliet metering station was being constructed. We finished this meter station on December 10, 1931.

We were delivering gas through this line before we had it fully completed because we expected the Chicago load to come on slowly the first few months, and it facilitated the operations that we had to perform around the compressor stations if this system was operated and if it was delivering rather small quantities. Obviously, we could not adjust the engines without operating them, and the delivery of a small volume facilitated this work.

Also, the back fill over the entire pipeline system was new and fresh, and we were constantly patrolling this line and taking whatever corrective measures were necessary at various points to keep the back fill in place and to get the back fill settled as promptly as possible.

We were also continuing with our work on the river banks. Some of this work could be done up to a certain point and then it was necessary to wait until further settlement occurred before we could complete the riprapping.

485 The replacement of these pistons carried on until September 27, 1932. The adjustment of the main compressor units carried over until July, 1932. In other words, it was not until that date that we felt we had all of the compressor units properly adjusted so that they would carry their full rated load with any degree of satisfaction. As a date for the purpose of setting up the company books, we arbitrarily selected January 1, 1932, as the date to use for completion construction.

On October 16, 1931, when we made the first delivery of gas under our firm contract with the Chicago District Pipeline Company, the defendants had on their payrolls a total of 737 men. We had 127 men carried on the payroll as operators and a part of the 127 were on stations, and, of course, some of their time was involved in this work of removing defective pistons and installing new pistons. The men carried as exclusively on construction work were 610.

During the period beginning October 16th and continuing for some time thereafter we were engaged in building up our operating organization. Some of the men who were to operate this pipeline system were selected from the personnel that had supervised the design and construction of the entire project. Of course, only the men who were qualified from an operating viewpoint were selected as operators, and those men who were not qualified were later released. A part of the operators had been selected by this time.

On January 1, 1932, we had 273 operators and 212 men carried on the payroll for construction duties. There was work in the nature of construction work to be finished up after January 1, 1932. Some of the men who were carried on the payroll as operating personnel on that date were devoting their time in part to finishing up the construction of the pipeline. A large part of the time of the men who were carried on the operating payroll in connection with the compressor stations was utilized on construction duties, particularly in connection with these exhaust valve gaskets and the piston replacement work. The same thing was true to some extent with the pipeline operating personnel, but not to the same extent.

On January 1, 1932, when I became general superintendent of the two companies there was a change in the scope of my duties incident to the change of my title from chief engineer to general superintendent. Prior to this date my duties had been confined to the design and construction of this project, and I had also assisted in some of the preliminary selection of a few of the operators. However, when I was made general superintendent of the two companies, my duties expanded and became more executive and supervisory in nature, and included such items as selecting the remaining operating personnel, the organizing of this personnel into the various operating departments, and the supervision of these departments.

Later on, in 1932, I assumed some responsibility in connection with the administering of the affairs pertaining to

Texoma's acreage. Prior to January 1, 1932, Mr. J. G.
486 Dickinson, who was in charge of Texoma's acreage,
had reported directly to Mr. Floyd C. Brown. Immediately after I became general superintendent Mr. Dickinson reported to me, and I gradually became involved in Texoma's acreage problems. This work had to do with the planning of Texoma's future drilling and development program, acreage trades, consolidation of leases, the expansion of the gathering system, and the expansion of the operating organization to handle the additional working and operating functions.

I also became involved in the development of facts pertaining to the Panhandle field as a whole, as a result of the heavy burden of litigation that Texoma has carried since it has been in operation in Texas. It was necessary to develop facts pertaining to Texoma's properties and the properties of other producers, facts pertaining to the Panhandle field as a whole, to the sour gas area, the sweet gas area, to geological conditions, and to see thatt hese facts were properly presented to the court.

I also assumed supervision of the company's sales organiaztion or sales department and supervised the market negotiations that this department carried on after January 1, 1932. It was the duty of this department to secure new contracts for the sale of domestic gas, new contracts for the sale of industrial gas, and to develop load building programs to increase the use of natural gas in the domestic markets that were then under contract.

As a matter of fact, as general superintendent I cover in the scope of my duties practically all of the executive ramifications of both of these companies, always, of course, under the direction of Mr. Brown, the general manager. I have been under Mr. Brown's supervision since 1919. I have been under his supervision on this one project since 1930 and have learned to know his policies fairly well. We confer in developing basic policies and I sometimes make decisions, all of which, of course, are subject to Mr. Brown's approval. Mr. Brown still says yes and no.

Questions by the Examiner.

As to what these sales programs were, when we secure a contract with a utility to distribute natural gas in a given town, we find that the consumption of that town is quite low, due to the type of market development that the utility management has employed in the past when they were distributing manufactured gas. In order to develop the market to the extent feasible and possible with natural gas, it is necessary to carry out promotional campaigns in order to increase the domestic consumption. This involves the use of more gas for commercial utilization, hotel cooking, restaurant cooking, summer hot water heating and more general automatic hot water heating, and also the use of natural gas to a greater extent in the heating of homes. It involves an appliance sales program in one phase of it, but that is not what it is directed at.

It is necessary for the utility to solicit this business. The business does not come to it. It obtains this business
only through advertising and direct solicitation and by
487 the establishment of promotional rates that will entice
the business, by the advertising of appliances that will
accomplish the results, and by the necessary sales endeavor to bring about an increased consumption of natural gas.

For instance, usually when you take a town that has been using manufactured gas, the consumption per meter will run in the neighborhood of 15,000 cubic feet per year, but in a development program you can increase that consumption up to some higher figure, depending on the type of territory and the wealth in that town. Sometimes these consumers' meters get up to the point of 50,000 cubic feet per meter for domestic utilization, not including house heating.

Direct Examination by Mr. Morgan Resumed.

As to what was done with all of the drawings, specifications, bids, awards, contracts, etc., that were made up in connection with the construction of this pipeline, we have in the company files all of the construction contracts and specifications that go with those contracts. We have all of the drawings. We have all of the vouchers making the payments under those contracts. We have all of the purchase vouchers covering the materials. We have all of the drawings pertaining to the fabrication of those materials or articles. In fact, I think we have every paper that forms the basis of the development of this project and the expenditure of the money that brought it into existence.

We have kept similar drawings, specifications, bids, etc., for additions to the pipeline and for replacements and other things of that kind, where it was necessary to have those specifications, etc. All of the contracts, specifications or drawings that have been prepared since the original project was constructed are also in our files. Those files are available to the engineers of the Federal Power Commission and the Illinois Commerce Commission in case they desire to see them in connection with this litigation.

We have not kept the old preliminary reports that were worked out in a preliminary way as studies. We have had no need for the preliminary reports that led up to what designs we were going to use or what materials we were going to use. We have kept the design that we purchased or we have kept the drawing that was used in assembling the material. We have kept the purchase record of the material and we have kept the contracts that assembled the project.

When I went out to California to inspect pipe lines out there or went up to Milwaukee to inspect the pipe mills of Smith Brothers, or to Gary to inspect the pipe mills by which our seamless pipe was manufactured, as the records here show, I did not make a written report of all of those things to anyone. I made these investigations to inform myself and as a basis of my own judgment, and having made the investigations I discussed my conclusions with Mr. Floyd C. Brown, but I do not recall that I made any formal report on any of those investigations.

The results of all of those preliminary studies are reflected in the thing that was finally adopted and which 488 was evidenced in the drawings, specifications and other records which have been kept as permanent records of the company and which are now available to the engineers of the two commissions involved in this litigation.

I have mentioned litigation in which Texoma has been involved with the Texas Railroad Commission and the fact that it was necessary for me to make some intensive study concerning the physical facts obtaining in the Texas Panhandle. This litigation developed out of a determined effort on the part of certain interests to obtain, through legislation or orders of the Texas Railroad Commission, a market for all producers of natural gas in the Panhandle field. They were attempting to obtain this market from the various pipeline companies, including Texoma.

Texoma had fortified itself with the necessary gas reserves and as the result of the conservation policy that was being followed in the field Texoma's gas reserves were being drained. Texoma was unable to protect itself against this drainage because of its limited market outlet. For Texoma to purchase gas under these conditions would in effect increase the drainage from its properties, and, at least in some instances, would result in Texoma's purchasing its own gas from the wells of others.

As a result of this situation Texoma has been involved in five major lawsuits around this particular question. Because of the importance of these lawsuits, it became my duty to see that the full facts pertaining to Texoma's situation, the situation of other producers, the full facts pertaining to the Panhandle field as a whole, and the geological facts pertaining to the field, were developed and properly presented to the court at the time the litigation occurred.

Those studies made under my direction in connection with that litigation involved the estimation of reserves, the observation of pressure conditions, the ascertainment of facts concerning drainage, and the relationship of sour gas to sweet gas, of oil to the gas, etc., in that field. This work also resulted in my being informed in regard to the entire field to a greater extent than I might otherwise be if we had been concerned with Texoma's properties only, and it had the same effect on other members of the company's organization, particularly Messrs. Dickinson and Peterson.

(July 25, 1939)

It was not my thought at the time I took over my duties as general superintendent on January 1, 1932, that the capital outlays of this pipeline project had all been made and completed. Due to our experience with other pipeline projects, we knew that projects of this kind required capital for various purposes during the years of its life.

In the case of this project, of course, we knew that Texoma was faced with a long acreage development program and that the drilling of additional wells would mean the building of additional lateral lines and meters. We knew that booster stations for these wells would be
489 needed in the later years of the field. We knew that capital would be required for other items, such as

water wells, cottages, future work on rivers, and items of this kind.

It became one of my early duties to confer with the operating heads, the chief engineer and other members of the organization, to minimize these capital expenditures as far as possible and to see that they were made in sufficient time to maintain the efficiency and capacity of the system and to protect the continuity of service. That has been a constant duty throughout the years that I have been general superintendent of these two companies. We have from time to time worked on various facilities in order to improve their efficiency or improve the capacity. We have diligently studied the Texoma acreage situation in order to minimize the amount of drilling required for the acreage and items of this kind. In spite of our constant endeavors in this direction, the two companies have experienced heavy capital expenditures each year of their existence.

I have the figures as to the amount of additional capital outlay expended or invested on the part of these pipelines beginning with the year 1932. The combined expenditures of the two companies, by years, have been:

1932	$ 558,435.46
1933	$ 325,321.67
1934	$ 309,872.53
1935	$1,327,080.20
1936	$1,131,145.58
1937	$ 709,818.95
1938	$1,041,394.86

This is a grand total of $5,403,069.25, or an average annual expenditure of $771,867.03.

Those are gross expenditures. I might say in this connection that these expenditures are in the years in which they were made and are not exactly coordinated with the years in which they were placed on the books of account. Subsequent adjustments might have been made back.

The number of men on the payroll of these two companies varies throughout the year. For the year 1938 it varied from 600 to 1,000 men. This variation is brought about by the different departments in the company, the different work that each of those departments performs, and the way the seasons affect different departments. I would say that 400 men are added for seasonal activities.

Questions by the Examiner.

The summer months, particularly July, August and September, are usually our biggest months. They are not necessarily always the biggest months, but usually they are. That is because in the other months of the year we are carrying such heavy loads on the pipeline and the compressor station equipment that we are able to carry out only a limited amount of maintenance then.

490 The number of operators, strictly operators, does not vary particularly over the year. When we come into the summer months, the operators being constant, the maintenance crews expand, because of the amount of maintenance work that we must perform on week ends, when the load is off, and matters of that kind, and then we also have various emergency jobs, or what may be termed emergency jobs, that we perform in the summer time. We will pick out the 4th of July to do some things that are done simply to guard service. We will pick out week ends or holidays, such as the 4th of July or Labor Day, to perform certain jobs that require shut-out of the line, and naturally those forces must be expanded considerably to handle that work promptly.

Direct Examination by Mr. Morgan Resumed.

The departments of the two companies may be described briefly by enumerating the Amarillo office of the Texoma Natural Gas Company, which is in charge of Mr. J. G. Dickinson. This office is generally referred to as the production department. However, in this office we have a number of divisions, such as the accounting division, which handles the books of account pertaining to the amount of gas produced, royalty to be paid, the production tax to be paid, and accounts of this kind.

Mr. Dickinson also has the land and lease division, which is headed by Mr. C. C. Kuhne. This department has to do with the keeping of the leases, observing the rental dates that occur in those leases, observing the obligations that accrue to Texoma under those leases, and has to do with acreage trades, acreage consolidations and matters of that kind.

Mr. Dickinson also has the division that is known as geological. This division contains Mr. C. J. Peterson, chief geologist of Texoma, and Mr. W. F. Brainard, his assistant. They also have other personnel, such as draftsmen, stenographer, etc. This department is concerned with the location of Texoma's wells, field records, geological records, and development of geological facts in connection with Texoma's litigation.

Mr. Dickinson also has a production division, which is headed by Mr. Charles Galloup. It is the function of this division to supervise the drilling of a well, to see that it is properly cemented, properly cased, and properly completed, and this department also has supervision of the wells during their operating life. By that I mean that it is the duty of Mr. Galloup to ascertain when any work is needed on these wells and what should be done to keep the wells in the best producing condition.

Some of the divisions I have just given are field divisions. For example, Mr. Galloup's is a field division reporting into the Amarillo office. The divisions that have been described up to now are all under Mr. J. G. Dickinson's supervision in the general production department.

I am now coming to a description of the property originating in Texas and coming on north to Chicago, describing the departments that handle that property and the operation of the property. That is what I meant by field divisions. I did not mean the gas field. I have com-
pleted only the production phase of the gas field. I
491 have not mentioned the gathering system or the Fritch
station or the booster stations or any of those features.

At Fritch, Texas, we have our first main line compressor station and gasoline plant. This station is under the supervision of Mr. R. T. Powers. Mr. Powers is superintendent of the Fritch compressor station and reports direct to Mr. G. M. Davidson, chief engineer and superintendent of operations in the Chicago office. Mr. Powers is supervisor of that entire plant, which consists of a compressor station and a gasoline plant, and in this gasoline plant is installed the equipment that performs the dehydration. In general the words "dehydration plant" and "refrigeration plant" refer to the same thing, except that I feel that the word "dehydration" is more accurate and descriptive, and the words "refrigeration" is more indicative of how the dehydration is accomplished. The way they have been used in this record those expressions mean the same.

Coming to the compressor stations of Natural Gas Pipeline Company of America, which number from 2 to 10, consecutively, these stations are under the supervision of Mr. W. H. Davidson, superintendent of compressor stations for the Natural Gas Pipeline Company. Mr. Davidson is located in the Chicago office.

Returning now to the Texas end of the system, we have the gathering system and we have the main 24 inch trunk extending from Fritch, Texas, to Joliet, Illinois. This is sometimes referred to in general as a transmission system, and this property is under the supervision of Mr. R. G. Strong, superintendent of pipeline operation for Texoma Natural Gas Company and Natural Gas Pipeline Company of America. Mr. Strong has general supervision of the present gathering system and booster stations and will have charge of the operation of the future facilities that are installed to expand the present gathering system and booster stations. His department has charge of all the field meters and all of the sales meters along the pipeline system.

The other division of the property is the telephone and pressure dispatching department. We have a privately owned telephone system, extending from Fritch, Texas, to Chicago. The system has various branches on it, connecting it to the Amarillo office, various points in the field, all of the compressor stations, and the regulating station and metering station at Joliet. This department is supervised by Mr. W. T. Bulla, who is located in the Chicago office.

In the Chicago office we have Mr. G. M. Davidson, chief engineer and superintendent of operations, to whom the various operating heads report, namely, Messrs. Powers, Strong, W. H. Davidson and Bulla. Mr. G. M. Davidson also has under his supervision the engineering department, made up of engineers, for preparing estimates for designs, for special problems, and he has under his supervision the drafting room.

The special problems division of the engineering department is headed by Mr. R. M. Bussard, and we supplant Mr. Bussard's efforts by supplying him with additional personnel from the company or with consultant from the outside
when this is necessary. Mr. Bussard sometimes re-
492 ports to Mr. G. M. Davidson and sometimes he reports
to me, depending upon who has given him the assignment with which he is confronted at that time.

The Chicago office also contains another department known as the accounting department. This is under the supervision of Mr. S. E. Campbell, the Secretary and treasurer of the two companies. Of course, this department has to do with the books of accounts and records of the company. To be exact as to Mr. Campbell's title, it is secretary and assistant treasurer of the two companies. He has charge of the records of the company.

All of those department heads have various subdivisions working under their directions. They all have assistants. Sometimes they have assistants in the Chicago office and sometimes their assistants are located in the field.

For example, Mr. Strong has division heads under him. The division heads are located on the property in the field. He has one division superintendent located at Fritch, Texas, Mr. L. D. Williams, and Mr. Williams has the immediate supervision of all of the gathering systems, the meters, and the main 24 inch trunk pipelines north to Station 2, and also of the present booster station. Mr. Strong has other superintendents up the line. He has three in total, two others in addition to Mr. L. D. Williams. He has Mr. Hugh Smith, located at Great Bend, Kansas. Mr. Smith has the immediate supervision of the 24 inch pipeline system extending from Station 2 to the Missouri River. He has Mr. E. D. Warren, located at Station 9, which is near Harper, Iowa, and Mr. Warren has immediate supervision of the 24 inch trunk pipeline system extending from the Missouri River to Joliet.

Mr. W. H. Davidson, who supervises the operation of the compressor stations of the Natural Gas Pipeline Company system, has a superintendent in charge of each of the nine stations under his supervision. This same general type of organization is carried out in each of the other departments.

Mr. Powers has supervision of his department. Mr. Hammerschmidt, who has testified here, is in charge of our Fritch laboratory, which is part of the Fritch station, and Mr. Hammerschmidt reports direct to Mr. Powers unless he is withdrawn from his regular assignments to investigate some special matter.

I have mentioned our special problems department, headed by Mr. Bussard. We assign to this department problems pertaining to the company business, but not immediately connected with the operation functions that are being performed from day to day. These are problems that we wish to have solved in order to guide us in some future capital expenditures or to guide us in some operating policy. The engineers in the engineering department are usually interrupted so frequently with requests from the vari-

ous operating heads that we find that we can make better progress with the solving of special problems by assigning to them a group of men that are not interrupted. Mr. Bussard's efforts are supplemented by any additional personnel that may be needed, and if we are unable to obtain this personnel from the system we obtain consulting engineers from the outside.
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We also have a new business department. This new business department came under my supervision as of January 1, 1932, and it has been the function of this department to secure additional contracts for the sale of domestic gas, additional contracts for the sale of industrial gas, and to develop the market outlet under these two different kinds of contracts. This department is in charge of Mr. H. O. Loebell. Mr. Loebell is a man that has had many years of experience in the development of markets for natural gas, particularly in his association with the Cities Service Company, and he is also a national authority on the combustion of natural gas. This department has varied from twelve to two men, depending on the amount of negotiation work being carried on. We have two men in that department now, one of them on part time.

As of January 1, 1932, when I became general superintendent, our daily deliveries of gas were fluctuating between sixty-five million and eighty million cubic feet. Part of the delivery was temporary. The firm portion of the delivery was approximately fifty-five million cubic feet. As of that time, that left an unused capacity of 95 million. The total capacity of the line as it was originally constructed was 175 million cubic feet per day.

Down to that time Natural Gas Pipeline Company had the July 25, 1931, contract with Chicago District pipeline Company and we had contracts for the sale of gas to four small towns located adjacent to our pipeline. Those contracts were not closed transactions so far as the activities of the pipeline were concerned. All that had been accomplished was the securing of the contract and in most cases natural gas service had been established, but there had been no market development take place either in the domestic phase of the business or in the industrial phase of the business.

From the standpoint of Natural Gas Pipeline Company in connection with these contracts it was necessary, in order to utilize or realize the full potentialities of the market, to encourage and assist the utility management in charge of the various properties in the development of their market territory. These endeavors took the form of guiding them into sale of natural gas for house heating and into the sale of natural gas for industrial utilization at special rates.

Our new business department had to do with these further promotional activities under existing contracts, and it also had to do with going out and getting new contracts. The promotional activities that we carried on under the contracts then secured were only a part of the function of this department. We went forward in a very aggressive manner, endeavoring to secure additional contracts for domestic utilization and industrial utilization with other utility operators that were operating gas properties in towns adjacent to our pipeline. This was one of this department's very major functions.

Although the pipeline system is now loaded 494 approximately to its full capacity, it is still necessary to maintain this new business department. It is not only necessary to load a pipeline, but in the case of this line a part of this load was secured under temporary contracts, and it is necessary to conduct negotiations for the purpose of renewing the contracts from time to time—in other words, to maintain the full load condition. We also find that it is necessary to have a department of this type for the purpose of rendering what might be called service. Some of the utility operators, having had no previous experience with natural gas, are confused at times as to what is the best policy to pursue, and due to the occasional industrial changes that take place in their property, they need guidance as to what they should do to keep their own service on a proper basis and keep their property earning its maximum. Consequently, in recent years, outside of the negotiations for renewal of the expiring contracts, we have used this department largely for servicing the contracts already secured.

The line has been substantially loaded since the beginning of 1936. The market negotiations directed at the loading of the line were carried out under my supervision and extended from January 1, 1932, until the beginning of 1936. Since that time there have been negotiations resulting in additional contracts and in the renewal of additional contracts, but the majority of the loading of the line, or the negotiations that resulted in loading the line, occurred from 1932 to 1935, with the exception of the negotiations that preceded the former date that resulted in the five contracts I have previously mentioned.

The building of this load involved cost to the pipeline company in addition to the salaries and office expenses of those engaged as operators in the new business department. I have already referred to the amount of volume that we were handling as of January 1, 1932, and in spite of strenuous efforts on our part the sales volume realized in 1933 was less than it was in 1932. The depression was getting progressively worse and we were faced with a very critical situation. Consequently, it was necessary for us to take many steps in order to overcome the difficulties and handicaps facing us. In other words, to expedite the attachment of these markets at a more rapid rate and in order to encourage the development of the markets, we made cash contributions to the new business activities on the part of these utility operators that had signed contracts with us. This expenditure totaled in the neighborhood of $1,500,000. These expenditures were cash contributions to the utility companies and equaled a million and a half dollars.

We also made contributions to those load building campaigns by furnishing natural gas under special contracts for limited periods of time at concession prices. These contracts of this type enabled the utility companies, through concessions in price on the industrial gas, to amortize the aditional capital that was required to make the natural gas available to the industrial consumer and to amortize the capital required for the yard piping, the burners, and the furnace changes in the plants of the various industrial consumers.

Cross-Examination Interposed by Mr. Slaff.

It is not completely correct to say that those concession prices allowed the consumer to amortize the additional
495 cost involved to him. You can start at either end.

There are two prices in the chain, our price and the price of the utility to the customer. By making a concession price on our part, the utility management was able to make a concession price to the consumer, so in those two divisions is the amortization of the capital expenditures on the part of the consumer and the capital expenditures on the part of the utility that made the natural gas available to the plant. When I refer to the utility management or the utility amortizing the capital, I am referring to the utilities that signed contracts with Natural Gas Pipeline Company of America for the purchase of natural gas to be resold for domestic consumption and that signed contracts for the purchase of natural gas to be resold for industrial consumption; in other words, our purchasers.

Direct Examination Resumed by Mr. Morgan.

The original capacity provided for in our system was 175 million cubic feet a day. That capacity was increased during the period from the beginning of 1932 to the end of 1935. We increased the capacity of the system in various steps. We did this by making certain changes in the compressor station equipment and by raising the intake pressure and the discharge pressure imposed upon the compressor stations. We also installed additional equipment in some of the compressor stations in order to realize this increased capacity. I do not have the dates at hand as to just when those steps were taken, but they were taken prior to 1936. It was during the interval from the time I began functioning as general superintendent on January 1, 1932, and the end of 1935.

Questions by the Examiner.

None of those concession contracts is still in effect. I have not refreshed my mind recently on the exact form that the contractual relationship took that covered the payment of these cash contributions, but I can describe them in general.

We would approach the utility management operating the gas distribution property in a given town and by discussion and negotiations with the management develop that that particular town should have a market development pertaining to house heating up to a certain point, or, at least, to a certain degree. We would then attempt to determine the cost of the campaign that would bring about the utilization of natural gas in this town to the extent that we had discussed. In the total cost of the campaign would be included such items as newspaper advertising, direct mail advertising, direct solicitation, advertising of appliances, and the establishment of sales policies pertaining to the sale of equipment on time payments, and many other costs.

Direct Examination Resumed by Mr. Morgan.

That would include the demonstration of gas burning appliances in the homes and in other places where they hoped to sell gas, if those features were incorporated in the sales campaign. The campaigns were not always the same for different towns. The campaigns were designed to fit the particular town in which the campaign was to be conducted, and in some cases it was necessary to set up demonstrating units in some public place where the utilization of natural gas could be demonstrated in a modern cooking range or in an automatic water heater or in an automatic gas fired furnace.

Having reached a general agreement as to the extent
496 of the campaign and the objectives to be realized and
the cost of the campaign, we would then decide on what portion of this total cost we would bear. We made these payments to the utilities in cash in various manners. One common form that the payments took was this: We said that for each additional house heating customer that you secure we will pay you X dollars. Also, we will consider as an equivalent of a house heating customer the sale of so many space heating circulating heaters, or the sale of so many radiant heaters. The attachment of any additional business, be it house heating through central heating plants or heating through auxiliary equipment, was converted into the equivalent units of house heating central heating plants. We then made our payment to the utility based upon the number of additional customers secured and the extent to which they carried out the campaign. That was one very common form of cash contribution.

Cross-Examination Interposed by Mr. Slaff.

These new business expenses I have spoken of were entered in our books of account; but I am not sure of the classification. I am not an accountant.

Direct Examination Resumed by Mr. Morgan.

I referred to increasing the capacity of the line by some changes in the compressor stations. We installed additional power or compressing units in the Fritch station, also in Stations 2, 3 and 9. We installed unloaders on the compressor end of those compressing units in all of the stations of Natural Gas Pipeline Company's system and on a part of the units of the Fritch station of Texoma Natural Gas Company.

An unloader in the sense I am using the term in connection with this property is an addition to the compressor end of the main compressing unit that may be used to vary the amount of clearance in the compressor cylinder. This permits the operation of the compressor unit over a wider and different range of pressures than you could have operated it without overloading the main power end of the unit without the unloader.

We also raised the intake and discharge pressures at the compressor stations, and I am not certain, but I think we enlarged the dehydrating equipment in the gasoline plant. There may have been a few other minor changes I do not think of at the moment.

I have been asked why we designed and constructed our pipeline with a capacity to handle 175 million cubic feet of gas daily from the beginning, when we had a firm market for only about 55 million a day and a spasmodic or temporary market for some twenty or twenty-five million in excess of that, instead of building it with a capacity to handle the gas that we had sales for at the time we built it. The volumes of sales I refer to as existing January 1, 1932, namely, 55 million firm and 80 million in total, including the interruptible, were the volumes that the market then required prior to the market development and prior to the connection of additional towns. We, through investigation, had determined that the natural gas requirements of these markets would be at least 175 million, if not more. Therefore, we attempted to select the most economical size of line that could be constructed at that time to perform the service that was expected and that would provide adequate gas for this area. To have constructed a smaller line, one more in keeping with the size of the load that 497 would come on originally, and later construct a second line and a third line, and so on and so forth, would have resulted in a cost far in excess of that which we had with the single line and the venture would not have been feasible.

It certainly would have been a handicap to our building up our load if we had to go out and sell gas and then build the pipeline to start delivering it. It has been our experience that you have difficulty in negotiating contracts for the sale of gas unless you can show that you have the gas to sell and show that you have the financial ability to make it available. Having constructed this line and having the gas in the field and having a system that was operating, we were in position to talk about the sale of something that we were ready to deliver immediately.

We thought the economies to be accomplished by building this capacity in advance and the advantages of our having the capacity at all times available as we built the load would more than offset the interest and the maintenance and the operation and depreciation on the unused portion of our line during that period of load building. We did not expect, however, that it would require the length of time to load this line that it did require. We were wrong on the depression.

Negotiation of all of these contracts consumed considerable time, some contracts more than others. I would say that negotiations sometimes extended over a period of months and sometimes over a period of two or three years. The difficulty we encountered was that it was necessary for us to convince the management of these utilities that the introduction of natural gas into their property and the changing of their service from manufactured gas to mixed gas or straight natural gas would prove to be feasible from their viewpoint.

It cost money to change over from artificial gas to natural gas. The utilities in introducing natural gas have what is called the change-over expense. This involves the expense of adjusting all their customers' appliances to consume the natural gas rather than the gas that had been distributed formerly. They also had certain capital expenditures. In some cases the utility laid lateral lines to the city in order to take the straight natural gas from the point of delivery on our system into their distribution plant. Sometimes it had capital expenses for the installation of equipment in order to odorize the natural gas before it was distributed. Sometimes they had expenses to their equipment if they were going to distribute mixed gas, a blend of natural and manufactured or a blend of natural and coke oven gas. The utilities had various expenses of that kind and they also had the problem of working out the new rates with their regulatory bodies. Usually these negotiations resulted in the rates to the consumer being reduced, with the result that the operating economy of the utility operator was affected.

Cross-Examination Interposed by Mr. Slaff.

I can give you a list subsequently of those instances in which rates to the consumers were reduced.

498 *Direct Examination Resumed by Mr. Morgan.*

We met with other sales resistance in addition to that coming from the natural aversion on the part of those with whom we were negotiating to spend additional money and to go to all of the expense and trouble incident to making the changeover. There were other elements of resistance encountered in our efforts to develop these markets. Even after we had the utility management convinced that the venture was feasible, and even after an agreement had been reached in regard to the rates at which the natural gas would be resold to the consumer, we still had opposition. This opposition came from a different source, usually from those interests that were financially affected by the introduction of natural gas, namely, the railroads, the coal producers, coal dealers, and some labor unions. These factions sometimes took an aggressive position early in negotiations and sometimes later. They occasionally appeared before regulatory bodies trying to prevent the introduction of natural gas. Other times they would carry on publicity campaigns designed to create uneasiness in the minds of the public.

By alleging that natural gas contained dangerous sulphur compounds and was injurious to the health of the consumer, and by alleging that natural gas would darken the pots and pans and the silverware of the housewife, they attempted to emphasize that the utilization of natural gas in the home was extremely dangerous, and whenever they could locate some instance where a catastrophe had occurred in connection with natural gas they gave this incident wide publicity.

They also attempted to play upon the local sympathies of the public by pointing out to the delivery trucks and the local coal dealers how it would affect their business. These efforts on the part of the various interests were not always the same in every locality. Sometimes in some places they were more aggressive than others. Railroads even went to the extent of establishing special freight rates on coal to towns where it was proposed natural gas be introduced.

In the case of the industrial consumers, these consumers were concerned with the cost of the yard piping, cost of burners, cost of furnace changes, if any were necessary, and they were also concerned with the utilization of natural gas and how the use of this fuel in their plant would affect their product. The industrial consumer was not interested in taking these chances unless he could see that his additional capital for the lateral line and burners could be amortized and he could also realize some saving to himself in his fuel cost.

The element of interrupted service was one of the difficulties we had to deal with in our effort to dispose of industrial gas. The coal interests, in an endeavor to hold the industrial consumers of coal, would point out to the prospective industrial customer that this gas was coming from the State of Texas, that its service might not be reliable, and that a shortage of fuel might be extremely expensive, and this hazard was particularly emphasized in the case of the glass customers. The nature of this particular process is such that a sudden interruption of a fuel supply would result in loss of a considerable amount of product and might even spoil some of the furnaces.

499 In negotiating these contracts for the sale of gas to be used as industrial fuel, we were not able to assure the purchaser, and our purchaser was unable to assure his purchaser, that he could get this gas continuously from day to day, from the first of the year to the last of the year. We did not attempt to sell the industrial gas on that basis. The contracts covering the sale of natural gas for domestic utilization gave the purchasers of gas under these contracts prior rights to a supply of gas, and our obligations in regard to the class of service to be rendered under the domestic contracts were different than the obligations that we assumed under the industrial contracts. It was necessary to give these domestic demands prior call on our capacity; otherwise they would not be interested in the contract at all.

Gas used for domestic purposes is subject to a fluctuating demand in different seasons of the year. We were able, with a capacity of 175 million, to protect the domestic users who relied upon our system as the source of their gas so that they would at all times have their full needs for domestic requirements, whether it be cold or hot or whether they wanted to cook a big meal or a little one. I explain that in this way:

The carrying of the two classes of service on a pipeline facilitates the rendering of the preferred class of service.

By that I mean having contracts for supplying natural gas to domestic markets and also having contracts for supplying natural gas for industrial markets enables us to render a more reliable and a more certain service to the domestic market. This is true because of the increased volume of gas being transported through the system, because of the increased amount of gas packed in the pipeline system, and because the consumption to the industrial consumer can be interrupted to meet the peak requirements of the domestic utilization.

Therefore, regardless of the weather and the calls upon our system for gas for such purposes as cooking and house heating and other domestic usage, we are always able to supply those requirements because they are well below the total capacity of our line, except, of course, when we may be confronted with some catastrophe such as a complete disabling of service.

If the domestic load during the winter months or some season of blizzard reaches a point where we are not able to sell the quantity of gas that we have been selling previously to our industrial customers, the operation of the various classes of contracts is such that the first delivery is to the domestic contract and the domestic consumer. Consequently, the entire requirements for this market are met, and then if there is any additional gas remaining it is sold to the class of industrial consumers that have purchased preferred service in the industrial classification. In other words, when we have not the gas available after supplying our domestic demand, some industry has to be cut off until that domestic demand goes down to where we have the gas available. That happens frequently.

500 *Questions by the Examiner.*

Natural Gas Pipeline Company of America has approximately seven direct contracts with industrial consumers. I am not certain of the exact number. When I referred to industrial contracts, in my previous testimony, I was not confining the term to the industrial contracts that we hold directly with the industrial consumers. I was also including all the contracts that we have with the utilities to cover the supply of natural gas to be resold for industrial consumption. Our obligation to deliver gas under our industrial contracts with the utilities is contingent upon the utilities following a certain schedule in their delivery of natural gas to their industrial customers. That is not a part of the agreement of July 25, 1931.

By requiring the utilities to curtail delivery in a certain order in our industrial contracts with the utilities, we automatically assure that the service to the domestic market will not be interrupted. The utilities, in turn, take certain steps in their contracts with the industrial consumers to enable them to carry out the proper program, but the clauses in these contracts between the utility and the industrial consumer are not uniform in language or in principle. We do not require that the utility submit to us for approval each industrial contract.

Direct Examination by Mr. Morgan Resumed.

Natural Gas Pipeline Company has negotiated 161 contracts for the sale of gas. Five of these contracts had been negotiated and signed by January 1, 1932, at the time I took over the supervision of the new business department. However, I have been concerned with these contracts since they were executed, particularly with those phases that pertain to market development under these contracts. With all of the other contracts included in the 161, I have supervised the negotiations that led up to the execution of the contracts. I have participated in the negotiations in a great many instances.

Of these 161 contracts, 47 are still in effect. Of those 47 contracts, 20 cover a supply of natural gas to be resold for domestic utilization. These 20 contracts are ordinarily referred to as firm contracts. Our obligation to deliver under each of those 20 contracts is a firm obligation as opposed to interruptible.

These 20 contracts continue in effect for a definite time, but not all for the same length of time. One of these contracts expires in 1939, eight in 1941, and eleven in 1946. Included in the eleven is the July 25, 1931, contract with the Chicago District Pipeline Company, which may be extended for a period of five years beyond 1946 at our option.

That leaves 27 of the 47 contracts for other than domestic purposes. Two of the 27 are Texoma contracts, covering the sale of natural gas at the mouth of the well to other pipeline interests. Some of the remaining 25 contracts are contracts between Natural Gas Pipeline Company and industrial consumers direct. There are approximately seven

of those. I am not certain as to the exact number. The
501 remaining contracts in that group are industrial contracts with utility companies covering a supply of natural gas to be resold for industrial utilization.

The two contracts of Texoma to which I referred are with other pipeline interests, and are in addition to its contract with Natural Gas Pipeline Company of America. Texoma has two contracts covering the sale of natural gas at the mouth of the well to other pipeline interests. One covers the sale of natural gas from Texoma wells located in Wheeler County, and this contract is with the Lone Star Gas Company. The contract is subject to cancellation by either party on sixty or ninety days notice—I am not certain which. The other contract is for the sale of natural gas from certain Texoma wells located in Gray County and is with the Coltexo Corporation, I believe there are five wells involved in the Lone Star contract and eight wells involved in the Coltexo contract.

As to why we sell gas when we need it ourselves, some of these wells are located in Wheeler County and some in Gray County, and when we constructed the gathering system we deferred extending it sufficiently to permit those wells to produce into our own pipeline system. Furthermore, the wells in Wheeler County were then connected to the Lone Star Gas Company and we were receiving revenue from the sale of the gas. All of those wells were already on the original blocks of acreage that we acquired.

These wells are so remotely situated with reference to our pipeline system that we cannot deliver the gas from them into the pipe line and we do not deem it economic to build to them in the light of the fact that we have more gas than we can sell to the west of there. We had the choice between selling gas from the wells to those interests that were willing to buy it or to make the necessary capital expenditures to connect the wells into our own system. Due to the development situation on the acerage adjacent to the system constructed, we have not needed the gas from these wells and have continued to sell it. If it is not sold, it will be drained away from Texoma's properties, and we are selling it and putting the revenue into our general revenue.

(Request by counsel to the two commissions for data underlying the economic problem outlined in the foregoing paragraph objected to by counsel for the company. The Examiner took the request under advisement.)

As a matter of fact, under the conditions in that field, Texoma would not be able to produce any more gas into its system during the life of the field if it had those Coltexo and Lone Star wells connected to its pipeline system. The record already shows that tremendous quantities of gas have been drained away from Texoma's properties, and if we were taking a part of our load from those wells in Wheeler and eastern Gray County that drainage would have been increased somewhere else to offset it.

The 25 industrial contracts, whether they be directly with the industrial consumer or with purchasers who in turn resell to the industrial consumers, are not permanent contracts. They are relatively short in length. Fifteen expire in 1939. Three expire in 1940; four in 1941; one in 1942; and one in 1946, and one contract runs until cancelled by either party on thirty days' notice.

502 It is my experience that when it is necessary to renew these contracts a certain amount of negotiation is required. The amount is not always the same in each instance, but the utility with which these negotiations might be conducted often has changes that it desires to make in the contract, and sometimes the negotiations pertaining to these changes consume considerable time.

These contracts do not all provide for the same price. The price in these industrial contracts is the result of negotiations, and the difference in price is accounted for by the difference in the service to be rendered by us in delivering gas under the contracts. We naturally negotiate for the highest price we can obtain on these contracts. The difference in price is due to the class of service that will be rendered under the different price classes. I mean that the higher priced industrial contract enjoys a class of service superior to a lower priced industrial contract. I am speaking of the industrial contracts between ourselves and the utility which resells the gas to the industrial consumer. The utility in reselling the gas to the industrial consumer makes price classifications based upon the class of service rendered also.

By the class of service I mean that the lowest priced industrial contract is the service that is interrupted first when there is a shortage of natural gas. Following that the next lowest priced service is interrupted if there is still a deficiency of supply of natural gas. In other words, if we have a heavy call on our capacity for domestic gas due to cold weather or some other consideration, and it is necessary to cut off temporarily a part of our industrial load, we cut off the fuel on the one that is paying the least for it first.

That happens because the total amount of gas available, of course, limits the amount that can be resold, and the operation of the contracts between Natural Gas Pipeline Company and the various utilities is such that it requires the utility to curtail or discontinue service to those customers in the lower priced utilization. These customers are sometimes grouped into general classifications, namely, boiler fuel customers, steel customers, glass customers. The general scheme of the operation of the contracts is that the customers paying the highest price for the industrial gas are interrupted last, and, in turn, our obligation to deliver the gas for the highest priced industrial consumer follows immediately after our obligation to deliver the domestic gas and before we deliver any gas for any lower priced industrial contract.

In conducting these negotiations we find that the man who is to be interrupted last and who may have a good chance at continuous service is willing to pay more money in order to be placed in that position.

As a practical matter, that limitation which we place upon our purchaser in our contract for the sale of industrial gas imposes the same limitation upon our purchaser when he resells it to other customers. I have already stated that our industrial contracts with the utility companies require that the utilities carry out this scheme of curtailment to the lower priced industrial customer before they curtail deliveries to any higher priced industrial customer.

This is done by stating that our obligation to deliver
503 any quantity of industrial gas is contingent upon their
following the said schedule.

Questions by the Examiner.

We do not have a similar provision in our July 25, 1931, contract, with Chicago District Pipeline Company. That contract covered a supply of gas that was to be a firm supply, with the exception that it did cover for a short period an additional supply of natural gas which was not firm and which was to be resold for certain specific uses. In that case we had only one contract involving two classes of service and only one price involved in the interruptible class of service. Later we negotiated industrial contracts with the Chicago District. By that I mean contracts covering a supply of natural gas to be resold for industrial utilization. These contracts came into existence in a certain order.

In the first contract there was a supply of natural gas to be resold as boiler fuel. Later there was another contract for a supply of natural gas to be resold to steel companies. There was also a contract covering a supply of natural gas to be resold to glass companies. In these three industrial contracts, with different prices, different service requirements were imposed upon the utility.

In order that the service to the highest priced industrial class of customer be satisfactory, and in order that those customers be retained, it was essential that the service to those customers be not disturbed at the time when service was being rendered to industrial customers paying a lower price. Consequently, the arrangement and provisions of the industrial contracts that operated separate from the July 25, 1931, contract was such as to require the utility to make delivery to the highest priced industrial customer and then to the next priced industrial customer, and that in the event of a deficiency in the total amount of natural gas available, the lowest priced industrial customer would be interrupted prior to any other priced class of customer.

Direct Examination by Mr. Morgan Resumed.

The industrial customer is not bound to consume any quantity of natural gas. In effect, these contracts are options on his part as to the amount of natural gas that he takes delivery on and consumes. The contract serves the purpose only of stating the price that is to be applied for the amount that he does take and consume, if he takes it.

In addition, in some cases there was included in the contracts between the utility and the industrial consumer certain minimum monthly charges for the purpose of amortizing the capital in the industrial meter that the utility provided for metering the gas to the consumer, but, in general, the contract between the utility and the industrial consumer is in effect an option on the part of the consumer, and he can take the gas and consume it or he can leave it. Our purchaser has that same option with reference to the gas going to that kind of a customer.

This element of uncertainty operates to vary the de-
504 mand for industrial gas from time to time. It is not only the element of uncertainty, but the particular business conditions affecting the industry and the particular policy that that industry is following in regard to the number of days per week that it operates, and items of this kind affect the demand for industrial gas. If the industry is shut down or curtailed as a result of adverse business situations, the deliveries under the industrial contracts go down the same as the consumption of the customers goes down. This is brought about not only by business conditions, but is affected to some extent by weather conditions.

This runs into substantial money. For instance, between the year of 1937 and the year of 1938, the volumes of natural gas delivered for industrial consumption declined from 29,118,904,000 cubic feet in 1937 to 24,304,875,000 cubic feet in 1938. The revenues declined from $3,775,215.64 in 1937 to $3,069,485.53, a difference of approximately $706,000.00.

Cross-Examination by Mr. Booth Interposed.

We have participated in negotiations between the utility and the prospective industrial consumer in many instances. When I use the term "utility" I am referring to all the utilities that purchase gas from us.

In recent years I do not recall that any prospective industrial customer has applied directly to us for service except customers located immediately adjacent to our line or customers located outside of corporate limits. In the early days, back in 1932 and during that period, there were instances where the industrial customer applied to us for service.

Direct Examination by Mr. Morgan Resumed.

As a matter of fact, the pressure is generally from us to the utility and from the utility to the prospective customer in order to acquire and attach this business.

Questions by the Examiner.

We do not sign the contracts between the utility and the industrial consumers in any way as guarantor of the agreement. Our industrial contracts with the utilities require that those contracts be sumitted to us; but we are not a party in any way to that agreement so far as signatures are concerned.

Direct Examination by Mr. Morgan Resumed.

I have been asked as to the protection of the firm load against the operation of the industrial contracts. The July 25, 1931, contract between Natural Gas Pipeline Company of America and Chicago District Pipeline Company provides for a firm supply of natural gas, and Natural Gas Pipeline Company is entitled under that contract in all events except in the case of force majeure. The pipe-
505 line company has no option about delivering the quantity required under that contract. The pipeline company delivers additional quantities of natural gas to Chicago District Pipeline Company under other contracts which are termed industrial contracts in general and which provide for an interruptible supply and these contracts contain a provision that in effect protect the quantity of natural gas required to be delivered under the July 25, 1931, contract.

The Chicago District Pipeline Company is required to submit copies of the contract that they or the local utility executes with the industrial consumer, after the contract is executed—that is, the contract between the Chicago District or the local utilities and the industrial consumer. They are submitted to us after they are executed. It is not required that we approve those contracts. It is required that they file them with us after they are executed in order that we be informed about the situation and to facilitate our preparation of the gas bill at the end of the month.

I recall only one instance where we sat in the negotiations between our purchaser and the prospective industrial consumer. In that instance we were present in order to stimulate the interest of the prospective customer in the use of natural gas and to determine whether or not we could be helpful in explaining to the prospective customer how he could use natural gas in the proposed utilization.

As stated, the pipeline was loaded from early in 1936. The volumes of natural gas sold by Natural Gas Pipeline Company of America under all of its domestic sales contracts for each of the years have been as follows: 1936, 44,568,561,000 cubic feet; 1937, 45,357,989,000 cubic feet; 1938, 44,454,164,000 cubic feet. The average of these three years is 44,793,571,000 cubic feet.

The volumes of gas sold by the company during the same period under its interruptible industrial contracts have been as follows: 1936, 25,046,776,000 cubic feet; 1937, 29,118,904,000 cubic feet; 1938, 24,304,875,000 cubic feet. The average for the three year period is 26,156,852,000 cubic feet.

The combined volumes for domestic and industrial sales for each of the three years have been: 1936, 69,615,337,000 cubic feet; 1937, 74,476,893,000 cubic feet; 1938, 68,759,039,000 cubic feet. The average for the three year period is 70,950,423,000 cubic feet.

Based on my experience through the entire operating life of this pipeline company in negotiating the various contracts under which Natural Gas Pipeline Company has sold and delivered gas, and my knowledge of the conditions under which we are now marketing and will market natural gas in the future, I have an opinion as to the volume of gas we will probably be able to sell and deliver over the next ten or fifteen years.

Assuming that the natural gas is available and can be economically produced, which will not be for a period of fifteen years, my judgment is that the average annual volume that Natural Gas Pipeline Company can expect to sell
year after year in those years when the gas is available
506 is an average of the three year period, 1936 to 1938 inclusive. This average volume is 70,950,423,000 cubic feet.

During the period of 1936 to 1938 inclusive, the system and equipment have been in an efficient operating condition. We have operated this system at capacity, in fact on many days in each of those years the main compressor units have been operated at loads in excess of their normal rating.

In arriving at this average sales volume for the future, which I expect to be the maximum average sales volume per year that this company can expect to realize, I have not only considered the condition of the equipment and the way it has been operated, but I have also considered the load conditions that we have experienced, the seasonal influences on these loads at various points, and I consider the average of the past three year period a good measure of the sales volumes of this system for the future.

We may have occasional years when we will exceed this average sales volume, but we will also have years in which we will not realize the average sales volume, as we did in 1936 and 1938.

I have said that we will not be able to sell and deliver these volumes over the next fifteen years because we would not have the gas available. As to the period over which I think we will have gas which can be economically produced and made available for sale in such volume, I will say that, assuming that we continue to make the capital expenditures necessary to carry out an adequate development program on Texoma's acreage and that the necessary capital is provided for the lateral lines, meter stations and booster stations that will be needed later in order to produce these wells into Texoma's system, and assuming also that proper operating and maintenance expenses are incurred to keep the system in efficient operating condition, and that Texoma does not lose any gas wells connected to its system, I think we might be able to produce the necessary volumes from Texoma's property to market the volume stated from the system of Natural Gas Pipeline Company until the end of 1951 or early in 1952.

However, by this time the rock pressure of Texoma's wells are going to have declined and will range between 75 pounds and 135 pounds, depending upon the particular part of the field in which they are located. Also, in my judgment, Texoma will have lost a large number of wells due to salt water, due to changes in the producing formation, and due to mechanical defects.

Already in the Panhandle field there have been some 80 or 90 wells abandoned at pressures in excess of 100 pounds. Texoma itself has plugged eight wells. I know that Texoma is going to lose at least six additional wells in the next two or three years. We are also currently finding it necessary to blow Texoma wells in order to free the well bore of cavings, and water, and in order to clean the producing formation.

We are able to keep the present Texoma wells in an
507 efficient producing condition now by this blowing operation, except in occasional instances where it has been necessary to move in clean-out tools and carry on rather extensive clean-out operations in order to restore the well to proper producing conditions. This method of conditioning wells is particularly effective now because of the pressures that exist in the formation, being pressures sufficient to flush the formation and to prevent it from clogging. However, in later years, after the pressure has declined, the method of blowing wells for the purpose of cleaning

the producing formation will not be as effective as it is at higher pressures.

I feel certain that Texoma will lose a considerable number of wells due to the clogging of the formation, due to mechanical changes in the casing, and due to changes in the formation; and, in my opinion, the lowest safe pressure condition that Texoma can expect to have all of its wells perform at is in the neighborhood of 100 pounds.

I am not able to predict the number of wells that Texoma is going to lose, nor am I able to predict the time that it will lose them. I am certain that declining reservoir pressures and other changes in the field will aggravate the problem of keeping these wells in good producing condition.

I have in mind also that in the later years Texoma will be producing its wells at a higher per cent of their open flow than the average condition that now exists on Texoma's wells. In general, we are now operating at from eight to ten per cent of the open flow of the wells. We have, however, in times past operated some of our wells in excess of twenty per cent of the open flow of the well, and we have found that this operating condition increases the operating difficulties of keeping the well in proper producing condition, because it accelerates the clogging of the formation and it seems to accelerate the intrusion of water into the well bore.

By 1951 the majority of Texoma's wells will be producing at 25% of the open flow of the wells, or some time prior to that time, depending upon the number of wells that Texoma loses, and depending upon the amount of drilling that is carried on, and matters of this kind. I am convinced that, as a practical matter, the situation associated with Texoma's wells will bring about a shortage of open flow two or three years prior to 1951 to the extent that Texoma will not be able to furnish the necessary volumes to enable the pipeline company to realize the sales volumes, the average sales volumes, that I have predicted; and that contemplates the development of Texoma's leaseholds to the maximum extent that we believe is economically advisable.

When the time comes that we cannot deliver the full volume of gas which I have stated, namely, the average volume which the pipeline has sold and delivered during the years 1936 to 1938 inclusive, whether that be in 1951, 1950, 1949 or 1948, we will then discontinue the delivery of natural gas under the interruptible industrial contracts that carry the lowest price. This operation will be continued from the lowest price to the next highest price contract until we reach a sales volume that is so small that it will not be advisable to operate a system of this magnitude.

508 I do not know when we will arrive at the point when it will no longer be economically feasible to operate the pipeline, because I do not know when or in what year we will be forced to curtail our sales volume due to lack of connected open flow, nor do I know the abandonment pressure that Texoma will eventually be forced to discontinue operations upon. The best that I can do is to indicate that following the time when Texoma is unable to supply the necessary production for this pipeline sales volume, it will be not more than three years before Texoma's rock pressures will have declined to a pressure of approximately 25 pounds. I mean three years from 1951. This determination is arrived at by careful analysis that has carried into an investigation of various matters connected with the Panhandle field, and I will describe this analysis in more detail later. My statement of three years from 1951 is based on the assumption that we will be able to go on with our full volume to that year.

If by reason of circumstances or contingencies which I have pointed out we reach the point prior to 1951 when we will no longer be able to deliver the full volume and we have to start curtailing our volume by cutting off the lower priced gas, then as to how long I think it will be from that time before the pressures will be pulled down to 25 pounds, if we are able to go that low, I will state that the analysis that was made to determine the period of declining sales volume that we might experience was made by assuming that Texoma would have sufficient open flow until 1951 and would be able to produce its wells down to 25 pounds. However, I indicated that as a practical matter I do not believe that Texoma is going to be able to keep all of its wells in producing condition, and that when the reservoir pressures decline to a pressure in the negihborhood of 150 pounds and the rate of production approaches 25% of the open flow of the well, the abandonments will increase and the rate of decline in the open flow will be accelerated because of changes in the producing formation brought about by salt water and the clogging of the formation. Consequently, it may be as much as two or three years prior to 1951 when Texoma's leaseholds will not be able to supply the necessary gas.

The figures I have given for the sales in 1936, 1937 and

1938 and my estimate of sales in the future were on a pressure base of 14.65, which is the pressure base employed in billing the gas.

The revenue received from the sale of natural gas by Natural Gas Pipeline Company for 1936 was $13,732,517.01; for 1937, $14,576,817.42; and for 1938, $13,769,434.41. The average for the three years is $14,026,256.28.

Breaking those figures down into the amounts received from the sale of firm gas and industrial gas for each of the three years and the average over the same period, the amounts are as follows:

In the year 1936, the firm revenue was $10,650,340.52, 509 and the industrial revenue, $3,082,176.49.

In the year 1937, the firm revenue was $10,801,601.78, and the industrial revenue, $3,775,215.64.

In the year 1938, the firm revenue was $10,699,948.88, and the industrial revenue, $3,069,485.53.

The average firm revenue was $10,717,297.06, and the average industrial revenue was $3,308,959.22.

I have an opinion as to the amount of revenue to be received by Natural Gas Pipeline Company during future years. My judgment as to the average annual revenue that the company can expect to receive from the sale of natural gas in those years when it has sufficient gas available is an average of the total revenue from sales for the past three years of 1936 to 1938 inclusive, or $14,026,256.28. That is the average for those three years.

My opinion is based upon the capacity of the present system and its efficiency and ability to deliver gas, upon the effects upon that equipment when it delivers the necessary volumes to produce this revenue, and upon my knowledge of the markets that I have gained as the result of a number of years of market negotiations with the utilities that are now purchasing this gas in the territory which we serve. I am certain that the capacity of the present system and the position now occupied by the utilities that purchase from us preclude this pipeline company from realizing larger annual revenues than the average of the past three years.

When we get to the point where we will not be able to deliver the full volume which has been estimated as our annual outlet, the annual revenue will decline as the sales volumes decline. As I mentioned previously, the lowest priced gas will be the sales that will be curtailed first. Consequently, the ratio between declining sales volume and declining revenues will not have a direct relationship, but will be the result of delivering less volume of low priced gas than had been delivered in the past.

In stating the average figures for the period during which we can sell and deliver the total volume estimated, I do not mean to say that there will not be years when we will exceed that revenue. I am talking about the average annual revenue that this pipeline company can realize. We may have years in which the annual revenue will exceed the average, as we had in 1937; but we will also have years when the annual revenue will not equal the average, as we had in 1936 and 1938.

As between the gross revenues received from gas sold for domestic use and that sold for industrial uses, my judgment is that the average of the past three years represents an accurate division of the revenue between firm domestic contracts and industrial contracts. I do not see any opportunity to increase the sales for domestic use,
510 which carries a higher price, and a corresponding decrease in the gas sold for industrial uses. There will be variations in the volumes consumed by the domestic market; but the result of these variations will approximate the average of the past three years. We have, through intensive efforts, arrived at a point in the development of these markets which I feel represents the ultimate development that we can expect to realize in this territory.

I see no opportunity in the future to increase the volumes of gas sold for industrial uses at the higher prices, with a corresponding reduction in the gas sold for lower prices. The average of the revenue received from industrial sales during the past three years, in my judgment, represents the annual revenue that we can expect to realize year after year in the future from the sale of industrial gas. The reason this is true is that the capacity of the present system limits the total amount of gas that is available, and since the domestic markets have first call on the total quantity that is available, the only amount that can be sold in the industrial markets is the difference. The amount of natural gas that has been sold in the industrial markets at higher prices is, in my opinion, the maximum amount that should be sold; otherwise, the service to the higher priced industrial customers will be jeopardized and the entire situation become demoralized.

It is possible that prices for industrial gas will decrease. It is also possible that the prices to the customers may increase; but I am talking about the revenue that we can expect to receive from the sale of these industrial volumes rather than the revenue that our purchaser receives in reselling this gas to the industrial consumer. In other words, I feel sure that we will be unable to raise our prices, and I think there is considerable question as to our ability to maintain the present contract price schedule.

I made a statement to the effect that if we undertook to increase the volume of gas sold in the higher brackets for industrial uses, we would endanger the quality of our service and might bring on a chaotic condition. I can illustrate that by describing the situation in the Chicago area. The total pipeline capacity available, after we serve the markets enroute to Chicago, is 185 million cubic feet per day. Our obligation to deliver under our firm domestic contracts with the Chicago District totals 126 million. This leaves a margin of 59 million pipeline capacity available to the Chicago area that can be resold in the industrial markets. In the industrial markets the contract negotiations and the sales efforts of our purchasers has resulted in the sale of this industrial gas to industries operating in the glass industry, industries operating in the steel industry, industries operating boiler plants, industries operating in the ceramic fields, and the price at which the industrial consumers in each of these industries purchase natural gas is related to the priority of service to which they are entitled. For instance, the glass industry pays the highest price and the boiler fuel customer pays the lowest price. In the event of a shortage of natural gas the boiler fuel customer is interrupted rather than the glass customer.

The total requirements of the glass and steel cus-
511 tomers, and all other industrial customers other than
boiler fuel customers in the Chicago area, frequently range from 55 million to 62 million cubic feet per day. Therefore, if you contract to sell and deliver another 10 million cubic feet of gas per day to the glass customers or the steel customers, the total requirements of those customers will be in excess of the 59 million cubic feet of pipeline capacity that is available. Consequently, the service to some of those customers in that price class will be unsatisfactory and they would not be interested in paying the prices they are now paying if the service was going to be of an interruptible nature or become of a nature that the service is to the boiler fuel customers. The price

would either decline or the customer would not accept delivery of the service.

There has been an increase in the price at which we have sold gas in the past and the price at which we are now selling gas for industrial purposes; but the fact that we now have higher prices for industrial gas than we had in earlier years is not indicative of an increase in the price trend. As I mentioned earlier, we have had prices for industrial gas that were concession prices and were made for limited periods of time for specific reasons. They were the result of long prolonged negotiations, and in these negotiations were involved capital expenditures on the part of the utility company and capital expenditures on the part of the industrial consumer. We have now passed out of the period when the special prices were made as concessions or made as inducements to accelerate the attachment of the industrial market, and my judgment as to the future revenue to be received from the sale of industrial gas is based upon the assumption that the present contract prices for industrial gas will continue in effect. This may be difficult to accomplish since we have pending the renewal of fifteen of these industrial contracts in 1939. Some of these renewals are with the Chicago District Pipeline Company, and I sense from my contracts with them that we may have difficulty in maintaining the present prices.

The industrial contracts that expire in 1939 are fifteen in number, and the last expiration date in the group is December 31, 1939. We will endeavor to renew these contracts at the first opportunity, but up to now have given preference to the preparation of the presentation of the evidence in this hearing. In other words, we are running behind schedule on negotiations.

I have referred to the decline in pressures in the Panhandle gas field and some of the problems that attend these declines. The effect of this is that as the rock pressure of a well declines, the open flow or the ability of that well to produce gas also declines. They do not decline at the same rate. Wells in different fields vary or have different characteristics, and wells in the same field vary. However, in the Panhandle field the open flow or producing capacity of a well declines more rapidly than the rock pressure. By that I mean, starting with any given rock pressure and open flow for a particular well, when 10% of the rock pressure is gone, more than 10% of the open flow is gone. That is true of the entire field, so far as I know. I do not believe there are any exceptions in the Panhandle field.

512 It is possible for those in the engineering profession to predict with reasonable accuracy the future course of the pressure decline and the potential producing capacity of the wells in the future, provided it is done properly. In the case of Texoma's wells this problem is complicated because of the drainage that Texoma has experienced in the past and is continuing to experience. Consequently, the rock pressure decline is not due to its own production alone. The Bureau of Mines has developed what is known as the back pressure method of testing a gas well. This method or principle when properly used will give the open flow that can be expected of any well at any future rock pressure. The principle is perfectly sound, but is based on certain theoretical assumptions, particularly that there be no change in the producing formation and that there be no change in the drainage area of the well. Consequently, in actual practice any determination in regard to the open flow or the producing capacity of a well in the future is less than the calculated amount as determined by the black pressure method if any of the assumptions on which the method or principle is based have not been fulfilled.

As to the potential producing capacity at future pressure levels indicated by these pressure decline tests, and whether or not it is more or less than that which is actually calculated to be realized in view of the assumptions that must be indulged in figuring these back pressure curves or making these back pressure tests, in actual practice it usually happens that the actual open flow realized at some later date is less than the calculated indicated open flow by the back pressure method. This may occur very early in the life of a well or it may occur later; but Texoma has observed on some of its wells already that the ability of these wells to produce is less than previous back pressure tests indicated it would be at the rock pressures that now exist.

An intrusion of salt water resulting in a salting up of the formation, or a caving in of the producing formation, or a bridging of the producing formation, operates to reduce the potential open flow at a given future pressure below that which is indicated by the pressure decline test.

As I previously stated, the calculated open flow as determined by the back pressure method will be realized only when there is no change in the producing formation, no change in the mechanical condition of the well, and no change in the drainage area of the well.

Counsel assumes that the number of wells be increased to where a well which is now draining an area for a mile around it has a well drilled within a mile of its location, and inquires as to the effect on the future potential producing capacity, in comparison with pressure, as indicated by the pressure decline curve, the drilling of that additional well will have. If there is no change in the rate of producing the first well before the drilling of the second and no change after the drilling of the second, and if the second well is produced at a sufficient rate, then it is to be expected that it would affect the producing area of the first well by having the first well decline in open flow at a more rapid rate than would have been the case had the second well not been drilled.

I have caused an investigation to be made through which I have sought to arrive at the future pressures of Texoma's wells and the capacity of those wells to produce gas over the period of the next ten or fifteen
513 years.

I mentioned previously the amount of work that myself and others in this organization have done in regard to the development of facts pertaining to the Panhandle field in connection with the five major lawsuits in which Texoma has been involved in the State of Texas. In connection with some of this work we were concerned with rock pressure conditions and open flow conditions and the trends into the future. This work was handled between 1932 and 1936, or possibly later. Also, from time to time Mr. Floyd C. Brown has discussed with me and urged that I undertake to determine the full and complete future development program of Texoma Natural Gas Company and to determine the future capital needs of both of these companies, not only for development but for all other purposes, to investigate what capital would be required for replacement, and to study the trend of future operating and maintenance expenses.

Since Texoma's development program was such a large part of the total future capital that was going to be required, I attempted to solve this problem with the assistance of geologists, production engineers, and others, a number of times.

The problem is not as simple as it appears on its face. Texoma's present rock pressures are the result not only of its own production but of drainage away from its leases and drainage into its leases. In the future Texoma is going to be drained in a similar manner. As a result of this, Texoma's annual production requirements related to its total gas reserves under its own leaseholds was not a true index of the number of years that it could expect to produce gas in those quantities. Even today Texoma's reserves related to its current and annual production requirements is not a true index of the number of years that Texoma can expect to produce the required volumes of gas.

Therefore, it appeared advisable to me to determine the total reserves, the total recoverable reserves, of the whole field, and to determine the annual withdrawals that would occur from this field in the future, and to combine this information with the data which Texoma had on its own wells in order to decide on the future course of the rock pressures of Texoma's wells. I am referring now to the rock pressures of Texoma's present wells and also the rock pressures of the wells that will be drilled by Texoma in the future, and the course that the decline of the rock pressure of these wells will take.

It also appeared advisable to carry with this analysis a determination of the total number of wells that Texoma should drill. Since the producing capacity of wells declines as the rock pressure declines, but not necessarily at the same rate, it is obvious that if Texoma does not drill it will be short of open flow earlier than it will if it does drill additional wells. If it drills only a small number of additional wells, the day when it will be handicapped by lack of open flow is delayed. If it drills a large number of additional wells we might delay the day when there is a deficiency in connected open flow even longer. Consequently, the query arises as to how many wells Texoma can afford to drill and will all of these wells be economical.

By that I mean, will these wells drilled in later years
514 produce enough gas and will the revenue received
from the sale of this additional volume of gas be sufficient to pay for the operation and maintenance expense of getting that gas to market and to amortize the addi-

tional capital that the drilling of the additional wells brought about.

I also mean to include not only the additional capital of the additional well, but the lateral line, the meter setting, and the booster station, if the additional drilling affects the amount of booster power that must be installed.

The analysis cannot be properly carried out unless it is co-ordinated with the sales price that is to be received from the gas and the sales volume that can be sold year after year.

In the early years, referring to from 1932 to 1936, it was almost impossible to make any progress with the production phase of this problem, because of the erratic policy of the State of Texas in regard to the conservation of oil and gas, particularly in the Texas Panhandle gas field. However, by 1936 it appeared, to me, at least, that conditions were becoming somewhat stabilized. I reached this conclusion because of the verdict of the Federal Court and the findings of fact contained in that verdict in a case which Texoma and others had, and which was decided in the Federal Court in the year 1936, I believe in the month of April. That was the case of Consolidated *vs.* Thompson, reported in 300 U. S.

Since it appeared to me that conditions were becoming somewhat stabilized in the field, I began to work on this problem more intensively, particularly the production end of it.

Later, about 1937, I began to see publicity pertaining to the consideration that Congress was giving to legislation then known as the Lea Bill. In my supervisory capacity with the company I had occasion to read this bill and consider what it might mean to the two companies by which I was employed. By 1938 it appeared to me that we would have legislation of this form, which we later did, being the Natural Gas Act, which was passed in June of 1938.

Also early in 1938 Natural Gas Pipeline Company intervened in a hearing before the Illinois Commerce Commission. Because of the situation confronting us in 1938, it appeared to me that we were going to need a complete economic analysis of both of these companies, not only for the purposes Mr. Brown had in mind but for the purposes of meeting the situation presented by the Natural Gas Act. It seemed to me that this situation called for an economic analysis that involved the future sales revenues, future sales volumes, future operation and maintenance expenses, the number of years that these revenues could be realized, the future needs for capital, for additions to the system, and for replacements to the system, in order to fix more accurately the total requirements of this system for future capital for these various purposes, and to fix more accurately the future earning power of the company.

Therefore, early in 1938, I started arranging the
515 organization under my supervision for the purpose of
working on this problem. I selected Mr. R. M. Bussard, the head of the special problems division in the engineering department, to take general charge of this study and to prepare certain phases of it himself. I supplied Mr. Bussard with assistants from the engineering department, from the drafting room, and various operating heads. I asked Mr. G. M. Davidson, chief engineer and superintendent of operations, to assist Mr. Bussard in general, particularly by conferring with the operating heads on the assignments that I was going to give them, and that he should devote sufficient time to a study of the natural gasoline market in order to arrive at the future course of the market price for natural gasoline, and, when the future production volumes were available, to determine the amount of natural gasoline this company could expect to produce if those volumes of gas were produced.

I spoke to Mr. J. G. Dickinson, Mr. C. J. Peterson and Mr. C. C. Kuhne in regard to helping Mr. Bussard on various phases of this problem that had to do with the present reserves in the Panhandle field in total and Texoma's present reserves, geological conditions, future withdrawals, future development work, and certain production engineering problems.

I selected various operating heads to cooperate in this study. Mr. R. T. Powers, the superintendent of the Fritch compressor and gasoline plant, was assigned the duty of working out his future operating expenses, his future replacements and his future additions to plants.

I selected Mr. R. G. Strong, superintendent of pipe lines, to prepare this same type of study for the gathering system, including the booster stations and the main transmission system.

I selected Mr. W. H. Davidson to do the same thing for the compressor stations on the system of the Natural Gas Pipeline Company of America.

I selected Mr. W. T. Bulla to prepare the projection for the telephone and pressure dispatching division.

I conferred with Mr. S. E. Campbell, secretary of the company, in regard to making available to Mr. Bussard certain help from the accounting department and asked him to cooperate on certain phases of this work particularly the general overheads and future taxation.

These operating heads I have referred to have been relieved of their routine duties from time to time, and in recent months have been completely relieved of their routine duties and have devoted their entire time to this matter.

I also supplied Mr. Bussard with the assistance of two outside consulting engineers to help on certain phases of this problem. These engineers were Mr. Stanley Gill and Mr. P. McDonald Biddison.

Mr. Bussard and the other assistants under him have worked constantly on this matter since early in 1938.

516 As I have mentioned, in recent months the operating heads I have named have devoted their entire time to this matter.

As a result of that circumstance we have been handicapped in certain features, particularly in contract negotiations, and we have been handicapped in the development of certain design work, which has resulted in the capital expenditures that we had scheduled for this year running at a slightly lower rate than they normally would. However, I do not foresee now that it means we will not eventually before the year is over accomplish the replacements and the additions and the maintenance that we had scheduled for this year.

In the making of this long study involving the whole economic setup of these companies I have supervised the work from its inception. I had many conferences with Mr. Bussard, Mr. G. M. Davidson, and all the other operating heads, and I have had conferences with the two outside consulting engineers that I mentioned. I have watched the development of this work. I have reviewed the various component parts of it as it was put together from month to month during the past two years or year and a half.

I am familiar with the studies prepared by Mr. Bussard and those who are assisting him, and with the results of those studies, and with the exhibits which they will bring into this hearing during the further course of these proceedings.

I am in accord with the conclusions that Mr. Bussard and these department heads and others have reached, and which they are going to present here through these exhibits and studies, with this reservation: In order to carry these calculations to a conclusion, certain assumptions were made. For instance, the present wage scales that now exist are carried forward into the future. The present rates of taxation are carried into the future. Certain assumptions were made in regard to the decline in the producing capacity of Texoma's wells. It was necessary to make these assumptions as a basis of calculation. However, it is my judgment that the result of these calculations is overly optimistic. It seems to me that there are many contingencies confronting these two companies that are not reflected in these calculations and could not be reflected in them and still have them be called calculations; that the results of this work must be read in the light of the assumptions made; and that the results must be modified by practical judgment. I feel that the result of this future projection is too optimistic.

Cross-Examination by Mr. Slaff.

I have testified in no cases in the last five or six years. I recall being on the stand two times, about 1921. That was not a rate case. About 1921 I identified a water sample in the Federal Court, I think, at Oklahoma City. I was on the stand in Federal Court in Tulsa, Oklahoma, in the case of Henry L. Lemons *vs.* Natural Gas Pipeline Company of America, in which the contractor was suing us for extras amounting to in the neighborhood of one million
517 dollars. I have not testified in any rate cases.

As I recall my testimony in the Lemons case, I identified the contract; I described the location of the work; I described the specifications and how our supervision of the execution of the work was carried out under the specifications. I may have described conversations and negotiations that I had with this contractor after completing the work in an endeavor to settle his claims for extras; but I am not sure of this.

Questions by the Examiner.

The heavy capital expenditures increase in 1935 and 1936 is a result of more than one thing. The amount of money expended for the drilling of gas wells in 1935 was $319,962.60, while the amount for the same purpose in the previous year was only $57,789.59. In 1936 the amount expended for the same purpose was $299,727.89.

For gathering lines the expenditures increased from $14,745.72 in 1934 to $247,093.72 in 1935 and $83,238.05 in 1936.

The expenditures for additions to plant in the classification that we call main lines, meaning the main transmission system, increased from $4,114.86 in 1934 to $247,497.61 in 1935, and $211,237.58 in 1936.

The expenditures for additions to compressor stations increased from $142,268.12 in 1934 to $417,480.98 in 1935, and $422,113.48 in 1936.

The capital expenditures that I have mentioned are the ones where the major variations occur, but there is no uniformity in the capital expenditures from year to year for other investment classifications. They vary by increasing and decreasing. I have mentioned the main items that brought about the accumulated increase.

Cross-Examination by Mr. Booth.

The following table shows gross capital expenditures of the companies in the years referred to:

Natural Gas Pipeline Company of America
and
Texoma Natural Gas Company
Gross Expenditures for Additions to Plant.

	1932
Lands in fee	$ 1,331.76
Leaseholds	21,986.00
Rights of way	47,348.12
Gas wells	262,370.29
Gathering lines	94,506.32
Main lines	9,826.10
518 Compressor stations	42,625.29
Gasoline plant	20,770.75
Telephone system	770.76
Meters and regulators	10,885.61
Other main line structures	5,593.38
Branch lines	6,489.09
Drilling and clean-out tools	—0—
Tools	1,364.39
General laboratory equipment	—0—
Automotive equipment	28,249.59
Furniture and fixtures	4,318.01
Booster stations	—0—
Total	$ 558,435.46

	1933
Lands in fee	$ 558.36
Leaseholds	7,692.00
Rights of way	27,605.35
Gas wells	123,452.45
Gathering lines	15,532.67
Main lines	1,488.82
Compressor stations	4,457.20
Gasoline plant	5,936.46
Telephone system	—0—
Meters and regulators	2,444.78
Other main line structures	2,951.87
Branch lines	111,362.57
Drilling & Clean-out tools	—0—
Tools	1,354.70
General laboratory equipment	534.32
Automotive equipment	15,956.27
Furniture and fixtures	3,993.35
Booster stations	—0—
Total	$ 325,321.67

	1934
Lands in fee	$ 222.15
Leaseholds	10.00
Rights of way	5,723.07
Gas wells	57,789.59
Gathering lines	14,745.72
Main lines	4,114.86
Compressor stations	142,268.12
Gasoline plant	38,402.71
Telephone system	961.59
Meters and regulators	3,374.70
Other main line structures	1,915.66
Branch lines	9,969.67
Drilling and clean-out tools	—0—
519 Tools	1,049.51
General laboratory equipment	170.74
Automotive equipment	26,420.64
Furniture and fixtures	2,733.80
Booster stations	—0—
Total	$ 309,872.53

	1935
Lands in fee	$ —0—
Leaseholds	9,351.00
Rights of way	2,039.93
Gas wells	319,962.60
Gathering lines	247,093.72
Main lines	247,497.61
Compressor stations	417,480.98
Gasoline plant	33,268.38
Telephone system	3,380.95
Meters and regulators	3,380.23
Other main line structures	2,306.75
Branch lines	2,934.31
Drilling and clean-out tools	790.79
Tools	4,413.06
General laboratory equipment	—0—
Automotive equipment	30,236.66
Furniture and fixtures	2,943.23
Booster stations	—0—
Total	$1,327,080.20

	1936
Lands in fee	$ 314.77
Leaseholds	3,734.23
Rights of way	9,223.47
Gas wells	299,727.89
Gathering lines	83,238.05
Main lines	211,237.58
Compressor stations	422,143.48
Gasoline plant	22,311.07
Telephone system	2,385.67
Meters and regulators	5,990.44
Other main line structures	15,403.04
Branch lines	9,018.22
Drilling and clean-out tools	2,527.53
Tools	6,265.90
General laboratory equipment	—0—
Automotive equipment	31,555.99
Furniture and fixtures	6,068.25
Booster stations	—0—
Total	$1,131,145.58

	1937
Lands in fee	$ 6,951.25
Leaseholds	51.00
Rights of way	3,287.89
Gas wells	246,616.19
Gathering lines	75,705.02
Main lines	132,637.49
Compressor stations	160,056.12
Gasoline plant	23,028.05
Telephone system	2,701.95
Meters and regulators	2,334.37
Other main line structures	3,616.99
Branch lines	1,578.10
Drilling and clean-out tools	1,189.53
Tools	11,893.73
General laboratory equipment	—0—
Automotive equipment	31,853.34
Furniture and fixtures	6,317.93
Booster stations	—0—
Total	$ 709,818.95

	1938
Lands in fee	$ —0—
Leaseholds	46,994.26
Rights of way	6,904.10
Gas wells	284,528.21
Gatherin lines	62,726.08
Main lines	288,571.13
Compressor stations	212,818.79
Gasoline plant	5,915.95
Telephone system	5,234.40
Meters and regulators	2,487.94
Other main line structures	8,884.54
Branch lines	151.61
Drilling and clean-out tools	—0—
Tools	43,201.87
General laboratory equipment	82.14
Automotive equipment	60,345.88
Furniture and fixtures	5,751.26
Booster stations	6,796.70
Total	$1,041,394.86
Grand Total	$5,403,069.25
Avg./Year	$ 771,867.03

Questions by the Examiner.

The six wells which I stated would have to be plugged in the next two or three years are in Gray County, in the general area where we have already plugged eight wells. It is sometimes referred to as the Lefors area. It is south of Lefors.

The analysis which I said would be given here later on rock pressure drops will go in by another witness. There are so many phases of this problem that each phase has been prepared by the operating heads responsible for these particular departments and functions, and they are the best qualified men to testify in regard to each particular part. The reference I made was to one phase of the complete analysis which will be covered by another witness.

Redirect Examination by Mr. Morgan.

At the time Texoma's gathering system was constructed I took steps to build the line on down to Wheeler County, where these wells are now connected to Lone Star, and past where the wells connected to Coltexo are located.

The layout of the main 24 inch trunk that forms the main artery of the gathering system was developed under my supervision, and when we awarded the contract for the construction of all that part of the gathering system which contains 24 inch pipe, we included the necessary 24 inch pipe to extend into Wheeler County. That contract had been awarded.

I was in Texas, going over the field before actual construction started. From the impressions that I obtained while in the Texas Panhandle and after considering the matter, I returned to Kansas City and recommended to Mr. Brown that we defer constructing the gathering system beyond a certain point in Gray County. Mr. Brown agreed, and I contacted the contractor that held the contract for the construction of the 24 inch gathering system and arranged to modify the original contract to exclude the 24 inch trunk that had been included and which was for the purpose of extending across Gray County and on into Wheeler County.

The modified contract as finally carried out covered the entire 24 inch gathering system as it exists today. After deferring the construction of the gathering system into

Wheeler County, we later decided not to construct the extension beyond where it now lies.

The considerations entering into our decision were that the cost of the part of the gathering system which was excluded from the contract then in effect and the cost of the lateral lines to connect the wells in central Gray County and the nine wells that we then owned in Wheeler County appeared to me to be excessive—in fact, the cost of this extension was slightly under one million dollars—and I thought it advisable to defer making this expenditure until it was clear that the extension would be needed. Later developments in the field made it inadvisable to make the extension.

522 As to how far we would have had to extend our 24 inch main gathering line in order to reach the central producing area in Wheeler County, the mileage that I had contracted and which was excluded from the contract before the gathering system was constructed was 29 miles of 24 inch line. As a result of that modification we eliminated an expenditure of $781,000 from that contract.

In addition to that we eliminated the cost of the lateral lines, and the meters, that would have been necessary to connect the wells in central Gray County and the wells in Wheeler County to this 24 inch trunk; but these facilities were not included in the contract to which I refer. We also eliminated the cost of a booster station that would have been necessary in the Gray County area very shortly because of the pressure conditions that existed. The approximate cost of the lateral lines and meters was $97,400, and the approximate cost of the booster station was $69,000, making a grand total of $947,000.

Cross-Examination by Mr. Booth.

Counsel inquires whether an 8 or 10 inch line would not have been sufficient to reach the wells in that area, instead of a 24 inch line. My answer is that an 8 or 10 inch line, or even a two inch line, would have been sufficient to reach the wells in that area, assuming that the line was long enough. As to whether an 8 or 10 inch line would have been adequate to take care of the gas produced in those wells, we were not designing this gathering system for the wells that Texoma then owned in the Panhandle field. We were designing it to serve the wells that it then owned, plus the wells that it intended to drill to produce the gas from its gas reserves. That is true of the portion of the system that was planned for Wheeler County, the system that was planned for Moore County, and the system that was planned for Carson County.

The question of whether or not an eight or ten inch line would have been adequate to serve all of the wells and the entire gas reserves in that area brings me to the consideration of all the acreage that Texoma owned in Wheeler County and Gray County, and I do not have those quantities in mind at the present time. It also brings into consideration the quantities of gas that would be produced and carried through the same 24 inch trunk that led west from Gray County to the Fritch station.

I did not make the statement that the 29 miles of line was intended to serve only the few wells which were used in supplying natural gas to the Lone Star Gas Company and the Coltexo Corporation.

Questions by the Examiner.

This morning when I was testifying in regard to deferring an expenditure, I was referring to the portion of the gathering system that we eliminated from the contract that I have just mentioned, and the additional investment that would be required to make that extension useful, and the booster station that would be required in the later years in operating those wells. I did not intend at any time this morning to say that we had ever determined or had a figure in mind that was confined only to the wells that we now own in Wheeler County, or that we then owned in Wheeler County, when we made our decision to defer building into Wheeler County.

We owned a lot of other acreage down in Wheeler County and in eastern Gray County at that time.

(Colloquy by the Examiner and all counsel with respect to time necessary in recessing hearing.)

523 **R. M. BUSSARD**, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(July 26, 1939)

My name is R. M. Bussard. I live in Highland Park, Illinois. I am employed by Natural Gas Pipeline Company of America and Texoma Natural Gas Company, and work in their offices at 20 North Wacker Drive, Chicago, Illinois. I have been employed by these two companies since their organization, and prior to that time by the Continental Construction Corporation.

I received my technical training at Purdue University, from which I graduated in June, 1923, with the degree of Bachelor of Science in mechanical engineering. Following my graduation, I went to Bartlesville, Oklahoma, where I obtained employment with the Empire Companies in their Junior Engineering Course. I continued with the Empire Companies and their affiliates, with the exception of one short interval, until I came with the Continental Construction Corporation, which was about July, 1930.

The Junior Engineering Course of the Empire Companies is designed to give the newly graduated engineer a two year course of training in the company. The engineer moves from department to department in the company and thereby completes his general education and obtains experience in the oil and gas business. My first assignment on the Junior Engineering Course was in the job order closing work of the natural gasoline department.

About July, 1923, I went to Sallyards, Kansas, where the company was constructing a natural gasoline plant, and there had charge of the construction office work. I took care of the payroll and the distribution of the payroll charges in the various parts of the job and I also kept track of the material and the places in which it was used throughout the plant.

About November, 1923, I went to Winfield, Kansas, with the Distribution Company there, which was one of the Empire Companies. In Winfield I did work on the distribution system, particularly in regard to the leakage testing of the system and the repair work. I also did some work in the customers office of the company.

The first of the year 1924 I moved to Eldorado, Kansas. My work there was to inspect the appliances in the commercial kitchens and the appliances of other commercial users of natural gas in Eldorado. I also estimated the house heating bills for various prospective house heating customers and made installation of the house heating equipment when the customer decided to purchase it.

I left the Junior Engineering Course while in Eldo-
524 rado, about May of 1924, and then went into the distribution department of the Eldorado Company, again doing leakage survey and repair work.

Early in the summer of 1924 I moved to Ottawa, Kansas. This was the headquarters town for a group of properties which had just been acquired. The group extended down the eastern part of Kansas. I had local charge of the leakage repair work in several small towns in this group which had just been purchased. There were no maps available, so we had to locate the property, conduct our tests, make the repairs, and make the necessary reports as to what we had found and what we had done to make the repairs and also report as to the condition of the system after we had made the repairs.

Late in 1924 I went to the Johnson County Gas Company, which is located in the suburban area of Kansas City, Kansas. This company was growing very rapidly, because of the large amount of suburban building, so that their job order work was much behind. I brought this work up to date and spent some time with the personnel that had charge of the customers' office.

A job order is a part of our paper work, in which we state the work to be done and make a request for permission to do the work. We describe the work and also the costs involved, and then as the work progresses the costs are accumulated against the particular order number and in the end we then have a cost accounting for the particular job that was done. The job orders are taken out for all types of construction work.

Early in 1925 I went to Bartlesville, Oklahoma, where I made a check on the capacity of a portion of the Cities Service Gas Pipeline Company system. This is one of the Empire Companies.

I then went to New York City, to the office of the man who had charge of the natural gas and natural gasoline activities of Henry L. Doherty & Company. This man's name is J. D. Creveling, and he is now president of the

Panhandle Eastern Pipe Line Company. I did a considerable amount of traveling under Mr. Creveling's supervision, and eventually reached all or practically all of the natural gas properties of the Henry L. Doherty & Company.

Some of the work which I did in traveling around from property to property related to market analyses and some related to determination of cost of construction of specific pieces of property, and various special problems that he would assign me to do. One of the first special problems was in Hamilton, Ontario, where one of the Doherty Companies desired to expand its distribution system and wanted to know the number of houses that they might expect to get connected to the system and the probable load that would be accumulated thereby.

Another problem had to do with a number of properties in Kansas. These properties had been recently purchased and Mr. Creveling desired that I make a change of their cost classification as to operation and maintenance over to the Henry L. Doherty & Company classification in
525 order that we might have some comparative figures to
see whether Doherty's operation was as profitable or more profitable than the former owners.

During 1926 I assisted in the preparation of the first market study on Denver, Colorado, and the adjacent area. The cause of this study was the fact that Mr. Minal Young was proposing to build a pipe line from the Texas Panhandle to Denver and towns enroute. The reason that I went to this particular property was that Doherty & Company owned the Denver gas distribution system, and also owned the Pueblo, Colorado, system and the Boulder, Colorado, system, and the system of other towns in that vicinity, including Fort Collins and Cheyenne, Wyoming.

While I was in Denver on this particular job, I was sent to Grand Junction, Colorado, to report on the feasibility of taking natural gas from the Gar Mesa structure. The town was served by manufactured gas at the time, and I prepared my report in reference to this property and recommended that there be nothing done about the local gas situation.

While we were in Denver I also did some work on the Colorado-Wyoming Gas Company, another Doherty subsidiary, which had constructed a pipeline from a local gas field to Fort Collins and, at the time I was in Denver, was constructing a pipeline from this field to Cheyenne, Wyoming.

The next major assignment to which Mr. Creveling sent me was the Arkansas Natural Gas Corporation. The name today is Arkansas-Louisiana Gas Company. We were concerned not only with the Arkansas Company and its property, but also with some other companies in the general Shreveport area. In fact, Doherty owned a gas distribution property and production property in Eldorado, Arkansas.

The first work done on the Arkansas Natural Gas Company assignment was at Pittsburgh, Pennsylvania, where I made in the company's office a general study of the capital structure, the property of the company, its income, its operation and maintenance expense, and the net results obtained by the company.

A little later we went to Shreveport, Louisiana, and studied some small companies in that area which we thought might be combined with the Arkansas Company. We also made a market study of the Arkansas Natural Gas Company and traveled through its properties in order to see the market possibilities. I compiled a report relating to the entire situation and, of course, presented it to Mr. Creveling. The property was finally acquired by the Doherty Company and the various mergers were made—not all the mergers that we contemplated, but a considerable number of them.

Early in 1929 I worked on a study of the Southern Natural Gas Company. This company was projecting a line from the Richland Parish and Monroe fields in Louisiana to Birmingham and Atlanta. My particular work on this assignment related to the distribution companies, their ownership, the number of customers, the amount of sales, and the other information that would enable one to get a general picture of the domestic market in the area. To get this information I, of course, had to call on various commission officers and the other places to which we
526 normally go to get information without directly contacting the companies themselves. That was in the area of Birmingham and Atlanta. That line has been built and is the Southern Natural Gas Company.

In July, 1929, I left the direct employment of Henry L. Doherty & Company and went to one of its subsidiaries, the Colorado-Wyoming Gas Company, whose offices were in Denver, Colorado. My first work there was to account for the materials that were being used in a pipeline which the company was constructing from the vicinity of Denver, Colorado, to Fort Collins, Colorado, to take care of Fort Collins and Cheyenne, Wyoming, and other towns in Colorado. That work relating to materials, of course, meant keeping track of the stuff from the time it left the plant to the time it was in the ground.

While I was with the Colorado-Wyoming Company I made a trip to Salt Lake City, Utah, to obtain some information for Mr. Kesinger relating to some construction problems of the Uintah Pipeline Company, which had constructed a system from approximately the northwestern part of Colorado to Salt Lake City, serving Salt Lake and projecting service to other towns in the area.

Also while with the Colorado-Wyoming Gas Company I went to Laramie, Wyoming, and investigated the possibilities of the Colorado-Wyoming Company extending its service to Laramie. I made a study during this same period of the amount of error that was occurring in the Colorado-Wyoming Company's orifice meters, these meters being the ones they purchased gas through in the local field near Fort Collins. The company's compressor station was so close to the point of measurement that there was a disturbance on the meter charts. We determined the amount of this disturbance and then checked back through all the charts and arrived at a correction bill.

I should mention that I made a study in Pueblo, Colorado, relating to the new business department in Pueblo and to the market possibilities.

About the time I finished with the measurement problem, the company proposed to build an extension of its system from Johnstown, Colorado, to Greeley, Colorado, and I was instructed to lay out the right of way, obtain the right of way, and supervise the construction of the line, but I received a call from Mr. Creveling asking if I could spend some time in Chicago to check over some market studies that had been made of the area outside of the Chicago metropolitan area. That was in May, 1930. I came to Chicago with the expectation of spending only two weeks, but the job lasted a good deal longer than that. I never got back to Denver, and am still here.

I was assigned to regular duty with Continental Construction Corporation in July or August, 1930. I do not have the exact date. I became a member of the staff of Mr. N. D. Holman, who had charge of what was termed

the Chicago marketing office, and was specifically assigned
to the duties of office engineer, correlating the field studies
made by other engineers as to the markets. Also I
527 conducted some field studies myself and had a number of men in the principal towns in the eastern part of Iowa, which would be contiguous to the pipeline that was being projected, which is the same line that is now owned by Natural Gas Pipeline Company of America. My work in Chicago had to do with this system from the time I first came here, when I thought it would be a temporary assignment.

With the exception of two special problems that Mr. Creveling asked me to do, I stayed under the supervision of Mr. Holman for approximately a year. Mr. Creveling asked that I go to Albuquerque, New Mexico, to study the Southern Union Gas Company project to take gas to Albuquerque and other towns in that area. He also later requested that I go to the Consolidated Gas Utilities Company, which takes production from the Texas Panhandle field and from points in Oklahoma, and finds some of its markets in Oklahoma and others in Wichita, Kansas, and vicinity. These special assignments at the request of Mr. Creveling were carried out prior to the moving of the Continental Construction Corporation offices to Chicago. When the office was moved to Chicago and the two companies, Natural Gas Pipeline Company of America and Texoma Natural Gas Company, began their operations I was assigned to the office of those companies here in Chicago. For a few months after the Kansas City offices came to Chicago I remained in the marketing work, but was then transferred to the engineering department. Practically all the work that I have done in the engineering department has related to special problems of one kind or another. These special problems were received either from Mr. G. M. Davidson, chief engineer, or Mr. E. V. Kesinger, the general superintendent, and I will discuss some of them.

Right at the beginning of the year 1935 I prepared a report referred to as the Rayburn report. Mr. Rayburn was a member of Congress from Texas and was chairman of the Interstate Commerce Committee of the House of Representatives. We gave the report that name because we hoped to make this information available to his committee, and at the time the Cole sub-committee was in existence we thought this information would be useful. My understanding is that the Cole Committee was a subcommittee of the Interstate Commerce Committee of the House of Representatives at Washington. The information in the report related to the situation in the Texas Panhandle field and the various problems we were faced with there.

Another problem which was more routine in nature was the preparation of the annual sales and revenues budget of Natural Gas Pipeline Company. I have also made studies relating to the quantity of industrial gas service that was discontinued because of insufficient capacity in the system.

I made several studies brought about by the various revenue acts which called for the company to make a declaration of its capital stock value. These revenue acts also brought into question the undistributed profits tax, and my studies endeavored to determine the proper capital stock value and also the amounts of undistributed
528 profits tax which the company might have to pay.

I prepared a report relating to the general fuel consumption situation in the State of Illinois. This was prepared in connection with one of the proposals to impose a state tax upon the sale of natural gas within the state. Late in 1933 and early in 1934 I did work with the natural gas executives who were studying the preparation of the natural gas code in the National Recovery Administration.

I have made a study relating to the economic method of boosting the field pressures when the time comes in the Texas Panhandle when pressures are inadequate to cause the gas to flow properly into the system of Texoma.

About two years ago I made a study relating to the steam turbine versus gas driven gas compressors. At the time I did this work the steam turbine driven compressor for gas compression use was having a temporary flurry and Mr. Davidson, the chief engineer, asked me to make a rather brief report relating to the possible economics in our own situation. My conclusion was that the gas driven engine or gas compressor was still the most suitable, all the various features being considered.

I made a study of the economics that would result if we would treat the fuel for the Fritch compressor station engines for the extraction of the gasoline content prior to the use of this gas as fuel in the engines.

I have also determined the revenue effect to the Natural Gas Pipeline Company of the application of the new measurment procedures outlined by the Measurement Committee of the American Gas Association.

I made a report as to depreciation for income tax purposes.

In collaboration with Mr. Davidson, the chief engineer, I prepared a paper on natural gas transmission problems. This paper was sent to the American Gas Association, where it was combined with other papers relating to natural gas and was a part of the proceedings of the third World Power Conference.

I think the most important assignment that I have had with the company is the particular one that I am on now, namely, the one that relates to the future economic life of Natural Gas Pipeline Company and Texoma. I have worked on various phases of this problem since 1936, but it was early in 1938 when the assignment was specifically made on this general entire problem.

In addition to my engineering training and experience, I have engaged in another line of technical study not specifically of a engineering nature. My contacts were so frequent with the accounting functions of various companies and, of course, of my own companies, that I have taken and about completed the LaSalle Extension University course in accounting. I would have had that done if it had not been for this particular assignment.

529 Mr. Kesinger directed me to start work on the present problem which I have at hand. This was early in 1938, I think about February, and I was then directed to spend my entire time in connection with this study.

Mr. Kesinger told me that inasmuch as it was evident that we would need to make a complete analysis of the economic future of the two companies, and of all the elements involved in such a determination, I should proceed to prepare myself to make that study, and to keep in mind that the specific answer to be obtained was the future economic life and the earnings possibility of the companies during that period of time.

There are several important elements in a problem of this nature. We have to determine the quantity of additional property that will be needed to carry on the business of the company, and, of course, we would have to determine the construction cost of that property. We would have to determine the cost of replacement of the existing property as particular portions might wear out and become no longer useful. We would have to determine the operation and maintenance costs of the present property and of any additional property that would be needed.

We would have to study the revenue to be obtained during the future and the quantity of sales that would produce the revenue. We would have to determine the general expenses of the company, and, of course, the taxes and expenses of that nature.

In thinking of the probable expenditures in the future for additions to present property, replacements of existing property and the maintenance and operating expenses incident to carrying on the operations of the company, I was not able to confine my studies to the leasehold interests of Texoma in the Panhandle field. The leasehold situation in the Panhandle field and the wells to be drilled thereon were an important element, of course; but if we stopped solely at the future well drilling we would not get anywhere near the entire picture. We would have to go on and determine the gathering system that would be involved and all the meters and regulators, and all the facilities, and then we would have to proceed, to study the compressor stations that existed on the system and see what replacements would be required there and what additions to capital would be required, and what their future operation and maintenance would be.

Similarly, we would have to study the main line departments of the company to see what they would need in capital and operation and maintenance and in replacement costs. In each of these various divisions we would have to give particular attention to their own peculiar problems. We would have to consider the branch lines of the company and replacements that might be needed to be made there. We would also have to study the communication system of the company.

In brief, it required a complete study of the entire system and all of its holdings and the expenses involved and a correlation of these costs and expenses to future gas production and future revenue. We didn't dare overlook any activity of the company.

530 The men referred to by Mr. Kesinger as having been assigned to assist me, from the engineering department, the drafting department, etc., and the cooperation of the various department heads, have been essential throughout this study. We could not have done the work without their assistance. The work was begun in the early part of 1938. Over a year has elapsed and we are still working on certain phases of the problem. As a matter of fact, some phases of the work have to be completed between now and next week before they will be ready to present to the Examiner. I have worked under tremendous stress in order to meet this particular hearing with the final results of the work.

Our problems have been discussed with outside engineers, namely, Mr. Biddison and Mr. Gill, and their opinions have been sought and their assistance has been given in this procedure. They individually sat down across the desk from me. I described to them the procedure we were following and gave them the information they desired, in order that they might understand what we have done. They have gone over a considerable portion of the information that is in the exhibits and also the preliminary form of some of the exhibits we have here. Some of them have been put in final form since they were here.

Various department heads, Mr. Dickinson, Mr. Strong, and the others named by Mr. Kesinger, have devoted time to this work. These men were instructed that this particular problem was the major problem of the company and they should give preference to it. As far as their time is concerned, I couldn't tell you exactly the total amount of time, the man hours, that have been given to this work because there are so many men involved. It has run so deeply into our field organization and all the other parts of the company I just couldn't tell you how much the total time is. Some of the men have been entirely relieved of their operating duties in order that they would have nothing else to do. Mr. W. H. Davidson, Mr. R. G. Strong and Mr. R. T. Powers were relieved entirely of their responsibility as operators and told to devote their entire time to this problem. That is also true of Mr. Dickinson for substantial lengths of time.

Mr. Kesinger has been the general supervisor of this study and throughout its preparation we have reported to him frequently as to the progress we were making and as to our plans, and have sought his approval of these plans.

In addition to this he has carried on the general management function in relation to revenues and sales. He has given me the figures which I used in my studies as to future volumes of gas sales and the revenues from those sales.

I have undertaken to organize and develop the facts resulting from these studies in such a manner as to present them here in the form of exhibits and testimony, and there will be a number of other witnesses who will testify as to parts of the study, particularly those parts which are in connection with their current operating problems.

Mr. J. G. Dickinson is prepared to testify relating to the capital expenditures of the production department and also relating to the cost of operating and maintaining the production department property.

531 Mr. R. G. Strong will cover the capital expenditures and the cost of operation and maintenance of the field booster stations, of the gathering lines in the field, of the meters and regulators in the field, in fact all the property that exists between the wellhead and the Fritch compressor station. He will also testify relating to the main line system of the two companies.

Mr. R. T. Powers will cover the Texoma Natural Gas Company Fritch compressor station and the gasoline and dehydrating plant at Fritch.

Mr. W. H. Davidson will take up the problems of the compressor stations in the Natural Gas Pipeline Company's property and will testify in regard to capital expenditures and to the cost of operation and maintenance and of replacement..

Mr. W. T. Bulla, the superintendent of the telephone department and the chief pressure dispatcher, will testify in regard to the communication system of the company.

Mr. G. M. Davidson, the chief engineer, has prepared a study of the probable future revenue to be obtained from the sale of the natural gasoline produced at Fritch. He will also testify concerning the future capital expenditures for automobiles and automotive transportation equipment, inasmuch as that property comes under his general supervision.

Mr. S. E. Campbell, secretary of the company, will take up the problem of additional furniture and fixtures and other replacement of the items now in the property account.

The other special phases will be covered by me in another appearance on the witness stand.

The first special subdivision of this work which I am prepared to present at this time relates to the producing characteristics of Texoma's gas wells. This is a very essential part of our study because it is from this general problem that we obtain our information relating to the future producing ability of the company's wells. In approaching this problem we realized it was necessary, or at least very helpful, to determine the relationship between the rock pressure of the company's wells and the open flow that would exist from time to time at the several rock pressures. By open flow I mean the quantity of gas that will flow from a well if open and allowed to produce without restraint, the total quantity of gas that the well could produce if it produces to the atmosphere and without any restraining influences on it whatsoever. Of course, that is an impractical quantity from our practical application. You never can get that much out. The size of the pipe enters into the calculation.

We had to know the quantity of gas the wells could produce in order that we might know whether or not there was sufficient production on hand to meet the market requirements of Texoma as of any time in the future from year to year. That was an essential piece of information
532 which we had to have in determining the number of
wells that would have to be drilled on Texoma's properties in order to keep this open flow at a point where it could meet its market outlets. It was the important element in the well drilling program, and, of course, there are a considerable number of capital expenditures which are contingent upon the well drilling program, such as additional gathering lines, the booster stations, meters and regulators, and all the other pieces of property that are required to get production from the wells into the system.

As to the principle which has been developed in the field of gas engineering to determine the relationship between the open flow and pressure, I point out that several years ago engineers of the United States Bureau of Mines made quite an extensive study of methods of determining the open flow of natural gas wells. The Pitot tube method, which was in use, was not altogether satisfactory. These engineers proceeded to develop a method which we call the back pressure method of testing a natural gas well. The results of their work are given in considerable detail in Bureau of Mines Monograph No. 7. The title of this monograph is "Back Pressure Data on Natural Gas Wells and Their Application to Production Practices."

We have used this back pressure determination, applying it to the wells of Texoma, in our general study of the future production from the various wells. I think I ought to describe briefly what the test is in order that there may be an understanding of the methods we used to apply the principle.

Briefly, the back pressure method of determining the open flow of a well involves, first, shutting in the well for a sufficient period of time to permit the rock pressure to stabilize. That is called the shut-in wellhead pressure. The next step in the procedure is to permit the well to flow at various quantities of gas per twenty-four hours and to record the rock pressure at the wellhead corresponding to these various rates of flow after the rock pressure has stabilized.

This theory and this method as explained in Monograph No. 7 is a reliable method if we keep in mind some of the things that will undoubtedly happen in the sands from time to time. As long as the condition would remain the same as the condition that existed at the time the test was made, future tests made under this principle would give the same results, almost coinciding with the results of the original test that was made. There are a number of factors and a number of things that can happen in the producing strata which we must recognize. I want to mention those because I have not been able to take all those things into consideration in my use of the back pressure method. Some of these things that will happen, we think, relate to the channelling of those strata. They relate to the intrusion of water. They relate to the fact that the producing characteristics of the well would change if additional wells were drilled in the general drainage area of the particular well which we have tested. There is also the salting up of the producing strata by sedimentation. I think that covers the major influences.

533 In regard to the possible effect of increasing the number of wells in a given vicinity so as to effect the drainage area, I mentioned the fact that the drilling of an additional well in the general drainage area of an existing well would have an effect upon the existing well. That is a result that obtains where the number of wells in a given area is substantially increased.

These disturbing factors which operate to cause the actual flowing capacity or potential flow of the wells to vary from that indicated by the back pressure tests will inevitably cause a reduction in the quantity of open flow in relation to the rock pressures. If you apply the back pressure test to a given well and thus get a potential open flow indicated for future pressure levels and any of these interferences which I have enumerated intervene, the actual open flow of the well will turn out to be less than that indicated by the back pressure curve.

I have prepared some drawings showing in graphic form the back pressure curves that have been obtained from Texoma wells.

(At this point counsel for defendants presented a document described as "Back Pressure Test Data on Wells of Texoma Natural Gas Company, Well Groups No. 1 to No. 12, Inclusive." At the direction of the Examiner the document was marked Exhibit 89 for identification.

Counsel for defendants also presented a map entitled "Texoma Natural Gas Company, Map Showing Grouping of Wells as Used in Study of Future Well Conditions." At the direction of the Examiner, this map was marked Exhibit 90 for identification.)

One of the first things I did when we entered this phase of our problem was to check through my files thoroughly to see that I had back pressure tests for all of Texoma's wells. I have back pressure tests for all but one well of Texoma, through it might be that there was a well completed just a short time ago and the back pressure tests have not come in yet.

Page 1 of Exhibit 89 records the data taken at the time of testing Texoma's well named Aebersold 1-G. It is in Gray County, close to the Carson County line, approximately on the west central side of the area numbered 1 on Exhibit 90, in Section 180, Block 3, I&GN, Gray County, Texas.

The upper portion of the page represents the location of the well, which I have just stated, and immediately thereafter we find a statement of the size of the casing in the well, the total depth of the well, and the location of the gas pays. The total depth is indicated at the righthand side of the page. Immediately under the statement of 8¼ inch casing we find a section of the data sheet in which the gravity is stated as being 0.684, and then we find the letter "L" and 2562 feet, this being the average of the gas pay depths. Below the letter "L" we find "GL", which is the product of the specific gravity and the average depth of the gas pay.

The formula below GL is a part of the back pressure 534 interpretation, but it has no particular practical value on our wells and is shown on this chart because at the time the chart was made out we thought it did have some value, but as we proceeded with our tests we found we were not using that particular part of the information shown on the sheet. I refer to that equation which is the square root of GL, divided by K Log, and the figures which are immediately thereunder, ending with Log. e times .0000347 equals .00001507.

I now refer to the portion of the chart which is headed "Shut-in pressure, pounds per square inch." In the line next below the shut-in pressure we find the words "Atmospheric pressure" and opposite them "13.0." That gives the generally accepted atmospheric pressure in the Texas Panhandle. That 13.0 means 13 pounds per square inch.

The next line down reads "Shut-in pressure at the wellhead, gauge, 302.0." This figure is in pounds per square inch and is the record of the pressure gauge at the time the well had been allowed to stabilize its rock pressure. That pressure determination is made with a dead weight gauge in order to get the most accurate determination. The wells will stabilize in varying periods of time. It might be half a day or it might be several days. It just depends on the particular well. All of the features of the producing strata and of the adjacent drilling enter into the period of time required for the stabilization.

The next line down is the shut-in pressure at the wellhead, absolute, and is the sum of the atmospheric pressure and the gauge pressure, namely, 315 pounds per square inch.

The next line is the shut-in pressure at the sand, and the symbol there, "P_f", is one which we will use quite often in the discussion to come. We arrive at the formation pressure, or the shut-in pressure at the sand, as it is called here, by adding to the shut-in pressure at the wellhead, absolute, the weight of the static column of gas in this particular gas well, and we find that weight by reference to certain tables.

Questions by the Examiner.

This "G equals 0.684" enters into the calculation of the weight of the column of gas.

The purpose of that formula I mentioned a moment ago was that if our wells were operating in certain pressure ranges, we would probably be using that particular correction. It relates to a correction involved in the use of the back pressure data and converts it to future use in interpretation of the data. I don't know whether it has anything to do with intertia or not. If we used it, it would have the tendency of increasing the shut-in pressure at the sand base. That is taken up in Monograph No. 7, and we could tell you more thoroughly about that by going into that particular angle and telling you just how minute that particular correction is. I will look that up and tell you.

Direct Examination Resumed by Mr. Morgan.

535 The next section of this data sheet is called "Observations during the test," and in this portion of the data sheet we find recorded the information obtained when the well was permitted to flow at various quantities for 24 hours and the stabilized rock pressures recorded at these rates of flow. We see recorded in this portion of the page the result of three tests on this particular well. In the first test the pressure at the wellhead, when stabilized, was 284 pounds, gauge, and then absolute 297 pounds.

If we proceed across the line of this particular test we find information relating to the meter data, particularly the coefficient for the particular meter in use and the size of the orifice in use, and then finally a statement of the total quantity of gas flowing per 24 hours, namely, 1,358,000 cubic feet. I use my 24 hour coefficient merely to multiply my meter reading by to get my results.

The stabilized pressure can be taken of a well flowing at a particular rate. It is only the gas that is flowing, not the pressure. After the flow is permitted to continue for a length of time uniformly the pressure as recorded by the dead weight pressure gauge will not change further, as long as that particular rate of flow is continued.

In getting this pressure rating, which I have called the stabilized pressure, at any given rate of flow, the engineer who is making the test on the well watches the rate of flow, the meter registration, and he also watches the pressure being recorded by the dead weight gauge. After he sees that the rate of flow has become constant and after he sees that the dead weight gauge is no longer changing in its pressure recording, he says that he has determined the stabilized well head pressure, and records that pressure as applying only to that particular rate of flow.

Questions by the Examiner.

I hardly know how to describe a dead weight gauge. The pressure record on the spring gauge has to do with the effect of the pressure upon that particular tube in the gauge. On a dead weight gauge we have a piston effect, and we lay all of the weight on top of this piston and it produces a pressure on the fluid in the dead weight gauge, and that in turn makes a registration. That is rather a rough description of what happens. It might not be an accurate description of the particular appliance; but I am thinking from a laboratory standpoint, from a standpoint of testing the gauge.

It is used instead of the Pitot tube because the Pitot tube method of open flow testing has some bad features to it on account of the quantity of gas that is wasted to the air and the hazard of fire and the inability to determine anything about the well other than just its absolute open flow, so we would prefer to use the back pressure test, and then we use a dead weight gauge instead of a spring gauge because in traveling through the country the spring gauges in the company trucks get bounced and jounced and get out of calibration; but a dead weight gauge once calibrated in the laboratory will remain in calibration and will remain accurate in the field.

The dead weight gauge is used to take all the pres-
536 sures when a well is tested, even when it is flowing. I
have given a very inaccurate description of the dead
weight gauge.

Direct Examination Resumed by Mr. Morgan.

Having completed the first test, which is recorded in Line No. 1 in that part of the sheet I am talking about, the engineer in charge of the tests then causes the well to produce at a different rate of flow and to become stabilized at that different rate, and records the stabilized rock pressure at the second rate of flow, and he proceeds from his second test to the third test. We think that three tests are adequate.

In the first test made on this particular well the rate of flow was 1,358,000 cubic feet per 24 hours, and the corresponding stabilized pressure was 284 pounds, gauge. On the second test the quantity of flow was 2,037,000 cubic feet per 24 hours, and the corresponding wellhead gauge pressure was 274.6 pounds. The third test used a flow of 2,827,-

000 cubic feet and recorded a wellhead pressure of 264.2 pounds gauge.

In this particular instance the man who made the tests was W. H. Tompkins. We have located at Fritch, Texas, two gas engineers whose principal function is to make the various tests on the wells. They are constantly testing wells for one reason or another. I would say that these men have been engaged in this kind of work three or four years.

Questions by the Examiner.

The time interval between these series of tests would depend upon the individual characteristics of the well. It will vary. When this well was producing at the indicated quantity per 24 hours in the second test, the well was unable to produce a pressure registration at the wellhead in excess of 274.6 pounds. There must be a pressure differential between the formation and the well bore in order that the gas flow. We probably used a different size of orifice because that particular meter would not carry the quantity in the second test with the size of orifice that was used in the first test. The degree of accuracy of measurement entered into the use of the larger sized orifices as they continued through the tests.

As to how long it was after we completed our first test before we started the second test, it is shown under remarks on this page that the flow was taken on the pipeline meter over night and then changed to flow prover, making a 24 hour stabilization on each point. The amount of stabilization time would be different for each well. It might be hours and it might be, as indicated here, a half a day or longer. The only thing we can do is wait for it to stabilize. We have no way to make it stabilize. The indication from the remarks is that it was 24 hours between test No. 1 and test No. 2 and 24 hours between test No. 2 and test No. 3 on this particular well.

Direct Examination Resumed by Mr. Morgan.

This section of the sheet is called "Calculation of back pressures at the sand." We find the data recorded for each of the three tests.

As to the first test, we find that the wellhead gauge pressure has been converted to pressure at the face of the
537 sand, at the bottom of the well bore, by the application of the 13 pounds per square inch atmospheric pressure

and by the further application of the weight of the column of gas under the flowing conditions that existed at the time the test record was made. The result is to obtain, for the first test, an absolute pressure at the face of the sand at the bottom of the well of 315.3 pounds per square inch absolute, while the well was flowing 1,358,000 cubic feet each 24 hours.

The back pressure recorded at the time of the second test is similarly handled in order to arrive at the absolute formation pressure at the face of the sand at the time the quantity of gas flowing in the second test was flowing, and, similarly, we determine at that third test the absolute back pressure at the face of the sand at the bottom of the well.

Questions by the Examiner.

The column heading on the division I have just discussed, the calculation of back pressures at the sand, is meant to indicate that in the following section of the sheet there are recorded the steps involved in getting from the well head gauge pressure to the be absolute pressure at the face of the producing sand.

The data sheet as made out is not used in the record of the information. It is another instance where the original concept of the sheet was found not to be useful in the actual work of the tests. In fact, we have a different form in use at this time, and I simply chose this particular well because it was tested about the time we commenced the study of the economics of the property. The symbol P_2^2 is not used on the data sheet. It is shown there because the form was incorrectly made and we just continued to use it without getting new copies printed. It is something that was on the form they used and is not something they used themselves in making the tests.

Direct Examination Resumed by Mr. Morgan.

The next portion of the page is called "Calculation of the fundamental relation," and this is a particularly important phase of the test because it is this fundamental relation that we are actually seeking to determine. This fundamental relation is the name given to the relationship between the open flow quantity of the well and its corresponding coincident rock pressure.

In the first column of this portion of the chart we find recorded the several absolute pressures at the face of the sand at the time the following tests were made and these absolute pressures have been squared and the figures given are in the thousands. In other words, the square of 315.3 pounds absolute is 99,400, approximately, and it is recorded on the data sheet as 99.4 for convenience. That particular F that has been squared is the symbol P_f that I said would be used frequently when I was discussing the group part of the exhibit.

Immediately above the figure 99.4 we find the symbol P_f^2, and to the right of the symbol we find a figure 112.0, and that figure is the shut-in pressure at the face of the sand recorded above as 334.6 squared and written down here in terms of thousands. Below the figure 99.4 we find the other flowing sand face pressures squared and recorded.

538 To the right of this column we find the difference between the shut-in pressure in the formation squared and the sand face pressure squared at the time the several flowing tests were recorded. When I say pressures squared, I mean absolute pressures.

In the next column to the right we find the statement of the quantities per 24 hours at a pressure base of 16.4 pounds per square inch that flowed at the time the several rock pressure test records were made, excepting, of course, the shut-in rock pressure tests.

The remarks in this section are meant to be field notes of the gas engineer making the test and are down there for his information and interpretation.

The pressure is found in the section called "Calculation of back pressures at the sand," and it is the righthand figure of 315.3.

On the bottom of this page we find on the lefthand side of the bottom line "Absolute open flow equals 13.7," and that indicates that the open flow of the well at the time it was tested was 13,700,000 cubic feet per 24 hours at 16.4 pounds pressure base. If the well produces without any restriction whatever, that is for the open flow quantity that is recorded at this point. It is not possible for a well to produce without restriction if it extends a distance of two or three thousand feet from the bottom up to the surface, surrounded by an iron casing; but in our determination of the absolute open flow we disregard the conditions that may exist above the sand face and simply take the absolute formation pressure that was determined under shut-in conditions. The friction of the casing itself is disregarded in the method determining the absolute open flow. You disregard everything; it is an ideal term. The absolute open flow is not accomplished, in fact, in the producing of a gas well, ever.

We next find the date of the chart and the name of the engineer who made the test.

Page No. 2 of Exhibit 89 is the chart of the data obtained in the back pressure test of the Aebersold 1-G and has been prepared as a sample to illustrate some of the principles involved in the back pressure work. It is just a graphic picture of the same data that is reflected on page 1.

I have been asked to explain that chart or graph, beginning first with the type of drafting paper that was used, and then explaining the legends at the lefthand side and at the bottom and up in the upper lefthand corner and also in the lower righthand corner.

This type of cross-sectioned paper is constructed on the basis of the logarithmic scale, and we commonly refer to it as log-log paper because both the vertical and the horizontal divisions are divided by the logarithmic scale. This type of paper is probably used by the Bureau of Mines engineers because of the fact that the mathematical relationship of the data they were obtaining would, when placed on this type of paper, produce a straight
line when the points were connected, and that is a
539 very convenient thing to have. This convenience re-
sults from the fact that the data can be projected to either side of the recorded points with the most accuracy as compared with curvilineal lines.

The scale on the lefthand side, in other words, the vertical scale, is what we commonly term the pressure factor, and it is the difference between the shut in pressure in the formation squared and the pressure at the sand face squared at the time a specific quantity of production was being obtained.

I have been asked to explain what I mean by formation pressure and pressure at the sand face. One of the first steps in the testing of the well is to determine the shut-in pressure at the wellhead and then we convert that to what we call formation pressure—that is, the pressure that is really in the formations producing the sand—by taking the wellhead shut-in pressure and adding thereto the atmospheric pressure and the weight of the column of gas. That is the pressure back in the formation from the well-head, and that is the meaning I intend to convey when I say "formation pressure."

When I say "sand face pressure" I am attempting to indicate the pressure existing at the face of the producing sand in the well bore at the time the flow tests were taken. That is the surface of the cylindrical bottom portion of the well. It is the inside of the doughnut down there in the well.

The bottom scale is expressed in millions of cubic feet flowing per 24 hours. In order to draw the heavy diagonal black line shown on this chart, we go back to the data sheet in the part called "Calculation of the Fundamental Relation," and in there we find that test one had a pressure factor of 12.6 thousands. We take that quantity of 12.6 thousands and proceed to page 2 of Exhibit 89 and find that value on the vertical scale. We also note on page 1 of the exhibit that the quantity of production at the time of this test was 1,358,000 cubic feet per 24 hours. We turn to page 2 of the exhibit and find this value on the bottom scale and cause our two points to converge at the point on the black line indicated as Ps equals 315.3.

We have thus charted one of the test data fundamental relationships, and we proceed similarly to chart the other fundamental relationships determined in the test.

After we found those three points we joined them with the use of a straight edge, and if the three points are on the line of the straight edge we know that our test data has been taken with accuracy. If there should be some variation, or, in other words, if some point did not fall on the straight line, we would know that we should go back and retest that well. Something had happened. It had not been stabilized or some other condition existed.

This sample chart also indicates the method of determining the absolute open flow of the well, and we find that story told by the broken line horizontal in the upper left portion of the page, and by the broken line 540 vertical in the middle of the page.

The horizontal line in the upper portion of the page records the fact that the shut-in formation pressure was 334.6 absolute, and it also records the atmospheric pressure; and that is the only pressure which we assume to be at the face of the sand for the purposes of determining the absolute open flow of the well.

When we square those two values, we find 111.957 minus 169 equals 111,788, and we also find a broken line immediately under the figures, and it proceeds from the left hand scale to the right to the heavy solid line, and we then read downward from that intersection to the horizontal scale, and then the horizontal scale tells us that the absolute open flow of this well at the time it was tested was 13,700,000 cubic feet per 24 hours. We could have obtained this answer by calculation, but we put it on this chart because we thought it would be a more clear explanation of this procedure.

What I have done is to follow Monograph No. 7 and construct my own pressure graphs for each of my investigations.

I have a similar data sheet and a similar chart for each of Texoma's wells, except for perhaps a recently drilled well for which the test data has not come in, and excepting one other well of Texoma. I do not have the data on that well because it is a bradenhead well and is not in a position to be tested. The Bradenhead is the fitting that is put at the head of the well if the well is producing both oil and gas. The gas is produced from an upper formation around the oil producing tube, coming out inside the main casing of the well but outside the tube or casing through which the oil flows, and we cannot make this kind of a test on that type of well with the fitting in place.

These back pressure tests and back pressure charts enable us to determine the fundamental relationship between the open flow of a well and the rock pressure at the time the open flow existed. Therefore, we can take this test data and determine what will be the open flow in the future of this particular well, when some other rock pressure will exist; in other words, when the rock pressure has declined. When the rock pressure declines from that registered here, which was 302 pounds at the wellhead, to 250 pounds, the conditions remaining the same, this chart would indicate what the open flow would be at a pressure of 250 pounds, or any other pressure in the future.

I have been asked to explain how I have utilized this back pressure test principle, which demonstrates the relation at present and in the future between open flow and pressure, in predicting the future flowing capacity of

Texoma's wells. Of course, we were able to make a back pressure record for each one of Texoma's wells and thereby we could foresee the future conditions in these existing wells, but it was also necessary that we have some interpretation or some means of finding what would be the open flow conditions in other wells which Texoma could be expected to drill in the future, and by the use of these actual well tests we have gone through a procedure which enables us to reflect the probable open flow conditions in the future in all the wells that Texoma
541 may have from time to time.

Our first thought was that we could take the individual well data and determine therefrom an average which would relate to all of the wells of Texoma, but when we placed the individual lines of the various wells—the back pressure lines—on a chart, we found that the average line of all these individual well lines was considerably divergent from the general pattern of the sheet. It seemed to us, therefore, that it would not be sound to use an average of all the wells, and that we should do some further work on this particular point.

We were also aware of the fact that any rock pressure forecast relating to the average of all wells would have a tendency to dampen out the pressure conditions throughout Texoma's area and would effect a result in our arriving at a booster station requirement that would be much too low. We felt that we should find some means which would permit us to more nearly reflect the local characteristics of Texoma's producing property or property to be produced.

With that thought in mind we next made a chart of each county, and on the particular county sheet we drew the back pressure lines for each of the wells in that county. That was a better interpretation. We saw that our pattern was becoming more nearly a useful pattern. In other words, the average line to the county was more nearly a reflection of the county situation.

Questions by the Examiner.

The pattern difficulty was that when we charted each one of Texoma's wells on a single sheet and then placed thereon a back pressure line representing the average of all the wells, we found that there was too much variation of many of the individual lines as compared to this average line.

I did not mean to indicate that, theoretically, back pressure graphs on any two wells should resemble one another. There are individual characteristics. There will be a degree of resemblance but not an exact resemblance. In taking so many wells they spread throughout the chart in such a manner that some of the lines were so far away from the average line for all of the wells that we felt that we did not have a useful interpretation at that point. I would not say that at any pressure factor we noted a deviation from our result that was not what we had anticipated. It was the general picture that we saw presented by this particular chart plus our realization that we were recording the rock pressure as an average throughout the field and we must avoid doing that because of the local rock pressure conditions.

The chart of well group No. 6 may be used for an explanation of what I mean by the composite or average back pressure line of the four wells whose back pressures are recorded on this chart. The four back pressure lines recorded on this chart are shown in solid black line 542 and the average of the four wells is shown by the broken line which you see running diagonally generally midway between the line farthest to the left and the line farthest to the right.

In preparing that average line we assume two different values for the pressure factor. We assume the value of ninety thousand for the pressure factor. It is not shown on the chart. We assumed that value of ninety thousand for the pressure factor and then recorded on our work sheets the open flow quantities from each of the several well lines at that pressure factor. We also took another pressure factor, namely, fifteen thousand, and recorded the open flow quantities relating to that particular pressure factor, and with these two open flow quantities determined, we calculated the position of this back pressure line representing the average. That gives the position and the direction of the line. In other words, we determined two points on the broken line and joined them.

As to what that average line showed with respect to the others that led us to a dissatisfied state of mind, I point out that if you were to put 143 lines on this particular sheet and determine an average line in the method I have indicated, you would see that these 143 lines swung in many different positions in relation to the average line.

The purpose of solving for this average or composite back pressure line in the different groups is to obtain a present situation as to the average composite lines, back pressure lines, of wells which have not yet been drilled and, therefore, cannot be tested for the purpose of this hearing; and in order to get information which is of value it is impossible to take as a whole the conditions obtaining in the different portions of the field where the producing conditions, the pressure, the open flow, and the other elements that enter into these tests are so variable under the physical conditions and under the operating conditions that have obtained and do obtain down there, that such an average composite line would not be useful in determining what the behavior or what the relation between future open flow and the pressures of the wells yet to be drilled will be.

Direct Examination Resumed by Mr. Morgan.

There is a further item of interest on page 2 of Exhibit 89. At the bottom of the title of the sheet we find N equals tangent of "A" equals x/y, and so forth. In our work on back pressure tests and their application to production problems we also determine this so-called "N" value or the slope of the back pressure line in relationship to the vertical axis of the chart. That gives us a quick indication as between various wells of the rate at which we can expect the open flow to decline in comparison to a decline in rock pressure. In other words, most gas wells will not decline as much as 10% in rock pressure when they decline as much as 10% in open flow. Of course, I am referring to Texas Panhandle wells. The slope of this line expressed in numerical value tells us what we may expect as to the percentage decline of rock pressure and the percentage decline of open flow during the same time.

543 *Questions by the Examiner.*

As to whether that result gives us a figure we can use in calculations and we do not have to read our graph, I will say that we do use that value in calculations, but the more important thing which that value shows to us may be illustrated by taking the "N" value of two different wells and seeing what these "N" values are. If the "N" value of a well is .6, we know that when the rock pressure declines 10% the open flow will have declined only a little more than 10%; but if the "N" value of the other well is in the nature of one, we know that the second well, when it has declined 10% in rock pressure, will have declined considerably more than 10% in open flow during the same period of time. In other words, the slope of the line off of vertical indicates an increasing tendency to decline in open flow at a more rapid rate than the decline in pressure. It means we would have to do additional drilling at an earlier date in order to take care of the decline in open flow.

We were led to grouping these wells because the back pressure tests which we had on hand could be used in forecasting those particular wells, but we had to have some means of forecasting the wells which were yet to be drilled on the property of Texoma, so we sought to obtain an average that we could use in forecasting.

(At this point counsel for defendants made the following statement:

I would like to make a preliminary statement here of what I am expecting to prove by this witness in connection with these back pressure curves in order to make it, I hope, somewhat easier to follow.

The purpose of this proof is to show that there is a definite relation in a given well, so long as the formation conditions remain the same, between the pressure obtaining in that well and its capacity to produce, or its open flow, and that by means of a test this relationship can be determined so that, looking to the future, this back pressure test and the chart which is drawn from the result of that test will indicate what the open flow or capacity to produce will be in the future, whatever that future pressure may happen to be.

Now, we propose to show by other proof which we will reach a little later—this matter is so complicated that we can't bring it along together—that we think we have a way of ascertaining the course of these pressures, and having obtained the pressures, then, by the application of these back pressure curves we hope to demonstrate what the capacity of the wells to produce will be in the future, reflecting, of course, upon the need for wells in order to meet the requirements of these pipe lines.

The back pressure curves themselves are all that we need

in predicting the future productivity of that particular well, or of these particular wells on which we have back pressures, at any assumed or given pressure in the future; but we can't get the full picture because we are drilling wells all the time. We know now it is going to be necessary to drill a great many more wells, and in order to see
544 how many more wells we are going to have to drill we must find out the behavior of the potential capacity to produce of the wells that are in existence now and also those that are yet to be drilled, and it is for the purpose of ascertaining the relationship of the wells to be drilled in the future that it becomes necessary to deal with what the witness has termed here a composite of the back pressure curves in particular areas.

The evidence will show that the reason we could not take these 140 some odd back pressure curves, and take the composite of all of them in arriving at the probable relationship between the potential open flow or capacity to produce and the pressure of wells yet to be drilled, is that there must be, in order to make such a prediction, a similarity of certain conditions, namely, there must be comparative uniform pressure in the area where the wells have been drilled and in the area where wells are yet to be drilled; there must be similar formation conditions; there must be similar drainage conditions, and by drainage in this connection I mean surrounding drainage; and certain other factors which the evidence already shows are highly variable in the different portions of this field.

And for that reason it has occurred to these engineers that by breaking this area in which Texoma has properties into smaller local areas where the pressures are about the same, where the formation conditions are about the same, where they are subjected to the same outside drainage considerations, and by taking the wells located in those local areas, and taking the composite of the back pressure curves of those wells, they can reasonably predict a composite of the back pressure curves of the wells yet to be drilled, as well as of those which have already been drilled in those areas; and then taking those results and applying them to the pressure which will obtain in the future, they predict, and they think with reasonable certainty, what the potential producing capacity of those wells will be from time to time on through the future as those pressures go down to the levels where the studies are discontinued.)

Direct Examination Resumed by Mr. Morgan.

I have stated why, in predicting the future behavior of wells to be drilled by Texoma on its reserves, I could not use a composite of the back pressure curves of all the wells on one chart and thus hope to arrive at the indicated average back pressure curves of all wells, including those to be drilled in the future. I made the same statement with reference to studies that I had made up by counties. Texoma's wells are in four counties, namely, Gray County, Carson County, Hutchinson County, and Moore County, Texas.

As to the conditions which enter into the question of the reliability of the ascertained composite of the back pressure curves of existing wells as pointing to the relationship between capacity to product or open flow and pressure of wells yet to be drilled, if the original test data is obtained under the proper conditions, then future tests made under the same conditions will give a back pressure line which
545 is in coincidence with the line originally obtained. However, here are a number of things that happen in the producing strata that will tend to cause a deviation from the line originally obtained in the first test.

For example, if there is a water intrusion in the sand we may expect that a future test will show a different relationship between open flow and rock pressure. If there is a channeling in the sand or sedimentation or salting or a reduction in the area of sand face exposed in the well bore, all of these things will cause a change in the relationship between rock pressure and open flow.

I have been asked to state the best means, prior to the drilling of wells, of arriving at the relationship between the open flow and the pressure of those wells yet to be drilled. Inasmuch as we cannot now determine what the back pressure test data would be of a well not now drilled, the best way for us to get an indication of what the future wells will be on the average in regard to the relationship between rock pressure and open flow is to arrive at an average of the existing wells and to use it in our future projection for all wells.

In determining whether or not you can reliably predict, or predict with reasonable certainty, the average back pressure curves of wells to be drilled in the future, it is desirable as to any given area to have that area cover similar conditions as to the producing strata and the rock pressure, the open flow productivity, and other elements of the producing characteristics of the wells in the area. We have to consider also the inside and the outside drainage, so to speak. We have to consider the entire effect of the production throughout the field. Speaking of Texoma's holdings, we do not have such uniformity of conditions throughout the area in which Texoma's wells have been drilled and will be drilled in the future.

I think that one method of illustration would be to cite the fact that pressures in the Gray-Carson County border line are lower than the pressures over in Texoma's Coon ranch in Moore County, for example. The eastern side of the field, the border line between Carson and Gray Counties, has suffered a considerably larger amount of drainage through a considerably longer period of time than Texoma's holdings over in Moore County, in the Coon area, or the Thompson area, or other places where Texoma has leases.

Comparing the area colored in pink and numbered 1 on Exhibit 90 and the area colored brown up in Moore County and numbered 10, the drainage would be greater and the rock pressures lower in the pink area than would be the case in the Moore County area which is colored brown.

If back pressure tests were made of the wells in area No. 1 and back pressure tests were made of the wells in area No. 10, and a composite is made of the back pressure curves of the wells in those two areas, that would not be a reliable indication of the relationship between potentials and pressures of wells drilled in area No. 10. Obviously, the lower rock pressure existing in Group 1 is going to show
a lower open flow existing in that area, using only rock
546 pressure as a guide, and therefore the composite of
Group 1 and Group 10 would not, in my estimation, be
the proper average to determine in the problem that we are studying.

That is what I meant when I said we could not take all of the wells of Texoma and construct their back pressure curves on the same chart and arrive at a composite that would be the most accurate in predicting the relationship between potentials and pressures in the wells to be drilled by Texoma, scattered over the whole area of its holdings. I meant to indicate that the composite of the whole would not be nearly as accurate as if we divided the whole into constituent parts and determined a composite of each constituent part, and applied the composite to that constituent part only.

We abandoned the idea of making four groups by counties because, using Carson County as an example, we know that the rock pressure and drainage conditions on the eastern side of Carson County are different from the rock pressure and drainage conditions on the northwestern portion of Carson County.

We finally decided that we would break the county areas into smaller than county areas; that we would use a number of areas in a county; and that we would strive to have the areas reflect a reasonable degree of comparable production conditions.

Pressure was the principal determining factor which we took into account in dividing these properties into these areas. Our knowledge of the drainage in the area was another factor, because we felt that where wells had had considerable drainage they would be the ones which should be included in a group, rather than including some wells that had had a lot of drainage and some wells that had had very little drainage.

We finally settled upon thirteen areas within which the Texoma properties would be found. I have delineated those areas on a map so that they can be pointed out, and that map is Exhibit 90.

I used the word "group" in describing an area of land because I divided the Texoma wells and the Texoma acreage into groups and came into the habit of calling them by specific group numbers. I named area No. 1, Group 1, because I had a group of wells located in that area which I call Group 1 of Texoma's wells, and that is true of each of the other areas. The order of numbering has no particular significance.

In Group 1 Texoma has a number of wells and a quantity of leaseholds, but it does not own all of the leases nor all of the wells that are in that area. This is one of the low pressure areas on Texoma's property. I made that particular grouping because it was my judgment that the production conditions in that area were sufficiently comparable from well to well that it was reasonable to group these particular wells into a group.

The next group is numbered 2, and is the purple colored
area in the south portion of the northeast quarter of
547 Carson County. It extends over a considerable area.

Within that area Texoma has a number of wells and leases, but does not own all of the leases and wells in that area. It is a fairly good rock pressure area. It is neither suffering from the most intense drainage nor from the least drainage.

The next group is Group 3-A and is the orange colored area located in the upper half of the northeast quarter of Carson County. Here again we find that Texoma owns some of the wells and some of the leases in the area, but not all of the wells and the leases. This is an area which has suffered a considerable amount of drainage, particularly from the production of oil to the northeast.

Group 3-B area, lying between Group 3-A and Group 2, is an intermediate area as to rock pressure and drainage, as is evidenced by its location on the map.

At one time in our study we did not have 3-A and 3-B, but had simply 3. When we considered Group 3 as we had it constituted, we came to the conclusion that our information would be more useful and our prediction more accurate if we split the area into two areas, 3-A and 3-B. The area designated 3-A is very much closer to those low pressure oil field areas than 3-B, and consequently has a lower pressure than 3-B, and we thought we would get more uniform pressure conditions in 3-A and 3-B separately, and also more uniform drainage influences, taking those areas separately, than if we put them together as we started out to do. The work had progressed so far that I did not want to go through and change all of the group number designations.

The next group in order is Group No. 4, and is the brown colored area, roughly in the southeast quarter of the northeast quarter of Carson County. This particular area contains a considerable portion as to area of the very large Burnett ranch. This particular ranch has not been heavily drilled and, as a consequence, the rock pressure conditions in this area are higher than the rock pressure conditions in areas which have been more intensively drilled and which are closer to the points from which the great quantity of gas production has been obtained in the past. In Group 4 Texoma has a number of wells and leases, but here again does not own all of the leases and wells in the area.

Group 5 lies on the north side of Group 4 and is in the northeast quarter of the northwest quarter of Carson County. It contains quite a few Texoma wells and a considerable quantity of Texoma acreage, but Texoma does not own all of the wells and acreage in the area. This area No. 5 is another area which has had considerable drainage because of heavy gas production in this particular case to the north of the group, and I think the heavy production to the northeastward has also had its effect on Group 5.

In Group 6, which is located in the southwest quarter of Hutchinson County, we have a relatively small area, and in here Texoma owns a number of wells and some leaseholds
but of course not all of the property in the area. This
548 group is quite close to Fritch, the compressor station
of the pipeline company. It has had considerable drainage from the heavy production in the southwestern portion of Hutchinson County.

Group No. 7, colored in blue and located approximately in the east central portion of the southeast quarter of Moore County, contains a considerable quantity of Texoma acreage and a number of its wells. In this group we find that the rock pressures are getting higher than the rock pressures in the previous groups discussed, for one reason because the group is more removed from the effects of drainage. I mean the rock pressures in Group 7 are higher than the rock pressures in the previously stated groups, and not that they are increasing. Texoma does not own all the property in this area.

Group No. 8, the orange colored area in the center of the east half of Moore County, contains a number of Texoma wells and a quantity of its leaseholds, although Texoma does not own all of the gas producing property in that area. This group has not had as much drainage as groups to the east, but it is now going to suffer some of the drainage that is being created by this heavy gasoline plant—carbon black plant production resulting from the intense amount of drilling that occurred in the northern portion of Moore County during the last few years.

Similarly, Group No. 12, the green area about the center of Moore County, is going to suffer from the drainage of this increased concentration of gasoline plant and carbon black plant production. In Group 12 Texoma has quite a bit of acreage and a number of wells, but does not own all of the gas producing property.

Coming now to Group No. 9, which is also approximately in the center of Moore County, we find ourselves in a rather intermediate position on the rock pressure conditions, in that the drainage in this area is more of the local drainage from the surrounding area rather than the drainage to that heavily concentrated production in the oil areas in the northern part of Moore County. Texoma has quite a bit of acreage in this area and a number of wells, but it does not own all of the property.

Group No. 11, colored yellow, again approximately in the center of Moore County, is almost completely Texoma acreage and Texoma wells. It is the area we recently referred to as the Coon ranch and is a high pressure area in that it has not suffered much drainage in the past. We do note that there is an increasing tendency for drainage to affect this group and it is coming primarily from the heavy gasoline plant and carbon black plant production in the northern part of Moore County.

Group No. 10, located in the southwest quarter of Moore County, contains a number of Texoma wells and quite a few of its leaseholds. It is removed from the heavy drainage of the large gas producing area, and, as a consequence, has not had its pressure so materially affected. Its pressure decline is more a matter of local drainage than of general drainage in the field. 549

I have prepared a chart for each of those groups showing the back pressure curves of Texoma's wells. Those charts are found in Exhibit 89 and start with the third page of the exhibit and continue for thirteen pages.

There are 12 Texoma wells in Group No. 1, all of which are charted on the composite chart of Group 1, page 3 of Exhibit 89. While that group contains the Bradenhead well which has been mentioned previously. It has no test, but each well in the group was assigned a number for identification purposes. There are only 12 back pressure curves reflected, and those 12 are all of the wells owned by Texoma in that area, except this Bradenhead well, on which there is no back pressure test.

We have made tabulations of the wells in these various groups and have included the tabulations in the back part of Exhibit 89, the pages of which are numbered 1 to 13, inclusive. Those pages list the Texoma wells that are in the various well groups and are charted on the back pressure charts of the various groups, except, of course, the Bradenhead well. They show the name of the well, the number of the well, and the description of the land on which the well is situated so that the well can be identified on the map.

Turning to page 3 of the exhibit and to the expressions on the left-hand margin such as "P_f^2-P_s^2) thousands," the letters contained within the parentheses are commonly referred to as the pressure factor. P_f is the formation pressure determined under the shut-in conditions at the time the well was tested or a well would be tested, and the characters squared indicate in mathematics that the number is multiplied by itself. The character P, refers to the pressure that existed immediately at the sand face in the well bore at the time a test was made under flowing conditions, and here again the square of the number indicates that it was multiplied by itself.

In plotting these curves we do not use the pressure test figures but convert them to the pressure factor that is indicated in the lefthand margin of this chart, and that pressure factor is the same thing I explained in connection with this sample back pressure curve. It is the same kind of charting paper. The figures along the bottom margin of the chart have the same significance as in the sample chart I have been talking about on page 2 of this exhibit. In this page 3 of the exhibit we are dealing with exactly the same things we have described in relation to the Aebersold well.

Each solid black line on page 3 is the back pressure line of a particular well. The numbers underneath key the line into the tabulation in the appendix of the exhibit, where we find, for example, in Group 1 that well No. 1 is the Osborne, or, to reverse it, the Osborne well is No. 1. You can take the number 1 or the number 2 or any other one of those numbers and turn over to this page 1 of what we have called the appendix, and see which one of those wells is represented in the back pressure curve above that number. 550

These back pressure curves were constructed from these test data sheets or from the back pressure charts which had been made from these data sheets.

There is a broken line running up through the other lines, underneath which is an arrow pointing up from the letters AVG. The letters AVG are an abbreviation for "average," and mean to indicate that this broken line seen on the chart is a line which represents the average of all the wells charted, or, as we more commonly speak of it, the composite back pressure line for this particular group of wells. We arrive at that composite line or curve from the back pressure curves of which it is the average or composite by finding two points which we know will fall on the composite line and then by drawing a straight line connecting these two points and projecting it to either side of the points.

The method that we use in determining these two points is to assume two values of the pressure factor. We take the first value we assume, which in this case is 90,000, or 9 on the scale of the chart, and by 9 I mean that particular 9 which lies between the figure "10" and "100" on the vertical scale of the chart, and then read the open flow of each well at that 90,000 point on the back pressure line of the well. When we had obtained the open flow of each well we added the open flows together and obtained the arithmetic average, and then with that arithmetic average and using the bottom scale of the chart located that particular arithmetic average as so much open flow quantity and so much pressure factor. That gave us one point.

We determined our next point in a similar manner, but by the assumption of a pressure factor of 15,000, and that 15,000 point would be located on this chart between the No. 10 on the vertical scale and the No. 2 next above it, and, of course, is the fifth division counting upward from the No. 10. Here again we got the open flow quantity from each of the back pressure lines, averaged them arithmetically, charted the arithmetic average in conjunction with the assumed pressure factor, and thus located the second point on our composite line. Then by taking the straight edge we joined these two points and extended such line to either side of the data points. The result was the composite back pressure line for Texoma's wells in this particular group.

We selected 90,000 and 15,000 as the control points because ordinarily it is advisable to make the back pressure tests at quantities of production which cause the pressure factor to fall within the center range of this chart. I say center range just as a matter of illustration. I really mean that they should fall within a fairly narrow range of pressure factors, because in this type of paper the accuracy of plotting decreases as you progress into the higher values of the scale. Therefore, we selected 90,000 and 15,000 as our pressure factors for the determination of the composite average, because they do fall within the approximate range of the test data, and gave us the most accurate composite line. The basic data for any one well are taken within the ranges that I have indicated.

551 This composite line which we have determined for that particular group indicates to me the future relationship between the rock pressure and the open flow on the average of the wells in that group, not only as to the present wells in the group, but also the future wells that Texoma may drill in that area. We anticipate drilling one more well in that group, and it is my view that the drilling of that additional well is not going to change the composite

back pressure curve of the 13 wells that we will then have in the area. If there were more wells to be drilled within that group, it is my opinion that, while they would not fall exactly upon the composite line for the group, they would fall in such positions to either side of it that on the average they too would come back to the same relationship of rock pressure and open flow that we have depicted in the average line of the existing wells.

Questions by the Examiner.

(Counsel stated that there was no uniformity as to the size of the area, but that it was just the area where the formation conditions, such as pressure and drainage and other influences, are the same which determined the size; that there was no particular quantity of acreage in any of those groups belonging to Texoma; that the groupings were so made as to encompass all the properties that Texoma was producing into its pipeline system and on which it intended to produce hereafter; that the reason other land was included was because it just happened that other people owned leases there, but of course the company had not had access to their wells to make tests on and had not made any tests on wells belonging to others.)

The slight deviation which might appear between a graph in Group 1 and the position shown in the sample curve would be more a matter of the draftsman in drawing the chart. The representation shown in Group 1 is more apt to be the correct one than the other; but we work with calculations a lot in order to avoid the very thing just pointed out. I would use a chart for a quick answer, but if I wanted to be sure my quick answer was right, I would enter into a calculation.

Direct Examination Resumed by Mr. Morgan.

By and large my deductions from these charts are based on accurate calculations and are not taken from the chart itself. This chart No. 1 was intended only as an illustration or demonstration of what is meant by back pressure curves.

This zone or area which I have termed Group 1 could have been broken up into two or three or half a dozen smaller areas. One of the things that entered into our determination of the particular areas adopted was an effort to get enough wells in the group to give a reasonable composite average. In that particular area the differences between the wells were not so extreme that we felt there was any need to subdivide them further, and then, too, the 552 more groups we have, the more work we must do in other phases of our study, and the amount of clerical computations involved in this work is very large. It is desirable to get some outside limits on a chart in order that the average may fall within it, and also in order that the future wells might be conceived as falling within the outside limits of the charted data.

Questions by the Examiner.

We felt we had a sufficient number of groups to give us a reasonably accurate forecast. As to well grouping, if we had constructed our groups so as to have more of the right-hand lines in one group and one of the left-hand lines in another, we would have gotten a different result, but the combination of the two results would again come back comparable to the one result that we got.

I do not recall the areas of all the different groups that we studied. We had at one time about 24 groups, I think. We gave further study to it, and came to the conclusion that the 24 groups were not adding anything more to our general solution of the problem than a lesser number of groups, except doubling the work, and furthermore, there is also that element of the greater number of groups having a fewer number of wells and not giving us the spread from left to right on the chart within which the composite line would fall.

This is probably the third set of these back pressure graphs that I have made. The back pressure tests of the individual wells were not made specifically for this proceeding. It is a matter of routine with us to test our wells. We actually use these back pressure tests to plan our program, and the production men use them in their work. We are using this special assembly in our present and future plans, and this is the order and arrangement that we use in determining the future economics of the companies for the purposes of these proceedings here. We have not used any similar order and arrangement for forecasting a plan on which we are now operating.

(Counsel for defendants here stated that this grouping has been prepared especially for the purposes of this case; that the companies do not need the grouping for the purposes for which they use this information in a routine way in connection with the studying of the history of the wells, and that it is not until now that they have ever been able to get through a study which would give them the answer as to the number of wells they are going to have to drill; that they had been working with it, but they have never known as much as they know now about what those future drilling requirements are going to be, because of the very 553 involved study; that these back pressure graphs are indicative of the total number of wells that they are going to have to have in order to obtain the open flow that will enable them to keep their pipeline loaded as long as there is gas available; that they have been drilling additional wells knowing that additional wells had to be drilled; that the lease obligations have had much to do with the drilling in the past, and it is only at this time that they have arrived at what they think is the answer as to the total number of wells they will have to have.)

Direct Examination Resumed by Mr. Morgan.

I have stated that I prepared a similar chart showing the actual back pressures of the wells in each of the groups delineated on Exhibit 90, and that I have ascertained the composite of those back pressure curves. I am now asked to state what that composite back pressure curve on each of the charts representing the other areas or groups pictured on Exhibit 90 indicates to me as to the relationship between the open flow and pressure of wells to be drilled in these respective groups.

We have made 13 of these group charts. Each one of these charts indicates to me as to that particular group what the relationship would be in the future between the rock pressure and the open flow of Texoma's wells in the group area, both the present wells and the future wells. Necessarily, the future wells individually will have back pressure lines which will not always be exactly on this composite line for the group. In fact, there may not be any of these individual wells fall exactly on that composite line, but they will fall to either side of the composite line, and, on the whole, the average for all wells, old and new, will conform to the composite line which we show on the chart for the group.

Such variation as there may be would not cause any particular change in the answers or conclusions that come from this work.

Page 4 of Exhibit 89 is the back pressure chart for the Texoma wells in Group No. 2. There are 24 wells charted on page 4, and that chart is prepared from the same kind of data and on the same kind of charting paper as the chart reflecting back pressure curves of wells in Group No. 1. The procedures were similar. We determined the composite back pressure line for Group 2 and it is the broken line shown on page 4 of the exhibit. The ultimate development in this group will be a total of 44 wells. That will mean an addition of 20 wells after the time this chart was made, or an additional 21 wells after January 1, 1939.

On page 5 of Exhibit 89 we have charted the individual back pressure lines of the several Texoma wells in Group 3-A, and we have also charted the composite back pressure line for the group. We proceeded to prepare this page, using the same kind of information and using it in the same manner as we did in the preparation of the previous
554 pages 2, 3 and 4. Sixteen wells are shown on the chart for Group 3-A, and we contemplate that a maximum of 13 additional wells will be drilled in that particular well group area.

All of the charts which I have talked about and which I am going to talk about from this exhibit are drawn on the same kind of paper and from the same character of data, obtained in the same way, as the data on the chart showing wells in Group 1 and shown on page 3 of the exhibit. All of the succeding charts are similarly compiled.

The chart relating to well Group 3-B, on page 6 of the exhibit, shows the back pressure lines of each of the Texoma wells in that group, and the chart also shows the composite back pressure line which was determined for the Texoma wells in that particular well group.

The succeeding charts of back pressure test data relate to Groups Nos. 4, 5, 6, 7, 8, 9, 10, 11, and 12. Each of these group numbers in a group of Texoma wells. Each of the succeeding pages shows the back pressure lines for the wells in the respective groups and the determined composite line.

Turning back to the sample back pressure curve on page 2 of the exhibit, I can take that chart and find the open flow of the well whose back pressure curve is shown which we may expect to exist, if the conditions of the producing formation remain the same, when the well pressure has dropped to about 100 pounds absolute in the formation.

I will illustrate the application of this particular pressure by citing the equation of 100 squared minus 13 squared. One hundred corresponds to P_f on the sample chart and 13 corresponds to P_s. One hundred squared is equal to 10,000, and 13 squared is equal to 169. The difference is so little less than 10,000 that for the purposes of answering the question I will use the value of 10,000. I find the figure 10 on the vertical scale of the sample chart and that is in correspondence with the pressure conditions stated in the question. I then proceed to the right along this line until we intersect the back pressure line of the well and then proceed downward to the scale for the quantity of daily open flow and read the figure 1.05, or in other words, 1,050,000 cubic feet per day will be the quantity of open flow which we may expect to find in this well at the time the pressure conditions are 100 pounds absolute in the formation. I can arrive at the potential for any given pressure by exactly the same process of computation.

In my actual studies in which I arrived at the future course of the producing capacities of these wells, I used calculations in determining the quantities that would correspond to rock pressures existing from time to time. The purpose of these charts is merely to show in a graphic way the same thing the calculations show. I think it would be impossible to describe this work without the charts. A pure statement of the calculations made would be very indefinite.

(At this point counsel for defendants offered EXHIBITS 89 and 90, and these exhibits were received in evidence without objection.)

555 I have been requested to explain for the record the practical use which Texoma and its production engineers and others employed in connection with gathering Texoma's gas make of these back pressure curves in the routine of their work.

I think to answer that question I ought to state why Texoma started making these back pressure tests. At first the company used the Pitot tube method of determining the open flow of its wells, but it saw that where it required a considerable length of time for a well to stabilize, it was improper to permit that well to continue blowing open to the atmosphere for that length of time. In the Aebersold No. 1-G, page 1 of Exhibit 89, we have a very definite indication of what would happen if we tried to determine the open flow of that well with the Pitot tube method and get an accurate answer.

For example, under the "Remarks" it is indicated that 24 hours elapsed between each test record. If we were working on the Pitot tube method we couldn't possibly let that well blow open to the air for three consecutive days because of the waste of gas, possibly because of the need for the production, and because of the danger of a fire or some other hazard developing during the period of three days. Furthermore, the Pitot tube method of testing revealed nothing as to the relationship of rock pressure and open flow. It told nothing as to what the operator could expect the well to produce if it had certain operating pressure conditions in the future, or even right concurrently as they went along from day to day.

For example, the meter charts from the various wells all pass over the desk of Mr. Galloup, who is superintendent of production, and he observes the registration that has been made on this particular chart, we will say the chart that belongs to the Aebersold well, and if it was a chart that had just been taken off the well, because of his experience, he is able to tell from this chart record whether that well is performing as it should be performing, and if there is something about the chart record that indicates to him the well is not doing properly, for example, not producing as much gas as it should for the pressure condition existing, he will turn to the back pressure data for that Aebersold well and check his conclusions which he reached when he observed the meter chart. If the comparison of the back pressure data and the meter chart shows that the well is doing as it should, there is no further action involved; but if the back pressure data indicates that the well is not producing as much as it should under the pressures recorded at the time the meter chart was in use, then Mr. Galloup can instruct one of his well operators to proceed to the field and blow that well and remove the water on cave-ins out of the well that have caused this deviation in ~~the normal production.~~

/ In other words, they use this back pressure chart as the index to what the production ought to be, and when the production drops below that, that puts them on inquiry as to some trouble that exists that requires attention. They are also interested in the future open flow at a future rock pressure, because they want to know what the various wells may be expected to do in current operation in the relatively near future.

556 Having worked out the relation between the open flow of the Texoma wells and the pressures of those wells, in order to predict the future producing capacity or potentials of these wells at given future times, we would have to develop the rock pressure situation in the future from year to year, and I have undertaken to develop the course of the rock pressures in Texoma's wells drilled and to be drilled in future years.

The first step in solving the particular problem as to rock pressure was to assemble the rock pressure data obtained from the various tests of the wells in the past. The Texas Railroad Commission makes a periodic rock pressure test of all the wells in the field, and open flow tests too, and also prior to the first Commission test Texoma had made various rock pressure tests and it has made rock pressure tests since the Commission's tests in 1938.

I have prepared tabulation showing the pressure information which we have had available either in the files of Texoma or those of the Texas Railroad Commission as to the past behavior of the pressures of Texoma's existing wells. We have prepared a rock pressure chart for each one of the same well groups that were referred to in the back pressure information and set out in Exhibit 90.

(At this point counsel for defendants presented a document entitled "Texoma Natural Gas Company, Rock Pressure of Wells in Various Groups." At the direction of the Examiner, the document was marked Exhibit 91 for identification.)

I am requested to state for the record what is contained in Exhibit 91.

This exhibit contains 13 pages, each page relating to a specific Texoma well group. As to a particular page, the page shows the rock pressure tests in the past of the Texoma wells in the well groups and the average from time to time of the rock pressure tests, and also the projection of this average into the future.

The Texoma wells on page 1 of Exhibit 91 are the same wells that are on page 3 of Exhibit 89, namely, the Texoma wells in well Group No. 1, and that is the situation with reference to each of the other well groups reflected by the charts shown in pages 2 to 13 inclusive.

The title of the chart which is page 1 of Exhibit 91 is "Rock Pressure of Wells, Texoma Natural Gas Company, Group No. 1." The vertical scale on this chart is the wellhead rock pressure pounds per square inch gauge, and the numbers on the scale run from 20 pounds at the bottom to 420 pounds at the top. The horizontal scale on this chart is a time scale and is expressed in years. The numbers relating to the years are plotted on the chart at the midyear point of the year. For example, 1931 refers to the year 1931 and the position of the figures on the chart is at the midyear point or the midpoint of the space devoted to the year 1931.

557 The legend for this chart contains, first, a rather thin solid black line, named "Actual Test Data."

The next part of the legend is a heavier black line and it is named "Average of Test Data."

The third item in the legend is a broken black line and its name is "Average Weighted for Acreage."

The fourth item in the legend is a dot-dash line called "Estimated Future."

Next below the estimated future line we find a light black line, with a figure at each end of the line, namely, the figure 2, and this figure indicates the number that has been given to the particular well of Texoma in this group and is the same well No. 2 that is in the composite back pressure chart in Exhibit 89.

The balance of the legend says "Actual Test Data 1935 to 1938 Inclusive, from Texas Railroad Commission; Other Actual Data From Tests Made by Company."

In the upper left hand portion of the chart we find these thin solid black lines named in the legend as being the actual test data, and referring to that line which has the number 12 at the left-hand end and the number 12 at the right-hand end, the line is intended to join the charted wellhead pressures of the test that was made at the midyear of the various years, starting with 1933 and ending with the first of 1939.

Similarly, the other light solid black lines depict the trend of the rock pressure for the particular well. The rock pressure as of the date of the test is charted on the chart and then all of these points are connected by a light solid line.

I might say as to the January 1, 1939, line, this was taken from Texoma tests, and we do not have at this time any overall test records available.

The Railroad Commission's tests in the last several years have been made in the summer time, and in arriving at the situation as it existed at the first of this year, to conform with other factual matter that is being prepared and has been prepared in this case, we had to use the company's tests as our control. We do not yet have available the midyear 1939 tests of the Texas Railroad Commission.

I would say here the pressure indicated about the midyear 1931 is an interpolation, in fact. The point of charting is about October, 1931, and it was at that time that the company's wells were coming into use for delivering gas to the Chicago project. They were so busy in the field that they were not able to make specific rock pressure tests right at that time, so we took tests that were made prior to that time and tests made subsequent to that time and interpolated the pressure as of October 1, 1931. Otherwise we have charted the actual data, and where we
558 say the tests are charted as of the midyear we mean
to infer that the tests were made quite close to the midyear. It is impossible to test all wells simultaneously as of July 1st or any other date. The Railroad Commission usually makes its tests during the months of June and July.

Well No. 12 does not extend as far to the left as well No. 13 because well No. 2 is a Texoma well which was drilled about the middle of 1933, and consequently there would be no previous test record on this particular well. That would relate also to well No. 11 and possibly to other wells in the group.

The heavy solid black line which we find running down through the general center of the pattern traced by the individual well lines indicates the arithmetic average of the rock pressures taken as of various dates.

The broken heavy black line, which is in a position somewhat similar to the solid heavy black line, indicates the average pressure weighted for acreage. In other words, we took the pressure as of a specific time and weighted them for acerage and thereby determined an average rock pressure weighted for acreage. The acreage which we weighted into those pressures was that acreage which was taken into account in fixing the rate of withdrawals from that well.

If that well was located on a tract of 320 acres and was produced on a basis of allowing to the royalty owner production that would give him his proportion of the total withdrawals based on a 320 acreage factor or unit, we weighted the 320 acres to that well. We used the quantity of acreage for each well that was used in the proration of the company's production to each well, regardless of the quantity of acreage to the specific well.

We commonly refer to the method used by Texoma in distributing its production over its producing properties as being the acreage-open flow method, and for abbreviated speech we just say A. O. F. By acreage-open flow we mean that the quantity of acreage assigned to the well and the open flow of the well are multiplied together to obtain a product for this particular well and then the products for each of the wells on production are added together to get the aggregate of all products. The individual well then gets its proportion determined by its product divided by the total of all products. This factor is multiplied by the total production to be prorated and we thereby arrive at the quantity for the specific well. We feel that this method of procedure gives each of our royalty owners a more fair share of the total outlet of the system than other methods.

As to the object of weighting the acreage into the pressures here and arriving at this average weighted pressure curve on page 1 of Exhibit 91, the trouble with using the arithmetic average of the rock pressures is that it does not take into consideration the fact that the wells are really located on acreage tracts of different sizes, and if we do not take into consideration the quantity of acreage in production we do not determine the true rock pressure condition in the Texoma producing property.

559 The idea is that by weighting in the acreage, all of the acreage which Texoma owns in the group, and arriving at this average weighted pressure, we will arrive at approximately the pressure at which a well would come in if drilled as of the time the test is reflected, whether that well be already drilled or not. There will be a very close comparison there. If a well be drilled in Group No. 1 at this time I would expect to find the pressure of that well within a close range of that weighted average pressure, and that would apply at any time throughout the course of years.

I have a line which I have described as a dot-dash line, extending from the right end of the broken line which represents the actual average weighted pressure history of the wells in that group, which I have labeled on the exhibit "Estimated Future." That line is a projection of the average line weighted for acreage based on the past actual tests of the wells in the group projected from the first of 1939 to the end of 1954.

I will explain how I arrived at the course of that line. When we entered upon the problem of determining the future rock pressure decline of the Texoma wells, we felt that we should begin with the weighted average of January 1, 1939, because that was the average which reflected the then existing conditions in the group of Texoma wells. I needed some help on this particular problem, so I asked the Texoma geologists to assist in preparing a plan whereby we could determine the rock pressure of the Texoma wells in the future. I suggested that we might use the accumulative production per pound drop, but they told me in no uncertain terms that that method was simply out of the picture and that all of the usual methods in use for rock pressure projection were also out of the picture because they would not accurately reflect the conditions that existed in the Panhandle field as a whole, the differentials in pressure and content and facts of that kind.

As we continued to consider this problem we did not find any one method by which we could move forward from January 1, 1939, but we did come to the realization that we could correlate an estimate of the future recoverable reserves of the field and an estimate of the future annual withdrawals from the field and thereby determine the probable number of years that would be required to absorb the estimated recoverable reserves and would also arrive at the rock pressure that would exist when these recoverable reserves had been exhausted by production.

The field is being gradually drilled up. Other wells are being drilled out across the field, extending out from the lower pressures across the higher prevailing pressures. I notice from the weekly progress reports coming over my desk that some company has reported a well at another point and when I look at my acreage map I see that that is beyond where the production is currently coming. This drilling is spreading throughout the field. The wider the production is distributed throughout the field, the more nearly the rock pressures in the field will correspond throughout the field.

560 Mr. Peterson, the chief geologist of Texoma, has placed in evidence an estimate of recoverable gas

reserves in the Texas Panhandle field, and Mr. Dickinson, the Texoma superintendent of production, has placed in evidence an estimate of the future annual withdrawals from the Texas Panhandle field. The correlation of these estimates showed that the production estimated by Mr. Dickinson would exhaust the estimated recoverable reserves to a 25 pound wellhead gauge—these reserves as of January 1, 1939—before the end of the year 1952, provided, of course, that the wells in the field would produce the estimated quantities, having in mind that as lower and lower rock pressures come into the picture the wells in the field could produce less and less gas and the well drilling would have to be made at an accelerated rate in order to keep up with the estimated annual rate of withdrawals.

We realized that the field could not be expected, physically or economically, to produce year after year at full blast rate of annual withdrawal down to the very day that the accumulated production was equal to the estimated recoverable reserves at a 25 pound wellhead gauge. Therefore, we compensated for this condition by moving the 25 pound pressure from approximately the end of 1952 to the end of 1954. It was our judgment that the end of 1954 was the latest date at which there was any probability that the gas field average rock pressure would be as much as 25 pounds.

By following this correlation of estimates, we established the end of the productive period in so far as we were concerned, and also established the rock pressures existing at that time, and we therefore had a beginning point as of January 1, 1939, and an ending as of December 31, 1954, between which we must trace the path of the rock pressure decline.

I treated as the dividing point at the end of 1954, a pressure level of 25 pounds wellhead gauge. I do not mean to indicate that that is the limit and the final economic abandonment pressure. I think that there are many Texoma wells that will have to be abandoned prior to the time the field average gets to 25 pounds, and that will necessarily reduce the quantity of gas which Texoma can expect to obtain toward the end of the period indicated on the chart.

I projected my pressure down to 25 pounds, even though I do not believe Texoma will produce until it reaches that point, because for the purpose of this study and our calculations we had to have a definite concluding date and we took this particular date as that definite concluding point. Possibly some of the Texoma wells will produce at that time.

After we had established the beginning point of our rock pressure decline in the future and the ending point of that decline, we found that we had the total amount of future rock pressure decline. We also had the total number of years during which we could expect Texoma would be in production. We also had the rock pressure decline during a recent period of time because of the fact that we had these rock pressure tests at the midyear of 1938 and at the beginning of 1939. We felt that this recent rock pressure decline was a good indication of the current conditions and of the immediate future.

561 We next considered whether the future rock pressure decline would be at an increasing rate or would continue at a constant rate. Inasmuch as the production from the field as a whole during recent years had been increasing and also because Mr. Dickinson's estimate was to the effect that the production of the field would continue to increase, we felt that the future rock pressure decline must be at a faster rate than in the immediate past.

If we were to assume that the rock pressure decline in the future will be uniform from year to year, that is, that the total rock pressure decline in the future is equal for each year in the future, we would be using the very method which our geologists had told us we could not use, namely, the correlation of accumulated production and of rock pressure decline. We concluded that the rock pressure decline in the future would be slightly faster from year to year.

With these conclusions at hand, we could have divided the total future rock pressure decline into yearly increments, each larger than the previous one, by simply doing what we call cutting and trying. However, there is a mathematical equation available wherewith we can find the amount of change from time to time and we can thereby determine the amount of increase in rock pressure decline from year to year in the future.

The use of this equation would aid us in our work. It would be quicker and the results obtained we thought would be more definitely established. The equation to which I refer is that for an arithmetical progression. Such a progression is any series of numbers each of which exceeds or is less than the preceding number by the same amount of difference. We could set up the total of this series of numbers as being equal to the total future rock pressure decline. We could set up the number of figures in the series as being the number of periods of time in our estimate of the future. We could set up the increase in half yearly rock pressure decline as being the difference between each successive number in the series.

I will state that equation, but first I would rather name the letters in the equation and state what each letter refers to. The letter "S" is the sum of the members of the progression, or, in other words, it is the sum of all the half yearly rock pressure declines and is equal to the total rock pressure decline in the future. The letter "A" will be the first number of the series, that is, the rock pressure decline between the last two recorded pressures in our actual data. The letter "N" will represent the number of members in the series. That is the number of half yearly periods in the future. I say half yearly periods because our last two actual rock pressure dates are the middle of 1938 and the beginning of 1939, a span of half a year. The letter "D" indicates the difference between the successive members of the series, or, in other words, the increase in half yearly rock pressure decline.

The equation of the arithmetic progression in the form in which we have used it is

$$D = \frac{\frac{2S}{N} - 2A}{N - 1}.$$

562 We can illustrate the use of this equation by taking the data relating to a specific Texoma well group and giving numerical values to the various letters in the equation. I will take Group No. 1 as an illustration.

"S", the sum of the series, equals the difference between the weighted average rock pressure of this group of 270 pounds, January 1, 1939, and the assumed average rock pressure of 25 pounds at the end of 1954. This difference is 245 pounds. "A" equals 6 pounds and is the difference between 276 pounds, which was the weighted average rock pressure at the middle of 1938, and 270 pounds, the weighted average rock pressure at the first of 1939. "N" is equal to 32 because the total period is 16 years and there are, therefore, 32 one-half year periods.

When we substitute these values in the equation and solve for "D" we find that the answer is one-tenth of one pound. This one-tenth of one pound is the increase in the half-yearly rock pressure decline from one half-year period to the succeeding half-year period.

Having determined the basis half-yearly decline, namely, the half-yearly decline in the immediate past, and also the increase in half-yearly decline in rock pressure, we were then able to establish the rock pressure decline which we would expect to exist at each of the succeeding half-yearly periods. For example, the first half-yearly pressure decline may be set at six pounds and, therefore, the second half-yearly rock pressure decline would be six plus one-tenth of one pound, or a total of six and one-tenth pounds. The third half-yearly decline would be six plus one-tenth plus another one-tenth, or a total of six and two-tenths pounds. Similarly we can determine the rock pressure decline in total for each of the succeeding half-yearly periods in the future..

We applied these determinations to the calculations of the total rock pressure as of any half-yearly period by starting out with the weighted average rock pressure as of January 1, 1939, and subtracting therefrom the first half-yearly decline, namely six pounds. That gave us a remainder pressure of 264 pounds.

We established the rock pressure at the end of the second half-yearly period by subtracting from 264 pounds the second member of the series which we had determined, or six and one-tenth pounds, thereby giving us a remainder of 257.9 pounds.

We proceeded in this manner throughout all the future half-yearly periods, determining the total rock pressure for each of the periods, and then placed these pressures on the chart and connected them by the dot-dash line which we have labeled "Estimated Future."

I have prepared a chart for each of the Texoma groups, and each chart is prepared in the same manner and using the same type of information as I have described in dealing with Group 1. I used the same method of computation in arriving at the estimated future pressure decline for each of those groups, and proceeded in exactly the same manner in each group.

563 The line will not fall in each group on exactly the same rock pressure points because the beginning point of each group is different. In other words, the existing rock pressure conditions in each group are the determining factors for the beginning of the estimated future line in each group. Whether the line is a gradual decline or a more steep decline depends upon the weighted average pressure existing on January 1, 1939. I have used the same method of computation and exactly the same formula as I have stated by letters and explained.

I would like to say one thing, that in charting these rock pressure determinations we chart to the nearest half pound. We cannot chart to tenths of a pound on a scale like that.

Before leaving this chart, counsel has inquired as to the situation encountered in one of the areas where the pressures were high on January 1, 1939. Any group from No. 7 up will indicate a higher rock pressure as of the first of 1939. In fact, practically all the groups are higher than Group No. 1.

(July 27, 1939)

(Counsel for defendants made in open hearing the following statement:

If we may turn to Exhibit 89, I want to make a statement at this time. On the 13 charts, beginning on page 3 and extending for the next 12 pages of that exhibit, showing the general back pressure curves of Texoma wells concerning which the witness Bussard testified yesterday, due to some questions asked the witness by the Examiner, we have taken another look at those composite curves and we are now afraid that we have committed an error in the location of those curves in that they should have been located probably by platting in the average of the logarithms of the "Q" values instead of the arithmetic average of the "Q" values.

In the light of that circumstance, and due to the further circumstance that further testimony of that witness is related to those curves, we are going to ask the Examiner at this time to let us withdraw that witness, recompute and replat those curves, if we find they have been incorrectly platted, which will not cost any time because we are prepared to proceed with other testimony not related to those curves. We will go ahead with that testimony and recall this witness when that checking and correcting, if necessary, has been completed.)

564 R. T. POWERS, a witness for defendants, testified as follows:

Direct Examination by Mr. Hedrick.

(July 27, 1939.)

My name is R. T. Powers. I live at Fritch, Texas, and am 42 years of age.

I received the degree of Bachelor of Science in mechanical engineering from the University of Missouri in April, 1919. Prior to that time I was in the United States army for a period. After graduating from the University of Missouri, I entered the employ in May, 1919, of the Empire Gas & Fuel Company at Bartlesville, Oklahoma, as a junior engineer.

A junior engineer is a graduate of a technical school who is employed by that company to receive training in various phases of the operations of that particular company. He is assigned to work in as many of the various departments of the company as possible during the course of a period of training which usually extends upwards to two years. In my case it extended until January, 1921.

From January, 1921, until March, 1923, I was assigned as chief clerk of the auto service of the Empire Companies at Bartlesville. From March, 1923, to September, 1926, I was employed in the gasoline division of the Empire Companies at Bartlesville. My immediate superior was Mr. G. M. Davidson, who is now chief engineer of Natural Gas Pipeline Company and Texoma Natural Gas Company. I was engaged in design and construction work in connection with the construction of several natural gasoline plants.

From September, 1926, to April, 1927, while in the same department, I was at Seminole, Oklahoma, in direct charge of the construction of two natural gasoline plants. From April, 1927, to March, 1929, I was again at Bartlesville, Oklahoma, in the natural gasoline division, in responsible charge of natural gasoline plant design and construction.

From March, 1929, to June, 1930, I was employed in the general engineering department of the Empire Gas & Fuel Company at Bartlesville. This work involved general design work of the Empire Company's East Chicago refinery, including the design of a tail gas plant.

At a refinery considerable volumes of vapors are evolved in the distillation processes employed in refining crude oil, and in addition considerable volumes of vapors are evolved by evaporation unavoidably from stored petroleum products. The purpose of a tail gas plant is to recover and collect these vapors, and to recover the valuable hydrocarbon products, which are in the nature of gasoline, from these vapors. A tail gas plant is quite similar in construction and operation to a natural gasoline plant.

This brings me to June, 1930, when I entered the employ
of the Continental Construction Corporation at Kan-
565 sas City, Missouri. My immediate superior at that
time was Mr. S. E. Campbell, assistant chief engineer, who is now secretary of Natural Gas Pipeline Company and Texoma Natural Gas Company.

From June, 1930, until July, 1931, I was located in Kansas City in the office of the Continental Construction Corporation, and my duties were the design of compressor stations, by which I mean the compressor stations of Natural Gas Pipeline Company and Texoma, the selection of materials for these compressor stations, the preparation of specifications for the construction of these compressor stations, the letting of the contracts for the construction of the plants, the supervision of the construction of these compressor stations, and in addition the duties and responsibilities that were carried out in connection with the design and construction of the Fritch gasoline plant and dehydration plant, sometimes referred to as the refrigeration plant.

From July, 1931, to the present, I have been in charge of the operation of the Fritch compressor station and gasoline plant and dehydration plant. My immediate superior now is Mr. G. M. Davidson, chief engineer and superintendent of operations.

In connection with my duties as superintendent in charge of the operations of the compressor station at Fritch, Texas, the gasoline plant and the refrigeration plant, I have been involved with a great many problems concerning design and construction and operation of these facilities, and since March, 1923, I have been intimately involved in problems of gas transportation, measurement and compression, with the extraction of natural gasoline from casinghead gas, and with the extraction of natural gasoline as practiced in connection with the transportation of natural gas from wells to markets.

(At this point counsel for defendants presented a photograph described as "Air View 303645, Compressor Station No. 1, Fritch, Texas." At the direction of the Examiner the photograph was marked Exhibit 92 for identification.)

Exhibit 92 represents the plant site occupied by the Fritch compressor station, gasoline plant and dehydration plant. This picture was taken during the winter of 1931 and 1932, shortly after operations were started. There have been additions to the buildings and improvements on the property since the picture was taken.

Several numbers running from 1 to 23 appear on this picture. Item No. 1 is the main compressor building. This building contains the 1250 horsepower gas engine driven gas compressor units. The building as shown there is 336 feet long, and is now 448 feet long. It is approximately 70 feet wide—I think it is either that or 68 feet.

Item No. 2 designates a black line on the picture which represents the exhaust stacks which serve the gas engines in the main compressor building.

Item No. 3 points generally at the piping manifold 566 between the main compressor building and the cooling tower, which is designated as Item 4. This means the gas piping manifold. Item 5 is the 100,000 gallon elevated water tank, which is made of steel. No. 6 is the office building.

No. 7 designates the cottage area which at that time contained 32 frame buildings used for the dwellings and bunk houses and boarding houses. At the present time there are 39 frame buildings in that area.

No. 8 is a 14 car garage used for the storage of employees' cars and for the storage of company cars and trucks. There are four of those buildings. The center one looks like one but is actually two. There are five at the present time.

Item 9 is the location of the loading rack where the natural gasoline manufactured by the gasoline plant is loaded in the tank cars for the market. It is completely surrounded and obscured by tank cars; but in the center of the string of tank cars is the loading rack.

No. 10 is the area used for the storage of pipe and materials.

No. 11 is the warehouse building, known as the pipeline warehouse and garage. That serves the needs of the compressor station, gasoline plant and refrigeration plant for some materials, but it is mainly for the pipeline employees, and is under the direction of Mr. L. D. Williams, whose superior is Mr. R. G. Strong.

No. 12 is a 55,000 barrel reserve water storage tank, made of steel plate.

No. 13 includes forty size 11 feet diameter by 40 feet long horizontal cylindrical gasoline storage tanks, also made of steel plate. Gasoline is stored in those tanks. We have added no gasoline storage tanks. Adjacent to the storage tanks are certain facilities for storing small quantities of oil and some equipment for the treating of natural gasoline.

No. 14 is the laboratory building.

No. 15 is a small garage and warehouse used exclusively by the gasoline plant.

No. 16 designates the boiler stack, to the left of which is the boiler house in which are housed the steam boilers.

No. 17 is the cooling tower which serves the gasoline plant and refrigeration plant or dehydration plant.

No. 18 designates the miscellaneous equipment used in the recovery of natural gasoline—in other words, the distillation area.

No. 19 is the pump and recompressor building, in which are housed various pumps serving the gasoline plant and small 200 horsepower gas engine driven gas recompressors.

Recompressor is just a name that has been used in the
567 gasoline business for a long time for the compressors
that serve a natural gasoline plant. They are called recompressors generally.

No. 20 represents the nine absorbers in which the natural gas, after it has been compressed by the compressor station, is contacted with an absorbing oil for the removal of its natural gasoline content.

No. 21 is the dehydration equipment where the water vapor content of the natural gas is reduced.

No. 22 is an earthen pit used for the reception of oil and waste matter blown from certain drips.

No. 23 is the five dust scrubbers on the incoming gas lines.

The long black line extending from No. 1 to No. 16

represents an overhead steam line used for conveying heating steam from the boiler house to the compressor station. There are actually two lines there, an eight inch steam line and a two inch condensate return line.

The black lines which seem to encircle the plant site, both on the lower side and the right side, represent our fence line. Around the field is the fence line, and the black lines are furrows. I think the farmer was plowing at the time the picture was taken.

The white lines extending from the left center of the page toward the top and to the right and around in among the buildings are roads serving the various facilities and the cottage area.

Over in the distance towards the top of the picture there are some hills and a river. Those hills are known as the Canadian River breaks, and the river is the Canadian River.

The plant site contains 80 acres. It is half a mile long and a fourth of a mile wide. We have not added any lands. We have built our additions inside the present acreage fence line.

(At this point counsel for defendants offered EXHIBIT 92 in evidence and it was received without objection.

Counsel for defendants then presented a document described as "Texoma Natural Gas Company, Additional Capital Expenditures, Compressor Station, Gasoline Plant, Refrigeration Plant. Witness R. T. Powers." At the direction of the Examiner, the document was marked Exhibit 93 for identification.)

Exhibit 93 generally represents a statement of the additional capital expenditures which will be required for the Fritch compressor station, gasoline plant and refrigeration plant during the period from January 1, 1939, to 1954.

The first page of this exhibit is not numbered, but
568 the succeeding pages are numbered down to 26. The
first line on the first page of the exhibit, entitled "Compressor Station," is a recapitulation of the expenditures that will be required by the compressor station and shown in more detail on page 1 of the exhibit. The second line, entitled "Gasoline Plant," is explained more in detail on page 13 of the exhibit. The third line, entitled "Refrigeration Plant," is explained more in detail on page 21 of the exhibit; and the laboratory apparatus is explained more in detail on page 14 of the exhibit.

The next subdivision on the first page is entitled "Book

Cost of Property Retired," and has reference to the book value of the equipment reclaimed or retired from investment, as shown by the books of the company. In other words, when we make an expenditure that take the place of some equipment that we now have, the equipment that we now have is retired in accordance with the actual book cost of that particular equipment.

The compressor station, gasoline plant, refrigeration plant and laboratory apparatus retirements are shown more in detail on pages 1, 13, 21 and 14, respectively, of Exhibit 93.

The next subheading is entitled "Salvage" and means the credit or salvage value received for any equipment retired from investment which has value for further use. In other words, when we retire property from investment we place a value called salvage value on that equipment, and that salvage value is also shown in the exhibit. Under the word "salvage" is listed the salvage value of retired property of the compressor station and the gasoline plant, the details of which are shown at page 1 and page 13, respectively. There is no salvage for the refrigeration plant and laboratory apparatus. Those figures represent gross salvage.

It is rather difficult to answer whether or not in preparing the figures presented by this exhibit, where salvage property is reused, we figured the cost of the new investment of that property salvaged as the actual salvage value, instead of the cost new of articles which we put into new equipment. That is an accounting matter with which I am not familiar. However, if we reclaim a pipeline on the compressor station site and use it somewhere else, it is my understanding that the new job is charged for the pipe at the cost of new pipe.

If we install a piece of pipe on the plant site which we have salvaged, we use the salvage value of the pipe. In my previous statement I had reference to using the current price for pipe salvaged and considered suitable for re-use. That is an accounting matter with which, as I said, I am not familiar. We do use salvaged property where it is re-used at the salvage value. When we reclaim a section of pipe and that pipe is considered suitable for use elsewhere, the accounting department is informed to that effect and in charging the reclaimed pipe to the new job they use a certain salvage value in making that account.

That value is arrived at in various ways. I think as we

proceed we will find the salvage value for equipment
569 is sometimes the trade in value, as in trading in an
automobile, and in the case of pipe I think one example occurs of some two inch pipe reclaimed this year to which a salvage value was assigned which is very close to the current price for two inch pipe. That salvage value was assigned to that pipe because it was in good condition and suitable for re-use.

Turning to page 1 of the exhibit entitled "Texoma Natural Gas Company, Compressor Station Department, Additional Capital Expenditures and Book Cost of Property Retired," the line numbered 1 is entitled "Dwelling Houses and Facilities"; line 2, "Equipment"; line 3, "Auxiliary Engines"; line 4, "Main Engines"; line 5, "Station Piping"; and line 6, "Buildings and Grounds." The expenditures for each one of those items are shown in more detail on pages 2, 3, 4, 5, 6, and 7, respectively, of the exhibit.

The items under the subheading "Book Cost of Property Retired," lines 8 to 12, inclusive, entitled "Dwelling Houses and Facilities, Equipment, Main Engines, Station Piping, Buildings and Grounds," are shown more in detail on pages 8 to 12, inclusive, of the exhibit.

The items under the subheading "Salvage," lines 14 and 15, entitled "Equipment" and "Buildings and Grounds," are shown more in detail on pages 9 and 12 of the exhibit.

Turning to page 2 of Exhibit 93, I will explain the necessity for the expenditure of $8,202 in 1939 for the construction of two 4 room cottages for the operating department. It has been the policy of the management to provide housing facilities for certain of the employees in the salaried class above that of the employee known as oiler. In accordance with this policy it is necessary from time to time to construct cottages for those employees as they become eligible for this accommodation. At this time two houses are being constructed for station and gasoline plant operators.

(Counsel here pointed out that the exhibit had to be started at some date, so it was started as of the first of 1939, and many of the items had already been installed.)

That first item is for the operators of the plants over which I am superintendent.

The second line says "Construct one 4-room cottage for pipeline." The necessity for that expenditure of $4,101.00 in 1939 is that it is my responsibility to maintain all of the equipment on the plant site and to supervise the construction of additions to the facilities on the plant site. It is necessary to provide accommodations at this point for the employees of the pipeline department. I have therefore been instructed to arrange for the construction of one 4-room cottage for a pipeline department employee this year, and this cottage is now under construction.

Throughout this exhibit concerning additional capital expenditures, we use current prices as of June, 1939, for the equipment and labor going into these additional capital expenditures referred to in this exhibit.

570 Lines 3 to 10 inclusive are generally the same, and I will explain the necessity for the construction of the various cottages for our own operators and for the pipeline department, ending with an expenditure in 1949 of $3,815.00 for the construction of a 4-room cottage for the pipeline department.

With reference to the one 4-room cottage for the pipeline in 1940, the statement which I just made with reference to the pipeline cottage being constructed this year applies generally. I have been instructed by the chief engineer to allow in this statement for the construction of certain cottages to serve the pipeline department employees, which include one 4-room cottage in 1940, one 4-room cottage in 1941, four 4-room cottages in 1942, two 4-room cottages in 1944, two 4-room cottages in 1947, and one 4-room cottage in 1949.

Items 11 to 16 inclusive are for the construction of garages and garage stalls.

In 1940 it will be necessary to construct two cottages for operators at the Fritch compressor station, gasoline plant and dehydration plant. That is for the reason that a program has been formed for constructing cottages as convenient to accommodate those employees now eligible or who are expected to become eligible in accordance with this program. We have from time to time employed numerous single men, and as time has passed they have become married and their situation demanded that they be provided with cottages. Heretofore the single men lived in bunk houses on the plant site, and they do at the present time. In a good many instances since the beginning of operations of Texoma single men have become married and now have families, and cottages must be provided for them.

The Fair Labor Standards Act of the Federal Government has had an influence upon the number of employees employed by Texoma, and it has an effect on the number of cottages required. It has had a very great effect. We originally based our operating schedule upon a 56 hour week, and are now using the 40 hour week. The number of cottages as shown on Exhibit 92 was planned and based on the 56 hour work week for the station and gasoline plant operators. In 1933, we changed to the 40 hour week for the operators and have continued that in effect since that time. This change necessitated hiring a considerable number of additional employees, and, in addition, the plant extensions which have been made necessitated the hiring of a considerable number of additional employees. The pipeline department's work has expanded similarly.

The condition at Fritch, Texas, with reference to housing facilities is that they have a few very poor houses. They are not good sized comfortable houses that would make an employee contented to stay there. In general I would call them two or three room shacks, not at all weather-proof and very uncomfortable. There is a demand among the employees at the station for suitable housing. The closest town of any size to Fritch is Borger, Texas, and that is 17 miles away. Pampa is something over 50 miles, and Amarillo is 37 miles.

571 In case of an emergency occurring at the station, such as a fire or a breakdown, it is desirable that all employees be immediately available.

My explanation for the additional cottages for the operators in 1940 was intended also to apply to the program which contemplates the construction of two cottages in 1941 for the operators. In 1939 these cottages cost approximately $4100 apiece, as shown in line 2, and over in 1949 and 1941 a 4-room cottage is listed as costing $3815. The difference is that the cost shown for 1939 and 1940 includes the cost of certain necessary additions to sidewalks, roads and curbing, which will be necessary, due to the nature of the lay-out of the cottage facilities, but which will not be necessary in the case of the cottages constructed thereafter.

The explanation I have given for the construction of these cottages down to 1941 applies to the expenditures down to the construction of the one 4-room cottage for the pipeline in 1949.

Items 11 to 16 refer to the construction of garages and additional stalls to garages. It is the management's policy to furnish garage stalls for the storage of the employees' cars and, in addition, it is necessary to construct additional garage stalls for the storage of company cars and trucks as additional employees are added to the personnel. The expenditures for garages and additional stalls to garages in 1940, 1941, 1942, 1944, 1947 and 1949 are necessary to accommodate the occupants of the cottages which will be constructed usually in the current year. In 1940, however, we will construct two garage stalls to serve two of the cottages being constructed this year. That work has been deferred until 1940. In addition to constructing a garage stall for the personal car of the employee, it is frequently necessary also to add a garage stall to accommodate a company car which will be assigned to him.

Item 17 is entitled "Construct 10 by 26 by 8 Foot Septic Tank" in 1942 at an expenditure of $1,808. The sewage disposal at the present cottage area is carried out by the use of a septic tank. This septic tank is undersized and badly overloaded. It will be necessary, in order to handle the additional sewage incident to the addition of the cottages enumerated, to add an additional septic tank by 1942.

Item 18 is entitled "Construct Additional Lighting Transformer, Wiring, Etc.," with an expenditure in 1939 of $1,498. This work is now in progress.

In the preparation of the information contained on page 2 I have carefully considered the number of employees that are housed at the Fritch plant and the living conditions in the vicinity of Fritch and the number of employees we will have in the future in arriving at these figures, and this is my best judgment as to the expenditures that will be necessary in these years for this particular item of dwelling houses and facilities.

572 Page 3 is entitled "Additional Capital Expenditure —Equipment." The first item is "Construct Annealing Furnace." An annealing furnace is a furnace or oven heated by a gas fire, in which cast iron engine parts which have cracked are pre-heated, in preparation for repair by welding, and after welding are carefully annealed. Due to the situation with reference to cracked parts of the engines, it is necessary to enter into a program of repair of those parts, and in order to do that properly it will be necessary to construct this annealing furnace in 1939 at an expenditure of $581. In general, by cracked parts of

engines I refer to the Worthington engine power cylinders, to Worthington engine power cylinder heads, and to Worthington engine exhaust valve casings.

A Worthington power cylinder weighs in the neighborhood of six tons. We have had some of those crack in the past, not only in our own plant, but others have been cracked in the other compressor stations. We have not been handling those things. It has been done at one of the other stations at this Illinois end of the line, and we desire to enter into that program at our own station. We find it more economical to do that rather than discard the cylinders or the equipment and buy new.

Item 2 is "Purchase of 400 Ampere Arc Welder." This machine is a generator used in welding the pipelines and machinery parts and in general welding around the station. The present welding machine which is now in use is deteriorating and it is my judgment that this machine must be replaced not later than 1942. In other words, this item is scheduled for the year 1942, but the expenditure may be made prior to that time.

Item 3 represents an expenditure of $1,485, and that has been installed. Item 4 has been installed. Item 5 calls for the installation of three additional dust scrubbers to be installed nearby No. 23 on Exhibit 92.

A dust scrubber is a large tank installed on a natural gas line, on the intake side of the compressor station. It is provided with suitable internal baffles, and its function is to effectively separate out of the gas stream any foreign matter such as dust, dirt, rust, scale and liquid. The present installation of dust scrubbers at this station is inadequate to perform this function in a satisfactory and safe manner, and it will be necessary to install three additional dust scrubbers in order to properly protect the compressor station equipment. It has been the general experience that as the wells of Texoma age and the pipeline of the company ages, these foreign materials which will be separated from the gas stream by the dust scrubbers will increase in quantity. We have heard of other pipelines and know of other pipelines which have had that experience in the Panhandle field, as well as our own.

Items 6, 7, and 8 have been purchased. Item 9 provides for the purchase of a grinder for the machine shop. This is an electric motor driven grinding machine, subject to extremely hard usage, and the condition of the present machine is such that in my judgment it must be replaced not later than 1940.

Item 10 provides for the purchase of three chain 573 hoists. These chain hoists will be used for the purpose of replacing chain hoists now in use and which are deteriorating to the extent that in my judgment they must be replaced not later than 1940. These chain hoists weigh from one to two tons each, and it is extremely dangerous to the men who are using these chain hoists to operate them if there is any likelihood of their deteriorating or breaking.

Going back to Item 3, entitled "Install Three Additional Dust Scrubbers," I will explain what would be the result if this scale, sand and foreign material were to pass from the pipeline into the engines and equipment.

If this scale, rust and foreign material and liquids are allowed to enter the engines they will, of course, contact the compressor cylinder walls and the compressor piston rings, causing excessive and very costly wear on those parts. In the operation of this gathering system it has been our experience that during cold weather appreciable volumes of drip gasoline, which is gasoline condensed out in the pipeline after the gas leaves the wells, will enter the station and will pass through this present dust scrubber installation ~~and~~ actually enter the cylinders in the form of a fine mist or spray, which has a very harmful effect upon compressor cylinders and compressor rings, due to the fact that this gasoline liquid tends to completely destroy the lubricating oil film on the cylinder walls.

Item 11 is entitled "Purchase Model 55 Western Voltmeter." This is merely a test voltmeter which is necessary for use in making various tests of electrical equipment throughout the plant. The necessity for this instrument has been demonstrated on very many occasions, due to trouble with our electrical equipment, and the necessity for checking voltages. We have ordinarily had to send to one of the adjacent towns and on many occasions have had to borrow voltmeters for that purpose.

Item 12 provides for the installation of an 18 inch by 10 feet lathe in the machine shop in the year 1941. The purpose of this installation is to replace the present lathe, which has been in service since 1931, and which has been subjected to extremely heavy usage almost continuously during the past four or five years. It is my judgment that in 1941 that lathe will have become so deteriorated that it will have to be replaced.

Item 13 provides for the installation of a 28 inch drill press in the machine shop. The purpose of this installation is to replace a similar drill press now in service, which has been in service since 1931 and which in my judgment will have become so badly worn that it cannot be used beyond the year 1941 and will have to be replaced at that time, if not sooner.

Item 14 provides for the installation of a No. 3 air compressor. At the present time this compressor station is served by two air compressors. This is the same number and the same size installation as utilized at each of the main line compressor stations, and the demand for compressed air at the Fritch compressor station and 574 gasoline plant, which are jointly served by these two compressors, is so great that, in the interest of safety and in order to maintain an adequate supply of compressed air at all times, it will be necessary to install a third air compressor. If the air compressor units were to break down, we would have to use an emergency compressor which is installed at the gasoline plant, which is operated by steam. This emergency compressor is held in reserve for just such occasions; and it is not to be used for routine operations. This air compressor will have to be installed in 1940 at a cost of $2,542.

Item 15 provides for the installation of a Zeolite water softener in the year 1940 at a cost of $9,710. A Zeolite water softener is a device employed to soften the water which is used for the purpose of cooling the various processes, or cooling the various engines throughout the Fritch gasoline plant and compressor station. The present water softener is inadequate in capacity to supply all of the water needed by these plants. At the present time some experiments are being conducted with chemicals which are added directly to the water for the purpose of softening it. However, these experiments have not been successful, and it is my judgment that the present water softening equipment must be supplemented by an additional unit in 1940 in order to provide the necessary supply of soft water.

A sufficient supply of soft water is necessary in the operation of the equipment at the compressor station and gasoline plant for the reason that if unsoftened water, or hard water, were used, the scale accumulations in the engine jackets and in the various other cooling equipment would soon become so heavy, and the cost of removal of these scale accumulations would become so heavy, that plant operations would be seriously hampered if not altogether interrupted. The degree of hardness of the water we have down there now is about 15 grains per gallon, and that is too hard for proper operation of our plant.

Item 16 provides for the installation of a water filtration plant in 1940 at a cost of $4,512. During the winter and spring seasons of the year, high winds prevail in this region and dust storms are frequently experienced. These storms are of varying intensity. However, in the operation of the plant and in the operation of the cooling towers serving the compressor station and gasoline plant, we find that the water circulated over the top of the cooling towers, which is broken into a spray or rain of water as it descends to the base of the towers, serves to catch immense quantities of dust borne by the winds.

As a consequence, the water which is circulated over these towers and over the cooling sections and through the engine cooling jackets becomes heavily laden with suspended matter. In other words, it becomes muddy. This mud will settle out in the engine jackets in very great quantities, seriously affecting heat transfer efficiencies and causing great expense in the matter of cleaning for the removal of these mud deposits.

I have been asked to explain the intensity of the dust storms that we have around Fritch, not only on account of Item 16 but also because we have in this exhibit other expenditures to be made on account of the dust situation
575 at Fritch. It has become customary to speak of dust storms by referring to visibility which prevails during the course of the storm. On innumerable occasions visibility has been reduced to less than 100 yards by these dust storms, which means, of course, that you can't see over 100 yards in broad daylight. On some occasions the storms have been so intense that automobile traffic on the roads has been completely stopped, due to the fact that the drivers could not see their way. It has been the experience in this region that on a few occasions it has been necessary to shut down certain plants because of this dust.

In May, 1936, I prepared and read a paper entitled

"Dust Proofing Compressor Stations" at the Natural Gas Section meeting of the American Gas Association in Dallas, Texas. I think it was May 8 or 9, 1936. That paper is shown in the printed reports of the American Gas Association.

I was pointing out the fact that circulating water becomes extremely muddy, and we have conducted certain laboratory experiments which indicate to us that the clarification of this water can be effected by the use of a filtration plant. It is therefore proposed to install a filtration plant for the purpose of clarifying this muddy water, in the year 1940, at a cost of $4,512. The filter is commonly described, I believe, as a pressure type sand filter.

Item 17 provides for installing a taper attachment on lathe in 1940 at a cost of $225.. Certain machine operations carried out in the machine shop of the compressor station call for the use of a taper attachment on the lathe. This taper attachment is used to facilitate necessary taper turning. The lathes originally purchased and installed were not equipped with taper attachments. It will be necessary, therefore, to purchase one taper attachment in 1940. We have a considerable amount of work to be performed in and about the plant with a taper attachment. If we have tapering work to be done now which must be of ordinary accuracy, we send the work to a machine shop in Amarillo, at considerable excess expense.

Item 18 provides for the installation of a 125 ton portable hydraulic forcing press in 1940 at cost of $725. This is another item of machine shop equipment which was omitted from the original installation and which is considered indispensable. The need for such a press has become more and more evident as plant maintenance programs have been heavier with the increasing age of plant equipment. Such a press is needed for removing sprockets and gears from shafts, for pressing bushings into housings, and for dismantling various assemblies, which work is now effected by various crude and time-consuming operations with hydraulic jacks or by the use of a 16 pound sledge. We occasionally break some of our equipment with the 16 pound sledge.

Item 19 provides for the purchase of metallizing equipment in the year 1940 at a cost of $550. Metallizing equipment is equipment employed in building up worn parts, worn metal parts, by the addition of a spray 576 of molten metal. Observation of metallized wearing parts in service on equipment similar to that employed at Fritch and experience with metallized wearing parts at other ~~stations on~~ our pipeline has indicated the practicability of this method of repair.

At the present time the rate of wear of piston rods of the gas engine driven compressors is such as to indicate the desirability of rebuilding the worn rods or replacing them with new material. It has been found that metallizing, or building up by the application of sprayed metal, can be safely performed and will prolong the life of the part to a very great extent.

If we do not have this equipment, the worn parts would ordinarily be discarded and replaced by new parts. I have taken this item into consideration in the cost of maintenance of the plant in an exhibit to which I will later testify; and that is true with reference to these other labor and material saving devices to which I have testified.

Item 20 provides for the installation of a replacement bottom in the 100,000 gallon elevated water tank. This tank is designated on Exhibit 92 as No. 5. This replacement bottom in my judgment must be installed not later than 1942 at a cost of $2,622. The present condition of this bottom is that it has corroded at a serious rate. Due to the shape of the bottom of this tank, mud deposits from this water to which I have previously referred settle on the metal surface, and this deposit of mud causes accelerated corrosion to take place. It is my judgment that this corrosion will have proceeded to such an extent that replacement must be made in 1942. In one of the other compressor stations of Natural Gas Pipeline Company under the supervision of Mr. W. H. Davidson, one tank bottom like this was replaced last year.

Item 21 provides for the installation of a Thomas Recording Calorimeter in 1944 at a cost of $2,162. The function of a Thomas Recording Calorimeter is to make a continuous record of the heating value of natural gas. A Thomas Recording Calorimeter has been in continuous service at this station since 1931. This instrument is constantly in use for checking the heating value of the gas entering the compressor station from the gas wells and of gas discharged from the gasoline and dehydration plants after having been denuded of its gasoline content.

This instrument contains much equipment which operates continuously in a water bath, and which is accordingly subjected to a considerable degree of wear and corrosion. It is my judgment that this equipment, plus the electrical recording device, will have completely worn out or have been corroded beyond further use not later than 1944. I am required by contracts which Texoma Natural Gas Company has to determine and record the heating value of the gas as it passes through this plant.

Item 22 provides for the installation of a Goulds oil centrifuge in 1946 at a cost of $1,616. The condition
577 of the circulating oil used for bearing lubrication for
the gas engine driven compressors became very bad during the first years of operation from various causes, including the prevalent dust storms. In 1936 a centrifuge was purchased, and this machine has been in continuous operation for the purpose of cleaning this oil and removing contaminated matter therefrom. In other words, we are able to re-use the oil that is used in the machinery, in the compressor engines and other engines by cleaning it with this oil centrifuge machine at a considerable saving in the cost of oil. The centrifuge machine operates at a very high speed. Its speed is approximately 6,600 revolutions per minute, and it is subject to considerable wear for that reason. In addition, a considerable amount of corrosion takes place in certain parts of the machine. It is my judgment that the machine now in operation will have deteriorated to such an extent that it must be replaced not later than 1946.

Item 23 provides for the installation of four G. R. gas coolers. G. R. stands for the name Griscom-Russell, which is the name of the manufacturer of the gas cooling equipment used at this station. In 1946, as will be later shown, it will be necessary to install one additional Worthington 1250 horsepower gas engine driven gas compressor, and in order to serve this gas compressor the four gas coolers shown under Item 23 will be required.

By reason of the compression of the gas, the gas compressed by the compressor systems leaves the compressor cylinders at a temperature which ranges between 250 and 270 degrees Fahrenheit. The gas must be cooled for various reasons. If it were not cooled serious difficulties would result, one being in the destruction of the paint on the 24 inch pipeline which carries the gas from the compressor station to the gasoline plant. Serious difficulties would be encountered in the expansion and contraction of this 24 inch pipeline with changes in this temperature which would occur in case of a plant shut-down, for example, when the line would cool off. In addition, the necessary functions of removing the natural gasoline content from the gas, and the functions of dehydrating the gas, could not be performed if the gas were not cooled.

With reference to Exhibit 92, the gas coolers are located inside of and in the base of the cooling tower, which is No. 4. A gas cooler consists of two cast steel, box-like headers. A header in this instance is shaped roughly like a parallelepiped. It is a long box. In other words, the gas from the compressors comes out in a large diameter pipe and must be transferred from this large pipe to smaller pipes.

The gas cooler consists of two of these headers or boxes made of cast steel. The gas enters this header and from the header it enters a number of one-inch outside diameter brass tubes. Each tube is 20 feet long. These tubes may be roughly described as brass, but we describe them generally as admiralty metal. The two headers, one at each end of the gas cooling section, are joined, therefore, by a number of those one-inch O.D. admiralty metal tubes. I think in this particular instance there are approximately 88 of these tubes. The wall thickness of the admiralty metal used in constructing these tubes is 1/16 of an inch.

578 The gas enters one header, one side of one header, passes through a group of these one inch admiralty metal tubes lying in a horizontal position into the header at the other end of the one inch brass tubes and returns along the other side through the other group of one inch admiralty metal tubes. The admiralty metal tubes of such length are extremely flexible and in order to provide sufficient rigidity as between the two cast steel headers on each side is installed a rolled steel channel to which each end of each header is attached. In effecting the cooling the water which descends from the top of the cooling tower in the form of a shower falls upon the bundle of one inch brass tubes and cools the gas which is passing through the inside of those tubes.

Item 24 is a 200,000 gallon elevated water tank, which it will be necessary to install in 1946 at a cost of $17,309. The purpose of the present 100,000 gallon elevated water storage tank at the Fritch compressor station is to provide a reserve water storage volume to be drawn upon in periods of unusually high demand for make-up water or for additional water in the cooling system, which may occur during the course of an extremely severe windstorm, which tends to blow great quantities of water out of the cooling towers.

In addition, the function of this 100,000 gallon tank is to provide a supply of cooling water for the necessary cooling of the operating gas engines in the event of the failure of a water pump. Should a water pump fail or stop, the supply of water for cooling the engines would be immediately interrupted were it not for the water stored in this elevated tank, and should this supply of cooling water be interrupted, the engines would probably be damaged beyond possible repair.

When a pump stops, the water in the present 100,000 gallon elevated tank will be drained through the engine jackets and thereby provide the necessary cooling during a short period of time. At the present time and with the present operating schedule, the supply of water stored in the 100,000 gallon elevated tank amounts to enough to maintain satisfactory cooling of the engines for approximately 13 minutes only. This means that in case of a pump failure requiring not more than 13 minutes to repair, the station can continue its operating schedule without interruption. At the end of 13 minutes everything would have to discontinue operation until the pump could be repaired. It is my judgment that at the present time we are operating on the borderline of safety inasmuch as practice in the industry generally is to provide water storage to care for an interruption of service by the water pumps of at least 30 minutes duration, and oftentimes longer. At the time the additional gas engine driven compressor is installed it will be necessary to install a larger tank in order to provide the desired and necessary protection to the equipment. That is the Worthington unit No. 16, shown on page 5, for which a gas cooler is supposed to be provided.

Item 25 provides for the erection of one 180 foot cooling tower in the year 1948. It is my judgment that it will be necessary to replace the cooling tower designated as No. 4 on Exhibit 92, and which was erected in 1931, in the year 1948. Experience with cooling towers installed on this pipeline system, as well as with those installed on other systems, indicates that the original redwood open type 579 louvre cooling tower will deteriorate in from fifteen to seventeen years to such an extent that replacement will be necessary. High winds together with ice formations in cold weather tend to seriously weaken the structure, causing the framework to become loose and seriously affecting the connecting bolts.

The present cooling towers have required considerable amounts of repair work and will continue to require repair. Consequently, it will be necessary not later than 1948 to completely replace that tower. Another factor contributing to the deterioration of the cooling tower is the vibration transmitted from the gas compressors to the gas coolers, which are supported by the lower portion of the cooling tower, and which also adds greatly to the tendency to loosen the framework.

Item 26 provides for the installation of 28—C-240 gas coolers in the year 1946, at a cost of $33,028. As described previously, the gas coolers are installed in the base of the cooling tower where they receive a constant shower of cooling water. The compressed gas entering these tubular coolers at a temperature of approximately 250 to 270 degrees Fahrenheit is cooled in this process to a reasonably close approach to the temperature of the cooling water.

The cooling sections are subjected to the full high pressure, discharge pressure of the gas compressors, amounting to 740 pounds per square inch gauge and are subjected to a great amount of vibration and to pulsations transmitted from the compressors. Experience with this type of equipment and with the service to which it is subjected indicates the safe working life of the tubular elements and of the tube headers is limited. The tubes are constantly vibrating, which induces wear between the tubes and the supports for the tubes as well as between adjacent tubes. Vibration induces fatigue in the tubes, and corrosion is proceeding on the external surfaces of the cast steel headers, on the channel members, and on the steel bolts holding the various parts together, due to the nature of the cooling water, which is highly alkaline. Effective protection from the corrosive action of the cooling water has not been developed. Furthermore, there is a likelihood that the admiralty metal tubes are undergoing weakening due to dezincification and embrittlement.

The metal zinc is contained in this admiralty metal, and by dezincification I mean that the corrosive action of the water has eaten out the zinc from that metal. In dezincification the attack from the water results in removal by the water of the zinc from the alloy, leaving porous masses or layers of copper. The metal of the tube wall is 1/16 of an inch thick.

The gas inside the gas coolers is at a pressure of 740 pounds per square inch gauge. Numerous replacements of the admiralty metal tubes have already been made due to wear. For the sake of safe operating conditions, and for the reliability of operations and freedom from disastrous failures, it will be necessary to allow for the replacement of these original gas coolers, which were installed in 1931.

Item 27 provides for the installation of 12—A-240 580 gas coolers. The necessity for the installation of those gas coolers is precisely the same as for Item 26. These coolers to be replaced under Item 27 were installed in 1935, and it is my judgment that they must be replaced not later than 1950. They are the same type of coolers; but, as indicated, they are slightly different due to the fact that they have different numbers. They have a slightly different number of tubes, but the cooling surface provided in the assembly is approximately in proportion to the amount of gas handled by the compressors which they serve.

The installation of the 28 coolers in 1946 is to replace those installed in 1931 to serve the twelve compressors, and the replacement of the 12 coolers in 1950 is to replace those that were installed in 1935 to serve the additional three compressors that were installed.

Item 28 provides for the installation of dust protection equipment to serve the auxiliary building. The auxiliary building houses the gas engine driven electric generating equipment, the machine shop equipment, the locker room, various storage facilities, and the water pumping equipment. On Exhibit 92 the auxiliary building has not been numbered, but it is the building right above No. 1, a smaller building right next to the main building.

The installation of dust protection equipment on the main compressor building of the station at Fritch, as well as the station known as No. 2 and the station known as No. 3, has been highly successful in combating the dust conditions and in excluding a very considerable amount of the wind borne dust from the main compressor building. In order to provide similar protection to the machinery and equipment in the auxiliary building, it will be necessary to install dust protection equipment in the year 1939 at a cost of $2,070.

The dust protection equipment consists of a large blower and in addition a housing for the blower equipment, which equipment filters from the air to be handled by the blower all dust, this being usually accomplished by the use of a water spray. The outside air is drawn into the dust protection equipment. The dust is filtered or washed from the air and the blowers force the clean air into the building to be protected. This has a tendency to exclude practically all the dust which would otherwise enter the building during the course of the frequent dust storms.

The blower creates a slight pressure within the building. To keep the dust out of the building which might come in through the cracks of the corrugated iron roof and siding, we have installed on the main compressor building a large amount of sealing materials, such as felt strips, to seal the various cracks in the building structure, and in addition on some buildings the longitudinal lap joints of the corrugated iron covering have been soldered. This is considered entirely successful in conjunction with the blower and filtration equipment; but without the blower and filtration equipment it has not heretofore been successful.

Item 29 covers the purchase of miscellaneous tools, instruments, jigs and appliances which are necessary in
581 routine operation and maintenance activities. As these
tools wear out they must be replaced by new equipment, and as our maintenance problems continue, additional equipment of a new or improved character will be required. It is my judgment that an allowance as indicated under Item 29 must be made for the purchase of miscellaneous tools, instruments, jigs and appliances. I mean that the cost of maintenance and the labor and material involved will increase in future years and it will be necessary that additional tool equipment be purchased in increasing amounts in future years. That will be disclosed, I think, in the next exhibit. However, essentially this item provides for a great many necessary replacements plus new equipment and tools for operations which may have been carried on in a makeshift manner in the past. This expenditure is in addition to the items provided for in my

exhibit which will describe the cost of maintenance and operation in the future.

Item 30 is "Install Gauge Glasses on Dust Scrubbers." This installation is now being made.

Page 4 of Exhibit 93 is entitled "Additional Capital Expenditures—Auxiliary Engines." Item one is entitled "Install Additional Oil Coolers" and provides for an expenditure of $2,081 in 1939.

The gas engines called the auxiliary engines are used for driving electric generators. There are three of these engines, each of which is a six cylinder vertical engine, with 14¾ inch by 16 inch cylinders. These engines were originally equipped with small oil coolers, which have proven entirely inadequate to properly cool the lubricating oil circulated to the bearings of the engines under normal operating conditions. The temperature of the oil delivered to the bearings may reach 200 degrees Fahrenheit, which is entirely too high for good operation.

It is my judgment that the present operating conditions are entirely too hazardous and that to relieve this situation new oil coolers of correct design to cool the oil to be pumped to the bearings to a temperature in the neighborhood of 120 degrees Fahrenheit must be installed in the year 1939, at a cost of $2,081.

On page 5 of the same exhibit, entitled "Additional Capital Expenditures—Main Engines," are five items.

Item 1 provides for the installation of Cuno filters to replace Nugent oil filters. The Nugent oil filter employs the cloth bag principle, while the Cuno filter consists of a number of thin discs of metal. The work is now being installed at a cost of $1,388.

Item 2 provides for the installation of water wash air filters. Actual experience in several seasons when severe dust storms prevailed has definitely proven that the present type of air filters serving the Worthington gas engines are inadequate, for the reason that this type of filter rapidly becomes overloaded with dust as the dust storm proceeds, resulting in restrictions in the flow of combustion air to the engine cylinders or in a carry-over of dust into the cylinders or in a complete shut-down of the engines.

582 Experience has proven that a water wash type of air cleaner is much more satisfactory and much more efficient, since it not only separates out all of the dust continuously, but also continuously removes and carries away to waste the entrained dust particles, maintaining a con-

stant minimum pressure drop through the filtering system for the passage of air. This work is, in effect, a continuation of a program already instituted at some of the other stations on this pipeline. At other stations water wash air filters have been installed, and it is therefore my judgment that water wash air filters must be installed at the Fritch compressor station in 1939 at a cost of $5,100. At the present time there are fifteen involved, one for each of the engines. There happen to be two filters per engine on the oil filtration, so there are 30 in all.

Item 3 provides for the installation of new type mufflers for the Worthington engines in 1940. A muffler is an enlargement in the exhaust line from a gas engine, designed for the separation of moisture from the exhaust gases, and also for an appreciable degree of silencing of the noise of the engine exhaust. There are two mufflers for each Worthington engine, a total of thirty.

It is our experience that mufflers of this character must be periodically replaced, due to the severe degree of corrosion to which they are subjected by the exhaust gases. It is therefore my judgment that the present exhaust mufflers must be replaced not later than 1940 at a cost of $14,517. That would be two mufflers to each engine, or thirty in all.

Item No. 4 is "Install 2 Unloaders." Unloaders have already been described in the record. An unloader is a volume or chamber which is attached to the compressor head at the end of the cylinder, which by means of a valve, which can be opened, increases the clearance volume at the end of the cylinder, thereby adding to the flexibility with which the compressor can be operated through a range of suction and discharge pressures, without seriously overloading the engine which drives the compressor. It does not extend the piston stroke, but simply extends the chamber at the end of the piston stroke.

Unloaders have heretofore been installed at the Fritch station and at other stations on the pipeline. At the Fritch station ten gas engine driven compressors have been equipped with compressor unloaders, and at the present time it is necessary to operate nine or more of the engines which are equipped with the unloaders continuously. This means that the desired degree of flexibility in operation is not thereby provided; that in the event of one of the engines with unloaders being inoperative for a complete overhauling, all of the remaining engines so equipped must operate continuously, in order to compress the required volume of gas. We desire to add to the number of units available with unloaders by adding two unloaders to one engine in 1940, at a cost of $834.

Item 5 provides for the installation of Worthington Unit No. 16 in 1946. In the next years, 1940 and 1941, there
583 will be occasions when fourteen engines must be operated for considerable periods of time in order to compress the requisite amount of natural gas. That is increased over past years because of an anticipated decline in suction pressures of certain volumes of gas to be compressed, and that will increase as the years go by and the pressures at the wells become less.

It has been definitely proven, through actual experience, that not less than two spare engines or standby engines must be available at this station at all times in order that all gas engine driven compressors may be kept in proper condition by a prudent maintenance program. Since the operating schedule calls for fourteen compressors, it becomes necessary to add one compressor. This addition has been set for not later than 1946, at which time throughout seven months of the year fourteen engines must be operated continuously.

The installation of this sixteenth unit would be on a concrete foundation which was installed for that purpose in 1935, at the time the last three engines were installed. This installation will be made at a cost of $70,466. In other words, we have had the installation of this engine in contemplation since the concrete base for it was installed in 1935.

The installation of this unit is delayed until 1946 for the reason that during the next two succeeding years the occasions for operating 14 units are not so frequent. However, for the two or three years preceding 1946, fourteen unit operation will be the rule, and the unit could well be installed prior to 1946. However, in the judgment of myself and the chief engineer, the date for installation of this engine was established in 1946.

Page 6 is entitled "Additional Capital Expenditures, Station Piping," and nine items are shown on that page.

Items 1, 2, 3, and 4 refer to additions which have already been made in 1939 to the various pipe systems of the plant.

No. 5 provides for the replacement of certain 12 inch and 18 inch muffler drain lines in the year 1940. This section of piping embraces 638 feet of 12 inch pipe and 230 feet of 18 inch piping, carrying hot water drained from the exhaust mufflers from the 15 gas engines. This hot water is extremely corrosive to these lines. The 12 and 18 inch lines are subjected to severe external and internal corrosion. It is my judgment that this piping must be replaced not later than 1940 at a cost of $4,973.

Item 6 provides for jacketing the 6 inch compressor discharge piping in 1940. The compressed gas is carried from the gas compressor cylinders underground to the near vicinity of the cooling tower, where it emerges from the ground and enters a manifold, and from there passes into the gas coolers in the base of the cooling tower.

The piping which carries this compressed hot gas from the compressor cylinders to the gas coolers is, there-
584 fore, subjected to the high temperatures of the compressed gas, which have been stated. There has not come to our attention any pipe coating which will withstand temperatures in this range for the protection of underground piping. The 6 inch buried compressor discharge piping has, therefore, been subjected to considerable amounts of corrosion, and at the present time we are faced with the problem of either replacing it or applying some form of protection.

The total footage of buried piping to which this item refers, serving the 15 compressors, amounts to 3,493 feet of 6 inch pipe. The prices given are installed prices and include the complete cost of labor and material. That is true of all the other items for additional capital expenditures shown in the exhibit.

In lieu of replacing this corroded pipe, it is proposed to apply to the external surface of the piping before it is completely deteriorated a jacket consisting of a shell of steel approximately ¼ inch thick. This jacket will be welded around the 6 inch pipe and will then protect the 6 inch pipe for a considerable period of time. In order to provide adequate and necessary protection to this hot 6 inch compressor discharge piping, it will be necessary in 1940 to apply a jacket at a cost of $9,492. The gas pressure in this discharge pipe is 740 pounds per square inch gauge.

If the pipe became unduly weakened due to corrosion, the line would readily rupture, and a very serious fire and explosion would almost inevitably follow, and our compressor station would be very, very seriously wrecked. This would have a very marked effect upon the volume of gas available for the markets, due to the fact that this station could not compress the required volume. As a matter of fact, it could not compress any. If the station burned down, we would be able to get very little gas, if any, into Chicago.

Item 7 provides for the replacement of 6 inch sickle bends. On Exhibit 92 the arrow leading from No. 3 points directly to the row of sickle bends.

Sickle bends are the bent piping through which the compressed gas from the gas compressor cylinder leaves the ground, and through a 180 degree bend enters a continuous header located above the ground level. It is called a sickle bend due to the resemblance of the pipe bend to a common agricultural sickle. It is used for the purpose of an expansion bend and to withstand certain vibration effects.

The sickle bends have been subjected continuously to severe vibrations, due to pulsations transmitted from the compressor cylinders. It is a matter of experience that piping of this nature, subjected for a considerable period of time to severe vibration of this character, eventually becomes weakened and is likely to fail, unless it is replaced. It is my judgment that these sickle bends cannot be operated beyond the year 1945, and that they must be replaced in that year at a cost of $3,713.

Item 8 provides for the installation of anchorages on 585 6 inch discharge lines in 1939. This refers again to the 6 inch piping carrying the hot compressed gas from the gas compressor cylinders to the cooling tower. At the compressor cylinder end of this piping, inside of the main compressor building, there are certain bends by which the piping which is below the floor level connects to the compressor cylinder above the floor level. Due to the nature of the service to which it is subjected, this pipe tends to expand and contract to a considerable degree as the temperature changes from the operating temperature to normal atmospheric temperatures when the engine is inoperative.

In January of this year a compressor piston rod broke in one of the gas compressor cylinders. This failure could have caused a very serious fire and explosion. However, it fortunately did not. The failure of this compressor piston rod is attributed to the movement of the compressor cylinder, due to strains which have been placed upon this gas discharge pipe by the temperatures mentioned.

It is my judgment that this piping must be securely anchored in such a manner as to eliminate all thrust on the pressure cylinders, for the safety of the plant. It is therefore proposed to install anchorage at the compressor end of this discharge piping in 1939, at a cost of $6,508. There is a total of thirty compressor cylinders, two per engine.

Item 9 provides for the installation of 12 inch headers in 1945. This item covers replacement of certain 12 inch header piping adjacent to the cooling tower from which the hot compressed gas enters the gas cooling sections, and to which the cooled gas returns after passing through the gas coolers.

This header piping is subjected to considerable vibration due to pulsations transmitted from the gas compressor cylinders, and it is a matter of experience that piping of this nature will eventually fail at points where lateral connections are welded to the main section of the header, there having already been several such failures at Fritch. Accordingly, it is my judgment that this header piping must be replaced not later than 1945, at a cost of $4,591.

We have heretofore done some replacing. Between the header and the lateral connection reinforcing plates are installed. There are four usually, installed at 90 degrees around the circumference of the lateral pipe connection. These reinforcing plates are called gusset plates.

A gusset plate is a triangular shaped piece of steel plate, the short sides of the triangular shaped section of the plate being welded, one side to the main connection or header, the other side to the lateral. With four of these plates around the lateral connection it has been considered that satisfactory reinforcement of the assembly was obtained. However, with headers at the Fritch station subject to pressures and vibration conditions which I have described, failures occurred at the toe of the gusset plate, in each instance on the header pipe itself, that is, the larger sized pipe. There was a fracture of the pipe completely through the pipe wall, necessitating complete replacement.

586 There seems to be a concentration of stresses at the point of attachment of the gusset plates to the header and to the lateral, and we have long since abandoned the use of the gusset plate for construction of this nature. The gusset plate has not been satisfactory for service of this character. We use what is known as a saddle reinforcement, which is a forging which completely encircles the lateral and extends out and over the header piping for a considerable distance and which is welded to the header and to the lateral as a reinforcement. These headers are

not the parallelepipeds I spoke about. This is a different form of header constructed of pipe.

Page 7 is entitled "Additional Capital Expenditures, Buildings and Grounds," and twelve items are mentioned there.

Item 1 has already been installed. Item 2 represents construction work which is now in progress.

Item 3 provides for the graveling of the area around the exhaust stacks at the Worthington engine side of the main compressor building. Since the beginning of operations the ground area surrounding the Worthington engine exhaust stacks has presented a very unsightly appearance. Due to the heat from the exhaust muffler, which is below ground level, and to the action of the water spray which is discharged from the exhaust stacks, no vegetation will grow in the area near the exhaust stacks. This results in the formation of a dry, barren stretch of top soil, and this soil becomes easily pulverized and is whipped almost continuously by even the slightest breeze against the compressor building, and in summer and the warm times of the year it results in considerable dust entering the doors, open doors, and open windows of the building.

The exhaust mufflers will be replaced in 1940. Following this operation, it will be necessary to remove this top soil and install a gravel paving surrounding the exhaust stacks to alleviate the condition described.

Item 4 provides for the installation of steel bins in warehouse and tool room in 1940. The storage of spare parts, tools and supplies in the warehouse serving the compressor station and in the tool room in the auxiliary building is carried out on wooden shelves and in wooden bins, which present a very unsightly appearance and are a very great fire hazard. It is my judgment that to eliminate the serious fire hazard from these wooden bins and shelves, it will be necessary in 1940 to replace the wooden bins and shelves with bins and shelves of steel construction, at a cost of $695.

Item 5 provides for the installation of 19 door checks in 1940. The swinging doors of the main and auxiliary buildings at the Fritch compressor station are constructed of heavy metal, and some are equipped also with wire glass panes. The operating force must necessarily pass through these doors many times per day in the performance of their duties. Due to the fact that brisk and heavy winds prevail during a great part of the year, there is an ever present

danger that the wind will whip the door from a man's hand and slam it violently open or shut, either seriously injuring the man or injuring the door or breaking the
587 glass pane. We have had men injured by that condition. Experimental door checks have given satisfactory results, and consequently, it will be necessary, for the protection of the personnel and to avoid further damage to the doors and buildings, to install 19 door checks in 1940, at a cost of $456. It is a larger, heavier piece of equipment than the ordinary type of door check.

Item 6 provides for installing a Transite roof on the main compressor building in 1943. Transite is a corrugated asbestos building covering which is used in lieu of the corrugated galvanized iron in a great many places. The original installation of the main compressor building was made in 1931 with corrugated iron roof and siding upon steel framing. The covering of this building is exposed to the action of the water spray blown from the cooling tower on one side and to the action of the water spray which is discharged from the Worthington engine exhaust stacks on the other side. This water spray contains a high concentration of total solids, and the spray when deposited upon the metal surfaces tends to cause the metal to corrode severely. In addition, under the action of expansion and contraction plus vibration, the corrugated iron covering tends to become loosened, causing an undue amount of leakage, particularly of the roof covering, by which I mean leakage from rain and some dust.

At other stations on this pipeline system the deterioration of the building covering has proceeded to the extent that two buildings had to be re-roofed in 1938, and in addition careful inspection has revealed that new roof coverings must be applied to the remaining buildings in the near future. There is a Transite roof on the laboratory building, and the two buildings above mentioned which were re-roofed in 1938 were re-roofed with Transite in place of the metal roofing. It is my judgment that the metal roof must be replaced with the more permanent Transite roofing in 1943, at a cost of $10,278.

Referring back to page 5, Item 5, "Install Worthington Unit No. 16," that Worthington unit or engine is the same as the main compressor units installed which compress the gas and push it on to its destination.

Item 7 provides for the extending of the main building for Unit 16, which I have just mentioned. This building must be extended at the time the engine itself is installed, that is, in 1946. At the present time space is available in the main compressor building for this engine No. 16, inasmuch as the concrete foundation is already in place. This building space is absolutely indispensable, however, for the storage of heavy repair parts and for conducting the necessary continuous repairwork to be carried on with a minimum of interference with normal operating activities, and saves much expense which would otherwise be necessary for handling repair parts to and from the more remote storage spaces. At the time the No. 16 Worthington engine is installed in this portion of the building, it will be imperative that this working space and storage space be provided for by extending this main building a distance of 28 feet, at a cost of $8,020.

Item 8 provides for the construction of black top
588 roadway and parking lot. This has reference to a roadway and parking lot which were constructed on this Fritch station site in the year 1936, in conjunction with the construction of an enlarged office building. The parking lot and roadway serving this building were constructed at that time of native materials, native gravel, and these surfaces of the parking lot and roadway have been subjected to serious rutting and erosion and present a considerable dust hazard. In accordance with the practice of providing hard surfacing or black top surfacing for the other plant roadways, these unsurfaced areas will be provided with a black top in 1939, at a cost of $1,831. This involves the use of asphalt and fine gravel.

Item 9 provides for the extension of the auxiliary building a distance of 14 feet in 1940. The purpose of extending the auxiliary building 14 feet as provided under this item is to provide space for the installation of water filtration plant, Item 16, page 3, of this exhibit. This extension will cost $1,740.

Item 10 has been approved and is under construction.

Item 11 provides for the installation of 2 Bay extensions for the pipeline warehouse in 1940. By 2 Bay is meant two section extensions. As previously mentioned, it is my duty to maintain the buildings on this Fritch station site and to install all necessary additions to those buildings. I have been directed by the chief engineer to provide in this statement of additional capital expenditures for this installation for the benefit of the pipeline department.

The auxiliary building is shown on Exhibit 92 but it is not numbered. It is just to the rear of No. 1, the main building.

The same reasons for installation apply with reference to Item 12 as were given for Item 11.

Page 8 of Exhibit 93 is entitled "Book Cost of Property Retired—Dwelling Houses and Facilities," and the words "Retire 163 feet of curbing" are used in two instances, with an amount of $163 in 1939 and $163 in 1940. In carrying out the construction of cottages during the years 1939 and 1940, it will be necessary in each year to extend certain of the existing roadways, and in order to make that extension in each year it will be necessary to destroy existing curbing. The details shown on page 8 represent the book cost of the curbing which will be retired from investment in 1939 and in 1940.

Pages 9 to 12 inclusive show the book cost of certain property retired, page 9 being equipment retired, page 10 being certain portions of the main engines retired, page 11 being certain station piping retired, and page 12 being certain buildings or portions thereof retired. Those items are retired on account of their replacement by certain items to which I have already testified.

On pages 9 to 12 inclusive, the word "salvage" is shown at the bottom of each page. For instance, on page 9, there is an item under the subheading "Salvage" entitled "Reclaimed Calorimeter," with an amount of $200 under
589 the year 1944. That is the salvage value of the
calorimeter which will be retired on account of the purchase of the calorimeter referred to on page 3, line 21, of Exhibit 93. By the use of the word "salvage" in connection with this item I have reference to the fact that, in my judgment, at the time the present Thomas calorimeter is replaced with a new calorimeter we will obtain from the manufacturer $200 credit for the return of the worn out equipment.

On page 12 there is another salvage item, which represents the book value of the usable equipment retired from investment, and that is with reference to the overhead telephone service referred to on page 7, line 10, of the exhibit.

The retirement of the corrugated roof is a part of the installation of the Transite roof on the main building. We retire from investment the book cost of the existing corrugated iron roof covering. The dustop air filters on page 10 are being replaced by the water wash air filters on page 5. The retirement of the 3 inch underground air line on page 11 correlates with the work which has already been completed on page 6, line 3, Item 3.

Page 13 and several subsequent pages are with reference to the additional capital expenditures of the gasoline plant, and the page is headed "Additional Capital. Expenditures and Book Cost of Property Retired." The first line, "Equipment" is further explained on page 15 of the exhibit, and the second and third lines entitled "Station Piping" and "Buildings and Grounds" are further explained on pages 16 and 17 of the exhibit; and under the subheading "Book Cost of Property Retired," lines 5, 6 and 7 are further explained by pages 18, 19 and 20 of Exhibit 93, and lines 9, 10 and 11 under the subheading "Salvage" are also explained in more detail on pages 18, 19 and 20 of the exhibit.

On page 14 additional capital expenditures and book cost of property retired are shown for laboratory apparatus. The expenditures set out under that item for the year 1939 have already been completed. In my judgment it will be necessary to make small expenditures each year for the replacement of worn out laboratory apparatus and for the purchase of new apparatus.

Page 15 is entitled "Fritch Gasoline Plant, Additional Capital Expenditures, Equipment," and shows eleven items, explained as follows:

Items 1 and 2 have been installed. The work provided for under Item 3 has been approved and preparations are under way to effect this installation. Item 4 has been completed.

The construction provided under Item 5 has been approved for completion.

By approval, I mean a work request has been signed and authorized by the management for the expenditure immediately, and drawings are being prepared and material being ordered.

590 Item 6 has been approved and authorized.

Item 7 provides for the installation of a gas fired oil preheater. In the operation of the gasoline plant it has been found necessary to install and operate equipment for cleaning or reclaiming the absorption oil used in the process of absorbing natural gasoline from the natural gas. This oil becomes contaminated from various sources and the function of the reclaimer is to rid the oil of the contaminating materials, which include lubricating oil from the gas compressors, gummy material, and carbon or coke. The capacity of the present oil reclaimer is inadequate to maintain the desired condition of the absorption oil, and in order that this equipment may be caused to render satisfactory service a gas fired heater unit must be provided to replace the present steam heater equipment. It is my judgment that this equipment must be installed in 1939 at a cost of $1,125.

The next item is "Install 144 foot Cooling Tower," with an expenditure of $14,400 in 1948. The necessity for that expenditure is the same as the explanation I gave for the erection of a 180 foot cooling tower referred to on page 3, Item 25, of Exhibit 93.

Item 9 provides for the installation of air filtration equipment in the pump and recompressor building and in the boiler house at the gasoline plant. This installation is identical with that provided for on page 3, Item 28, and is properly called dust protection equipment. My explanation for the necessity of that item is the same as for the one to which I have just referred.

Item 10 provides for the installation of cooler, accumulator and pump in 1939. This installation has been authorized, and work on the installation is under way.

Item 11 provides for the purchase of miscellaneous tools and provides an allowance of $50 per year for the years 1940 to 1951 inclusive, for the same reasons as outlined under Item 29, page 3.

Item 12 has been completed and the purchase has been made.

Item 13 provides for the purchase of miscellaneous laboratory equipment in the amount of $50 per year during the years 1940 through 1951. In the operation of a general chemical laboratory it is necessary from time to time to replace worn out and broken apparatus and to purchase apparatus for new work or for special problems. It is my judgment that this allowance will be necessary in order to properly carry out the functions of this laboratory.

Page 16 is entitled "Fritch Gasoline Plant, Additional Capital Expenditures—Station Piping," and shows four items.

Item 1 has been authorized and the work is under way.

Item 2 provides for the laying of 548 feet of 4 inch pipe. This item covers the replacement of 548 feet of 4 inch pipe

which serves to carry hot compressed gas from some of
591 the gas compressors at the gasoline plant to the outlet from the gasoline plant. This pipeline operates at a high temperature and carries gas at a pressure of approximately 740 pounds and is subject to serious corrosion. It is my judgment that this pipe must be replaced in 1940, at a cost of $512.

Again, in 1947, under Item 3, it is my judgment that this pipe will have to be replaced, at a cost of $512. This is the same pipe, for a similar purpose.

Item 4 provides for the construction of vapor recovery and steam lines. A vapor recovery line is a system of piping installed on the loading rack to be used for the entrapment of the vapor ordinarily evolved in the loading of gasoline into a tank car through an open dome cover. At the present time one-half of our gasoline output is being marketed in tank cars. However, it is probable that beginning in 1940 our entire output will be so marketed.

The loading of gasoline into an open dome of a tank car is an extremely hazardous operation. The purpose of the vapor recovery system will be to provide piping and appliances by which the gasoline can be loaded into the tank car and the vapor evolved can be withdrawn through a safe system of piping to an appropriate safe place, in such a manner as to eliminate the hazard existing in loading through the open dome. An accidental spark nearby the loading place would cause a fire, and has in other operations. We have not had any fires yet.

I have said that half of our gasoline is shipped by tank car now. The other half is delivered to the purchaser through a pipeline, and it is the purchaser's pipeline. They come to the station after the gasoline.

In addition to the hazard of loading tank cars, which is to be corrected by the addition of the vapor recovery line, it will be necessary to provide a steam line to the loading rack, to be used for the purpose of steaming out the tank cars prior to entering them for the purpose of making repairs. It is becoming more and more necessary to enter the tank cars for the purpose of freeing the outlet valves, and this is an extremely hazardous undertaking with the present equipment. At the time the vapor recovery system is installed, it is my judgment that a steam line should be provided for the general safety of loading operations. This work should be performed in 1940, at a cost of $2,996.

Page 17 is entitled "Fritch Gasoline Plant, Additional

Capital Expenditures—Building and Grounds," and shows four items.

Item 1 has been authorized and work is under way.

Item 2 provides for the installation of fourteen door checks in 1940. The explanation for the necessity of those fourteen door checks is the same as Item 5 on page 7, to which I have already testified.

Item 3 provides for extending sidewalks at the gasoline plant in 1940. Originally, some gravel sidewalks were provided for the use of the operators in passing from 592 the cottage area to the gasoline plant area, and from the gasoline plant area to the compressor station. These sidewalks, gravel walks, have long since been covered by blown dust, and it is necessary that firm footing be provided for those men who must pass through these areas. It is therefore my judgment that a concrete sidewalk should be constructed from the compressor station to the gasoline plant and from the gasoline plant to the cottage area in 1940, at a cost of $979.

Item 4 has been authorized and the work is under way.

Pages 18, 19 and 20 of this exhibit refer to book cost of property retired and to salvage. My explanation of the book cost of property retired and salvage with reference to the Fritch gasoline plant and of the way this exhibit is set up is the same as my explanation with reference to the compressor station.

The Mason pump governors on page 18, line 4 relate to the 10 pump governors in line 4, page 15.

My attention is called to page 18, Item 1, reading "Retire top of 1600 barrel tank," with an expenditure of $100 in 1939. Early this year the top of the 1600 barrel tank was completely destroyed by a wind storm. It was accordingly retired from investment.

Item 2 on the same page, being an expenditure of $1,684 in 1939, represents the book cost of two 1600 barrel wood water tanks which have been retired from gasoline plant equipment. They have been reinstalled as a portion of the compressor station investment, Item 4, page 3, of this same exhibit.

Item 12, "Retire Fisher Titrimeter," with an amount of $194 in 1939, represents the book cost of an item of laboratory apparatus which has been retired from investment.

On page 19, entitled "Book Cost of Property Retired—Station Piping," Item 2, reading "Retire 2 inch oil line," represents the book cost of a certain section of 2 inch oil line which has been retired from gasoline plant investment and reinstalled as a portion of the additional capital expenditure shown under Item 1, page 6. The oil line was used as a portion of an addition to the yard hydrant system. The salvage of 1018 feet of 2 inch oil line, at the bottom of page 19, refers to Item 2 on the same page.

On page 19 there is a retirement of 545 feet of 4 inch pipe in 1940 at $291, and the same amount of 4 inch pipe in 1947 at $512. The book cost of the existing 4 inch line amounts to $291. That is the amount now on the books against that particular section of piping. In 1947 the book cost of the property retired will be equal to the additional capital expenditure shown under Item 2, page 16, in the amount of $512. In other words, the cost of laying 548 feet of 4 inch pipe in 1940, with prices as of June, 1939, is higher than the cost of the same equipment in 1930 and 1931, and in addition, the conditions under which the
593 replacement must be made are much more difficult,
due to the conditions of operation of the plant and the adjacent pipelines and other structures.

Page 21 is entitled "Refrigeration Plant, Additional Capital Expenditures and Book Cost of Property Retired." Under the heading "Additional Capital Expenditures" the first three lines, "Equipment," "Station Piping," and "Building and Grounds," are explained more in detail on pages 22, 23 and 24, respectively, of this exhibit 93; and under the subheading "Book Cost of Property Retired," lines 5, 6 and 7, entitled "Equipment," "Station Piping," and "Buildings and Grounds," are explained more in detail on pages 25 and 26, with the exception that there is no property retired for Buildings and Grounds, being line 7.

Referring to Item 2 on page 16, this should be "Lay 545 feet" instead of 548 feet. 545 is the correct figure in all places where this line is referred to.

In 1947 we are going to retire pipe which will be laid in 1940.

Page 22 is entitled "Fritch Refrigeration Plant, Additional Capital Expenditure—Equipment," and mentions three items.

Item 1 has been completed.

Item 2 provides for the installation of 7 G. R. Bentube Coolers in 1948. This refers to Item 26 on page 3. This item on page 22 refers to the replacement of 7 coolers serving the dehydration plant, which, in my judgment, will have deteriorated to such an extent that they must be replaced not later than 1948 at a cost of $5,192. It is the same kind of equipment as that referred to in Item 26, page 3. In other words, the item on page 3 refers to the compressor station, and the item on page 22 refers to the refrigeration plant.

Item 3 provides for remodeling the refrigeration plant in the year 1942. This equipment is not now operating as it was originally intended to be operated, for the reason that very shortly after it was placed in operation as originally intended, the troubles and difficulties with gas hydrate formations immediately became apparent. It was necessary to modify the plan for operating this equipment until the problem could be solved and some means be provided for the prevention of the difficulties due to the hydrate formations.

The solution arrived at was the injection of calcium chloride brine solution into the exchangers and into the propane-to-gas exchanger serving this facility. The function of the liquid brine was to wet the surfaces of the heat exchangers in such a manner as to prevent the formation of hydrate crystals. Due to the nature of the construction of the exchangers into which the brine is injected, it is extremely doubtful that the brine reaches all portions of the heat exchanger surface. Consequently it has been found that a certain amount of gas hydrate builds upon the heat exchanger surfaces at a very slow rate.

594 Had we originally contemplated the use of this liquid in this process, we would have utilized an entirely different design, employing a contractor or large tank containing trays or bubble plates, by means of which we would have contacted the gas with this hydrate inhibitor, and a great deal more attention and care would have been exercised in the selection and design of the facilities for separating moisture from the gas stream.

Originally the process was a straight refrigeration process, in which the gas to be dehydrated was to be cooled to a temperature of 40 degrees Fahrenheit, at which the water vapor contained in the gas would condense to such extent that nowhere else in the operation of our transmission system would pressure and temperature conditions prevail at which additional moisture could condense out of the gas.

The refrigeration process then was expected to separate from out of the gas the desired amount of water vapor. However, in the operations with the injection of the brine inhibitor it has been found that occasionally through some disturbance in the gas flow or otherwise, a small amount of the brine may pass out of the dehydrating equipment into the main line. This is extremely undesirable, and a hazardous condition. We also find that there is a certain amount of corrosion occurring, due to the use of the brine solution.

I have stated that brine may pass out of the refrigerating system into the pipeline. It has actually passed out. A certain amount of corrosion is occurring in the metal parts contacted by the brine. The evaporating equipment utilized in reconcentrating the brine is particularly susceptible to this corrosion, and numerous replacements of heating coils have been made. Some corrosion is also occurring in the dehydration equipment which is exposed to the main gas line pressure, which at this point varies between 735 and 715 pounds per square inch gauge.

This corrosion, due to the action of the calcium chloride brine, has not proceeded to a dangerous extent. However, it is my judgment that the use of this brine should not be continued beyond the year 1942, and that some other fluid to be used for this purpose should be found.

It is also my judgment that at the time we select some other fluid, of which there are several now available which will perform the same function as calcium chloride brine and which are non-corrosive, the plant should be remodeled in such a manner as to positively guarantee against the extremely slow hydrate formation which now takes place, and against any possibility of any carry-over of fluid into the main line, and to provide complete contacting between the gas and the inhibitor. Several dehydrating plants have been installed in recent years on other pipelines of various designs, and utilizing various inhibitors.

This brine fluid enters the pipeline as a fluid. However, the passage of the dry gas through the pipeline in contact with any brine fluid which may be found results in that gas picking up and absorbing the moisture content in the brine solution and eventually leaving the brine as a crystalline deposit. That is a matter of experience that we
595 have found in the pipeline. We have not observed so
far that it ruins the pipeline. The formation of these crystals inside of the pipeline in time would doubtless result in decreased flow efficiency of the gas through that particular section of the pipeline so affected.

Over a period of years the brine which enters the pipeline is a very small amount, a few barrels; but it could be much more than that in the event of some failure of equipment. There are other styles and designs of dehydration equipment now in operation on other pipelines, and it is my intention to submit designs and plans for remodeling this equipment to take advantage of all the improvements incorporated in recent designs, if at all possible. Accordingly, it is my judgment that, not later than 1942, the dehydration equipment must be remodeled at a cost of $90,251. It is my judgment that such expenditures will be approved when presented to the management.

Page 23 is entitled "Fritch Refrigeration Plant, Additional Capital Expenditures—Station Piping," and shows two items of expenditure. (Objection by counsel for Illinois Commerce Commission to testimony with respect to any item beyond the year 1941 upon the ground that expenditures made by the company from the years 1941 to 1954 are not material to the issues involved. Objection overruled.)

Item 1 provides for the replacement of 160 feet of 6 inch pipe in the year 1941. This section of piping is used for the purpose of carrying hot compressed gas and is subject to serious corrosion to such an extent that it is my judgment that it must be replaced in 1941 at a cost of $279. This pipe conveys compressed propane gas from the gas engine driven compressors serving the dehydration plant to the cooling sections in the base of the gasoline plant cooling tower.

The explanation I have given for Item 1 applies also to Item 2. It is my judgment that this line will again have corroded to such an extent in 1948 that it will have to be replaced. It is the same piece of pipe that is to be laid in 1941.

Page 24, entitled "Additional Capital Expenditures, Buildings and Grounds," contains an item entitled "Install two door checks." This item provides for the installation of two door checks on the refrigeration plant control building, and the explanation of the necessity for that item is the same as the necessity for the door checks to which I referred this morning.

The retirement items on pages 25 and 26, entitled "Fritch Refrigeration Plant, Book Cost of Property Retired, Equipment," on page 25, and "Station Piping," on page 26, are explained in the same manner with reference to the additional capital expenditures of the Fritch refrigeration plant as I have heretofore explained with reference to the compressor station and gasoline plant. On page 25 the retirement of 7 G. R. Bentube coolers, involving $5,215, is the item referred to on page 22, line 2; and the items on page 26 are the items referred to on page 23, lines 1 and 2.

I prepared this exhibit, and it represents my best judgment of the expenditures which will be made for additional capital expenditures, and the dates thereon represent my best judgment as to the years in which the capital expenditures will be incurred. It is quite likely that some of
596 the expenditures may be necessary prior to the dates shown.

I prepared the figures representing these capital expenditures, using prices as of June, 1939, obtained from the chief engineer. My work sheets used in preparing this exhibit will be available to counsel for the two Commissions, and their engineers, at such time as may be convenient to both of us.

(At this point counsel for defendants offered EXHIBIT 93, which was received in evidence over the objections of counsel for each of the Commissions, to whom an exception was allowed. Motion by Commission counsel to strike all of witness' testimony except such as deals with the reasonably immediate future denied.

Counsel for defendants then presented a document entitled "Texoma Natural Gas Company, Operation and Maintenance, Compressor Station, Gasoline Plant, Refrigeration Plant, Witness R. T. Powers." At the direction of the Examiner, the document was marked Exhibit 94 for identification.)

The first page of Exhibit 94 is entitled "Summary of Operation and Maintenance, Compressor Station, Gasoline Plant and Refrigeration Plant," below which is line 1, entitled "Compressor Station," line 2, entitled "Gasoline Plant," and line 3, entitled "Refrigeration Plant." These are explained in more detail on pages numbered 1, 14, 21-A, respectively, of the exhibit; and under the subhead "Maintenance," lines 5, 6 and 7 are explained more in detail on pages numbered 1, 14 and 21-A of the exhibit.

The next subheading is entitled "Total Operation and Maintenance." The totals shown in the four lines numbered 9, 10, 11 and 12 are the totals respectively of the items above. In other words, line 12 is the total of line 4 and line 8; and line 9 is the total of lines 1 and 5, etc.

On that same page the amounts listed for the years 1932 to 1938, inclusive, are the actual costs of operation and maintenance of the compressor station and gasoline plant and refrigeration plant for the years indicated; and the next column after 1938 is the average of the years 1936, 1937 and 1938.

Out at the end of those columns, the first from the end is, as is designated, the average for the years 1939 to 1954, inclusive, and the last column is the total expenditures for the years 1932 to 1954, inclusive.

On page 1 of Exhibit 94, lines 1, 2, 4 and 5 are explained in more detail on pages 2, 3, 4 and 5, respectively, of the exhibit. Line 3 is entitled "Traveling Expense," and this item includes necessary traveling expense of officials and engineers whose headquarters are in the Chicago office on behalf of the Fritch compressor station.

Line 6 is entitled "Credits" with the letter "R" before each of the figures shown on that line. The electric generating equipment serving both the compressor station and the gasoline plant is located in the auxiliary building at the compressor station. The amount of electric power
597 consumed by the gasoline plant is metered and a charge is made to the gasoline plant for the amount of power consumed. The credit received by the compressor station for this sale of power is shown under line 6, and the corresponding charge is included in the gasoline plant expense. That is in effect a wash-out so far as Texoma Natural Gas Company is concerned, and is only a charge and credit as between departments for the purpose of keeping account of the cost of operations of the separate units of the plant.

Under the subheading "Maintenance" on page 1, lines 8 to 15, inclusive, are referred to and explained more fully on pages 6 to 13, inclusive, of this exhibit.

Referring to page 1, line 1, entitled "Labor," the explanation of the method of determining the costs involved is shown in detail on page 2; and on page 2 I have computed the total wages per hour for operating shift labor in 1939 with a total of eight employees at a total cost of $5.65 plus per hour. In calculating the operating shift labor for the years 1940 to 1952, a change has been made over the year 1939. Beginning in 1940 and continuing through 1952, it will be necessary to maintain on shift duty 9 men instead of 8, for the reason that the number of gas compressor engines to be operated will be such that additional attendants will be required. (Objection by counsel for Illinois Commerce Commission overruled.)

About the middle of page 3 are the words "Use of Average Cost per M.H.P. Hr.” M.H.P. Hr. means thousand horse power hours, and that has the same reference to the few lines above that to the right where the words occur, “Cost Per M. Horse Power Hour.”

At the bottom of the page is a tabulation from 1939 to 1954, and under the heading “Engine Hours” appears a figure, 104,221, and under “Horse Power Hours,” 119,514,211. As the years progress that amount increases down to the year 1947 and continues at the rate of 115,272 engine hours, and 130,249,944 horse power hours, down to 1952, when the number of engine hours and horse power hours decreases. The reason for these changes is that the suction pressure at which the portion of the gas to be compressed by the Fritch compressor station will reach the station will decline continuously until the year 1947. As the suction pressure declines, the horse power to compress a unit volume of gas will increase and the quantity of gas compressed per engine will decrease.

For this reason the engine hours necessary to operate in order to compress the requisite volume of gas will increase until 1947, and correspondingly the horse power hours to be expended to compress the gas will also increase. From 1947 through 1951 the volume of gas to be compressed will remain constant, as will the pressures at which the gas will be delivered to the compressor station. Accordingly, the engine hours and horse power hours remain constant. Beginning in 1952 and continuing through 1954, the decline in engine hours and in horse power hours is occasioned through the decline in gas volumes to be compressed, due to the falling off of gas available to the Fritch compressor station in the last three years of operation.

I secured the figures for the quantities of gas which
598 would be put through and compressed at the Fritch
compressor station from Mr. R. M. Bussard, who has testified and who will later testify in this proceeding concerning those items.

On page 6 the amounts set out opposite each of the items and under the years in question represent my best judgment as to the cost of labor that will be expended on the maintenance of the equipment of the compressor station. The same is true as to the amounts to be expended on material going into the equipment of the compressor station shown on page 7, and the amounts as to the labor going into the maintenance of the auxiliary engines shown on page 8.

Page 9 shows the cost of materials going into the maintenance of the auxiliary engines at the compressor station; page 10, the cost of labor going into the maintenance of the main engine at the compressor station; page 11, the cost of materials going into the maintenance of the main engine at the compressor station; page 12, the cost of labor and material going into the maintenance of the station piping at the compressor station; and page 13, the cost of labor and material going into the maintenance of buildings and grounds of the compressor station.

My attention is called to page 14 of Exhibit 94, entitled "Fritch Gasoline Plant, Operation and Maintenance," and I am asked to explain how I arrived at the cost of labor going into the operation of the Fritch gasoline plant. The cost of labor, as shown on line 1, is arrived at in a manner similar to that employed in the computation shown on page 2 of this exhibit. On page 2 I show for the compressor station the number of men operating shift labor in 1939 and an increase of one man after 1939. I did not mean to imply that we increased the personnel at the gasoline plant. My calculation, as stated, is similar in principle to that for the compressor station. The smaller number of men required for the operation of the equipment renders it somewhat easier to utilize the plan of totaling the annual salaries of the different operators. For the cost of men on salaries I used the present salary scale and the present hours of employment per man.

All through this exhibit I have used the present rates of pay for all labor and men employed on salaries; and the same hourly time per day. I made no provision for increases in salaries in the future. The first line, entitled "Labor," shows an average of $33,345 per year for 1936 to 1938, and a cost during 1938 of $34,303.08 for this item; but I have used a straight figure of $34,037 thereafter, with slight decreases in the last few years of operation, which indicates that I do not anticipate any increase over the 1938 cost.

To the cost of materials going into the operation of the Fritch plant are charged various materials, including water purchased, electric power, water treating chemicals, gasoline treating chemicals, automobile expense, brooms, charts, cleaning and polishing material, belts, etc. The cost as shown on line 2, page 14, is built up by totaling the cost of the electricity, water, gasoline treating chemicals and miscellaneous materials based upon past experience and nor-

mal consumption of those materials and on present prices.
Throughout this exhibit the present cost of labor and
599 materials was used.

Cross-Examination Interposed by Mr. Slaff.

It is my judgment that prices of material will increase. I have not attempted to study the question deeply enough to form a judgment as to the amount of increase. I have been told to figure material costs on present prices; but I have a generalized judgment that from 1939 on, the prices of material will increase. That applies to everything in this exhibit and my preceding exhibit as far as materials are concerned.

(Motion by Commission Counsel to strike foregoing exhibits on ground of incompetency of witness' judgment denied.)

Direct Examination by Mr. Hedrick (Resumed).

I was instructed to use the present prices as to labor, equipment, etc., in preparing Exhibits 93 and 94, and I did so. I used the prices as of June, 1939.

(Renewal of motion of Commission Counsel and objection to any discussion of Exhibit 94 denied and overruled.)

Line 2 of the exhibit indicates that I expect a slight increase in the expenses for material going into the operation of the gasoline plant over the cost in 1938. I have a gradual increase beginning in 1939. With reference to the cost in 1938 of $60,855.63, the cost in the first four years thereafter, including 1939, will be slightly lower than that cost, and then there will be a slight increase in the future.

Line 3 refers to damages in connection with liabilities incurred through damage to personal and real property of others resulting from the flow of waste water or waste oil across property or a flow of sewage across a property, and it is my judgment that the cost of those items will not exceed $35 a year during the subsequent years of the life of this project.

The cost of operating fuel for the operation of the Fritch gasoline plant, being line 5, is arrived at in this way: Based upon a normal rate of fuel consumption, the boilers will consume a volume of 229,047,000 cubic feet of gas in 1939. In Exhibit 93, page 15, Item 10, allowance has been made for the installation of certain equipment and the installation of this equipment has been authorized. As the result of placing this equipment in operation, the present supply of fuel now consumed by the boilers will be devoted to other uses and it will be necessary for the boilers to be fired with natural gas instead of the present high BTU value gas. This results in an increased volume of boiler fuel. The remaining item represents the volume of fuel consumed by the gas compressors serving the gasoline plant.

It is my judgment that the cost of lubricating oil and grease going into the operation of the Fritch gasoline plant will be lower during subsequent years than it was in 1938 because of improved economy in the consumption of lubricating oil. There will be a reduction in the quantity used.

Referring to line 7, "Absorption Medium", it is my judgment that the cost of the absorption medium at the Fritch gasoline plant will be only slightly higher in subsequent years than in 1938, and less than the 1936 to 1938, inclusive, average. The consumption reported in 1936 is
600 slightly above normal due to some mechanical difficulties.
The absorption oil consumption for 1937 and 1938 is considered to be normal, and is based upon the average consumption of absorption oil during those years per million cubic feet of gas processed. It is a matter of experience that the amount of absorption oil consumed is directly related to the quantity of gas processed, assuming normal operation.

The item on line 8, "Laboratory Expense," includes salaries of four employees engaged in chemical work at the laboratory, plus the cost of materials, chemicals, apparatus, instruments, etc., employed in the conduct of the chemical testing work. The expenditure from 1939 during the balance of the project is slightly in excess of what it was in 1938 because of some salary differences which have been effected and which were in effect June 1, 1939.

The items on lines 11 to 16 on page 14 are explained in more detail on pages 15 to 20 of Exhibit 94.

Page 21-A is entitled "Fritch Refrigeration Plant, Operation and Maintenance." Line 1 on that page is entitled "Labor." It is my judgment that the costs for labor going into the operation of the refrigerating plant will be slightly less in 1939 and subsequent years of this project than they were in 1938. The item "Labor" for the years 1939 through

1952, inclusive, was obtained through a calculation similar to the one described as being used in obtaining the labor under line 1, page 14, for the gasoline plant. The calculation covers the necessary labor and reflects a small economy in the consumption of labor in the operation of the refrigeration plant.

It is my judgment that the expenditures for the years 1939 on for material going into the operation of the Fritch refrigeration plant, as shown on line 2, page 21-A, will be approximately the same as in 1938.

Line 3, entitled "Operating Fuel," shows a slight increase for the years 1939 on, over the year 1938. In preparing a statement to show the fuel consumption of the Fritch refrigeration plant, the increased fuel consumption reflects the increased amount of operation necessary to process the volume of gas in 1939, and thereafter, in excess of that processed in 1938.

On line 4, entitled "Lubricating Oil and Grease," there is an increase over 1938 and a decrease under the average for 1936 to 1938. The increase over 1938 is due to certain accounting procedure in that the actual consumption of oil in 1938 may not have been correctly accounted for. The cost for the years 1939 and thereafter is considered normal, and reflects certain economies in the quantities of oil consumed as compared to the average for 1936, 1937 and 1938.

On practically all of the pages of this exhibit there is a rapid falling off shown in the last two or three years of the expenditures for the operation and maintenance of the compressor station, the gasoline plant and the refrigeration plant. That rapid decrease in expenditures in those last
three years is due to the fact that operation and main-
601 tenance expenses will decline in those last three years
because of the decreased quantity of gas made available to Fritch for compression.

Referring to the sub-title "Maintenance" on page 21-A, the items opposite lines 6 to 11 are explained in more detail on page 21 for equipment labor and equipment material, page 22 for auxiliary engine labor and material, page 23 for station piping, and page 24 for buildings and grounds.

On page 25 of Exhibit 94, entitled "Compressor Station Department, Maintenance of Houses and Facilities—Fritch," there is shown the cost of maintenance of houses and facilities; and on page 26 is shown the maintenance of houses and facilities of the production and pipeline department at Dumas, Kingsmill and Skellytown. These maintenance costs are based upon the number of houses now at the Fritch station and upon the schedule for the construction of additional housing facilities. Items 1 to 16, inclusive, on page 25 have been prepared to show the details of the expenses of maintaining the houses and facilities listed, based on past history and experience, and on prices as of June 1, 1939.

It is necessary to maintain the houses by periodic applications of paint in order to preserve the interior and exterior surfaces from deterioration. It is a matter of experience that these houses must be painted every four years. The expenditures shown on pages 25 and 26 are the normal and necessary maintenance and upkeep expenses of those houses and facilities.

Referring to Exhibit 94 as a whole, the prices for labor, material and other items going into the maintenance and operation of the compressor station, gasoline plant and refrigeration plant shown in this exhibit represent my considered judgment, based on experience which I have had during my employment with Texoma Natural Gas Company and experience which I gained prior to that time with other employers, using prices as of June 1, 1939, as to the costs of maintenance and operation of the compressor station, gasoline plant and refrigeration plant during the years shown by the exhibit. I am not testifying as to the continuing of June prices in the future. The costs to which I have testified are over-all costs based simply on unit prices as of June 1, 1939, and I am making no prognostication that these June prices may be effective in the future. (Objections and motions to strike by Commission Counsel and Counsel to the Illinois Commerce Commission with respect to Exhibit No. 94 and the testimony in explanation thereof overruled and denied.)

Exhibit 94 was prepared by me. It is my work. It is my judgment that these items of labor and material referred to in this exhibit will be required in the future operation and maintenance of the compressor station, gasoline plant and refrigeration plant during the years in question.

(At this point counsel for defendants offered EXHIBIT 94, and it was received in evidence over the objection of counsel for each of the Commissions, to whom an exception was allowed.)

Cross-Examinatoin by Mr. Slaff.

I have testified in no other cases and have written no technical papers other than the one to which I referred in my testimony. My working papers will be down at Fritch.

602 W. H. DAVIDSON, a witness for defendants, testified as follows:

Direct Examination by Mr. Hedrick.

(July 28, 1939.)

My name is W. H. Davidson. I reside at 2218 Ewing Avenue, Evanston, Illinois, and am 37 years of age.

I attended Texas A. & M. College and received the degree of Bachelor of Science in civil engineering in 1924.

Immediately after graduation I was employed by the Empire Companies in Bartlesville, Oklahoma, as junior engineer, and as such I secured field experience in the oil production, refining and engineering departments. I also had varied experience in the various departments of the office of that company in Bartlesville, Oklahoma.

After a year as a junior engineer I was assigned permanently to the engineering and construction department. In 1925 I was detailed as assistant resident engineer on the construction and revision of the gas compressor station located at Petrolia, Kansas, for the Empire Gas & Fuel Company. Later in that year I was assigned to Ponca City, Oklahoma, where I was engaged in construction work at the Empire refinery there. In 1926 I was assigned to several construction jobs, consisting of small compressor stations. Later in that year I was on a job which entailed a continuation of the construction program at Petrolia, Kansas, where I had been the year before.

As stated, I assisted in the construction and revision of a compressor station at Petrolia, Kansas. I was assigned to that point on three different occasions to carry out the planned construction program. In 1927 I was assigned as resident engineer on the construction of the compressor station at Pampa, Texas, which was situated on the gas line leading from the Texas Panhandle to Wichita, Kansas. While at that point I was also assigned as resident engineer on the construction of a carbon black plant. In 1928 I was detailed as resident engineer on the construction of a new compressor station at Corwin, Kansas.

I said I was resident engineer. The Empire Company of Bartlesville, Oklahoma, maintained an engineering and construction department. One of the functions of this department was to design and to construct various plants for all of the departments of that company. The department had a number of construction engineers who were assigned to jobs in the field as they came up. As resident engineer on such a job I had responsible charge of an individual plant, which included the supervision of the erection and installation as well as of personnel required in making such erection and installation.

In 1929 I spent several months at the Tallant, Okla-
homa, compressor station, engaged in the revision of
603 that station, the installation of new equipment, and
the revamping of the gasoline plant at that point.
About April of 1929 I was assigned to East Chicago, Indiana, as assistant resident engineer on the construction of a 15,000 barrel refinery. The plant was originally designed as a 15,000 barrel plant. Early in 1930 an additional 10,000 barrel extension was added. The approximate cost of the entire plant was $13,000,000. The construction of that project was completed late in the year 1930. After its completion I returned to Bartlesville, Oklahoma, where I spent several months in the office writing a report on the construction of that plant.

In March, 1931, I transferred to the Continental Construction Corporation, where I was assigned as resident engineer of the construction of what is now known as No. 9 compressor station of Natural Gas Pipeline Company, at Harper, Iowa. I spent only a short time at that point, and then moved to No. 10 station, near Geneseo, Illinois, and started the construction of that plant. At midyear I was transferred to the pipeline department to supervise the construction and completion of the pipeline throughout the state of Illinois.

When the Natural Gas Pipeline Company started operations as such in 1931, I was given the position of district pipeline superintendent, having as my territory the state of Illinois. I continued in that capacity until June, 1934, when I was transferred to the Chicago office and given the responsibility of superintendent of compressor stations for Natural Gas Pipeline Company, and that is my title at this time. I have supervision over the nine compressor stations of Natural Gas Pipeline Company.

(At this point counsel for defendants presented a document described as "Natural Gas Pipeline Company and Texoma Natural Gas Company Compressor Stations." At the direction of the Examiner, the document was marked Exhibit 95 for identification.)

Exhibit 95 is a map showing the route of the pipe line from the Texas Panhandle field to Chicago, and at intervals thereon are shown the several compressor stations which operate on this pipe line. The compressor stations are marked on the map. Station No. 1 at the south end of the line is the station over which Mr. Powers, who testified yesterday, is general superintendent. My territory starts in at Station No. 2, about an inch up on the dark line north of Station No. 1.

Station No. 2 is located at Gray, Oklahoma. The number of engines installed at each plant and the horse power of the engines and the total installed horse power is shown at each point marked "Compressor Station." The approximate distance in miles between Stations 2 and 3 is 84; between stations 3 and 4, 84; between Stations 4 and 5, 89; between Stations 5 and 6, 86; between Stations 6 and 7, 90; between Stations 7 and 8, 89; between Stations 8 and 9, 91; between Stations 9 and 10, 99; and between Station 10 and Joliet, 109.

In addition to the stations being numbered on Exhibit 95 they are also designated by name, such as Gray, Mineola, Heizer, etc., and are sometimes referred to by name instead of number.

604 (At this point counsel for defendants offered Exhibit 95, and it was received in evidence without objection.

Counsel for defendants at this point presented a document described as "Fairchild Aerial Survey, Inc., Dallas, Texas," and on the reverse side, "No. 303405-2, Compressor Station No. 6, Continental Construction Corporation, near Beatrice, Nebraska." At the direction of the Examiner, the document was marked Exhibit 96 for identification.)

This picture was taken quite soon after the completion of that station in 1931. It is an aerial photograph of the compressor station numbered 6, located near Beatrice, Nebraska, and shows the general lay-out employed at all of the compressor stations on the main pipeline. On this picture are shown numbers from 1 to 17.

The structure or building designated as No. 1 is what is called the main compressor building and houses the main compressor units. The figure 2 points to the exhaust stacks and mufflers which serve the main compressor units. Figure 3 is the auxiliary building which houses the generating equipment, pumps, machine shop, boiler, and other pieces of equipment. Figure 4 shows the office building. Figure 5 shows a building which is utilized as a combination warehouse and garage. Close by to figure 6 is what is known as the 30 by 30 sump.

A sump is a facility which could be called a hot well, and is used to receive the cooling water as drained from the equipment, main engines and auxiliary engines, and other equipment requiring cooling water.

Figure 7 indicates the lubricating oil storage tanks; figure 8, the gas regulator house; figure 9, the 100,000 gallon overhead water tank; figure 10, the house serving the sump pump; figure 11, the gas manifold piping directly in front of the cooling tower; figure 12, the cooling tower; figure 13, the pipes storage racks and area in which other heavy equipment is stored; figure 14 the pipeline warehouse serving the forces of the pipeline department located at Station 6, which forces are under the supervision of Mr. R. G. Strong, but the building is included within the compressor station plant investment. Figure 15 shows the overhead domestic water tank. Figure 16 shows one of the garages provided for the employees. Figure 17 shows the cottage area and road.

The broad white line near the right side of the picture is the main highway from Beatrice, Nebraska, to Lincoln, Nebraska. The small white lines running past the main engine building and the auxiliary building down to the office building and up toward the houses are sidewalks serving the various facilities and cottages.

(At this point counsel for defendants offered EXHIBIT 96 in evidence, and it was received without objection.)

In addition to the equipment shown on Exhibit 96, other equipment has been added from time to time up to the present time. There has been an extension made to the cooling tower. There has been an extension made for the main building. That extension is on the side 605 away from the auxiliary building. There have been roads added to the main plant site. There have been other cottages constructed on the plant site, and I believe that is all the major additions. There is one observation I might make here, that the usual layout includes water wells on the plant site. Unfortunately, we could not locate water wells on the plant site at Station No. 6 and those wells are located approximately a mile away to the left side of the picture. A water line has subsequently been installed out to the location of the water wells, and in addition, at Station 6 we have a water line leading from the station into Beatrice to supplement the supply of water for our own use at that station.

There are 30 acres in the plant site at Station 6. The limits are not very well defined. However, they are shown roughly by the main highway on the west, the dirt road immediately in the foreground from the main building on the north, and there is a fence to the south of the cottage area. There is a faint line running along the middle left-hand section of the picture which may be traced as the property boundary. It is approximately a prolongation of the left side of that dark field which is about the upper center of the picture.

There are also dust scrubbers located on the station site which are not included in this picture. We have three dust scrubbers at that station at this time.

(At this point counsel for defendants presented a document described as "Natural Gas Pipeline Company of America, Additional Capital Expenditures, Compressor Station Department, Witness W. H. Davidson." At the direction of the Examiner, the document was marked Exhibit 97 for identification.)

Exhibit 97 includes a tabulation of additional capital expenditures that will be required on the compressor stations of the Natural Gas Pipeline Company from the years 1939 to 1954, inclusive. It also includes a tabulation of the retirement and salvage on capital expenditures for those years.

Referring to page 1 of that exhibit, the details of the item "Equipment" in line 1 are set out more fully on page 2 of the exhibit; and lines 2, 3, 4, and 5 on page 1 are set out more fully in detail at pages 4, 5, 5, and 6, respectively, of the exhibit.

Under the subheading "Book Cost of Equipment Retired," lines 7, 8, 9, 10, and 11, entitled "Equipment," "Main Engines," "Yard Piping," "Buildings and Grounds," and "Bunk House and Dwelling," are set out more fully in detail on pages 3, 4, 5, 5, and 6 of Exhibit 97.

Under the subheading "Salvage" line 13, entitled "Equipment," the items referred to are set out in more detail on page 3 of the exhibit.

I was here yesterday when Mr. Powers testified, and heard all of his testimony.

I am now requested to take page 2 of Exhibit 97 and
606 explain the items numbered 1 to 28, inclusive, and state
the necessity for the expenditures set out on that page
in the years 1939 to 1950, inclusive.

First I will say that the definitions Mr. Powers gave yesterday in his testimony of the items which I also have listed in my exhibit are in accordance with my understanding of the definition of those items, such as dust scrubbers, Griscom Russell Bentube gas cooling sections, etc. We have a number of pieces of equipment located at the compressor stations on the main line which are identical with those located at the compressor station at Fritch under Mr. Powers' supervision, and the equipment which is identical Mr. Powers has described very well.

Taking Item 1, in general the necessity for an expenditure of $83,534 for additional dust scrubbers in 1941 is the same as the reasons given by Mr. Powers. However, we on the main line have a slightly different situation from that of Mr. Powers at Fritch.

Dust is usually defined as foreign matter. This dust may be made up of iron oxide, sand, scale or any other foreign material. The common nomenclature for such material is dust. In the operation of this line there accumulates on the interior wall of the pipe scale or dust. Periodically this scale or dust breaks loose, and it seems to accumulate as the gas pushes it forward. It might be described as an internal dust storm, because that is exactly what it is.

I believe the use of the words dust storm is common nomenclature in the pipeline industry. I know that I have heard the term used for a number of years. It is not the same kind of a dust storm that Mr. Powers referred to yesterday in describing the dust storms of the Texas Panhandle; but I imagine it is pretty bad inside the pipe.

The turbulence of the gas as it accumulates scale seems to increase the intensity of the internal dust storm, until it reaches a compressor station and passes through the dust scrubbers, which are designed to take out such foreign materials. It has been our experience in the past that when such dust storms occur inside of the pipe, the present scrubber installation is not adequate to separate this dust from the gas, and a large portion of it passes on over into the suction line heading to the station, thence through the compressors, where it creates a very serious condition.

When I described those dust storms a moment ago and the reason for them, I meant that when a small amount of dust starts to break loose in the pipe, as the velocity of the gas containing that small amount of dust continues up the pipeline, it breaks off other particles of dust on the inside of the pipe, and that accumulation increases from time to time until you have what you term a dust storm on the inside of the pipe. The dust that is broken loose seems to form an abrasive to knock off other pieces of scale or dust on the walls of the pipe.

There are now three dust scrubbers located on the inlet of each compressor station. The expenditure as shown
607 in the year 1941 provides for the installation of one
additional dust scrubber at each of the Stations 2 to 10 inclusive. That represents an expenditure, roughly, of $9,300 per station.

The next item, No. 2, is entitled "Renew Griscom Russell Bentube Gas Cooling Sections, Stations 2 to 10, Inclusive." I believe Mr. Powers discussed this item, which he installed at the Fritch compressor station. The same reasons for making such new installation on Stations 2 to 10 prevail as prevailed at Fritch.

There are 24 C-169 Bentube sections installed at each station. It will be necessary to renew these gas cooling sections, installing the sections at two stations in each of the years 1944, 1945, 1946, and 1947, and in one station in 1948. It is very possible that we will be required to install all of these sections before the year 1948. However, it is customary in our company when doing work of this magnitude to spread it out over a short period of time. The volume of work to be done at all of these stations in any one year is so great that you spread the work out over a period of years so it will be more properly and efficiently handled. It is not possible to continue the operations of the pipeline and have a number of stations out of service at the same time, because the capacity of the pipeline is thus greatly reduced.

Items 3 to 10, inclusive, have to do with the drilling and equipping of water wells at stations 2 to 9 inclusive. All of the compressor stations on the main section of the pipeline secure the necessary cooled water from water wells which are either drilled on the plant site or in the near vicinity. Continuous station operation depends directly upon an uninterrupted supply of good quality water in sufficient quantity. Water make up requirements over the system vary considerably. They vary according to the load carried on the pipeline, and they also vary with climatic conditions but to explain that would get us into a discussion of relative humidity, wind and atmospheric temperature. Generally speaking, we would probably use a little more water in the summer time than in the winter, providing the load is anywhere near normal. On the average, the requirements of these stations will fluctuate between 60,000 and 200,000 gallons of make-up water per day for each station.

As I use the term "make-up water," it is that water that is required to be added to the system in order that sufficient circulating water may be provided for the operation of the plant.

Our water well problems over the system are ever present. Naturally, over such a long distance, quantities and qualities of available water vary quite widely. The water problem becomes more complex each year and each location has its own individual characteristics and peculiarities. The experience with water wells on this system indicates that only with the future drilling of new wells will we be able to meet the necessary requirements.

We have set up, and have had set up the last two or three years, a definite water well drilling program to offset any possibility of depleting the water supply at the several stations. The supply of water in the wells that have been
608 drilled in the past has been depleted at a number of
stations. At Station 2, for example, the history of the water wells at this point shows a tendency for these wells to sand up. The water bearing stratum is extremely fine grain sand. Three water wells have already been drilled at this station, in addition to the original wells that were installed at the time the plant was constructed. These wells

were drilled in 1931, 1934, and 1938. Due to our past experience on the wells already drilled at Station 2, it will be necessary to drill additional wells to augment the existing supply in the years 1942, 1946 and 1950. They might be required sooner than that.

Item 7, "Drill and Equip 3 Water Wells, Station 6, and Construct Pipeline and Power Line," requires an expenditure of $50,094 in 1941, and $7,177 in 1947. We have had trouble with our water wells originally drilled at Station 6 from the time the station was first placed into operation. These wells are drilled off the station site and are shallow wells, approximately 37 feet deep. They produce from a formation almost entirely dependent upon seasonal rainfall. This area has suffered several protracted drouths, and it has created a condition in these wells where they are entirely inadequate.

This problem became serious enough in 1934 that the company constructed a pipeline to the city limits of Beatrice, Nebraska, and arranged to purchase water from the city. This service has been thoroughly satisfactory in so far as the quality of water is concerned. However, there have been times when water requirements for the city of Beatrice have been so heavy, particularly in the summer months, that the pressure of the water delivered to our plant was too low to allow the water to be passed through the water treating plant which softens the water.

The city of Beatrice naturally protects its own interests first. Not less than ten days ago we had an occasion to shut down Station 6 for the purpose of cleaning out the entire system, that is, the system which holds the water for the plant. We are not allowed to shut down these plants for any great length of time. Six to eight hours is considered a long shut-down period, and it is very necessary that we start the plants up on immediate notice.

The occasion of which I speak occurred when we had authority for such shut-down. Upon starting up we were delayed to a considerable extent in getting under way and starting again to pump gas, because we could not secure sufficient quantities of water from the mains leading to the city limits of Beatrice.

There is a further complication surrounding the water situation at Beatrice. The city operates under a contract with the Layne-Western Water Well Company. The Wayne Water people drilled several wells, and sell the water to the city, and the city has an option to purchase the line

and the wells at any time. I have been informed from a very reliable source, and it is a matter of public record and there have been articles in the newspapers, that the city of Beatrice is arranging to purchase the line and water wells serving that town. We are only able to secure water
for our plant use at Beatrice from the city of Beatrice
609 due to our contacts with the Layne-Western Well peo-
ple, who also drill our own water wells. It is very doubtful if we can long continue securing water from the city of Beatrice if they purchase that plant, as it is rumored they will.

The public record I speak of is proceedings of the city council of Beatrice. I have been informed by this reliable source that a resolution has been introduced and that there have been proceedings before the council, the nature of which was that they would purchase the water system now owned by the Layne-Western people, under the city's option to purchase the wells and water line, and there have also been numerous newspaper articles in the daily papers of Beatrice to that effect.

Our own water wells originally drilled, as mentioned before, are entirely inadequate. They are only capable of producing from 25 to 50 gallons a minute, and for the reasons stated we have shown an expenditure of $50,094, which includes the cost for drilling water wells at Blue River, approximately four miles away from our plant, and constructing a pipeline and a power line to that point to transport water to the station site for plant use.

We transmit our own power from our station to the water wells for pumping purposes. We are doing that in a number of instances. We have automatic devices at the well, electrically controlled at our plant, for running these wells. That is electric power, and we generate all of our own electric power.

Questions by the Examiner.

I don't think I can state exactly in hours or minutes how long that interruption, caused by lack of water, was, that is, the time representing the difference between the time we would normally have been able to start up and the time we actually did. When I used the term "authorized," it was authorized by the dispatching department and with the consent of the management. There are several duties which we must perform at each compressor station at least once or twice per year, and we watch for the time when we can shut down the station for a very short period of time and get those things performed.

There are, of course, some deliveries being made from the line at the time. There might be a number of things done to take the place of Station 6. Usually the line is packed up pretty well before such an allowance is made to shut down the station. When I say "pack" I do not mean that we run our pressures above normal. We never exceed a maximum pressure, which is 712 pounds, but we secure a higher gradient, possibly, between stations.

Direct Examination Resumed by Mr. Hedrick.

In other words, with reference to the time the station was
shut down, I stated that it was in the neighborhood of
seven hours, for repairs, and when we wanted to start up
we were delayed by reason of not having a sufficient
610 quantity of water from Beatrice. I am not able to state
how much of the delay was occasioned by the shortage
of water. I can determine that later, but I don't have it
right now.

When a station is shut down we completely stop the engines, but before doing that we increase the quantity of gas contained in the line by higher pressures at other places along the pipeline, such as between Stations 9 and 10, or 8 and 9, etc., before we shut down that station.

Questions by the Examiner.

As to what would happen between Stations 5 and 7, naturally Station 7 will have a lower intake pressure into the station than it would normally have from Station 6. Station 7 can draw the line back to Station 5 through the by-pass. The gas in effect goes by the station on its normal course and it is just not pushed for that period of time or compressed for that period of time at Station 6, or at any other station that might be out. There is an amount of gas that does go right on by the station, but in somewhat reduced volumes.

Whether we could change our intake draw from Station 7 and our output pressure at Station 5 to completely cover the effect of taking out Station 6 would depend on what the delivery happened to be at that time. If the delivery was a low enough quantity we could do that.

Direct Examination Resumed by Mr. Hedrick.

When we increase our line pack prior to shutting down the station, we do that by raising our intake pressures at the other stations, so as to pull additional quantities of gas into the plant, thus making up somewhat for the shutdown of Station 6, for instance.

Going back to the question which the Examiner asked with reference to the shutting down of Station 6 and the result of shutting that station down, and how we could shut it down without serious impairment of deliveries of gas to our customers, I will endeavor to explain the steps which are taken in such a station shutdown, using, for example, a shut-out at Station 6.

Before such a shut-out is possible we must have deliveries somewhat below normal. To prepare for such a shut-out the line ahead of Station 6 is packed. By the word "pack" I mean that the average pressure on that line is raised, or that the intake pressure to any station ahead of Station 6, being Stations 7, 8, 9 and 10, is raised above what it normally would be. In other words, there is an additional volume of gas stored in the pipeline by virtue of the higher pressures than normally would be in that length of pipeline.

When that condition is reached, Station 6 may shut down for a period of time, that period of time depending entirely upon the volumetric take ahead of Station 6. As the pressures in the pipeline ahead of Station 6 fall below normal pressures, by which I mean pressures of the intake side of the station, then it is necessary to start Station 6 into
611 operation and to proceed under normal conditions.

While the station is shut-out, it is possible by the manipulation of valves to allow the gas to pass up the pipe line, what we term, by-pass the station, in reduced volumes. The pressure between any two stations ahead of Station 6 is raised from an average standpoint, but it is not raised above the limitation of 712 pounds at the discharge side of the station.

With reference to the shutdown of Station 6 about which I testified a moment ago, I cannot say what the effect of the shutdown of that station was on the balance of the pipeline because I have been engaged in other duties, such as the preparation of this exhibit. However, I have been informed by Mr. W. T. Bulla, who has charge of pressure dispatching, that the time over the normal time that the station would have been shut down was two and three-quarters hours by reason of lack of water for the circulating water system which is secured from Beatrice, Nebraska, and that he has had difficulties since that time maintaining proper pressures on the system.

Questions by the Examiner.

To explain that we must go back to the fundamentals of this shut-out. I believe I stated that it would be necessary for Station 6 to start up after such a shut-out after the pressures on the intake of the stations ahead of No. 6 fell below normal. When we schedule a shut-out we know from experience just about what length of time that will take. Inasmuch as we were not able to start up the station on schedule, those pressures fell below normal pressures, and the gas continued to flow out at the end of the line, and we have not been able to get up to or to realize those pressures since that date. I am not positive whether that condition still exists, but it did exist for some period of time after this particular occasion.

When we cut out and come back on the line at a station according to schedule, we establish normal conditions without any difficulty on the line. Schedules for shut-outs must be studied very carefully before such shut-outs are granted. We know our commitments fairly well, and only schedule shut-outs for such period of time as commitments will allow.

Direct Examination Resumed by Mr. Hedrick.

Proceeding to Item 8, entitled "Drill and Equip 2 Water Wells at Station 7," with an expenditure in the year 1940 and another in 1946, I will explain the situation at Station 7 and the necessity for these expenditures.

The wells at Station 7 are located approximately 8,000 feet from the station site. These wells are comparatively shallow. They are 59 feet deep. They are also dependent to some extent on seasonal rainfall.

When preparing this exhibit we knew that the water wells at Station 7 were none too stable. We included provision for an additional well at Station 7 in the amount of $7,559 in the year 1940. We were a little optimistic in

that regard, as we have experienced trouble with both
612 existing wells at Station 7, that trouble resulting from clay clogging up the sand. We are now securing quotations, and I have authority from the management to drill an additional water well at Station 7 just as soon as we can get it in, that is, in the year 1939. We also provided for an additional well to be installed in 1946, at a cost of $7,559.

Line 10 is entitled "Drill and Equip 2 Water Wells, Station 9." In the past we have suffered many difficulties from the water situation at Station 9. The original deep wells located at this station supplied a quantity of water which was extremely hard and corrosive. After attempting to operate this station with such water for several years, with very poor results, we drilled two water wells in the Skunk River bottom, which is some seven miles south of the plant site.

These wells provide a much better supply of water. However, the water does contain a quantity of iron. We do not hope to operate these wells at their present capacity beyond the year 1944, and have provided for the installation of an additional well at a cost of $6,619 in 1944, and for still another well at the same cost in 1948.

Going back to Item 4 concerning the drilling and equipping of three water wells at Station 3 in 1941, 1945 and 1949, the situation of the water supply at Station 3 presents still a different problem than any heretofore mentioned. The supply of water at this station has held up to a fair degree. However, the quality has not held up as desired. The water from the two original pumping wells at this station has become harder and the total solids have also increased appreciably. It has already been necessary to drill one additional well at this station. This well was drilled in 1938, and some relief and decrease in hardness and chloride content was noticeable in the other wells by reason of the fact that they did not require the amount of pumping time that was necessary with only two wells.

As the wells become older, the water bearing strata immediately around the well become less porous, and the inlet screen in the well becomes corroded, which does not allow as much water to enter the well as would enter a new well. These wells will produce less water with age. They will also contain an increase in total solids and hardness and chloride content as they are pumped harder in an effort to make up the necessary water requirements. We have therefore provided for the installation of three additional water wells at Station 3, to be installed, one each, in the years 1941, 1945 and 1949.

Item 5 covers the necessity for drilling and equipping two water wells at Station 4, with expenditures in 1941 and 1947 for that purpose. There again the wells at this station are shallow. They are 52 feet deep. They are also affected to some extent by seasonal conditions. These wells at the present time are becoming harder, that is, the water from these wells is becoming harder, and in line with our water well drilling program we have provided for one additional water well at Station 4 in each of the years 1941 and 1947, at a cost of $8,076.

Item 6 covers the necessity for drilling and equip-
613 ping two water wells at Station 5 with an expenditure
in 1942 and another in 1948. The same general reasons exist at Station 5 as those described for the preceding station.

Item 9 relates to the necessity for the expenditure of $7,876 in each of the years 1941, 1945 and 1949 in drilling three water wells at Station 8. All of the present wells serving this plant are at a considerable distance from the plant site. The plant is located near Truro, Iowa, in what I have been informed is a glacial drift area. The water producing sands existing in this area are not necessarily connected. This fact precludes the possibility of drilling wells closely together without securing what we term sympathetic action. By that I mean when wells are drilled closely together one well will very nearly produce the same quantity of water as two or more wells, or, in other words, the water is secured from a pocket or confined sand of fairly narrow limitations.

This fact was illustrated in our original wells drilled for that station, which are located approximately 150 feet apart, and it was found upon pumping any one of the three wells that the water table went down correspondingly in the adjacent wells. The problem of an adequate supply of water at Station 8 was the subject of considerable study by myself and the engineering department.

We made an exhaustive study of the surrounding vicinity and made numerous test drillings with a test rig, which showed the possible formations that we might encounter in our search for an ample water producing sand. It was found that we could not secure water of sufficient quantities in the immediate vicinity of our original wells. Therefore, we drilled additional wells to augment the original supply at a considerable distance away from the original wells. The survey as made has not been encouraging. The Layne-Western Water Well people, who drilled these wells for us, have been very pessimistic in their opinions regarding a continuous supply of water in sufficient quantities for this station.

However, we have scheduled the drilling of additional wells in this area, to be located at a considerable distance from the existing wells, for the future. Our only other alternative is to construct a pipeline and drill wells farther away from the plant site than the existing wells, at an expenditure much greater than that shown in this exhibit. We, therefore, have shown the installation of one well for Station 8 in each of the years 1941, 1945 and 1949, in the amount of $7,876.

Item 11 is entitled "Install Water Treating Tower at Station 10." A water treating tower as included in this exhibit describes a tower which will be erected in 1939, and is now under process of being designed, for the treatment of circulating water at Station 10.

This is necessary because the water produced from the deep wells now being operated at Station 10 has been corrosive since the station was first put into operation. One of these two wells became inoperative in 1935, due to corrosion in the casing allowing the upper strata 614 of clay and sand to fill in and make the well practically inoperative.

We repaired that condition by installing a casing liner. We were not able, however, to inhibit the corrosive elements of the water in daily use for the equipment in the plant, although we tried numerous methods. Our Mr. Hammerschmidt, chief chemist, located at Fritch, Texas, made a number of experiments on this water problem at Station 10. He has followed the serious problem of corrosion at this point for a number of years. Through his efforts, he devised a means by which the water might be treated with the use of natural gas, which would inhibit the corrosive tendencies of that water.

We followed the initial experimental findings with a test or pilot plant at Station 10 in which we endeavored to simalate the actual operating conditions as much as possible. The result of this continued experiment was gratifying to the point that we have secured authority to proceed with the design of a tower and other apparatus which will treat the water at this plant and make it usable and uncorrosive.

This study of the water problem at this plant has taken a considerable length of time. It is not possible to secure water in sufficient quantities for plant use from any other strata than those from which we are now securing that water, and all of the water from that source is corrosive. The only other alternative is to search for a sufficient supply of water near the Green River, which is located north of the city of Geneseo and some seven miles from our existing plant site. We hope by the installation of the water treating tower at Station 10 to be able to utilize our present supply of water from the deep wells at that point and to prevent the expenditure of over $75,000 for the drilling of additional wells on Green River and the laying of the necessary pipe and power lines to serve those wells. The exhibit, therefore, shows an amount of $5,500 which will be expended in 1939 for the erection of a water treating tower at Station 10.

Item 12 refers to an expenditure of $11,190 in 1940 for a water treating plant at Station 9. I believe I stated when describing the water well situation at Station 9 that the original wells were extremely hard. In fact, they were in the neighborhood of 200 grains in hardness. This water could not be treated or softened economically by any known method. We attempted to operate the plant without benefit of a water treating system.

When we constructed the power and water line serving the new wells in the Skunk River bottom, we were hopeful that we might be able to operate that plant on the new water so obtained without the use of further water treatment. This water is from seven to nine grains in hardness.

After approximately two years of operating the station on that water, we have found that scale is built up in the system, particularly in the engine cylinders and exhaust valves and other points of high temperature. This scale has been detrimental in the disintegration of the
615 various engine parts, and has also increased the rate of wear on the cylinders and exhaust valves. We desire to operate our engines with cooling water at as near zero hardness as is possible to secure. We have included in the exhibit under Item 12 a sum of $11,190 for the installation of a water treating plant at Station 9 in 1940.

Item 13 relates to an expenditure in 1945, 1946 and 1947 to renew redwood cooling towers at Stations 2 to 10, inclusive. I heard Mr. Powers' testimony yesterday as to the necessity for a like item at Station 1, and the necessity for the renewal of the cooling towers at Stations 2 to 10 is the same as that about which Mr. Powers testified. In other words, by 1945 these cooling towers will wear out and have to be replaced.

Not later than 1945 we will be required to renew the cooling towers at Stations 2, 3 and 4, in the amount of $20,740. In 1946 we will renew the cooling towers at Stations 5, 6 and 7, in the amount of $20,904; and in 1947 we will renew the towers at Stations 8, 9 and 10, in the amount of $23,976. I have had considerable experience in the past in maintaining these cooling towers at the various stations under my supervision.

Questions by the Examiner.

The cooling towers were part of the original construction in each case. We do not believe that one tower will necessarily outlive the other; but, as explained under Item 2, page 2, it is our policy to spread such construction over a period of time, as it is not usually possible, in view of our operating conditions to make an overall installation in one year.

Direct Examination Resumed by Mr. Hedrick.

In other words, we could not shut down all of our stations at one time in order to install cooling towers. We could not even construct one cooling tower at any station that was operating as rapidly as we might construct a cooling tower at a station which was not in operation. We would have to do it piecemeal. Therefore, it takes a longer period of time for that construction work to be completed at any particular station. There will be periodic shut-outs of short duration necessary as we are constructing a tower. Obviously, we could not shut the station down long enough to tear the old tower down and build a new one.

Item 14 is an expenditure of $4,354 in 1939 to install rotary air compressors and piping at Stations 2 to 10, inclusive. I am not positive whether or not Mr. Powers testified with respect to this particular air compressor. However, this item has already been installed this year.

Item 15 is an expenditure of $2,745 in 1944 to renew sump pumps at Stations 2 to 10, inclusive. Each station is equipped with what is known as a sump or hot well, 10 feet by 10 feet, such as is shown at No. 10 on Exhibit 96. The duty of the pump installed within the building, shown by the figure 10 on Exhibit 96, is to pump hot exhaust water. This pump is on almost continuous duty. The water from the exhaust mufflers is corrosive in nature and frequently repairs are necessary on these pumps. The condition prevailing on these pumps over the system at the present
616 time will make it necessary to renew all pumps not later than 1944, in the amount of $2,745.

Item 16 is an expenditure in 1939 and another in 1940 to renew impellers in centrifugal water pumps. An impeller may be otherwise defined as a water wheel, attached to a rotating shaft, encased within a pump, which performs the duty of pumping water.

The original pumps installed at each station for pumping circulating water were equipped with 1,750 gallons per minute bronze impellers. This capacity is slightly under the desired capacity for pumps in this service, and to provide additional capacity for the water pumping equipment, 2,000 gallons per minute impellers have been installed at Stations 2, 3, and 9. As it will be necessary in the future to replace the original impellers within the water pumps at the remaining stations, these impellers will be of the 2,000 gallons per minute size to provide the additional capacity needed.

Item 17 represents expenditures in 1943, 1944 and 1945 to renew bottom in 100,000 gallon water tank at Stations 2 to 9, inclusive. The original water tank installed at each station was equipped with an ellipsoidal bottom. The pitch or slope of this bottom was fairly low. In the course of our yearly overhaul of all equipment, we inspect the interior of these water tanks. The inspection has indicated that there is corrosion existing on the shell and bottom of all tanks to a varying degree.

The corrosion in the water tank at Station 10 was very bad last year, and had progressed to a point where a new bottom was mandatory. The new bottom installed was of a greater slope or pitch and is a conispherical bottom rather than an ellipsoidal bottom. The conditions as existing in the other overhead tanks on the pipeline will require the renewals of the tank bottom at Stations 7, 8 and 9 in 1943, at Stations 4, 5 and 6 in 1944, and at Stations 2 and 3 in 1945.

Item 18 represents an expenditure in 1939 to install lightning protection at water wells at Stations 4, 6, 7, 8 and 9. That item is under construction or installation at the present time.

Item 19 represents an expenditure of $3,039 in 1939 to increase lighting capacity at Stations 2 to 10, inclusive. That item is also now under construction.

Item 20 represents expenditures in 1939 and 1940 to caulk and install dust filtration equipment in auxiliary building at Stations 2 to 6, inclusive. We have at the present time dust protection equipment installed in the main compressor building at Stations 2, 3 and 4. The success enjoyed by such dust filtration equipment has led to a definite program for so equipping other buildings housing machinery at those plants in the dust area.

Since we have been in operation on this pipeline we have
experienced many, many dust storms, as described by
617 Mr. Powers in his testimony. The dust area includes
Fritch and Stations 2 to 6, inclusive. There are milder storms periodically to the east of Station 6; but these storms are not of sufficient intensity nor do they occur frequently enough to require dust filtration equipment beyond Station 6. We will install dust filtration equipment in the auxiliary building at Stations 2, 3 and 4 in the year 1939, at a cost of $6,210, and we will install dust filtration equipment at Stations 5 and 6 in the amount of $4,140 in 1940.

Item 21 is for caulking and installing dust filtration equipment in the main building at Stations 5 and 6. The necessity for that installation is the same as that explained concerning Item 20. We have already done that at Stations 2, 3 and 4.

Item 22 is an expenditure in 1942 to renew boiler blow-down pits at all stations except Station 7. The boiler blow-down pit is a small concrete pit located outside of the auxiliary building and directly behind the heating boiler. It is used to receive the condensate from the boiler which is periodically blown down. This small pit, built of concrete, disintegrates under such service. It has been necessary to renew the pit at Station 7. The boiler blow-down pits at all of the stations will be renewed not later than 1942, at a cost of $904.

Item 23 represents an expenditure in 1946, 1947 and

1948 to renew oil centrifuges at all stations. My explanation as to the necessity for this installation is the same as that which was given by Mr. Powers concerning the Fritch station.

In 1946 we will renew the centrifuges at Stations 2, 3 and 4, at a cost of $3,405; in 1947 we will renew the centrifuges at Stations 5, 6, 7, and 9 at a cost of $4,540, and in 1948 we will renew the centrifuges at Stations 8 and 10, at a cost of $2,270.

Item 24 is an expenditure in 1941 of $41,590 to construct and equip central machine shop. I believe Mr. Powers testified as to the necessity for renewing certain machine shop equipment and tools at Fritch. That station is already provided with more machine shop equipment than any station on the main line, and, with the additions to be made, will be able to handle a large amount of the necessary work that will be required in the coming years as the machinery deteriorates or requires certain types of repair.

We are greatly handicapped at the present time in securing machine work of the nature we desire. That is principally caused by the fact that our pipeline runs through an area that is not industrial and it is a very difficult thing to secure adequate machine shop service at those points or within any reasonable radius of such stations.

Furthermore, when we are able to secure such service, it is usually in a railroad machine shop, or it is in some manufacturing plant which operates their machines on a production line. We attempt, in our repair schedule and overhaul procedure, to do certain things in sequence and it is very necessary for us to have the work performed
618 on that schedule. Like all other facilities serving our plant, we do not wish, nor can we afford, to depend upon outside service. We must have such facilities within our control.

There are many items under the maintenance schedule shown in a later exhibit which will require machine work, and for that reason, in order to provide an adequate machine shop for our own use, we will build such a machine shop, equipped with the proper tools, not later than 1941. We will build that machine shop at Station 6.

The need for such a machine shop for the proper and efficient maintenance program facing us in the future will be much greater than it has been in the past. Each succeeding year brings the necessity to a greater extent for such machine tools.

Item 25 is an expenditure of $8,019 to install fire pumps at all stations, and has been completed in 1939.

Item 26 is an expenditure of $4,354 in 1939, and $1,100 in each of the years from then on until 1950, for tools. All tools, other than miscellaneous operating tools, and being those tools costing in excess of $25, are charged into the plant account. Each year of operation it is necessary to add special tools for the performance of specialized repair work. Each year we have added tools. In 1939 we have already purchased tools not heretofore carried, at each station.

For example, we purchased an air drill for each station. We now have on order steel trucks, which will be utilized to store and carry the repair crews' tools. We have also purchased corrosion testing equipment, as explained under Item 11, in connection with the water treating experiments at Station 10. Other tools have been authorized for purchase this year, and include metallizing equipment, tool post grinders, and other smaller tools in the category I mentioned. In future years after 1939 we will purchase tools at least to the extent of $1,100 per year, up to and including the year 1950.

Item 27 is an expenditure of $356 in 1939 for a power lawn mower at Station 6. That item has been purchased and is now in use.

Item 28 is an expenditure in 1939 of $1,710 to construct wash racks at Stations 2 to 10, inclusive. That item has been approved and is now in the process of design and will shortly be installed.

Questions by the Examiner.

I am asked to explain what is meant by these reclaim designations. I believe Mr. Powers in his exhibit showed the reclaim in a manner similar to mine. The asterisks behind the figures only indicate that there is a retirement of those items. Answering whether that price figure which has a reclaim designation is the figure of the cost new less the amount of the reclaim, I will say that we have included in the figures as tabulated on page 2 the new cost in some instances, that is, the cost of new materials where it
619 was not possible to use any of the material retired.

In other instances we have utilized some of the material as salvage in the new installations; but the asterisk itself only denotes retirement of that specific item.

Cross-Examination Interposed by Mr. Slaff.

The amounts of expenditures set down for each year are based on prices of materials and prices for labor as of June 1, 1939. That is not true as to the salvage value. We have projected into salvage our judgment of what the salvage value will be at some future date. The salvage is the book cost of that usable material that is recovered from the plant and used in another investment or placed into material stock.

Going back to my statement with respect to the amount of additional capital expenditures for all of the years beyond 1939, the statement I made applies throughout the entire exhibit in so far as new materials to be purchased are concerned and also with respect to prices of labor.

I was here yesterday and heard Mr. Powers' testimony. It is true with respect to me as with respect to him that I am not qualified and have not attempted to be qualified to give an expert opinion on the future economics of this country and future prices. I have not attempted to make any economic study of future prices. I have been instructed to use the prices as of June 1, 1939.

(Objection by Commission Counsel to further testimony with respect to prices beyond 1939, motion to strike all testimony to this point on that subject, objection to such line of examination, and motion to strike testimony on ground that it is purely speculative and does not concern itself with the reasonably immediate future overruled and motions denied.)

Cross-Examination Interposed by Mr. Booth.

The June 1, 1939, prices which are used in this exhibit were obtained largely through our purchasing department, which is in daily contact with vendors of such materials as are included in this exhibit.

Direct Examination Resumed by Mr. Hedrick.

I secured that information through the purchasing department of Natural Gas Pipeline Company.

Referring to page 3 of Exhibit 97, the retirements on that page are retirements of property to be retired on account of renewal or installation of property shown on page 2, which takes the place of the property retired shown on page 3, and the asterisks on page 2 refer directly to items on page 3. In other words, the second item on page 2 shows an expenditure in 1944 of $43,020 for renewal of Griscom Russell Bentube Gas Cooling Sections, and the book cost of the Griscom Russell Bentube section which will be retired at that time is $27,794.

Cross-Examination Interposed by Mr. Slaff.

The term "reclaimed" is used because that is a term which is normally used when making retirements from capital investment. It does not necessarily mean reclaim in the sense that there will be salvage. On some of the items on which retirement or reclaim is shown, there is salvage. It is used on page 2 in the sense of being synonymous with the word "retirement."

620 (The Examiner here made the inquiry of whether the term "reclaim" is a variable term in the accounting department of defendants. He stated that in Mr. Powers' case the words "retirement" and "salvage" were used, and inquired whether the word "reclaim" appeared in one sense in one place and other words appeared in other places, and whether its appearance here depended upon the fact that at one time they thought they would have salvage value and other times would not. Counsel for defendants thereupon stated that he might be responsible for that; that they had been in a considerable hurry to get these exhibits prepared, and after this exhibit had been mimeographed he noticed the word "reclaim" instead of "retirement" but told Mr. Davidson not to have the page remimeographed, as counsel could explain, as Mr. Slaff suggested, that the words are synonymous.)

Question by the Examiner.

When I used the term "reclaim" I did not think there was some salvage connected with the items which I subsequently decided there would not be.

Direct Examination by Mr. Hedrick Resumed.

I am not an accountant.

On page 3 is a sub-heading, "Salvage." Item 2 shows that on account of the water wells that will be installed at Station 2 in 1946 there will be a salvage value from a well retired to the amount of $2,559, and so on throughout the balance of the page. That salvage is figured at the actual cost as shown by the books of the company for that particular equipment.

(Counsel for defendants thereupon stated that, as he understood it, when casing is taken out of a water well and put into another well, it is charged into the capital investment in the second well at its actual cost as reflected by the books; that it is not salvage in the sense that they are going to talk about at the next session; and that it is just a bookkeeping term which counsel is informed will be included in the bookkeeping requirements promulgated by the Federal Power Commission in 1940. Counsel also stated that it was intended to put the secretary of the Company on to explain some of those bookkeeping details.)

Referring to page 4, Mr. Powers testified yesterday to similar items referred to under Items 1, 2, 3 and 4, and the testimony given by him as to the necessity for those capital expenditures is the same explanation as I would give so far as the stations under my supervision are concerned.

Item 1, entitled "Replace Nugent Oil Filters with Cuno Oil Filters," at an expenditure of $4,386 in the year 1939, will be made at all stations Nos. 2 to 10, inclusive.

Item 2, entitled "Convert Worthington Air Filters to Water Wash Type," will be installed at Stations 4, 5, 6
621 and 7 in the year 1939 in the amount of $1,600.

Item 3, entitled "Renew Main Engine Air Filters," will be installed at Stations 2, 3, and 4 on 17 units in the year 1944; and at Stations 5, 6 and 7 on 15 units, in the amount of $4,500, in 1945.

Item 4, entitled "Renew Main Engine Exhaust Mufflers," in the amount of $10,968, provides for the renewal of exhaust mufflers on 12 engines at Stations 2 and 3 in 1939. The amount of $32,904 appearing in the year 1940 provides for the renewal of exhaust mufflers on 36 engines at Stations 4, 5, 6, 7, 8, 9 and 10 in 1940.

The book cost of equipment retired from main engines shown at the bottom of page 4 would be explained in the same manner as I explained similar matters on page 3 of this exhibit.

The date used by me in determining prices for labor and material going into the capital expenditures contained in Exhibit 97 was June 1, 1939. I prepared that exhibit.

Referring to Exhibit 97 as a whole, the amounts shown thereon for labor and material and other items going into the additional capital expenditures shown in this exhibit represent my considered judgment at this time, based on prices as of June 1, 1939, and based on the experience which I have gained through my employment with Natural Gas Pipeline Company and other experience arising out of my previous employment. (Objection by Commission Counsel overruled.)

Questions by the Examiner.

In giving my answer I mean that so far as prices enter into it, they are based on prices as of June 1, 1939. I have no opinion regarding prices at all. The amounts are based upon my judgment, using prices as of June 1, 1939. My judgment relates to the amount of material and the quantities which I have used and their necessity from an engineering standpoint. I confined my judgment to the two elements of labor and material. (Renewal of motion by Commission Counsel to strike from record all testimony with respect to prices at costs beyond the year 1939 denied.)

Direct Examination by Mr. Morgan.

The various items of addition and replacement set forth in Exhibit 97 represent my considered judgment, based on my experience in the position I occupy, as to expenditure it will be necessary to make at times not later than those indicated in this exhibit, basing the figures set forth in the exhibit upon prices of labor and upon material and equipment costs as of June 1, 1939.

Everything in this exhibit represents my considered judgment, except the element of prices, which are based upon those furnished me by the purchasing costs as of June 1, 1939.

Cross-Examination Interposed by Mr. Slaff.

I have considered in this exhibit prices as of June 1,
622 1939, but I have not formed any judgment as to what
prices will be in each of the years 1940 to 1954, inclusive.

With respect to Item 10, page 3, the impellers to be retired will be at those stations where the new impellers are to be installed.

Direct Examination by Mr. Hedrick, Resumed.

The impellers will be installed at Stations 4, 5, 6, 7, 8 and 10, and the retirement is also at those stations.

The necessity for the expenditures listed on page 5 of Exhibit 97, for yard piping, buildings and grounds, is the same as that given in the testimony by Mr. Powers with reference to similar items.

Item 1 of those same items, entitled "Jacket 6-inch Discharge Lines," represents an expenditure of $7,311. This work will be performed at Stations 2, 3 and 4 on seventeen units in the year 1940. Like work will be performed at Stations 5, 6 and 7 on fifteen units in the year 1941, in the amount of $6,483. Also like work will be done at Stations 8, 9 and 10 on sixteen units in the amount of $6,897 in the year 1942.

Item 2, entitled "Renew 10 inch Discharge and After Cooler Headers," will be performed at Stations 2, 3 and 4 in the year 1939; 5, 6 and 7 in the year 1940; and 8, 9 and 10 in the year 1941. The amounts as shown in the years 1939, 1940 and 1941 represent the jacketing of the 6 inch inlet and outlet lines for the Griscom Russell gas cooling sections.

In the year 1943 the amount of $8,520 is the cost of renewing the 10 inch discharge and 10 inch after cooler headers at Stations 2, 3 and 4. The amount of $7,320, shown in 1944, is the cost of renewing the same headers at Stations 5, 6 and 7. The amount of $8,520, in 1945, is the cost of renewing the same headers at Stations 8, 9 and 10.

Item 3, entitled "Renew Muffler Drain Line," in the amount of $6,327, is for the renewal of this drain line at all nine stations in the year 1944.

Item 4, entitled "Renew Underground 3 inch Air Line," is the cost of renewing the 3 inch underground air line from the air receivers to the main building at eight stations in 1940.

I am not certain whether Mr. Powers testified as to the renewal of underground 3 inch air lines. There is a 3 inch air line which extends from the air receivers to the main building and is used to pipe air for starting the main engines. The air line was found to be in a bad state of repair at a number of stations. We have removed the air line at Station 2 and reinstalled it overhead. This Item 4 provides for the installation of a 3 inch air line now underground to an overhead location at all the other eight stations.

It is my judgment that, based on the experience which 623 I have gained as superintendent of the compressor stations of Natural Gas Pipeline Company, these items will have to be renewed as of the dates shown. Several of the items occurring on page 5 will undoubtedly need renewing before the dates shown.

My explanation of book cost of property retired is the same as my explanation of book cost of property retired with respect to page 3 of Exhibit 97.

Under the subtitle "Buildings and Grounds, Additional Capital Expenditures," Item 1, to install extensions to main buildings at Stations 2, 3, 6 and 7, has already been completed.

Item 2 is to install door checks on main and auxiliary buildings. My explanation for that is the same as that made by Mr. Powers in his testimony.

Items 3 and 4 are to install Transite roofs on main buildings and on auxiliary buildings. My testimony as to the necessity for this installation is the same as that given by Mr. Powers for similar items.

Question by the Examiner.

The principal element requiring the Transite roof is the corrosiveness from the water cooling tower spray on the one side and the exhaust water spray on the other. There is another factor which I do not believe Mr. Powers mentioned. This building, being constructed of sheet iron, is subject to quite a bit of expansion and contraction as it gets hot and cools off, and that seems to loosen the tie nails where the roof sheets are tied to the purlings.

Direct Examination Resumed by Mr. Hedrick.

The Transite roofs on the main buildings will be installed at Stations 2, 3 and 7 in 1940 at a cost of $11,267, at Stations 5, 6 and 9 in 1941 at a cost of $9,781, and at Station 8 in 1942 at a cost of $3,687. We have installed Transite roofs on the main buildings at Stations 4 and 10 prior to 1939.

We will install Transite roofs on the auxiliary buildings at Stations 4, 7 and 10 in 1941 at a cost of $3,867, at Stations 3, 5 and 9 in 1942 at a cost of $3,973, and at Stations 2, 6 and 8 in 1943 at a cost of $3,997.

Item 2 in the amount of $2,160 is for door checks which will be installed on swinging doors in the main and auxiliary buildings at all stations in 1939.

Item 5 is to install steel bins at warehouses and tool rooms at all stations in 1940, at a cost of $6,120. Mr. Powers testified as to the necessity for the installation of those bins, and my testimony would be the same as his.

Item 6 is to grade and tile manifold area in 1939, at a cost of $3,542. That expenditure will be made at Stations 2, 4, 5, 7, 8, 9 and 10. The installation has been completed prior to 1939 at Stations 3 and 6. In explaining the necessity for that item, I may refer to the photograph
624 designated as Exhibit 96 and explain that the manifold area so defined under Item 6 is that area between the cooling tower, designated as No. 12, and the main building, designated as No. 1, and in which the manifold piping is located, as designated by No. 11.

This area is subjected to constant precipitation, caused by spray falling from the cooling tower. In this area all control valves are located. These valves require frequent manipulation by the operators.

In the original construction of the plant, gravel walks were provided in this area. Those walks have disintegrated over the space of years that the system has been in operation, caused mainly by the frequent necessity of excavating to inspect and repair the piping in that area. This item provides for the installation of concrete block walks to supplant the original gravel walks. These concrete blocks may be removed when such excavation is needed or when trucks are driving in that area for any reason, and they may be replaced at later times.

The tiling is to lower the water table on this constantly wetted area, so that the operation and maintenance of this area will be facilitated.

The expenditure in 1939 for that item will be at all stations, with the exception of Stations 3 and 6, at which the installation has already been made.

Item 7 is entitled "Gravel Area Around Exhaust Stacks," with an expenditure in 1940 of $1,121. Mr. Powers included this item in his testimony, and my explanation of the necessity for this expenditure is the same as his.

Item 8 is entitled "Hard Surface Plant Roads," and shows expenditures in 1940, 1941 and 1942. In 1940 the plant roads at Stations 8 and 10 will be hard surfaced or black topped, at a cost of $2,855. In 1941 the plant roads at Stations 5, 6 and 7 will be black topped, at a cost of $2,955. In 1942 the plant roads at Stations 2, 3 and 4 will be black topped, at a cost of $3,410. My testimony as to the necessity for those expenditures is the same as that of Mr. Powers.

Items 9 and 10 are now under construction. Authority for the expenditure shown in Item 11 has been granted and the material is under order.

My explanation of book cost of property retired is the same as the explanation given in connection with page 3 of Exhibit 97.

When we install a Transite roof we do not put it on over the iron. We take the iron off section by section, so the building is not open to the elements.

Cross-Examination Interposed by Mr. Slaff.

I stated with respect to Item 3 and page 4 the stations at which the main engine air filters are to be renewed, 625 and with respect to Item 4 I stated at what stations the main engine exhaust mufflers were to be installed.

Direct Examination by Mr. Hedrick Resumed.

Page 6 is entitled "Additional Capital Expenditure for Bunkhouse and Dwellings," and provides for the construction of eight four-room cottages at an expenditure of $33,576, in 1939. I believe Mr. Powers in his testimony dwelt at some length on the necessity of providing dwelling accommodations for certain employees in his operating personnel and also other employees connected with the pipeline and other departments which are situated in the field.

The Natural Gas Pipeline Company has a definite cottage building program under way. This program has been in effect for the past several years and will be extended through the year 1941.

As the stations were originally designed, planned and laid out, each station included a number of dwellings for the employees. Those dwellings are shown on Exhibit 96, under the figure 17. On that Exhibit 96 we show eight cottages. At present there are nine cottages at Station 6; that is, one additional cottage has been constructed at that point.

The original design and layout of the station included accommodations for main and auxiliary operating engineers who would be located at each station. They also provided one house for the pipeline superintendent. Shortly after the start of operations it was found that it was necessary, for the safe operation of this line, to house other personnel than the compressor station personnel at each station. That additional personnel included telephone linemen, meter men, pipeline foremen, truck drivers, welders, division clerks, as well as the repair foremen in the compressor station department and those operators heretofore named.

Shortly after this first cottage building program was undertaken, we started operation under the forty-hour work week. That automatically caused us to employ additional men as operators in the compressor station department and additional auxiliary and main engineers who were eligible for living accommodations at the station site. We were able to bear with this problem for a short time, due to the number of our employees who were then single. These men were housed in bunkhouses and secured accommodations at boarding houses situated on the plant site.

Our building program as now in effect and which will be extended in the future will provide additional living accommodations on the station site for those members of all departments who are eligible for houses and who are not now provided with houses. This item includes the construction of eight four-room cottages in 1939, those cottages to be constructed, one each, at Stations 2, 4 and 7, two at Station 10, three at Station 6, at a cost of $33,576.

It is very necessary in the operation, maintenance
626 and repair of station equipment that operators in the classes named be housed at the station, so that if an emergency occurred at one of the stations or on the pipeline, the employees may be more readily available than if they were in a town five or six or ten miles away or scattered around at places considerably removed from the pipeline.

I might add another point. It is not possible to house all of the employees that work for the pipeline department. The majority of the employees that are working for the pipeline department are what are termed maintenance or laborers. Only the pipeline foremen, superintendents and key men are located in the houses at the station site, where such houses are available for those men. In the event of an emergency arising in the pipeline department, they depend largely on the personnel housed at the central location, that is, the compressor station, for immediate action, and compressor station men as well as pipeline men answer this emergency call. This fact increases the safety factor to an immeasurable degree in so far as operation of the pipeline is concerned, irrespective of the operation of the station.

It has happened quite frequently during the time Natural Gas Pipeline Company and Texoma have been operating that employees were called out at night or while they were off duty for an emergency in maintenance or repairs to the pipeline or compressor stations. It is almost a weekly occurrence in so far as the compressor station department is concerned, and it has also happened in the past on emergencies occurring on the pipeline away from the compressor station.

We have made a practice of interchanging employees between the pipeline department and the compressor department during the past three years. This interchange of employees has the prime motive of training all employees for emergency duty, as well as routine duty, in every department.

The next item is entitled "Construct Six 4 Room Cottages," at a cost of $25,182 in 1940, and represents the cost of two cottages to be constructed at each of Stations 3, 4 and 5.

The item entitled "Convert Three 7 Room Bunk Houses" at a cost of $5,700 in 1940 is the cost of converting a seven room bunk house into a private dwelling house at Stations 2, 5, and 9. Originally, as stated previously, we provided bunk houses and boarding house accommodations for those single employees. The labor turnover on this system has been low. The employees have married and raised families, and the remaining number of single men is very low. The result of this has been that the boarding houses and bunk houses are no longer useful for any appreciable number of employees. In many cases bunk houses were only occupied to the extent of one or two rooms. Inasmuch as we desired to house more employees at the station, and obviously when a single employee was married he could no longer live at the bunk house, and must move to town, we converted bunk houses and boarding houses at six of the stations into private dwellings.

This item, as stated, in the amount of $5,700, is for the
627 conversion of the three remaining boarding houses and bunk houses into private dwellings at those stations stated in the year 1940, and that expenditure will be required and made in that year. There is some possibility that we might construct at least one of these conversions this year. Incidentally, we now have out bids for cottages in 1939.

The year 1941 will complete the cottage construction program. In that year we will construct thirteen 4 room cottages at a cost of $54,561; one cottage at each of Stations 3 and 9; two cottages at Station 7; and three cottages at each of Stations 5, 6 and 8.

Item 2 is entitled "Renew Domestic Water Tanks." The domestic water tank is a galvanized overhead tank, as shown by No. 15 on Exhibit 96. The life of this type of tank is limited, and a number of the tanks now installed have corroded badly on the bottom and sides. This tank is used to provide domestic water for cooking and drinking for the occupants of the cottages. It also supplies the necessary sewage water. One tank, situated at Station 5, has already corroded to the point where renewal has been necessary. A redwood tank was installed at this point as a replacement for the galvanized iron tank. The redwood tank is made of lumber similar to that used in the cooling tower. The condition of the tanks at other stations, as investigated and found, indicates that renewal of these tanks will be necessary in the years 1939 through 1942, if not sooner.

In 1939 we will renew the tanks at Stations 3 and 5. I believe I stated that the tank at Station 5 has already been renewed this year. In 1940 we will renew tanks at Stations 2, 4 and 10; in 1941, at Stations 6 and 7; in 1942 at Stations 8 and 9. These tanks will be renewed at the unit cost of $310 per tank in the years mentioned.

Item 3, entitled "Hard Surface Cottage Roads," is the black topping of the roads servicing the cottages in a manner similar to the roads servicing the plants and described in this exhibit previously. In 1940 we will hard surface or black top the road servicing the cottages at Stations 8 and 10, in the amount of $2,825. In 1941 we will hard surface the road serving the cottages at Stations 5, 6 and 7, at a cost of $3,379. In 1942 we will hard surface the road servicing the cottages at Stations 2, 3 and 4, at a cost of $4,213.

Item 4 provides for the construction of concrete floors in the cottage garage. The original installation in the garages as constructed was of crushed rock or gravel in the cottage area. The plant garages, or those garages situated in the area immediately surrounding the compressor station proper, such as the garage shown by the numeral 5 on Exhibit 96, are constructed with a concrete floor. Concrete floors have been much more satisfactory than rock or gravel floors as used in the employees' garages.

The company regulations require that the garage be kept in a neat and orderly condition, and it is impossible to keep the garages in that condition with crushed rock or gravel floors when the employees drive their cars in covered with mud and knock it off in there, etc. The condition of the garage floors at the present time is not good. They are rutted, and the gravel or crushed rock has a very high
628 percentage of mud intermingled with it.

Item 5 is for hard surfacing tennis courts which have been provided for the employees at several stations. There are seven tennis courts now installed. Since the building of these courts the employees have made frequent use of them. We have frequent petitions sent into the Chicago office for improving these recreational facilities. We have had petitions for lighting the courts, and many petitions for hardsurfacing the courts because it is not possible to keep up a good playing surface at all times with a dirt or improvised court.

The cost of hard surfacing these courts which will be hard surfaced is $1,725 in 1940 at Stations 2, 3 and 4; $1,150 at Stations 5 and 7; and $1,150 for tennis courts located at Stations 9 and 10.

Item 6 is for the construction of additional garage stalls. The construction of garage stalls parallels the construction of additional cottages. Each employee renting a company cottage is entitled to a company garage to house his personal car. In addition, as additional employees are housed at the station there will be other company cars to provide garages for.

Item 7 is for the installation of additional septic tanks and sewage that will be necessary as the housing program progresses. The present septic tanks in use at each station are designed primarily for the original number of cottages located at each station, and as we add cottages at each station additional sewage disposal facilities must be added. Many of the present tanks are now overloaded at those stations where part of the building program has gone forward.

Item 8 is for the improvement of the lighting facilities for the cottage area at all stations, and is now under construction.

Item 9 provides for the construction of additional playground facilities at Station 4. This is also under construction at the present time.

I will explain the situation with reference to tennis courts and playground facilities. No small part of my duties is connected with direction of personnel, and in pursuance of those duties I come upon many problems concerning the welfare of the employees, individually and collectively. The employees desire to secure accommodations at the station, and after securing such accommodations they desire recreational facilities of one kind or another.

Our pipe line, as stated before, traverses a rather sparsely settled area. By that I mean that there are not usually large towns situated close by the station sites. These people engaged in either the operation of the pipeline or the compressor station equipment need recreational facilities of some kind or another. It has been the company's policy to provide such recreational facilities as it felt it could justly do. In my own opinion, I believe such an expenditure as has been made to date has been justified in many ways and has paid big dividends in so
629 far as satisfaction and contentment of the employees are concerned. It is very doubtful in my mind that we could satisfy the employees to the degree that they are satisfied without the provision of such facilities.

To date we have not had any serious labor troubles. I like to believe that the major reason we haven't had such labor trouble is because the management has cooperated to the degree that it has in providing facilities for the employees as requested, and when those employees have shown a real interest in securing such facilities. I believe that the facilities which we provide are really a part of the employees' compensation, although perhaps rather intangible.

Item 10 is for the installation of additional drainage at

Stations 2 and 6. Work requests have been issued for these jobs, and material has been ordered.

My explanation of the retirement at the bottom of page 6 is the same as the explanation of the retirements on page 3 of this exhibit.

(At this point counsel for defendants offered EXHIBIT 97, and it was received in evidence over the objection of counsel for each of the Commissions, to whom an exception was allowed.

Counsel for defendants then presented a document described as "Natural Gas Pipeline Company of America, Operation and Maintenance, Compressor Station Department, Witness, W. H. Davidson." At the direction of the Examiner, the document was marked Exhibit 98 for identification.)

I prepared Exhibit 98.

Line 1 on the first page of this exhibit shows expenditures for operating labor from 1932 to 1954. The expenditures from 1932 to 1938 are the amounts in dollars actually expended for operating labor during those years. That is also true as to lines 1 to 6, inclusive, and lines 8 to 15, inclusive, except that lines 8 to 15 represent items for maintenance. Those are the actual expenditures for the items as listed by lines for the years 1932 to 1938.

The average as shown for the years 1936 to 1938, in the amount of $259,627, is an average of actual expenditures for those years, but it includes the presently prevailing wage scale in only two of those years, that is, 1937 and 1938. In 1939 the volume of gas to be transported by the Natural Gas Pipeline Company will be slightly in excess of those volumes pumped and delivered in 1938, and a slight increase in the cost of operating labor for the years 1939 to 1951, inclusive, provides for that slight increase in gas deliveries.

The difference in cost in 1938 and what we say it will cost in 1939 amounts to approximately $165 per year, per station.

On operating material, which is line 2, the costs for each of the years 1939 to 1951, inclusive, are slightly lower than
the 1936-1938 average and somewhat higher than the
630 1938 average. The cost for the operating materials
that will be necessary in 1939 is $135 less than the average for the years 1936 to 1938, in the amount of $49,042. That difference is so slight that I believe the expenditure could be termed as very nearly the average.

It is my judgment that those amounts to be expended in 1939 will also be expended in the years 1940 to 1951, inclusive. This applies to lines 1 and 2 for operating labor and operating material.

On line 3 I show $300 per year from 1939 to 1952 on account of damages. The company is liable for damages for a number of different things, including damages accruing from waste drainage and loss of cattle due to drinking the fluid from the septic tanks. It is liable to the general public for any condition which might exist because of its operations that may be hazardous. It is liable for fires and explosions that might cause loss on adjoining properties. There have been a number of damage settlements since this portion of the exhibit was prepared. Damages accruing for 1939 are in excess of $560. None of this was for fire or explosion damage. The damage settlements to date in the current year include payment for a number of sheep which were alleged to have been killed at Station 8 from drinking effluent from the septic tank, and also include a settlement, I believe, for a drainage problem.

It is probably true that these small annual figures would not begin to cover or take care of any damage from fire or explosion. However, what I had particularly in mind, although I imagine the record will be a little confusing on that point, were damages from fires occasioned by burning off weeds and grass on the plant site, when I was thinking of fires. We have a large area on the plant site upon which there are no facilities, and we try to keep a large part of the vegetation cut down, but in the fall of the year we burn it off. At several stations there are buildings right up against the property fencing, although we have not experienced any damages from that cause that I recollect. There might be damages from that cause.

We have not made any provision for large items of damage that might occur. As to whether we have any situations existing at the compressor stations which might result in heavy and serious damages to persons or property, we have a situation that was called to our attention last winter, although it has been prevalent for a number of years. That is a situation that exists at each of stations Nos. 4 and 5. Those two stations are situated north of a main traveled highway, adjacent to the station, in about the same position as the highway noted on Exhibit 96. The prevailing winds at those two stations are such that they blow the spray from the cooling tower out over the roadway, and it presents a condition that is hazardous to people driving by the station.

It freezes on the surface of the road and makes it slick. It also, depending upon the atmospheric conditions, creates a fog which obstructs the vision of the driver of the automobile. This matter has been discussed in our office in Chicago, and I have been instructed to place signs at some distance at either side of the station site where this 631 condition exists, and in addition to the signs we place men out there with flags or lanterns, as the case might be, to flag and caution automobile drivers. We do that when it is frozen and also when the fog is real bad. This condition does not prevail continuously. It prevails at certain atmospheric conditions, naturally, and it prevails when the wind is in the north.

Item 4 includes the expenses for myself and other executives of the Chicago office who may have occasion to go out in the field to inspect the compressor stations, and it also includes the expenses of any engineers sent out for special investigation of any particular problem.

Item 5 is the cost of operating fuel for operating the main compressor and auxiliary engines at each compressor station. That yearly amount for the years 1939 to 1951 is somewhat less than the 1936-1938 average. We have used the fuel consumption as in effect the latter part of 1938. In 1938 we effected certain fuel economy in the operation of the main engine equipment, particularly, and we believe and hope that we may continue operation at this low fuel consumption.

Item 6 is for lubricating oils and greases, which are necessary for the operation of all the compressor stations' operating equipment, particularly the main engines and auxiliary engines. The amounts from 1939 on are a little less than the 1936-1938 average.

Items 8 to 15, under the sub-head "Maintenance," are explained in more detail on pages 2 to 8 of Exhibit 98.

Page 9, entitled "Bunk House and Dwellings, Labor and Material," includes the necessary maintenance, labor and material for the bunk house and dwellings for the years 1939 to 1954, inclusive, and includes painting and repairs necessary to the cottages and also the necessary maintenance to the sidewalks, grounds, piping and other appurtenances necessary to the cottages. The amounts shown on this page are not included in the general recapitulation on the first page of Exhibit 98, and will be in addition to that recapitulation.

I used prices as of June 1, 1939, for both labor and materials in figuring the costs of the various items making up this exhibit.

It is my considered judgment, based on my experience and my knowledge of the property of Natural Gas Pipeline Company and the demands upon that equipment in the course of the company's operations, that at prevailing costs of labor and materials as of June 1, 1939, the amounts set forth in Exhibit 98 will be expended by the company in the operation of its business and the maintenance of its property on the respective dates stated in this exhibit.

(At this point counsel for defendants offered EXHIBIT 98 in evidence.)

632 *Cross-Examination Interposed by Mr. Slaff.*

In entering retirement expense on the books of the company, we consult with the accounting department of the company. I have been instructed by the accounting department that such expense is a proper maintenance charge.

Direct Examination by Mr. Hedrick Resumed.

As shown on this exhibit, retirement expense is that expense incurred while making the retirement of any particular item that is retired, that is, labor expense. It is the cost of taking that material out of service, and it is my testimony that that particular expense will be incurred in the years shown in this exhibit. If it is a proper bookkeeping entry as retirement expense, it is my judgment that the expenditure should be included as I have included it here, as a bookkeeping matter.

Cross-Examination Interposed by Mr. Slaff.

Answering your question as to what distinction I make between labor connected with the retirement expense and materials with retirement expense, there are no material items included in retirement expense. They are all labor items. I make the distinction because there is no material used in making the retirement. We retire materials from service in the course of years. I believe, if I am not mistaken, that the retirement of materials is shown in Exhibit 97 under the heading "Salvage and Retirements." I am not familiar with the bookkeeping procedure as to what account the materials retired are charged to.

Cross-Examination Interposed by Mr. Booth.

As to whether I had anything to do with the determination of whether or not the items included in this exhibit are properly to be treated as operating and maintenance expense from an accounting point of view, that the accounting department sets forth a procedure to be followed by all operating departments. We follow that procedure as set forth. Exhibit 98 follows exactly the procedure followed in the everyday run of the business of the company. I received those instructions from the accounting department on the day I started to work for this company, which I believe was in March of 1931. I did not receive any instructions from them in connection with the preparation of this exhibit.

(At this point EXHIBIT 98 was received in evidence over the objection of counsel for each of the Commissions, to whom an exception was allowed. Motion by Commission counsel to strike witness' testimony denied.)

Cross-Examination by Mr. Slaff.

I testified in one other case for Natural Gas Pipeline Company. That case had to do with a lawsuit brought by a farmer residing across the road from our Joliet regulator station. It was a damage suit. (Renewal of motion by Commission counsel to strike Exhibit 98. Company counsel limits purpose of exhibit and Examiner reserved ruling on motion.)

633 R. M. BUSSARD, a witness for defendants, recalled, testified as follows:

Direct Examination by Mr. Morgan.

(July 29, 1939)

When I was testifying on Thursday morning, counsel requested the Examiner to allow my withdrawal from the witness stand in order that I might check the method which I had used in the computation of the composite or average back pressure curves of the several groups of wells located on the areas respectively set forth on Exhibit 90. I have made such a check.

I have considered the matter both personally and with those whom I consulted concerning the engineering problems involved in this study to determine whether or not there was any error in the method of computation. We have concluded that there is no reason to change our method of computation, and I am not bringing in any new change as a part of my testimony.

However, in the course of checking these curves and the charts on which these curves appear in Exhibit 89, we did discover a few errors which I think we should point out at this time.

The mistakes that I want to discuss this morning first are on the fifth page of Exhibit 89, which is the back pressure data chart for well group No. 3-A. In order to locate the points of error, I will speak of the horizontal scale in terms of the cycles from the left hand edge of the sheet. Starting at the left hand edge and moving to the right to the end of the second cycle on the horizontal scale, we find the figure "5" and then above it a "1" and a "0". The little figure above the "5" appears to be "10." It should be "1.0." The drafting room was in error there.

To locate the next correction I wish to make on this sheet, progress to the right to the end of the succeeding cycle on the scale, at which we find the figure "1.00." The drafting room made an error there, and that figure should be "10."

I would like to say that the mistakes on the chart have not affected our calculations. In fact, they did not enter into our calculations at all.

Another mistake which I find is on page 8 of Exhibit 89, which is the page for well group No. 5. The charting of the composite line on this sheet is in error at the pressure factor point of 15,000. The composite line is located at 1.3 as drawn on the chart for the value 15,000, whereas it should be located at a Q quantity of 1.03. Again we have an error that occurred in the drafting room at the time the chart was constructed. The error does not occur in our calculations. We have prepared a revised page for this particular group, if you desire it.

634 (At this point the corrected sheet for Group No. 5, at the direction of the Examiner, was marked Exhibit

99. EXHIBIT 99 was offered and received in evidence without objection.)

The document which is marked Exhibit 99 is the corrected chart on well group No. 5 appearing in page 8 of Exhibit 89.

While I was on the stand the Examiner asked some questions concerning some symbols appearing on page 1 of Exhibit 89. I am prepared to explain those symbols.

When I was explaining this section of page 1 of Exhibit 89 called "Calculation of Back Pressures at the Sand," I was asked for the meaning of the symbol P_2^2. P_2 is a symbol which was obtained from the Bureau of Mines publication RI 2929, and, as defined in that publication on page 2, is the absolute pressure at the wellhead in pounds per square inch. Therefore, the symbol P_2^2 on page 1 of Exhibit 89 is P_2 multiplied by itself, or the square of the wellhead absolute pressure.

RI 2929 is not the same as Monograph No. 7. It happens that the Bureau of Mines made their first report concerning their back pressure work in two reports of investigation, RI 2929 and RI 2930. Both are dated May, 1929.

All of the other symbols in that portion of page 1, which is called "Calculation of Back Pressures at the Sand," are defined in this report of investigation 2929 on page 2, and the symbols are also defined in Monograph No. 7 on page 141.

I here read into the record an extract from RI 2929, at page 2, showing the definitions of the various terms:

"Method of Computing Pressures at the Sand in a Gas Well.

Nomenclature.

"The following nomenclature has been used in the formulas and in explaining the methods of computing pressures at the sand in a gas well from volume and pressure observations at the wellhead:

P_2=Absolute pressure at the well head, pounds per square inch.

P_1=Absolute pressure at the well head plus the pressure drop due to friction, pounds per square inch.

P_s=Absolute pressure at the sand, pounds per square inch. (Absolute pressure at the well head, plus the pressure drop due to friction, plus the pressure due to the weight of column of gas.)

P_f=Absolute formation or "shut-in" pressure in the sand, pounds per square inch (absolute pressure at the well head when shut in, plus the pressure due to the weight of the column of gas).

635 Q=Rate of flow, cubic feet per 24 hours, at 14.4 pounds per square inch and 60 degrees F., assuming an average flowing temperature of 80 degrees F. in the producing "string" of casing or tubing. (It is here assumed that 80 degrees F. represents an average temperature in the producing string, and the actual variation from this assumed condition will not create any considerable error in the computation of pressures.)

d=Internal diameter of the producing string, inches.

G=Specific gravity of gas (air=1).

L=Length of pipe, feet.

R=Combined factor selected from Weymouth's formula 4 for flow of gas through pipe=square root of $P_1^2 - P_2^2$ (See P. 18).

e=Base of Napierian logarithms=2.71828.

F=Correction factor for density due to pressure variation in the flowing column of gas (see p. 21)."

Questions by the Examiner.

I think I can give a general statement about the formula in the upper lefthand portion of page 1 of Exhibit 89 which I decided not to use.

These expressions to which the Examiner refers have to do with the calculations for the determination of the weight of the moving column of gas and also have to do with the calculations for the determination of the pressure effect of friction in the string of pipe. I left the impression from my answers that I did not make these corrections and that if I had made the corrections the expressions called for would have resulted in very minor errors. I did not express myself very clearly on that point. What I intended to say was that I did not go through the long calculations. I did not do all of the mathematical work involved in solving the formulae, and the reason I did not do that was because there had been developed certain tables which, in effect, solve these formulae and permit us to materially reduce the work involved in determining the correction for the weight of a column of gas and the correction for the friction effect.

At the time this formula on page 1 of Exhibit 89 was made, only R. I. 2929 was in publication, and our production engineers who made that form for our regular use made it in that particular manner following the symbols and formulae indicated in R. I. 2929. At a later date these tables that facilitate our work were developed, and at the time Monograph No. 7 was published in late 1935, I think, the tables were incorporated in the monograph and are shown therein. In other words, we have been using a calculation sheet such as this since late in 1931, when this particular formula on page 1 of Exhibit 89 was prepared by one of our production engineers.

636 R. I. 2930 was also in publication but had no particular bearing on this. The No. 2929 relates to computing the pressure at the sand in a gas well and is called Part 1. R. I. 2930 is a fundamental relation for gauging gas well capacities, and is Part 2 of the publication then made.

As to what I mean when I say "correction for the weight of the column of gas," perhaps if I say why we do that it will explain. We desire to determine the pressure conditions at the bottom of the well, the bottom hole condition, as we call it, but our gauges used in recording the test data are located at the head of the well up at the ground surface. So to get from the ground surface record to the bottom hole pressure, we must add to the ground surface record the weight of the column of gas. I think there was nothing other than just dead weight that I was taking into consideration; there was nothing like inertia.

Direct Examination by Mr. Morgan.

When I was withdrawn from the stand, counsel was about to ask me some questions concerning one of the charts shown in Exhibit 91, having to do with the rock pressures of wells belonging to Texoma in the several groups shown on Exhibit 90 and with the projected weighted average pressures in those respective groups of wells.

Counsel refers to the rock pressure curves dealing with wells in Group 1 and rock pressure curves dealing with the wells in Group 8, pointing out that my estimated future curve for the wells in Group 1 approaches the righthand side of the chart at a point which I have taken as 25 pounds well head gauge at the end of 1954, and that the same line on the page of the chart representing Group 8 has a different course; that the curve in Group 1 is represented by a line that is comparatively straight when compared with the course of the curve shown in Group 8, where the line takes more the course of the righthand half of a rainbow. I am asked to explain how I account for the difference in the behaviors of the pressures as I conceive them to be in those two groups during the period from January 1, 1939, to the end of 1954.

The difference in appearance of the two lines comes about primarily from the fact that the weighted average rock pressure in Group 1, as of January 1, 1939, was materially lower than the weighted average rock pressure in Group 8 as of January 1st, 1939. In other words, the weighted average pressure of the area to which I have referred as Group 1, as of January 1, 1939, was approximately at 270 pounds, and the weighted average pressure prevailing in Group 8 as of the same date, January 1, 1939, was approximately 384 pounds.

I am asked to explain the circumstance that the pressures in an area where they have already been reduced to 270 pounds on January 1, 1939, will so decline as to be equalized with the pressures in Group 8, which I found to be 384 pounds on January 1, 1939, by the end of 1954, and to explain what it is that will cause those lines to take such different courses over that same period of time.

The lines necessarily take the different courses be-
637 cause of the difference in total rock pressure decline
that will occur in the respective groups. Group 1 is close to an area quite highly developed and from which there has been a considerable quantity of production. Necessarily, the weighted average pressure in Group 1 has been materially affected by this production and has declined materially to this 270 pounds average that the chart shows. On the other hand, the area represented by Group 8 has had very little development in it. The company has very few wells there, and, in fact, the other companies have very few wells there.

In the future there will be more wells, and as there are more wells drilled in area No. 8, necessarily the rock pressure is going to decline more rapidly because of the greater quantity of gas that is being taken out of it. This general trend of distribution of production is not confined to Group 8 particularly, but it is something that is going to happen in the field as a whole. We are going to see increasing amounts of drilling in areas not now highly developed. As the production spreads it is going to have its effect upon the rock pressure and we are going to see an accelerated decline, because there will be not only the general drainage effect throughout the field, but there will be this increased concentration of production, or, rather, it is a spread of production which increases the tendency of the area to decline in pressure.

It is our opinion that as this production spreads, the field begins to become more and more uniform as to pressure conditions, and eventually, when the gas is taken from the field, there has to result a uniform pressure condition.

As the production spreads throughout the field and reduces the rock pressure in what are now the higher pressure areas, there necessarily results a lesser drainage into that low pressure area and into Group 1. Over a period of time it must occur that the repressuring effect into Group 1 will be less than it has been.

Our schedule contemplates drilling one more well in Group 1 and an additional nine wells in Group 8 on Texoma's property. There will be a number of other wells drilled in that area by owners of other leases, because that is a comparatively undeveloped area. When these additional wells are drilled on Texoma's property and additional wells are drilled on the property of others, the pressure decline in that area will be accelerated as compared with what it has been in the past. Obviously, the pressure decline is going to increase, because the decline is dependent on the drainage from the area and the quantity of production from the area, and the more you produce the more the pressure decline will increase. That pressure will go down at a faster rate as compared with what it has declined during the past years.

In our study as to the future capital requirements of
Texoma we have used these weighted average rock
638 pressures indicated by the estimated future line in conjunction
with our back pressure chart work, in that, knowing the rock pressure from time to time, we can refer to the various group back pressure charts and determine the quantity of open flow that will exist at the corresponding date in the several groups.

The open flow for the wells to be drilled in a particular area in a particular year is determined by taking the rock pressure in that particular year and group and going to the composite back pressure line for the group and determining the open flow from this composite line and then, of course, assigning that open flow to the wells in the group in the year.

By the use of the two curves, the curves shown on Exhibit 91 and on Exhibit 89, we are able to ascertain how long the present wells of Texoma would produce a sufficient quantity of gas to meet the requirements of the Texoma portion of the pipeline outlet. By using the rock pressure data in conjunction with the back pressure data we can tell how much a well in the particular group would produce, and I speak of an average well in the group, and thereby build up the total production for the company and relate that to Texoma's portion of the market demand of Natural Gas Pipeline Company.

As to the other uses which I have made of the facts and principles developed by these curves and the calculations which these curves represent in the economic study in which I have been engaged, the rock pressure data and the back pressure data permit us to make a number of rather important determinations by finding the quantity of gas to be produced in a given year. In a given year we can determine how much gas the booster stations in that particular area are going to handle, and thereby with the rock pressure conditions and the volumes to be handled we know how much horsepower we have to have. We know when we have to put the horsepower in. We know where we have to put the horsepower.

Also we can determine the size of the gathering line that has to be laid from the new well to the existing gathering system. We can determine such things as we need in Mr. G. M. Davidson's estimate of the gasoline plant revenue in that we can find the quantity of gas to be produced in Moore County in a given year and in the other counties, and inasmuch as there is a difference in the gasoline recovery, we are thereby enabled to get a more accurate picture of the quantity of gasoline recovery.

As to whether I made use of the same principles in determining the future drilling requirements of Texoma in order to have available this full quota of the pipeline's market outlet during the latter period of the project's life, I will say that inasmuch as we can by use of the rock pressure and back pressure data determine the quantity that the wells can produce, we could determine what well drilling would be required to meet Texoma's share of the full market requirements of the pipeline company.

As we proceeded from year to year in our study, we always saw to it that the production did not exceed 25% of the open flow, because there is a law in the State of Texas that prohibits production in excess of 25% of the daily open flow quantity of the well. That is a statutory requirement, or limitation.

I have already stated that in determining the num-
639 ber of wells to be drilled I collaborated with Mr. J. G.
Dickinson, the general superintendent of production of Texoma Natural Gas Company. In this study I have undertaken to determine, in consultation with Mr. Dickinson and others, the number of wells that Texoma will drill in the future, the time when it will drill those wells, and the location of those wells as they are drilled.

The future well drilling program and the location of the wells has been a matter of collaboration, and Mr. Dickinson and I have worked quite closely on that together. In distributing these wells from year to year and in the various groups, we have to take into consideration the particular area, and we have to consider the contractual obligations of our leaseholds and of our consolidation agreements. We have also to consider the need for protection against outside drainage and against drainage by others close by the areas in which we have leaseholds. It is also necessary that we take into consideration the management's direction that we so distribute the cost of drilling and the other costs contingent upon the drilling throughout the future of the company that there may be no undue burden imposed from year to year upon the revenues of the company, and, necessarily, we also want to avoid deferring drilling until just that very day in which we get into a shortage of open flow and then have to try to drill our wells all at once in order to maintain our market position. The result of this work that Mr. Dickinson and I have prepared together is a well drilling program.

These considerations of lease requirements and drainage protection, and the policy of the company in distributing the burden of its drilling program over the whole life of the field instead of deferring it until the production must be had in order to meet the immediate situation—or, to state it otherwise, conducting its drilling operations on a hand to mouth basis—govern the spread of the drilling throughout the years, and not the total number of wells to be drilled. We have arrived at the total number of wells to be drilled by the application of the engineering production principles which are illustrated by Exhibits 89 and 91, together with the cost of doing the drilling and the revenues that can be obtained therefrom. I have prepared a tabulation setting out the number of wells to be drilled and the schedule of the drilling.

(At this point counsel for defendants presented a document described as "Texoma Natural Gas Company; Future Wells, Gathering System and Booster Station Program; Witness, R. M. Bussard." At the direction of the Examiner, the document was marked Exhibit 100 for identification.)

That tabulation is the first sheet in Exhibit 100. Along the lefthand side of this page are the words "Group No. 1," and below the figure "1" some other figures; then, "Total Carson-Gray" and some other figures, and then "Total Moore" and "Grand Total." Confining ourselves to that portion of the page, which is approximately the upper half of the page, those numbers refer to the Texoma well groups that we have used in our Exhibits 89, 90 and 91. When I speak of Group No. 1 on this exhibit, I am talking about that pink area over in the western part of Gray County, as shown on Exhibit 90.

640 The figures in the column headed "1938" are the number of wells owned by Texoma in the several well groups as of December 31, 1938. With one exception, those wells were all then completed and either connected with our pipeline or about to be connected with the pipeline. As of the date given, these wells were in production.

To illustrate the figures in the column headed "1939," I will take the first figure in the column which is the number "2." That is set opposite Group No. 2, so that there is an indication that we intend to drill two wells in this particular well group in 1939; in fact, those wells may have been drilled at this time. I am not just clear in my memory as to that. I take the first of January, 1939, as the dividing point, for reasons already reflected by the record.

The second figure "2" is to the effect that there will be two wells drilled by Texoma in Group 3-A in the year 1939. Next we find that there will be one well drilled in Group 3-B. Moving on down, the figure "5" opposite "Total Carson-Gray" simply indicates that there will be a total of five wells drilled in the Carson-Gray County area during 1939 by Texoma.

We move on down to the figure "2" opposite Group No. 7, which means that there will be two wells drilled by Texoma in Group No. 7 in 1939. Similarly, the numbers below relate to the number of wells that will be drilled in each one of the groups during 1939. Then we come to the number

"17" opposite "Total Moore," and that means that there will be a total of 17 wells drilled by Texoma in 1939 in Moore County.

Finally we see the number "22," and there we have the gross number of wells to be added to production during 1939 by Texoma.

If I went through it in detail, my explanation of the figures under the captions of 1940, 1941, 1942, and so on across the page, through the year 1951, would be the same.

In effect we have assigned Group 6 to Carson County; but it is actually in Hutchinson County. It is a terminology on our part. We just refer to the area east of Fritch station as being Carson-Gray County, and this will apply also to Group 5. Group 5's boundary lines are up in Hutchinson County a little ways.

The totals show that there are 22 wells to be drilled in 1939, 20 to be added in 1940, 20 in 1941 and 20 each year on through the year 1944. That indicates the total number of wells to be drilled each year during the period 1939 to 1951, inclusive. Just one well will be drilled in 1951, 9 in 1950, and 12 in 1949. We have determined that there will be a total of 215 wells added to Texoma's production after the first of 1939, which, including the wells already drilled and on production, will make a total of 350 wells.

The lower half of this same page of Exhibit 100 is an accumulation in that the starting figure at the end of 1938 has added to it the subsequent yearly drilling, and this
641 sheet simply shows how many wells are on hand at the beginning of each year, and finally totals 350 wells.

In getting the gas into the pipeline from the 215 wells which are to be drilled after January 1, 1939, we will have to lay lateral lines in order to connect those wells to the existing system, and when the rock pressure becomes inadequate to cause the gas to flow to Fritch and arrive there at an adequate pressure, we will have to install booster stations in the field.

We have made a study as to the lateral line and booster station requirements in connection with these 215 wells that Texoma will add to its production after January 1, 1939, and the second sheet of Exhibit 100 contains a summary of the lateral line construction required by the well drilling program.

The first column, of course, speaks for itself and shows the years during which the wells will be drilled, as shown in the schedule on the first sheet of this exhibit about which

I have been testifying. The second column shows the same figures as those reflected on the first sheet as to the number of wells to be drilled.

There are five columns immediately to the right of this second column under the general caption "Miles and Size of Line." The figures at the head of the first four columns in this section are the diameters of the lines that we anticipate we will have to lay to connect the future well drilling to the existing gathering system.

Taking the column headed "Four-inch" and going downward, we find the total amount of four-inch pipeline that would have to be laid each year in the future to connect the future well drilling to this system. Similarly, under the columns headed "Six-inch," "Eight-inch," and "Ten-inch," we find the annual quantities of additional gathering lines to be required. The final column in this particular section is headed "Total" and is the gross mileage added by the capital expenditure of Texoma for well lines each year that the drilling program continues, and down below is a summation of the total amount of mileage laid throughout the drilling period.

We expect to lay 106.61 miles of four-inch gathering line from the first of 1939 to the end of 1951. The symbol "R" means that we are taking one section of line out by retirement. This is because we had to make a shift on account of our booster station development and the line was not needed any longer. The total column carries only the net for the year.

We expect to lay 67.8 miles of six-inch line in the future well drilling activities, 17.89 miles of eight-inch line, and 1.68 miles of ten-inch line.

Coming back to that letter "R" at the bottom of the column under the four-inch, I called attention to the fact
that opposite the year 1951, in the column headed
642 "Total," we show the net amount of pipe added to
the system during the year. I did not make a specific reference to reclaim. I just wanted to call attention to the fact that the reclaim was not included in the mileage shown on this sheet.

When I speak of reclaim, I mean we take the line up out of the ground and stock the pipe. It is not necessarily retired from the plant account as long as the pipe is taken in stock. It would go out of plant in service and into materials and supplies if the company retained ownership.

To the right of the group about which I have been testifying there are some figures under the general caption "Change Connections." "Change Connections" relates to some work in addition to the laying of the well lines and the connecting of these lines to the existing system.

As we go into the future and construct booster stations, we will have to make some changes in the lines from time to time, and we will be disconnecting a four-inch line from, let us say, a ten-inch line and reconnecting that four-inch line to another line, possibly a line which has been laid for the purpose of an intake line into a booster station. These quantities in this particular section called "Change Connections" simply mean that we will cut loose so many connections of a certain size in a certain year and reconnect the line to another part of the gathering system.

The figures as to the quantities of pipe taken up and retired from plant account and put in stock or used somewhere else will all be developed through another witness.

Over on the right hand side of sheet No. 2 is a double column of figures under the general caption "Well Connections, Meter and Regulator Setting, Etc.," with the subheadings of "Four-inch" and "Six-inch." The future well drilling will not produce wells of uniform size. We commonly use a four-inch meter piping and six-inch meter piping, depending upon the size of the well. These two columns to which I have referred simply indicate the size of meter piping that will be required for a certain number of wells in the different years, and they are just an indication to the man who has to make the cost estimate that he should provide in his cost estimate for these numbers of the various sizes shown.

We build gathering lines of different diameters out to different wells in the field. The diameter of the gathering line depends upon the quantity of gas the line has to carry, the length the line will be, and the pressure conditions under which that line will operate. The variations of those three factors are the determinations of the diameter of the lines shown in our gathering system construction program.

We have made a very careful study of the quantities and sizes of lines that will be required to connect these 215 wells with the gathering system. In fact, that is one of the uses of the correlation of the rock pressure data and the back pressure charts.

In the pages immediately following sheet No. 2 of
643 this exhibit we have shown the details of the gathering system construction for each of the several years of the drilling program. Pages numbered 1, 2, 3, 4, 5, 6, 7, and on to 12, inclusive, are devoted to such details. These detail sheets are self-explanatory and can be readily correlated with sheet No. 2. They are simply the details of each of the years and the totals for each year as brought forth on sheet No. 2 of this exhibit in the recap.

On page 1 of these detail sheets there is a note which reads "This assumes the Pythian property is purchased." The word "purchased" is somewhat erroneous, and should be "acquired." By this particular note I mean to refer to a proposition the company has up with the Phillips Petroleum Company, whereby Texoma will trade a well and some lease for a well and lease of the Phillips. The name of this particular lease and well that we expect to get from the Phillips is called the Pythian.

Another element in that trade is the gathering line between the well and our existing 24 inch trunk. That happens to be some 3.8 miles, as indicated on this sheet, and included in our negotiations with the Phillips is the item of purchasing that quantity of gathering line. That exchange of properties has been actually effected. The transfer was made after these figures were compiled, but it is now effective and that qualification is no longer necessary.

Questions by the Examiner.

The Phillips well was already connected to our lines because we have an agreement with the Phillips Petroleum Company for the exchange of natural gas. This was a line through which they were bringing gas to us under their exchange agreement. One of the wells that Phillips Petroleum Company used to deliver gas to us under their exchange agreement has now been acquired by Texoma. In other words, they were swapping gas for a while and now they have swapped wells.

Direct Examination Resumed by Mr. Morgan.

The results of our analysis and study of the booster station requirements are set forth starting with page 13 of the exhibit. Page 13 is a summary of the booster station program. The upper third of the page relates to the number of stations that will be installed in Moore County and to the number of stations that will be installed in the other counties in which Texoma produces.

The figures might be explained by taking the year 1946 and finding the figure 19 opposite Moore County. As of January 1, 1946, we will have booster station power installed at 19 different points in Moore County, according to our calculations and estimates. They will be installed in 1945. We chose the first of the year as a very definite breaking point, for simplicity of presentation.

The figure to the right of the figure "19" is "30" and that figure "30" indicates that as of January 1, 1947, there will be booster station power installed at 30 points in Moore County. This means a total of 30 points, of which 11 will have been constructed during the preceding year. By this I mean that there will be 11 different additional booster station locations brought into the
644 Texoma field property during 1946. When I say location, I mean the buildings, engines and all of the piping and everything else that goes with that station, a completed, ready-to-operate station.

Questions by the Examiner.

These are not what would be called centrally located booster stations. They are more in the nature of decentralized stations. I believe Mr. Brown said there was a possibility of adopting a decentralized program, and this particular program we have gotten up here is more in the nature of a decentralized program. There are some instances where there are stations which have on their intake only one well; but they would be few in number. The number of wells on the intake varies from station to station.

Direct Examination by Mr. Morgan.

On page 13, moving out to the last column under the year 1954 are the numbers 30, 30 and 60. The first 30 means that there are 30 booster stations installed in Moore County as of the first of 1954. The second 30 means that there are 30 booster stations in Carson, Gray and Hutchinson Counties. The total installation as of the first of 1954 will be 60 stations. There will be 60 locations at which booster stations will be built as of that date, and there will be 60 booster stations handling the production of 350 wells as of the first of January, 1954.

There is another group of figures under the caption "Number Units in Use, Moore County, Carson, Gray and Hutchinson Counties," and so on, immediately below the group of figures about which I have just been testifying. The figures under the caption "Number of Units in Use" tell us how many engines are in use in the several stations that have been built as of January 1st of the years under which the numbers appear. For illustration, under the caption "Carson, Gray and Hutchinson Counties," for the year 1939 there is a total of one. That means one booster station engine is in use now. It is in that group of Carson, Gray and Hutchinson Counties. By the end of that year or the beginning of 1940, we will not have to add any engines in Carson, Gray and Hutchinson Counties, and that one unit which is in use as of the first of 1939 is still the only unit in use as of the first of 1940. We will have to put two more engines into operation during the year 1940; and I arrive at that figure by seeing that under the year 1941, as of January 1st, we will have three engines in use.

There are no booster stations provided for in Moore County, or engines provided for use in booster stations in Moore County, prior to 1946. That difference in requirements is a reflection of the pressure conditions existing in the various areas. The pressures in Moore County are sufficiently high that it is not until during 1945 that our study shows any need to install any booster station horse power in Moore County. We are providing for these booster stations and this booster station investment as it is required during the future history of the project.

There is a third group of figures opposite the lines under the caption "Horse Power in Use" on that same page 645 13 of Exhibit 100. We have just been talking about the number of units in use, and inasmuch as the size of the engine that we contemplate is a 40 horse power engine, we multiply the number of units by 40 horse power per unit to represent the horse power in use at the dates shown, and that simply refers to the aggregate horse power of the engines which are shown in the group of figures immediately above it.

As of the first of 1954 our study shows that Moore County will require 126 units, containing a total of 5,040 horse power. Our studies further show that for the same date, and for Carson, Gray and Hutchinson Counties, we will have to have 81 units in service. These 81 units amount to 3,240 horse power.

However, Texoma as a whole will have to have 207 units in service as of the first of 1954, accumulating to a total horse power of 8,280. These will be gas engine driven compressor engines.

We have spoken of compressor engines in the field by using the term "Booster Stations" in order that we may have a differentiation between the power that we have to install in the field and the power that is installed at the Fritch station, which we ordinarily call a compressor station in our words. It is the same thing, but geographically located at different points. We use the two terms for convenience in conversation.

Questions by the Examiner.

As to what will be the lowest possible intake pressure for these booster stations, I will say that these engines will operate to a very low intake pressure; but the lower the intake pressure the less the capacity of the engine to handle the compressed gas. If we were operating under one intake and the intake pressure diminishes, one way we could make an adjustment to operate would be by changing the gas compressor cylinder size. Those cylinders are removable.

Direct Examination Resumed by Mr. Morgan.

Pages 14 and 15 of this exhibit give details relating to the location of the various booster stations and to the number of engines in use at each station at the beginning of each year. There is nothing about that detail and correlating it with page 13 that needs explanation.

(At this point counsel for defendants offered EXHIBIT 100 in evidence, and it was received in evidence over the objection of counsel for each of the Commissions, to whom an exception was allowed. Motion by Commission Counsel to strike witness' testimony in connection with Exhibit 100 as deals with anything beyond a reasonably immediate future denied.)

I have prepared a map which shows the location of the 251 wells drilled and to be drilled after January 1, 1939, and the location of the booster stations which are to be put into operation after the first of January, 1939.

(At this point counsel for defendants presented a map described as "Texoma Natural Gas Company, Panhandle Gas Fild of Texas, Gas Wells, Gathering System and Field Booster Stations." At the direction of the Examiner, the map was marked Exhibit 101 for identification.)

Exhibit 101 was prepared under my direction, and
646 shows the gas field property of Texoma Natural Gas
Company. This property is divided by color between property existing in the field on January 1, 1939, and the property to be constructed thereafter. I will start with the top of the legend and go down.

The first symbol in the legend is a black circle opposite the words "Present wells," and that means that the several black circles show the location of the wells that Texoma had on January 1, 1939. Wherever that circle appears on this map, at that location Texoma had on production a well as of January 1, 1939.

The next symbol in the legend is a solid black line, and this solid black line shows the location of Texoma's gathering system in the Panhandle field as of January 1, 1939.

The next symbol in the legend is a solid green line, and this solid green line shows the location of Texoma's telephone system in the field as of January 1, 1939.

The next symbol is a black triangle, and this black triangle shows the location of the booster station which Texoma owned as of January 1, 1939. There was only one at that time, and it is located in Section 102, Block 5, I. & G. N. Survey, Carson County. That station is used for a series of wells as it is located there. As I recall the construction of the intake line to that station, it pumps out of the lateral line, and therefore all of these wells, including the one on the direct line, are feeding into that station.

The sold red line in the legend relates to the gathering system, that is, to the pipelines which Texoma will need to construct after the first of January, 1939, in order to connect with the wells which will come into production after that date and the general gathering system of the company.

The broken green line represents the telephone system construction which Texoma will have to make in the field after the first of January, 1939.

The solid red circle represents future wells to complete development, and the various points on the map on which these red dots are located give the location of future wells to be drilled by the Texoma Company.

I see that I have missed the red triangle, which relates to the location of booster stations to be installed by Texoma in the field after January 1st, 1939, and those are the 60 points that we spoke about in a previous exhibit, and they stretch throughout the field.

The remainder of the legend is a solid black line with diagonal red lines running through it, and a solid red line with diagonal red lines running through it; and these relate to the parts of the gathering system which we think Texoma will have to take because no longer usable. A diagonal red line across the black line indicates that
647 it is a piece of property existing on the first of the year 1939 and will probably become no longer usable and will be reclaimed. Where we find a solid red line with a diagonal red line across it, we mean to indicate that some construction after January 1, 1939, will later on prove to be no longer usable as originally built and will be reclaimed.

Exhibit 101 shows the geographic distribution of the wells already drilled, the gathering lines already in existence, and the booster stations in existence as of January 1, 1939, and the wells, gathering lines and booster stations as shown in Exhibit 100. All 350 wells are located on this map, and all the pipeline mileage and all the booster stations are shown here. Within the usual drafting limits, they are accurately located on that map.

(At this point counsel for defendants offered in evidence EXHIBIT 101, and it was received in evidence over the objection of counsel for each of the Commissions, to whom an exception was allowed.)

(Counsel for defendants offered in evidence EXHIBIT 91, and it was received in evidence over the objection of counsel for each of the Commissions, to whom an exception was allowed.)

Cross-Examination by Mr. Slaff.

I am requested to take any well or any year in the future and explain how I use Exhibit 89 to determine the open flow of a well to be drilled in one of the groups in any future year, showing the step by step method.

I am going to take the rock pressure decline map on Group 8 as an example of the determination of the rock pressure as of January 1, 1946. I wish to state that my actual calculations were based upon a calculation I have discussed in the testimony, but I shall use the chart for illustrative purposes.

On January 1, 1946, the rock pressure decline map of Group 8 shows that there was 292 pounds gauge well head pressure. If I might, I would like to forego the calculation on the weight of the column of gas and assume that 292 pounds was the formation pressure absolute as of that date. The symbol will be P_f. Having determined a formation absolute pressure of 292 pounds, I next go to the back pressure data chart for Well Group 8 in Exhibit 89.

In this chart relating to Group 8 the left hand scale relates to the pressure factor. The pressure factor is $P_f^2 - P_s^2$. In my illustration I will use 292 pounds as P_f and 13 pounds as P_s. The square of 292 is 85,264. The square of 13 is 169. The difference of the squares is 85,095.

We now find on the vertical scale the point 85 and proceed from that point to the right until it intersects with the composite back pressure line. We then proceed downward to the horizontal scale, and as I read the chart, we reach the horizontal scale at a value of 4,300,000
648 cubic feet per 24 hours, and, if I have not made a mathematical mistake or a chart mistake, I have given you the answer as to the method that we use in correlating rock pressure and the back pressure test data.

That is illustrative of the method. Actually we went through a formula because of the mass of information we had to prepare.

Questions by the Examiner.

To my mind, the significance of the words "back pressure" is twofold. It is to distinguish from the ordinary Pitot tube open flow method, where the gas leaves the well and blows to the air without there being anything to hold the pressure back against the sand, except the weight of the column of gas/ but in that particular test procedure illustrated on page 1 of Exhibit 89 we call that a back pressure test, or the Bureau of Mines did, because the gas is producing into the ordinary string of pipe, the ordinary lateral line, and the pressure is being made in that line and being held back against the face of the sand rather than just blowing open to the air. The recorded data as to the well head pressures are the back pressures existing at the time the tests are recorded.

649 J. G. DICKINSON, a witness for defendants, recalled, testified as follows:

Direct Examination by Mr. Morgan.

(July 31, 1939.)

I have heretofore stated that my position with Texoma Natural Gas Company is that of general superintendent of production. My duties as general superintendent of production include supervision of the accounting department where charts from Texoma's meters are figured, gas royalty computations are made, and royalty checks are prepared. We have the job orders covering investment work done for Texoma, and a general set of Texoma's books is kept in the Amarillo office.

My duties also include supervision of the land and lease department. In this department we handle the taking of leases, the preparation of consolidation agreement contracts, and the handling of complaints and legal work.

I also supervise the geological department. In this department we keep maps, sub-surface data, sub-surface maps, analyses of well samples. The geologists recommends the location of wells and determine the depth at which casing is to be set. They locate the gas pays when the wells are drilled in. They keep statistical information and make reserve estimates.

The production department comes under my supervision. This department makes locations of wells in the field. They haul in rig material and casing. They furnish fuel for the drilling. They recommend the depth at which the first string of casing is set. They supervise the cementing of casing. They survey the hole to determine if it is straight. They watch samples and assist the geologist in the locating of the depth of the gas pay. They drill in and log gas pays. They inspect charts of well meters. They test wells and blow wells to remove water and cavings. They supervise the clean-out work.

In addition to these activities I act as agent for Texoma in Texas. I represent Texoma in dealing with the regulatory bodies and in matters of public relations. I am familiar, of course, with the contractual obligations of Texoma in the matter of its lease obligations.

I spoke of supervising the accounting that is done in Amarillo. That accounting, of course, is done under the general direction of Mr. Campbell, the secretary, who prescribes the system of accounting which I see is followed out in the keeping of accounts in Amarillo.

I am sure that Texoma has not a sufficient number of wells already drilled on its properties to meet its requirements for the future. We have plenty of open flow at this time to meet our requirements; but as the rock pressure declines the open flow of the wells will decline, and at a
greater rate. The open flow will decline to a point
650 where we will not be able to produce enough gas from
the presently existing wells to meet Texoma's outlets.
In order to meet that situation we propose to drill enough wells to provide the requirements of Texoma's market; and, after giving thorough consideration to the problem, we have decided to do it in a uniform and orderly manner.

I have been requested to tell something about the history of the company's policy with reference to eastern Gray and Wheeler counties, and explain why Texoma would sell gas from those wells instead of connecting those wells into the pipeline system, in the light of the circumstance that Texoma will probably need more gas for its own purposes.

In the beginning Texoma had a considerable amount of acreage in eastern Gray and western Wheeler Counties, and we contemplated building a line into this area, not only to take care of Texoma's wells that we acquired in this area, but also to take care of any future drilling we might do. At about the time we were ready to start work on this line in Wheeler County, it was decided to postpone construction of it. We had sufficient gas on the west side to get us started, and we decided to defer building the line until a later date.

Early in the history of Texoma's production, the State of Texas became very lax in the administration of conservation laws, and stripping operations were finally permitted, which had a very serious effect on the pressures in the area of central Gray County and also in Wheeler County. This production of gas in these two areas brought the pressures down to such an extent that we began to examine the problem rather critically to see whether we should build into the area at all. We finally decided that the building of a line into eastern Gray County and Wheeler County would not prolong the life of this project at all; that we would be able to get sufficient gas from the western area up to the time the field was exhausted; and exhaustion of the field was dependent not only on our own withdrawals but the withdrawals of others; so we finally determined that we would not build a line into eastern Gray and Wheeler Counties.

This resulted in our surrendering most of the acreage that we had in those areas in order to avoid the payment of rentals, taxes and other costs of carriage. With respect to building a line into the area to serve the wells which we had, we decided against this proposition because the cost of a line to take care of these wells would be more than twice the cost of drilling wells in other areas to provide the same amount of open flow that was available in these areas. The rock pressures in central Gray County and in Wheeler County are now at a point where we could not deliver gas into our pipe line under present pressures.

Exhibit 101 does not extend far enough east to show the wells owned by Texoma in the Lefors area of eastern Gray County and the wells belonging to Texoma in Wheeler County.

Questions by the Examiner.

My attention has been directed to an isolated well with a
proposed booster station, and a short distance from
651 that, an isolated well and a proposed well, and I am
requested to state what happens to those wells.

At such time as those wells decline to a point that they will not feed into the line against prevailing pressures, we will have to have booster stations. At the present time those wells are connected to Cities Service Company by an exchange agreement which is cancellable on 60 days' notice. The wells are so located that we can take them into our lines at any time we find it necessary. We have six wells that feed into Cities Service lines on exchange agreements.

Direct Examination by Mr. Morgan.

By that I mean that we are delivering our gas from wells which are near their lines and they are delivering us an equivalent quantity of gas from some wells of theirs which are near our lines. By that means we have been able to effect an economy by being able to avoid the building of gathering lines. Under these exchange agreements we simply deliver them a quantity of gas and they redeliver to us a similar quantity. No money changes hands; it is simply an exchange of gas.

The six wells connected to Cities Service are Purvis No. 1; C. C. Yowell; two J. J. Crutchfield wells, one of which is in Section 37, Block 4, I&GN Survey, Carson County, and I believe the other is in Section 38; Gulf No. 1-G, in Section 21, Block 5, which is several miles from our line; and Burnett D-1-G, in Section 34, Block 5, I&GN Survey, Carson County.

We also have some wells in eastern Carson County and western Gray County where we are now delivering to Phillips. We are doing that to avoid installing booster equipment right at this time. They are down in the low pressure area in western Gray County. Phillips is producing from wells in the same area into a line and can receive this gas at these low pressures where we could not do it at all. We would have had to build a booster station before this time in order to get that gas into our system against prevailing pressures. In return for that Phillips is delivering gas to us close to Fritch and they are delivering some of it from northern Moore County into our gathering lines.

By means of that exchange we have been able to keep our capital investment down, but up to this time I do not believe the amounts would be material. We would probably have had to build one or two small units in order to get this gas into our system. All of the wells east of a point in Section 25, Block 4, I&GN Survey, Carson County, are now delivering gas to Phillips. That is a temporary arrangement and does not result in decreasing the quantity of gas that goes into our system that would otherwise come from those wells by any quantity at all.

Except the Coltexo and Lone Star wells, which are not shown on this map, this covers all of the wells under exchange agreements.

652 The Phillips exchange is on a quality basis, and not on a well basis. It involves 18 million cubic feet daily.

On Exhibit 17 the wells in the Lefors area which are connected to Coltexo's pipeline are those wells located generally directly north of the non-productive area that is shown in white on Exhibit 17. There are now six wells connected to Coltexo, and the total open flow of these wells is approximately 15 million cubic feet. The rock pressures range from 146 pounds to 200 pounds.

These wells could not be economically produced into our pipe line system. We would have to build a compressor station and build a line over to the terminus of our line in Western Gray County. The terminus of our line is about five miles directly south of the town of Pampa, and it is about 15 miles from that terminus over to these Lefors wells. We would have to build a compressor station to pump the gas and build a gathering line to the wells. We would not be able to produce the gas into our line in the absence of a compressor station. It would not require an enlargement of any part of the additional line to take delivery into the system.

There are seven Texoma wells in Wheeler County connected to the Lone Star. I will name those wells and give their locations.

Gordon No. 1-T and No. 2-T are located in Section 91, Block 17. The rock pressure of both of those wells is 216 pounds. The open flow of No. 1 is 26,000,000, and the open flow of No. 2 is 21,000,000.

Hicks No. 1 is located in Section 53, Block 17, H&GN Survey, Wheeler County. It is in the center of the northeast quarter of the southwest quarter. Its rock pressure is 281 pounds, and its open flow is seven million.

Morgan No. 1 and No. 2 are located in Section 93, Block 17, H&GN Survey, Wheeler County. Morgan No. 1 has a rock pressure of 231 pounds and an open flow of 11,600,000. No. 2 has a rock pressure of 219 pounds and an open flow of four million.

Sewell No. 1 and No. 2 are located in Section 1, Block 24, H&GN Survey, Wheeler County. No. 1 has a rock pressure of 209 pounds and an open flow of 18,400,000. No. 2 has a rock pressure of 207 pounds and an open flow of 10,000,000. The total open flow of these seven wells in Wheeler County is 98,893,000. The average open flow of the wells is 14,000,000 per well.

Comparing the costs of building a gathering line over to Lefors and Wheeler County wells and drilling wells in the Carson-Gray area in the vicinity of our pipeline, as con-

templated in the program as portrayed on Exhibit 101, it
would be more economical to drill wells in the western
653 part of the field. In fact, it would cost about half as
much, or less than half as much, as building, for example, a ten-inch line into Wheeler County. The distance from the terminus of our pipe line over to those Wheeler County wells is about 29 or 30 miles.

Those wells in Wheeler County would not by means of their own pressure deliver gas into our Fritch station, and in order to get the gas from that Wheeler area we would have the same situation as that in the Lefors area, namely, that of building field compressor booster station equipment in order to deliver it in.

When I said that it would cost more than twice as much to build a pipeline and make the other investments necessary to deliver gas from these wells into our system, I was talking about drilling the same number of wells over in the Carson area.

The six wells in the Lefors area have a total of about 15 million cubic feet of gas daily. The situation in Lefors is such that all the wells over there have an open flow equal to about one well in the other part of the field, and what I said would apply to all of the wells in both the Lefors area and Wheeler County with respect to open flow; that is, we could drill the same open flow in the west part of the field at less than half the cost of building a line to connect this open flow in central Gray County and Wheeler County, because in one well we would get as much production as we have in all six of those in Lefors. Those are the six wells Mr. Kesinger testified were due to be plugged and abandoned in the next two or three years, and I think that is what will happen to them. They are in the same vicinity and in the same situation as the six wells we have already abandoned.

I said a while ago that it would not add any time at all to the life of this project had we connected these wells or had we developed the Wheeler and eastern Gray County leases and connected them into our pipeline system. By that I meant that the life of the Panhandle field and the life of Texoma's operations is going to be determined by the rate of withdrawals from all sources. Thus, we are able to get the gas we need in the western part of the field and the building of a line into the eastern part of the field won't be any help in prolonging the life of Texoma's pipeline, because the western part of the field is going to last longer than the eastern part. The pressures in Wheeler County are quite low as compared to those in the western part of the field. This is reflected very graphically by Exhibit 17.

I understand about the limitations which Mr. Bussard referred to when he said he computed the future available open flow to Texoma on a basis of taking a maximum of 25% of the open flow daily from each of its wells. That is a legal requirement in Texas, that wells will not be produced in excess of 25% of their open flow.

It would not be safe for Texoma to so handle its drilling program as that it had barely four times as much as the
daily outlet available from its wells, for this reason:
654 Texoma is required to shut some of its wells out in
order to prepare them for rock pressure tests. Some of the wells are out of the line for clean-out operations. Some of the wells are shut out for blowing. The gathering lines freeze up in winter time, which causes the shut-out of some of the wells. In considering the number of wells and 25% of their open flow, Mr. Bussard has taken a theoretical viewpoint of it. It does not consider the practical angle. He is talking about the maximum that could be accomplished if conditions were at all times ideal.

Something has been said about some of the wells being off the line for blowing, and I am requested to state why it is necessary to have some of these wells off the line for that purpose and to describe that operation of blowing these wells.

Mr. Galloup, our production field superintendent, inspects charts on Texoma's wells, and when he detects characteristics in the charts which he can identify, he goes out, or sends some of his men out, to blow these wells. This blowing is to take the water out of the well or to blow out cavings, and the process is to shut off the side gate where the well feeds into the gathering line and then open up the top gate and let the well vent itself to the atmospheric pressure. That blows the water or other foreign matter that has gotten into the well out through the top of the well.

Questions by the Examiner.

The charts referred to are recording charts. They record pressure and differential. The pressure pin makes a mark around the 24 hour chart and then the differential that measures the difference in pressure across the orifice also records another line around the chart. These are meter charts.

Differential is the difference in pressures. On the upstream side of the orifice the pressure will be higher than on the downstream side of the orifice, and knowing the size of the hole and the difference in the pressures we calculate the volume of gas passing.

Direct Examination by Mr. Morgan.

I have spoken of water as one of the things which we blow out, which Mr. Galloup went into at some length, and I am now requested to explain how this other matter gets into the well or formation and why it is necessary to blow it out of there.

The gas as it comes into the hole is saturated with water and the release of this pressure tends to let some of this water drop out. This water runs down the sides of the well bore and causes the lime to flake up and causes the shale to cave. It becomes mud and falls into the bottom of the hole. This foreign matter accumulates and begins to have some effect on the producing characteristic of the well. It restricts the flow, or in some cases it causes the differential pin to be very erratic and to have a choppy motion when it should be smooth. We have to blow the wells to get this out in time, because if we leave it there too 655 long we have a clean-out job, and it has been my observation that some of this debris that is blown out may come from the producing horizon itself rather than off the walls of the well bore. Some of this water may begin to drop out back where this pressure begins to decline away from the well bore. For example, we have one well in Carson County that last week we had to blow twice because of the debris in the well, and it took about an hour each time to clear it out. The debris seemed to continue to come after an ordinary period of blowing, which usually does not exceed thirty minutes.

The operation of blowing the well will not be as effective as a means of cleaning out the water and debris from the bottom of the hole in the future as it is at the present time. As the pressure declines and the open flow declines, we reach a point where it will be very difficult to get this water and foreign matter out. We will then have to install tubing.

Mr. Bussard has testified that the schedule of wells to be drilled by Texoma in the future totals 215 wells, including those that have been drilled since the first of January, 1939. I assisted him in working out that schedule. My judgment is that that estimate is all right from a theoretical standpoint, but it does not take into account the practical considerations. It is based on the assumption that the theoretical flow characteristics of Texoma's wells are going to remain the same over their entire life, and that in turn infers that there will be no change in the reservoir conditions.

We are pretty certain that that is not going to happen. I had Mr. Kuhne make back pressure tests of 30 of Texoma's wells that were tested in 1932 and 1933 again in 1938 and 1939. We find that on those thirty wells the open flow which we would expect at a 100 pound pressure has declined 50% between the tests in 1932 and 1933 and the tests in 1938 and 1939. So we have rather definite evidence that there are going to be changes in that reservoir and also in the flow characteristics of the wells. I think from a theoretical angle Mr. Bussard's study is good; but, in my opinion, it is too conservative with respect to the matter of drilling.

(Motion by Commission Counsel to strike above testimony and objection to any future testimony dealing with a period beyond the reasonably immediate future denied and overruled. Statement by Company Counsel that the company is entitled to all future additions as part of present rate base.)

I have stated that there would be changes in the open flow of these wells indicated by these back pressure curves. The character of the changes will be such that it will tend to lower the open flow for the reason that the open flow is affected adversely by the mechanical clogging of the pore spaces, by the intrusion of water, and by changes of that character in the producing horizon. Those are the two fundamentals.

In concurring with the schedule of 215 wells to be drilled on Texoma's property as indicated by Mr. Bussard, I am concurring only to the extent that it is the indicated number if the potential could be expected to stand up to the indicated level which he has developed through his back pressure curves and pressure decline curves. I mean by that that I think more wells will be required than indicated by Mr. Bussard's study.

In my statement that my observations between 1932 and 1938 showed a 50% loss from what we expected, I meant that the back pressure curves taken first indicated certain open flows at 100 pounds pressure and the second tests gave a result which was 50% less than the result we obtained the first time at 100 pounds pressure, indicating to me that the reservoir had plugged up to such an extent that it brought about this change in the result. It could not have been drained. In the event of drainage the pressure factor would have been taken care of in the curve. A change in the reservoir condition is the only thing that could explain it.

Direct Examination by Mr. Morgan.

What I am saying is that there were two back pressure estimates made, one back in 1932 and 1933 and another in this year and the latter portion of last year, and the open flow indicated on the second test was 50% lower than on the first test.

Cross-Examination Interposed by Mr. Slaff.

If the indicated open flow was ten million in 1932, 50% of that indicated open flow in 1938 would be five million. If the open flow were five million in 1938, 50% more would be seven and one-half million in 1932 instead of ten million.

Direct Examination by Mr. Morgan.

In order that the matter may be clarified, I will explain that the first back pressure tests were taken in 1932 and 1933, and the second tests were taken in 1938 and 1939. The results of the tests indicated that the open flow which would be expected at 100 pounds pressure was 50% less in 1938 and 1939 than was indicated in 1932 and 1933. That indicates to me that there is a change in the reservoir conditions to the extent that the pore spaces are obstructed so as to prevent the flow of gas into the hole in the manner which was indicated by the first tests.

Questions by the Examiner.

What I meant in my reply to Mr. Slaff's inquiry was that if the first figures were ten, then 50% less than that would be five. If the figures were five, 50% more would be seven and one-half. If I had an open flow of ten in 1932, I looked at the chart and figured that we would have seven and one-half million in 1938, and we actually came out at half of seven and one-half million. We read our back pressure curves to find our prediction for 1938, and the result in 1938 was half of our prediction. The rock pressure both times was above 100. We were reading on the chart at the 100 pound rock pressure mark trying to determine the open flows at 100 pounds by our back pressure chart method, and the result of the readings in 1938 and 1939 were 50% less than they were in 1932 and 1933. We constructed two back pressure charts on different dates 657 and got two different theoretical results.

Direct Examination by Mr. Morgan.

This was due to changes in that five year period between the times they were taken. That was not in all of Texoma's wells but just in 30 wells that we had data on in 1932 and 1933, and it indicates that in those 30 wells these mechanical difficulties we have been talking about here had intervened to thwart what would have been the open flow without further obstruction. We know that the open flows of Texoma's wells decline more in a period of time than is indicated by back pressure tests taken immediately after well drilling. We have that practical check on it.

We have drilled 18 wells so far this year, and will drill a total of 22 wells during this year.

The changes in the reservoir conditions due to water and shale are the things that change open flows as indicated by the back pressure curves. Those are the two fundamental conditions and are interchangeable.

My impression is that if the number of wells around Texoma's wells be increased and thus reduce the drainage area, it would not have any material effect on the flow characteristics of the wells except to reduce the pressure in the area more rapidly than that indicated.

Although we have a potential in our present wells adequate to meet our present market requirements, we have already drilled some wells and will drill four more this year. We have made a considerable study to determine our drilling program, and for a number of reasons we have decided to adopt a uniform and orderly program. Some of these wells that we are drilling now are required by consolidation agreements. Some wells which Texoma is now producing are assigned large acreage assignments and are producing at a higher percentage of open flow than we think is desirable.

The drilling of wells now gives us an opportunity to anticipate and meet implied lease obligations with respect to the development of large leases. These implied obligations accumulate, and if we don't take care of them as we go along we get some complaints from the lessors. We can handle a uniform and orderly drilling program with a minimum investment in rigs and derricks and casing, and at less contract hauling expense.

We can handle a uniform and orderly drilling program with our present trained personnel. Mr. Galloup and Mr. Peterson have both had many years of experience in different fields, and we think it is desirable to handle a drilling program which our own men can take care of.

658 The producing of wells at a moderate rate of open flow, at a moderate percentage of their open flow capacity, results in less mechanical clogging of the pore spaces. There is less danger of water encroachment at moderate rates of flow. There is less formation of condensate in the well bore at moderate rates of flow. We obtain a better spacing pattern of our wells, and hence a more uniform drop in pressure as far as Texoma's operations are concerned, and this in turn will delay to some extent the installation of particular booster units. I believe that covers the reasons why we want to drill in a uniform manner.

That is the settled policy of the company and has been the settled policy of the company during a period of years. We have anticipated the drilling of wells in a uniform manner. To some extent in the early formation of our consolidation agreements we delayed drilling in order to bring leases into consolidation. For example, we are prorating on the basis of open flow and acreage, and we attempted to show the land owner that it was to his advantage from a royalty standpoint to put as many acres under the wells as he could. That situation helped us in the formation of those consolidation agreements, and during that period we held up on some of our drilling in order to offer them the first well as an inducement to make these agreements.

I have seen the schedule of wells as outlined by Mr. Bussard, showing the nmber of wells to be drilled in each of the years from 1939 to 1951 inclusive, and I have taken that schedule of wells and developed the cost of drilling those wells. The costs of drilling these 215 wells drilled and to be drilled after January 1, 1939, were based on actual experience in drilling in the areas which we contemplated developing. A well in Moore County we estimate would cost $22,014, whereas a well in Carson and Gray Counties we estimate will cost $17,702.

Those two amounts take into account the difference in depth to which the wells have to be drilled and the difference in the formation characteristics, which will have the effect of making drilling in Moore County more difficult than it is in Carson County and also more costly. On the average, the wells in Monroe County would be 500 feet deeper than those in Carson and Gray.

Costs as of June 1, 1939, were used as the basis of our calculations in fixing the cost of those wells. It was necessary for us to figure out the number of wells that would be drilled in Moore County each year and the number of wells that would be drilled in Carson and Gray Counties each year. We have done that and have prepared an exhibit which sets up the schedule of costs of drilling these additional 215 wells.

(At this point counsel for defendants presented a document entitled "Texoma Natural Gas Company. Additional Capital Expenditures and Operation and Maintenance, Production Department. Witness, J. G. Dickinson." At the direction of the Examiner, the document was marked Exhibit 102 for identification.)

Page 1 of this exhibit is a summary of the additional capital expenditures of the production department of Texoma Natural Gas Company.

659 On the lefthand side of the sheet is a tabulation of the captions under which these capital expenditures will be made, and the years under which these expenditures come are shown at the top of the sheet and across to the right. For example, well drilling in 1939 requires an expenditure of $418,720. This amount in 1940 becomes $414,408, and so on.

Sheet No. 1 is supported by detailed sheets. Page No. 2 illustrates the information as to the number of wells in Carson and Gray and Moore Counties, and the cost in each county group, which supports the figure of $418,720 on the first line. Then the amount in each year is shown on page 2. The totals correspond with the amounts in the first line on page 1.

Turning to page 2, it will be noted that in 1939 we have five wells in Carson and Gray and fifteen wells in Moore. Further over on the same line we have $88,510 as the cost of the wells in Carson and Gray and $330,210 as the cost of the wells in Moore. The $88,510 is obtained by multiplying $17,702, which is the cost of one well, by five, the number of wells to be drilled in Carson and Gray Counties. In like manner the $330,210, which represents the cost of drilling in Moore County, is arrived at by multiplying $22,014, the cost of a single well, by fifteen, which is the number of wells to be drilled in that county during 1939.

That accounts for twenty of the 22 wells which I stated were scheduled to be drilled this year. The other two wells were commenced in 1938 but were completed in 1939, and were charged as of the time they were commenced.

The same explanation applies on down that column of figures on the upper half of page 2, making a total of 67 wells yet to be drilled in Carson and Gray Counties and 146 wells yet to be drilled in Moore County, at a total cost of $4,400,078.

That capital cost includes the drilling of the well and the casing, the master gate and the Christmas tree. The Christmas tree is represented by the fittings at the top of the well and includes the gate valves for the control of the well, which is a series of valves above ground. It includes the master gate and a gate on top of that for blowing and a side gate off the well and small valves to release pressures so that the big valve may be operated. These sums do not include the cost of installing a meter, the base on which that meter is installed, the meter connection, or things of that kind.

Going back to page 1 of the exhibit, a second line is shown called "Well Liners," and an aggregate sum of $18,450 to be expended during the years 1940 to 1947 inclusive. We usually finish our wells in eight-inch casing. As a well is drilled in we frequently encounter shale interspersed in the lime formation. This shale when the water condensate gets on it falls into the hole, and we have found

that by the installation of liners we can prevent some of this difficulty. These liners consist of six-inch pipe and are usually about 600 feet long. They extend from the bottom or near the bottom of the hole up into the eight-
660 inch casing. These liners are slotted in each joint by an acetylene torch and long slots are cut in every joint of pipe so that we let the gas in but keep the formation back to a very large degree.

The thought might occur that the cavings would come in and shut off the slots. This was true when we bored holes instead of slots. The caving would get in there and plug that hole and seal it off, but usually in a slot there will be a little place where gas can get through and that gas would keep running that piece of caving up and down until it finally wore it out and blew it out. They are rather effective in keeping the well hole clean. That is similar to what is known as a sand point in a water well.

These liners we anticipate installing in 41 wells. These are wells that have already been drilled by Texoma but which do not have liners at the present time. We have liners in about 40 wells. There are some wells that we need to run liners in, but in some of them which we have drilled we encountered our open flow in too much volume to be able to run a liner. It is necessary to wait until that open flow declines in order to be able to get a liner down the hole.

In some wells the well appeared to be in such a condition after drilling in that we wouldn't need a liner, but we found later that we have a lot of trouble with cavings in these wells so that we will need to install liners. These liners will necessarily be installed at such time as we move in tools to clean out, because we will need the drilling machinery and the equipment in order to put the liner in the hole, and as we reach these wells for cleaning out in which no liners have been installed, it is our purpose and determination to install liners in those wells which we think need it.

It costs $450 to provide and install a liner in a well. We have $3600 for liners in 1940, which is a total of eight liners. We have seven in 1941, seven in 1942 and 1943 and 1944, two in 1945, two in 1946, and one in 1947, making a total of 41. I think that is the rate at which liners will be installed in these 41 wells. It is a program that I have developed in connection with my consultation with Mr. Galloup. It is quite likely that some of these liners will have to be installed at an earlier date than scheduled here. These are the latest dates to which we felt we could delay this work.

The details as to installing these liners are shown on page 2. That shows the number in Carson and the number in Moore and the total number for each of the years from 1940 to 1947 inclusive, and the total cost. In my judgment, that sum of money will be expended in the installation of liners in Texoma's wells not later than the times indicated in this part of the exhibit, the second half of page 2.

Cross-Examination Interposed by Mr. Slaff.

I mean that in my judgment that sum of money will be expended and that the number of liners will be installed.

In making this estimate we based our prices on prices
661 as of June 1, 1939. In my judgment, that could well
be a reasonable figure in 1947; but I have not formulated any judgment as to what prices will be or could be in 1947.

Direct Examination by Mr. Morgan.

On page 1 there is a third line, labeled "Well Tubing," in which we show a schedule of $11,585 for the year 1941, $17,313 for 1942, and varying amounts on through the year 1953. Texoma's wells are completed usually with eight-inch casing. As the rock pressure declines and as the open flow declines it will be more and more difficult to blow the water and cavings out of the hole. To alleviate this condition the common practice in gas well operation is to install tubing, which is usually two inches in diameter. This tubing extends from the top of the hole to about the center of the gas pay, and the installation of the tubing increases the velocity of the gas and permits the blowing of the water and debris from the hole at low pressures and with less gas loss than if it were blown out of the big hole, and it has the additional ability to get the water and cavings out in a great many cases where you could not do it without the tubing.

We have estimated that approximately 58% of Texoma's wells will require tubing. We hope that some of the areas will not become affected with water and that in some wells we will be able with our liners to keep down the debris to the extent that we may not have to have tubing in them.

It is possible that we have been too conservative in this estimate. We may have to have tubing in more wells. This represents our judgment as to the minimum amount of tubing which Texoma will be required to install. This tubing estimate is carried on the upper half of page 3 of this exhibit, and like the cost of drilling, the cost of installing tubing is controlled by the location for its installation. For example, in Carson County the installation of tubing cost is $1,094 per well, whereas a tubing installation in Moore County would cost $1,223.

That tubing stays in the well once it is installed. It is left in there and the well continues to produce from the casing, but when we want to blow the well we shut the valve on the casing and open the valve on the tubing, and it blows through the tubing. It is just a small metal pipe. It looks just the same as two-inch line pipe.

I have set out the number of wells which in my judgment will be tubed and the time they will be tubed in the Carson-Gray area and in the Moore area, separately, on the upper portion of page 3. It shows a total of 90 wells in Carson and Gray Counties and 114 wells in Moore County, a total of 204 wells out of the 350 wells that we estimate Texoma will eventually acquire. This makes a total of $237,882 that we will be required to expend for tubing.

The totals shown on page 1 under the first solid black line across the page and opposite the words "Total Gas Wells Expenditure" are simply the sums of the amounts to be spent for well drilling, well liners, and well tubing for each of the years 1939 to 1953, inclusive.

662 The next line is designated "Drilling and Cleanout Tools." There are three items, one of $25,780 for 1940, one of $28,270 for 1945, and one of $22,770 in 1951. I will explain the use to which we put cleanout tools and the necessity for having those tools from the standpoint of Texoma's production department.

As I have described previously, we are troubled to a considerable degree with the caving formation in the well bore. Sometimes this caving can be removed by blowing the wells, but oftentimes it forms that solid bridge and cannot be removed, or else it accumulates to such a degree in the bottom of the hole that it cuts off some of the gas pay.

We now have one cleanout machine which we expect to remodel. This is an old-style machine and in its present condition is hard to move around. We expect to utilize it and make it more portable. We anticipate the rebuilding of one of our rigs at a cost of $3,100. The rebuilding of that machine we anticipate to cost $2,000. In addition to that, we intend in 1940 to purchase a new cleanout machine, which will cost $5,500. We will purchase two strings of tools at a cost of $7,590 each, a total of $15,180, making a total for the year of $25,780.

It will be necessary to buy a new cleanout machine and these additional strings of tools, even though we are going to overhaul the one we have now, because we expect to use one machine in Moore County and one in Carson County. There is quite a long distance between these two counties, and the moving of one machine from one locality to the other would cost a good deal of money, and we anticipate that one machine won't take care of our needs during this period. When these wells get in a situation where they must be cleaned out, it is necessary to clean them out before they are restored to normal production.

It is my judgment that this is a minimum requirement for cleanout and drilling machinery and equipment that Texoma will have to provide not later than the year 1940. In figuring the cost of that equipment we have used the cost as of June 1, 1939.

We anticipate that this equipment will take care of our needs until 1945, when it will be necessary to buy an additional machine. We calculate that by this time we will have worn out or lost the two strings of tools which we bought in 1940, and that we will be required to purchase a string of tools for the new machine and two strings of tools to replace the old tools, at a total cost of $28,270.

We estimate then that in 1951 we will have worn out or lost the three strings of tools we had in 1945, and it will be necessary to replace them at a cost of $22,770, making a total of $76,820. These costs were figured on the same basis.

When I speak of tools being worn out or lost, I refer to losing them in the hole and not being able to fish them out. It happens quite often if a line breaks, a drilling line breaks, and you are not able to get hold of it with fishing equipment or in fishing you mash out the end of the tools so you can't get over them, you usually wind up by
663 leaving them in the hole. Oftentimes, in a case like that we drill by them. We start a new hole and drill alongside them, but we still leave the tools in the hole. We can bring the well back on production but we cannot recover the tools under those circumstances.

If we do not lose the tools by 1945 it will not be necessary to make this replacement, except that we will wear out the drilling lines. We will have worn out the drilling line and the sand line and some of the surface equipment that goes with a string of tools. A large part of the string of tools will have to be replaced by that time whether we lose them or not.

This losing of tools in a well is a frequent occurrence. We have it occur in our drilling operations right along. Our contractors have that kind of trouble. We have lost tools in the well and been unable to recover them in two instances.

This detail of clean-out tools is set out on the bottom of page 3.

The detail of the next item of expenditure, "Houses, Garages and Warehouses," is found on page 4. In general, it represents the housing and garage facilities which we need to install to take care of our personnel during the years. As we drill additional wells we will require additional well operators and additional car and truck facilities. Our field housing facilities are located at Dumas in Moore County and at Kingsmill in Carson County.

In the year 1940 we have scheduled houses in the amount of $10,103 in the Dumas camp. In Dumas we anticipate the erection of one 4-room and one 5-room house in 1940. At the present time there are two houses at this locality. Both of them are occupied by employees of the gathering system. The two production department operators should have houses during this year. One of them lives in Amarillo and is driving to the field every day, and one of them lives in a little shack in Dumas. We also expect to build a 5-room house at Kingsmill during 1940, and to provide garage facilities as indicated in the estimate here. The total expenditure for that year will be $17,521. The items for garages at Dumas and Kingsmill are to take care of the company's cars assigned to these operators and also to take care of their personal cars.

The properties of Texoma in Moore County are pretty widely scattered. They cover an area of about 30 miles across. It is not possible for our production men to get around to attend to their duties without having a car, and that is why the company maintains company cars and puts them at their disposal in connection with the discharge of their duties. Also, from the standpoint of the man working out in the field and his own personal convenience, it is necessary for him to maintain a car out there because otherwise his wife could not get to town very often. It is about 50 or 60 miles to the town of Amarillo, which is the principal town in that area.

The additional houses in 1942 and 1943, and on later,
664 1947, 1948 and 1951, are necessary as we increase our
operating personnel, and that is based on the personnel required to operate the property; taking into account the number of wells which we expect to drill. The present personnel cannot continue to look after the wells as they are increased in number from year to year, and this will require the putting on of additional men and the providing of additional housing facilities.

It is my judgment that for these houses and garages which are set forth on page 4 in detail, the amounts shown on that page and in the recap on page 1, in the line designated "Houses, Garages and Warehouses," will necessarily and actually be expended by Texoma not later than the dates indicated.

I do not in my studies bring in an estimate of the cost of maintaining and keeping up these houses because that has been handled by Mr. R. T. Powers, who is taking care of the maintenance and repair of all houses in the Texas Panhandle. It is a part of his duty to keep up all the houses, not only at the Fritch plant but the houses assigned to production and pipe line employees out over the field, and those figures are shown in the studies that Mr. Powers brought here when he was on the stand, including Exhibit 94.

A warehouse is a place where we store materials that we need out in the field from time to time. The purpose of a warehouse is to keep the material in condition and protect it against the weather and against loss or theft.

The garages are divided into two classifications, one for company trucks and cars, and the other for personal cars of employees who are entitled to cottage facilities. The need for the garages for the company trucks and cars is the same as the need for a warehouse. We need those garages to protect the equipment from exposure to weather and to protect it against loss through theft.

A reason for the company's policy in making available to some of its employees cottage facilities and facilities for protecting their personal cars is that we need employees at those locations. In having them near the scene of their work we save automobile expense and we save time. It is a matter of importance that these men be available in the area as much of the time as possible in order to take care of any emergency that might happen and be able to handle better the job that they do.

Another reason for providing houses is the competitive situation. Other gas companies operating in the field and other oil companies make a practice of furnishing houses for their men. The carbon black companies do it, also the oil pipeline and the oil producing companies, and if we are to retain the quality of men which we need in our operations we have to meet those competitive conditions.

I think I can best explain to what extent other gas pipeline companies, oil companies, refineries and carbon black industries provide housing facilities for their men out 665 in the field and around their plants by some illustrations. For instance, the Phillips Petroleum Company has a complete town right north of the town of Borger which is called Phillips, and was previously known as Whittenburg. There are several hundred houses in this camp. They have also provided playgrounds and tennis courts and various other facilities which are for the purpose of making their employees satisfied to live in that location. They have provided schools, and have actually built and operate a high school, that is, a public school that advances a pupil on through high school grades in that vicinity.

It is a proper and necessary thing in my judgment that those things be provided in that particular territory because if an employee lives in town he has available a great many facilities that are not available in the field, and since it is unreasonable to do the driving that is necessary for employees working in the field who live in town, we have in some measure to provide some facilities of that character in the field. I think without doubt that the employees consider the availability of a house and garage is a part of the compensation they get for working for the company. We know when we go after them to hire them for a job that that is one of the questions they ask us—is there a house available. To my mind it is just a necessary part of our operation.

Questions by the Examiner:

We charge a nominal rent for the houses. This rent just about covers the repair and depreciation of the property.

For those who do not have houses we do not have a subsistence allowance. The men for whom we do not furnish houses are as a rule temporary employees and we pay them by the hour. When we get through with the particular job we have for them to do we let them go. They are usually local people who live in the nearby town, and in a great many cases they are farmers who work part of the time on the farm and part of the time for us.

Direct Examination by Mr. Morgan.

Such revenues as are received from the rental of these cottages are included in the general revenues which have been brought in here by Mr. Woodford, for instance.

All the items on page 1 have been covered except the item of leaseholds. The $2,800 scheduled for leaseholds during 1939 has already been expended. It was made to acquire leases to be added to consolidation agreements that are already in effect. It was money we had to expend in effecting the consolidation agreement.

We are not through with consolidations. We will have additional work of this kind, and in our operating budget for the land and lease department we include money under the item of "Miscellaneous" to carry on the work of consolidation.

A considerable part of the expense of securing consolidations is expense incurred in getting the consent of the
royalty owners under Texoma's wells to allow addi-
666 tional acreage to be put under those wells for produc-
tion. Some of the item may be expended for the acquisition of an additional small tract or two; but that is not included in the investment item.

It is necessary to spend money in order to get the parties to join in a consolidation agreement because the royalty owner under a well will not get any more royalty if additional acreage is added than he is getting now. The compensation is to get him to permit additional acreage to be assigned to his well, and the money for royalty to be paid out of the production of the well that is on his own land. In other words, so far as he is concerned, he is satisfied with the situation without any consolidation if the well has already been drilled. A consolidation agreement affects him a little adversely because as we add additional acreage we further distribute the royalty payments that are made based on acreage and open flow, and he thinks when we approach him with a consolidation agreement that it is something desirable from our viewpoint, and since he does not care anything about it his attitude usually is that he will do it if there is some money in it for him.

The figures on page 6 of Exhibit 102 show the amounts for operation and maintenance of the Amarillo office and the Amarillo land and lease department.

The lefthand side shows the classification of the items of expense, and across the page at the top are shown the years that these items of expense were incurred or will be incurred. From 1932 to 1938, inclusive, are actual operating figures. The next column shows the average from 1936 to 1938. That is the period during which the pipe line has been loaded and that is the reason those years were selected. Additional years are shown from 1939 to 1954, inclusive, and the figures in those years are estimated figures based on past expenditures, consideration being given to the fact that some additional expense will be incurred as Texoma does additional drilling.

We will have increased expense for clerical salaries, for instance, because we will have more charts to calculate and more incidental expense to handle in connection with the operation and maintenance of additional wells. This, of course, occasions increased office supplies and stationery and printing, and as we add additional help to calculate the charts and handle this work we will require additional office space, which will run our rentals up.

This is not just an offhand guess or estimate. We have carefully worked this estimate out and taken into consideration the past expense and tried to construct as accurately as we could the conditions with which we would be confronted as we added additional wells.

This applies to the other items as well as to clerical salaries, office supplies and the items which I have mentioned specifically, except that we have eliminated the item of miscellaneous expense and tried to classify it and include it in the other items.

It is my judgment, after due consideration and care-
667 ful study, that Texoma will incur these expenses for
operation and maintenance in our operations over the period of time covered by this exhibit.

I have not broken the expense of the Amarillo office and land and lease department down into any detail. I have broken the production department estimate down in detail, and that is found on page 6-A. The details of this are subsequent to this page. There is no page 5 in this exhibit. We misnumbered it and called it page 6 and the other page 6-A.

We have classified well operation and maintenance under two main headings, one, well operation, and the other, well maintenance. Under well operation we show labor, material, car and truck, damages, traveling expense, gas royalties, and miscellaneous. Under well maintenance we show labor, material and car and truck. The details for the item of labor are shown on page 7, in which we have shown a unit cost per well. By unit cost I mean the cost on which our estimate is based by actual experience. In 1939 we estimate some increase in that cost due to adding additional wells and due to additional expenditures because of the aging of the properties. The unit cost per well for labor for the years is shown in the first column to the right of the column showing the years, and this means an average for each year.

The $72.50 represents the current unit cost for labor in the operation of our wells. It will be different for the other years because the property is aging, and it has been our experience that as wells grow older they require more attention, and we have attempted to allow for that in this estimate.

Since 1932 there has been a change in the working hours and in the wage scale of those engaged in the operation of the wells, and, therefore, in order to arrive at this unit cost, we picked last year where we had the latest year reflecting present hours of labor and labor scales, and the average cost per well in 1938 for labor was $72.50; for material, $9; for truck and car, $15.50; and for traveling expense, $3.50.

The righthand column represents the number of wells in operation connected to our gathering system in 1938, and for each year after that we have the number of wells that will be in operation. The advance from $72.50 to $73.04 per well for operating labor in 1939 is due to an allowance for increased attention to Texoma's wells as they become older. The same is true in materials, car and truck, and traveling expense. We have added seven cents per well for increased material; twelve cents per well for car and truck expense; and about three cents for traveling expense. Those estimates are based on actual experience. That is what happens as wells get older. We have to allow for increosed attention as the property ages.

The same thing is true of maintenance. These unit costs
increase as the property becomes older, and it requires
additional labor and materials and car and truck expense
for maintenance. Last year the average net mainte-
668 nance cost for labor was $4.50 per well; for materials,
$9 per well; for car and truck expense, $1 per well.
In 1939 we have stepped up the cost three cents per well
for labor, seven cents for materials, and one cent for trucks.

The figures shown on page 6-A for labor, materials, and car and truck reflect the amounts calculated on a per well basis that are shown on page 7, with the exception that under "Well Maintenance" the item of cleanout expense is shown under "Materials," and under "Car and Truck," and under "Labor" expense. This cleanout expense is also represented in detail on page 8. We estimate that we will clean out one well a year for every fifteen wells in operation. That is based on experience, and it virtually means that we will give Texoma wells one cleanout operation during their producing life. This cleanout cost is estimated at $1,260, and that divided by fifteen gives a unit cost of $84 for cleanout per well per year for 1939.

This cost in 1946 becomes $2,060 per well, principally on account of the fact that we contemplate by that time the use of acid in our cleanout operations. These unit costs reflect by the number of wells the total cleanout cost shown in the fourth column on page 8, and at the bottom half of the page these costs are divided in percentages in order to put them under the items of labor, materials, car and truck and contract labor. The contract labor item is shown as "Materials" on page 6-A. In working down the figures shown on page 6-A, it is necessary to use pages 7 and 8 in order to correlate them.

Page 9 is a detailed example of the effect of the computation of those quantities based on those unit costs, as, for example, under "Total Labor" in "Well Maintenance in 1939" will be shown the figure $1,827. On page 6-A, under "1939, Labor, Well Maintenance," is $1,827. Another illustration would be to take the car and truck expense. In 1939 the total car and truck expense will be $1,904, as shown on page 9. That is made up of $136 for the unit cost of car and truck expense, $1,468 car and truck expense incident to cleanout, and $300 incident to reclaim, and a total of $1,904. That appears on page 6-A under "Car and Truck Expense" in 1939 as $1,904.

We did the same thing for "Materials." The material item is shown in the upper right hand part of page 9, and shows for 1939 a unit cost of materials of $1,224; cleanout, $567; reclaim, $260; cleanout contract labor, $8,720, and reclaim, $1,509, making a total expense under that item of $12,280. Turning back to page 6-A and looking under "Materials" under 1939, we get $12,280. It is merely a work sheet to show the application of those factors.

Based on my experience in the discharge of my duties as general superintendent of production for Texoma Natural Gas Company, and the experience I had prior to going with the Texoma Natural Gas Company, and upon my knowledge of the conditions obtaining down there in that field and the problems to be met in connection with the production of gas for Texoma Natural Gas Company, it is my judgment that these costs of operation and maintenance reflected by this exhibit and shown on the different pages hereof will be incurred over the period of time indi-
669 cated in the exhibit, if the operations continue that long.

In this exhibit these costs, particularly the operating and maintenance costs, are projected on through the year 1954, at which time Mr. Bussard has concluded from his studies the pressures in the field will have reached an average of 25 pounds at the well head; but in bringing in these figures showing these costs down to that time I do not mean to imply that I believe that Texoma's property can be produced down to that pressure level.

Based on our experience in the Panhandle field, I am certain that operations cannot be continued to a pressure level of 25 pounds, because we have already found it necessary to abandon a number of wells at a much higher pressure. I have also had experience in other fields in which wells were abandoned at a much higher level, and I have had the opportunity to observe the operation of others in the Panhandle field, and it is my judgment that Texoma will not be able to produce its property below a pressure of 100 pounds.

In making this statement I am conscious of the fact that some falling off of Texoma's production will come about above 100 pounds. In other words, I do not think we shall operate at full capacity down to 100 pounds. We will have some restriction in the amount of gas available to the pipeline before we reach that point, and a tapering off will begin at an earlier period. There will be some wells that may be produced below the 100 pounds, but at a very much lower total quantity of gas than would be required for the pipeline. Therefore, it is my judgment that the 100 pounds is a point at which we can consider the operation of Texoma would be concluded.

In order to have a larger quantity of gas at pressures ranging from 100 pounds up to 125 or 150 pounds, we could drill additional wells if it were economical to drill them. We have made a study of that situation and we do not believe it is economical to drill wells in that bracket. We consider it economical to drill a well if we can get our money back with interest during its productive life, and when the pressure conditions and the open flow conditions in the field reach a stage where we cannot hope to produce enough gas from a particular well that we might drill at that time to pay for the well and pay for its operation and maintenance, that well will not be drilled.

These 215 wells that Mr. Bussard and I have agreed will be drilled represent the limit of the number of wells that I think will be economical from the standpoint of Texoma, in the light of conditions that obtain down there and which will obtain as this record shows.

(At this point counsel for defendants offered EXHIBIT 102 in evidence, and made the following statement:

This projection of these figures through the years 1952, 1953 and 1954, is due to the circumstance that we can rely only on the judgment of witnesses as to whether this project can extend beyond the year 1951. Mr. Bussard has brought in figures showing that the pressures 670 will have been pulled down to 25 pounds by the end of 1954. For the purposes of calculation we have put in what it will cost if it were possible to conduct these operations until the pressures reach such a level as that. However, Mr. Kesinger has testified, and now Mr. Dickinson has testified, that in their judgment these wells cannot be produced through the year 1954 but that production will stop prior to that time. Mr. Kesinger said two or three years prior, and Mr. Dickinson says to ground the average pressure at the well head of 100 pounds.

Now, we are entitled to have this record in such shape that if the Examiner were not to agree with Mr. Dickinson we would have some basis for computing the operating costs and the replacement costs down to such time as the Examiner finds that Texoma will be able to produce these properties, and it is a simple matter, if it should be deemed that Mr. Dickinson is correct and that these properties cannot be economically produced when the pressures reach 100 pounds, merely to chop off any expenses of operation or maintenance, or any capital expenditures, and the revenues also, after the time when it is found that we shall have reached the end of the life of this project. Upon offer of Exhibit 102 in evidence by Company Counsel objection was made by Commission Counsel to the introduction of the exhibit and to the witness' testimony with respect to it on three grounds, namely, the witness had testified he had no judgment as to what prices would be in the future, the exhibit and his testimony deals with a period of time beyond any period which can be deemed to be the reasonably immediate future, and, according to the witness' testimony it is inconsistent with Exhibit No. 91. Company Counsel in reply to the objections stated that the reason for the projection of the figures through the years 1952 through 1954 is due to the circumstance that only the judgment of witnesses can be relied upon as to whether the project can extend beyond the year 1951.)

Questions by the Examiner.

If operations should cease, taking a hypothetical case, in the year 1950, my estimates up to that point would be unaffected. My opinion as to the year when it will be necessary to cease operating is reflected in the chart which I introduced the last time I testified, showing the total withdrawals from the field cumulative at the point they cross Mr. Peterson's estimate of recoverable reserves at 100 pounds, which is the point at which I think we will cease operations. That chart is Exhibit 87.

I got that for the early part of 1948, but as we approach that period we begin a tapering off. As I explained, we will abandon some wells, and during the later years we won't reach our full requirements, and some requirements will be obtained below 100 pounds; but the effective abandonment pressure I have set at 100 pounds.

In other words, the withdrawal from the whole field would have been cut down prior to that time so as to defer the time when the pressures will have gone down to 100 pounds. As I recall the figures, that will be during the year 1951. I will check my figures and make a positive statement about that.

Questions by the Examiner.

The note on page 7 is to add $50 per year to operation materials, starting with 1944, for additional warehouse facilities. That is added into the total of the materials and is shown on page 6-A in addition to he other data that appears on page 7.

All of these reclaim items concerning labor repre-
671 sent simply the labor expense in reclaiming some
material.

If economical operations cease in 1951, that would not in any way affect the operation and maintenance expense up to that year. The rate of acceleration of decline would have something to do with changing those figures but in making our estimates we have tried to take into account the fact that there will be some decline in production in those later periods. I think Mr. Bussard and I both agree that there will be a rate of decline there.

(At this point EXHIBIT 102 was received in evidence over the objection of counsel for each of the Commissions, to whom an exception was allowed. Motion to strike witness' testimony denied.)

Cross-Examination by Mr. Slaff.

Under the item "Gas Acreage Rentals" this expense in 1939 will amount to $7,835 in 1940, $992; and in 1941, $720. At the end of 1941 Texoma will have under production all the leases it intends to keep and no further rentals will be required. That is to say, all the wells will not be drilled by that time, but in my judgment all the acreage will be under production. That would be reflected in the item "Gas Royalties" on page 6-A from that point on. The royalties are based on the total amount of gas which Texoma produces and are determined by the quantity of gas which Texoma does produce.

I have testified by affidavit in those gas proration cases which have already been mentioned, the same that Mr. Peterson testified in. I testified before the Texas Railroad Commission at one time in 1931 concerning the Common Purchaser Act, which had just been passed when we started operations in Texas. The extent of that testimony had to do with whether or not I thought a gas producer without a market outlet should be given part of Texoma's market. I did not believe so. I think that was in October, 1931.

672 R. G. STRONG, a witness for defendants, testified as follows:

Direct Examination by Mr. Hedrick.

(July 31, 1939)

My name is R. G. Strong. I live in Evanston, Illinois. I am 46 years of age.

I was graduated from high school in the spring of 1912. In November, 1912, I enrolled in the Machinist Apprentice Shop School of the Westinghouse Air Brake Company, Pittsburgh, Pennsylvania. The factory for this company is located at Wilmerding, Pennsylvania, a suburb of Pittsburgh. In connection with the shop practice obtained in this course, the Westinghouse Company conducted regular classroom work. In this connection I studied the subjects of mechanical drawing, shop arithmetic, trigonometry, analytical geometry, calculus, Steinmetz' theory of alternating currents, and also during my course at that time I had work as an instructor in the Y. M. C. A. night school, instructing in mathematics. I continued this course until 1915, at which time I completed it.

Immediately upon such completion, I secured employment with the same company as an assistant foreman in the manufacture of three-inch shrapnel shells for the British government. At the time the Westinghouse Company received this order, they did not have a building nor equipment available for the production of these shells. I assisted with the installation of all automatic equipment and with the initial tooling and final production of this order.

This work continued until September, 1916. At that time I enrolled in the engineering school of the University of

Michigan. At the time of my matriculation I received credit from the university for the mathematics and shop practice that I had received at the Westinghouse Air Brake Company. I attended the University of Michigan for the term 1916 and 1917.

Early in the fall of 1917 I secured employment as a foreman of the machine shop of the Aetna Chemical Company, Carnegie, Pennsylvania.

In December of the same year I left this company and enlisted in the U. S. Navy as a machinist's mate. After my two weeks detention period at the League Island navy yard at Philadelphia, I was assigned to duty on board the U. S. S. Maine.

In July of 1918 I passed an examination for admittance to the Fifth Officers Reserve Class to be enrolled that fall at the U. S. Naval Academy, Annapolis, Maryland. In September, prior to my enrollment at the academy, I received my commission as an ensign in New York City. In October I entered the engineering class of the Fifth Officers Reserve Class and during a four months' period I had an intensive course in U. S. naval marine engineering.

673 In February, 1919, I was assigned to duty on the U. S. S. Mississippi. While on board that ship I was responsible for the engineering performance record. I was also assigned as an assistant officer in the maintenance of all auxiliary equipment. My regular watches were stood in the main engine room, which happened to be steam turbines.

I was discharged from the U. S. Navy in July, 1919. In September, 1919, I obtained employment with the Empire Gas & Fuel Company, Bartlesville, Oklahoma. I was located at their camp near Eldorado, Kansas. My work was that of mechanical drafting and general machine shop practice in the Empire Company's machine shop. In July, 1920, I was given the position of superintendent of this machine shop. This also included supervision of the central heating plant, auxiliary electric power generating plant and the ice plant, and, two or three years later, the boiler shop department.

I continued in this capacity until April, 1926, at which time I was transferred to the engineering department of the Empire Companies at Bartlesville, Oklahoma. My work in that department consisted largely of general engineering problems, the major one of which was oil and gas pipeline construction.

Under the immediate supervision of Mr. E. V. Kesinger, I handled the details of the preparation of specifications and contracts, the awarding of contracts, ordering and shipping materials, and the direction of all field inspection of pipeline construction, and during this time made trips to the field to check the progress of pipeline construction and also to check the understanding that the various inspectors had as to the application of the specifications in connection with the pipeline construction.

Late in 1928 the Texas Pipeline Company and the Empire Pipeline Company formed what is known as the Texas-Empire Pipeline Company. This project consisted of the construction of a 12 inch oil pipeline from Cushing, Oklahoma, to Chicago. I was assigned to duty on the construction of this pipeline as supervisor of all field inspection.

I continued on this project until its completion in the early fall of 1929. At that time I returned to the engineering department of the Empire Companies at Bartlesville, Oklahoma, and was assigned problems relating to the initial development of the Texas-Chicago pipeline project. That is what is known now as Texoma Natural Gas Company and Natural Gas Pipeline Company of America.

During this preliminary work, until June of 1930, I specifically took part in the development of the pipe that ultimately went into the construction of the Texas-Chicago pipeline. In connection with this experimental work I assisted with the development of the physical and chemical properties of the pipe, and also assisted with testing to determine the weldability of the steel.

In June, 1930, I joined the Continental Construction Corporation and was assigned the duty of preparing 674 specifications, contracts, ordering materials, routing materials, supervising field inspection of the Texas-Chicago project. This work was all handled under the direct supervision of Mr. E. V. Kesinger, chief engineer, and Mr. S. E. Campbell, assistant chief engineer.

During the course of the construction of the Texas-Chicago pipeline I made frequent trips to the field to determine the actual physical conditions as they related to the construction of this pipeline. In July, 1931, I was given the position of superintendent of pipelines, which position I now hold.

My duties in this position consist of the operation and maintenance of the entire pipeline system, by which I mean the gathering system of Texoma Natural Gas Company, the main line of Texoma Natural Gas Company, and the main line and its branch lines of Natural Gas Pipeline Company of America. In this connection I am responsible for the transportation of natural gas from the time it leaves the well head until it passes our respective sales meters.'

In addition to my operation and maintenance activities, I also supervise all capital expenditures that are made in the pipeline department in the interest of both companies.

In addition to the mechanics of transporting gas from Texas to Chicago, a distance of approximately 900 miles, there are three factors which have constantly been a guide to me in supervising this maintenance program of the pipeline system. These factors are; safety of employees and of the public in general, protection of private and public property, and continuity of service.

The forces of nature, as well as other factors, are constantly working against this desired protection. Those forces are rain, floods, wind, drouth, landslides, earth tremors, lightning, snow, and ice. In the short life of this project we have experienced the effects of all of these forces in some degree.

On the average we have from 200 to 225 employees under my supervision. This number fluctuates considerably. We have had as few as 125 or 130 and as many as over 500 at a single time.

(At this point counsel for defendants presented a map entitled "Natural Gas Pipeline Company of America-Texoma Natural Gas Company: Map showing Location of Property, Pipeline Department." At the direction of the Examiner, the map was marked Exhibit 103 for identification.

Counsel for defendants also presented a map entitled "Natural Gas Pipeline Company of America, Map Showing Location of Property, Pipeline Department," and at the direction of the Examiner this map was marked Exhibit 104 for identification.)

I will first discuss Exhibit 103. The organization of
675 the pipeline department of Texoma Natural Gas Company and Natural Gas Pipeline Company of America has the entire line or entire system divided into three divisions. Each division is subdivided into two districts.

District No. 1 of Division No. 1 is known as the gathering system of Texoma, as shown on the large scale map, Exhibit 101.

The main line of Texoma is known as District No. 2, which begins at the Fritch compressor station and terminates at compressor station No. 2 near Gray, Oklahoma.

These districts are designated on the map by name.

District No. 3 is in the system of Natural Gas Pipeline Company and is that part of the pipeline which begins at compressor station No. 2 and terminates at compressor station No. 5.

District No. 4 begins at compressor station No. 5 and terminates at the Missouri River, south of Plattsmouth, Nebraska.

Exhibit 103 represents what we term the south half of the system.

Continuing on Exhibit 104, District No. 5 is divided into two subdivisions, 5-W and 5-E. 5-W represents the western half of Iowa, beginning at the Missouri River, proceeding east to a point south of Indianola, Iowa, and District 5-E is the eastern half of Iowa, beginning at a point south of Indianola, Iowa, proceeding in an easterly direction to the Mississippi River crossing south of Muscatine, Iowa.

District No. 6 is that part of the system in the State of Illinois, which also includes what we term the branch lines.

The Joliet meter and regulator stations are located at the eastern terminus of the 24 inch line, and they are also under my supervision.

Referring to Exhibits 103 and 104 and the designations on the left side of the exhibits from top to bottom, the top line shown in pink, entitled "Single Line Stream Crossings," refers to a number of stream crossings, to which reference will be made during the presentation of the pipeline exhibits.

These combination horizontal and vertical lines, and in some cases vertical lines, extending downward, show more specifically the location of these stream crossings with respect to the main 24 inch line, which is shown throughout in red.

The purple legend is entitled "Compressor Stations" and it shows the location of the respective compressor stations from 1 to 10, inclusive. The location of each station with respect to the pipeline is also designated in the same manner as has been explained.

676 The next horizontal line in red reads "Gate Valves."

A gate valve is, in general design, the type of valve which we commonly know of or see in oil, water and air service. In this connection it is a large piece of equipment specifically designed for this pipeline system; in fact, the valve was constructed in accordance with the specifications of the engineering department of this company.

These gate valves are nominally located every ten miles along the pipeline, with the exception of where a multiple line river crossing is encountered. At that place the multiple line river crossing gate valves are used in lieu of a main line gate setting.

Counsel has commented that between gate valve No. 7 and gate valve No. 11 the distance is something over two inches, while the distance between gate valve No. 6 and gate valve No. 7 is only a little over an inch, and has inquired if I mean that within the space between 7 and 11 there is a river header with a valve that we can utilize as a gate valve. At this location there is not a river crossing. Compressor station No. 2 serves as a block gate for that particular location. There is a main line valve in the pipeline at that point.

Continuing this example, there are two multiple line river crossings between main line gates No. 11 and No. 12, namely, Willow Creek and Beaver River. These crossings serve the same purpose as the main line valves as far as controlling the flow and stopping the flow is concerned in the pipeline system.

The main line gate valves are 24 inches in size. They are what we term a flange valve. They are steel constructed throughout. They were specially designed and constructed for this pipeline system. The inside working parts were all made of stainless steel. The valve alone is worth about $1200. and weighs two and one-half tons.

The numbers in the red circles designate the numbers of the gate valves as they are shown on the records of the company.

The next horizontal line in brown is entitled "Swage Drains." These drains are shown in a brown colored triangle over the entire system. The swage drain is a pipeline connection which is welded to the bottom of the 24 inch pipe to provide an outlet when coupled with a subsequent installation of a tank for the accumulation and removal of condensate.

The installation of the swage drains at the time this pipe line was being constructed followed the general procedure and practice of pipeline construction at that time. This company pioneered in the design and construction of a dehydration plant, the purpose of which was to remove the condensate from the gas before entering the pipeline system. At the time of the design of this line we had no idea what the efficiency of this dehydration plant would be. We have since learned through experience that the dehydration plant has been efficient and the subsequent use of the swage drains has not been needed.

677 We have started a program of removing and reclaiming these swage drains. All of them have now been removed from the main line of Texoma Natural Gas Company between compressor stations Nos. 1 and 2. That reclaiming or removing is designated by the word "Reclaim" or the abbreviation "Rec.," which will be noted under each swage. Additional swages have also been reclaimed from the pipeline system. The same notation of "Reclaim" has been made. The number in each one of those triangles is the number which has been assigned by the company to each one of those swage drains, and that number is as it appears on the records of the pipeline company.

Cross-Examination by Mr. Slaff Interposed.

After we retire them from plant and service we put the usable material in warehouse stock and junk the remainder. We have found the gate valve and the flanges to be usable; but I cannot say offhand what percentage that is of the material.

Direct Examination by Mr. Hedrick.

The next horizontal line, shown in orange, indicates the installation of drips under the entire pipeline system. The drips are also numbered and are so shown on the records of the pipeline company. The "Rec." under some of the drip numbers means "Reclaim" as I described it with reference to swage drains. A number of the drips have now been reclaimed due to the fact that they were no longer needed for the purpose for which they were installed, and also to the fact that they represent, as they were constructed, a hazard to pipeline operation.

The bottom horizontal green line, or last line, is entitled "Multiple Lines Stream Crossings." That shows the location of each multiple line stream crossing, that is, each stream where there are two or more pipelines installed. The three lines at the locations of the multiple line crossings are only a legend used on this map to designate a multiple line crossing, and have nothing to do with the number of lines involved.

Exhibit 103 contains a red line which is fairly straight across the map but when we get over here to the east end of the exhibit the line, instead of being straight, swings down to the south for a couple of miles and then up again where it crosses the Missouri River. That is a location where rights of way could not be secured to project a straight line, which necessitated a deviation to the southeast. In other words, instead of continuing the line straight on across to the Missouri River, we brought the line around those places where we were unable to secure rights of way from landowners.

On Exhibit 104 the red line which designates the pipeline is not as straight generally as it was shown on Exhibit 103. The pipeline as it proceeds across the States of Iowa and Illinois deviates more or less from a straight line. There are two reasons for this, one of which was our inability to secure rights of way, and the second is due to certain physical conditions of topography which prevented the
678 construction of a straight line, such as the particular roughness of the country across Iowa and certain portions of Illinois. In other words, when we came to a bad hill or bluff or some other physical obstruction in the terrain, instead of building the line up over that obstruction we went around it, if it accomplished better pipeline construction.

We have a program for the removal of swage drains and alteration of river crossings, the details of which will be brought out as we proceed.

I have complete supervision of the gathering system of Texoma Natural Gas Company as shown on Exhibit 101, with the exception of the property at Fritch and the individual wells, which come under the production department. I have supervision over the 24 inch main gathering line and the lateral lines leading from the wells to the main trunk line. Exhibit 101 represents a true picture of the main trunk gathering lines and lateral lines of Texoma as they exist at the present time and are shown in black on Exhibit 101.

The swage drains which have been removed and will be removed in the future, and also some of the drips which have been removed, have been used by the company in the past.

(At this point counsel for defendants offered in evidence EXHIBITS 103 AND 104, and they were received in evidence without objection.

Counsel for defendants then presented a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Additional Capital Expenditures, Pipeline Department. Witness, R. G. Strong." At the direction of the Examiner, this document was marked Exhibit 105 for identification.)

Exhibit 105 represents amounts to be expended as additional capital expenditures by Natural Gas Pipeline Company and Texoma in the pipeline department, of which I have jurisdiction and supervision.

On page 1 of Exhibit 105, under the heading "Additional Capital Expenditures," where the word "Texoma" appears, those additional capital expenditures of Texoma Natural Gas Company, of which page 1 is practically a recapitulation, are shown in more detail on page 2 of the exhibit, and the line entitled "Natural Gas Pipeline Company" is explained in more detail on page 7 of the exhibit.

Under the heading "Book Cost of Equipment Retired" the retirements of Texoma Natural Gas Company and Natural Gas Pipeline Company are shown, and these are explained in more detail on pages 2 and 7 respectively of Exhibit 105.

The items shown under the heading "Salvage" are explained in more detail on pages 2 and 7 respectively of the exhibit.

The number of years in the first line represents the
679 years during which the expenditures shown will be
made, and the additional capital expenditures to be made during those years are shown in recapitulation form directly below the designated year.

Turning to page 2 of Exhibit 105, line 1, entitled "Gathering System," line 2, entitled "District No. 2," line 3, entitled "Booster Stations," and line 4, entitled "Tools," are explained more in detail on pages 3, 5, 4 and 6, respectively, of Exhibit 105.

Under the heading "Retirements" the retirements of gathering system, District No. 2, booster stations, and tools are explained more in detail on pages 3, 5, 4 and 6, respectively, of the exhibit; and the same is true with respect to the sub-heading "Salvage."

The amounts to be expended for these different items designated on page 2 are set out for each year during that period of time under the headings 1939 to 1954, inclusive.

The information as to the lateral lines to be constructed by Texoma Natural Gas Company from 1939 to 1951, inclusive, and also as to item No. 2, entitled "Meter Houses," was obtained from Mr. R. M. Bussard of the engineering department, under Mr. G. M. Davidson's supervision, as chief engineer and superintendent of operations. The information which I received from Mr. Bussard and Mr. Davidson is contained in Exhibit 100, which was introduced in evidence during the testimony of Mr. Bussard.

The lengths of line, the sizes of the line, and the location of the lateral lines to be constructed are shown in Exhibit 100. These future gathering lines shown on Exhibit 100 are shown in red lines in Exhibit 101.

After Mr. Bussard gave me that information, it was my responsibility to develop the costs of constructing each of the lateral lines as shown in Mr. Bussard's Exhibit 100; and throughout this entire Exhibit 105 I used prices for labor and material going into the additional capital expenditures by the two companies as of June 1, 1939.

After getting the information from Mr. Bussard I proceeded to calculate the cost of constructing each one of the lateral lines shown in detail in Exhibit 100 and depicted on Exhibit 101, and the figures set opposite line No. 1 on page 3 of Exhibit 105 for the years 1939 to 1951 represent the capital expenditures to be made for the construction of lateral lines shown by Mr. Bussard's Exhibits 100 and 101 in each of the respective years 1939 to 1951, inclusive.

Line 2 is entitled "Meter Houses." A meter house is a small corrugated, galvanized iron building, constructed on a steel framework. The size of this building is six feet wide, eight feet long, and seven feet high. The purpose of this building is to house the orifice meter gauge. One of these houses, which includes the meter setting, is constructed at each well immediately upon its completion.

680 The number of wells to be drilled by Texoma Natural Gas Company beginning with 1939 and terminating in 1951 was given to me by Mr. R. M. Bussard and is contained in a tabulation presented by him marked Exhibit 100. After I received the information as to the location of these wells, I assigned a meter house to each well. The cost of a meter house as represented by this exhibit is $139. I do not know the total figure as to how many will be built

in the years 1939 to 1951, inclusive; but it is in Mr. Bussard's exhibit. I have the figures by years.

In 1939 we will connect 22 wells; in 1940, 20 wells; in 1941, 20 wells; in 1942, 20 wells; in 1943, 20 wells; in 1944, 20 wells; in 1945, 18 wells; in 1946, 19 wells; in 1947, 18 wells; in 1948, 16 wells; in 1949, 12 wells; in 1950, 9 wells; and in 1951, 1 well.

It is quite necessary that meter houses be constructed over each meter for the protection of the meter itself and the equipment contained within the meter house from weather conditions.

Line No. 3 is entitled "Construct Bridge Across Big Blue Creek," and shows an expenditure in 1942 of $54,508. Big Blue Creek, which is referred to as item No. 3 on page 3 of Exhibit 105, is located on the Bennett ranch in Moore County, Texas. This creek is now crossed with a single 24 inch pipeline. During the past few years we have had considerable maintenance expense at this crossing for the purpose of protecting the 24 inch line and the continuous flow of gas through the line. These expenditures have been made for the protection of the banks from erosion and for the protection against erosion of the stream bed and the widening of the stream. We have used such facilities as concrete wing walls, concrete anchors around the pipe, split steel reinforcing sleeves around the couplings, and what is known as jetty protection.

This work has been only partially successful. The width of the channel at the present time is 356 feet, which indicates an increase of 60 feet since 1931, which is the approximate time the river crossing was first constructed. This stream normally carries a very small amount of water. In fact, it can be jumped across at times, or easily waded. Due to the topography of the drainage area, the drainage from rains is very rapid. In fact, this stream can change from a very small quantity of water to one of turbulent intensity, having a depth of 12 to 16 feet.

The bed of this stream is sand with a depth of approximately ten feet, resting on a shale sub-surface. During these flood periods the entire body of sand moves en masse downstream. The forces thereby developed against a structure such as a pipeline are obvious.

I desire to relate an experience that we have had with our gathering system crossing at another point on this same creek, which is on the Sneed ranch, and is located southeast of the Bennett ranch. This crossing was originally constructed with two 18 inch parallel submerged pipelines. In 1935 we experienced one of these floods which I mentioned. As a result of that flood the upstream 18 681 inch pipeline failed or broke in two at the south bank. We then started to reconstruct that crossing. Before the work was completed we had a second flood which completely reversed the arc of the pipe from an upstream arc to a downstream arc. We were then convinced that it would be futile to spend additional money at that crossing for a submerged crossing. As a result of that, we decided to construct a suspension type bridge. A picture of that bridge was introduced through the witness Floyd C. Brown and is marked Exhibit 78.

The present suspension bridge across Big Blue Creek in Moore County, Texas, is located on the Charles Ragsdale survey block on the Sneed ranch. It is approximately six miles north and west of the Moore County Canadian River crossing at the point I am indicating on Exhibit 101. The crossing of Big Blue Creek with the single 24 inch line, at which place a suspension type bridge is planned, is located on the W. E. Bennett ranch, which is in Section 3, Block M-1, Moore County, Texas.

Page 18 of Exhibit 105 represents the amount of river work that has been done by Texoma and Natural Gas Pipeline Company from the time the original line was constructed in 1930 and 1931 to January 1, 1939. The description of this work is shown by the respective pipeline district numbers. The year is given in which the work was performed, the county and state are also shown, and the actual costs of the work performed. Some of this work was maintenance work. It does not all represent capital expenditures.

Questions by the Examiner.

Prior to 1935 on the Big Blue River crossing we had two 18 inch lines, and it was then changed to a bridge. After constructing the bridge we then installed two 18 inch lines on the bridge. We originally had two 18 inch lines submerged across the creek or river. We still have two 18 inch lines across the stream on the bridge.

The Big Blue crossing on the Bennett ranch is becoming increasingly important. This is due to the fact that there will be additional production from those sections of Moore County to the west, northwest and southwest of the Big

Blue crossing In order to safeguard the delivery of this gas and provide for continuity of service, we are going to construct a suspension type bridge across this stream in 1942, at an expenditure of $54,508. We will also construct on this bridge two 18 inch parallel lines.
(August 1, 1939)

Direct Examination by Mr. Hedrick.

Yesterday Mr. Slaff asked me a question concerning Exhibits 103 and 104. As I recall the question, it was what percentage of the material salvaged from the reclaim of a swage drain was usable, and I replied that I didn't know but that I would get the information. I was in error when I answered the question, due to the fact that I had in mind the usable material salvaged from the reclaim of a drip instead of a swage drain. There is no salvage from a
682 swage drain; it is all junked.

I wish to advise further with respect to the Big Blue Creek crossing. This is Big Blue Creek on the Bennett ranch in Moore County, Texas. Just before coming over this morning I had a report from the operating superintendent in Texas, who advised me that floods within the past two or three days have caused additional damage at that crossing to the extent of about $1000. This is further evidence of the forces of nature which are continually acting against the maintenance of a pipeline system. The results of these forces cause a considerable portion of our continued expense.

I did not get a complete report this morning of the nature of the damage, only that the river was wider than it had been known to be before; and I assume that more of the pipeline will have to be anchored and more of the couplings will have to be sleeved in order to stabilize the line at that point.

On line 4, page 3, of Exhibit 105 is a provision for an expenditure of $167,482 in 1940 to construct two 12 inch Canadian River lines. This Canadian River crossing is the Moore County lateral of the Texoma gathering system. On Exhibit 101 the Moore County lateral crossing to which I refer is about two miles northwest of the Fritch compressor station. All the gas from the Moore County area is required to pass across that river at that point before reaching the Fritch compressor station.

This is on the Moore County 24 inch lateral where it crosses the Canadian River. This river is crossed with four 12 inch pipelines. Each line is approximately 7,000 feet long.

The Canadian River has a water shed or drainage area above the pipeline crossing of over 23,000 square miles. This drainage area is quite rough as to topography. The slopes are steep. It is semi-arid; which has been aggravated in the past few years on account of the drouth conditions in the southwest country. Rains, when they do occur, rapidly flow to the drainage areas and to the creeks, and hence to the main stream, the Canadian River.

It is not uncommon to see a flood approaching down the channel in the wall of water stage. By that I mean there is a distinct wall of water three to four feet in height. Preceding this approaching flood you will observe a boiling of the sand, as there is a very strong subsurface flow. The total depth of the sand in the Canadian River channel has never been found. There is a stratum of sand approximately 25 feet in depth, which is known as floating sand. This stratum is completely saturated with water during flood conditions. The sand moves en masse downstream during heavy flood. The force of this moving body of sand is sufficient to shear off bridge piers, piling, power line poles, break pipelines, and do damage of that character.

By way of explanation I would like to cite for you 683 some of the damage that was done by the Canadian River in the vicinity of our pipeline crossing as a result of floods during May and June in 1937.

The stream at the top of the picture on Exhibit 92 is the Canadian River of which I speak. If you will refer to that photograph you will observe the route of the 24 inch pipeline running from the Fritch station northwest across the Canadian River. We are accustomed to speaking of it as the main trunk line rather than a lateral line. It runs to Moore County.

You can follow the back fill by that lighter line across the photograph. The line enters the river at the south bank at the point I am indicating on the picture, approximately two inches in from the righthand margin, and leaves the river on the north bank about one inch from the righthand margin.

As a result of these floods of 1937, the Canadian River Gas Company lost four 8 inch lines on May 29, 1937. This crossing is about three and one-half miles upstream from our Canadian River crossing. The Phillips Petroleum Company lost four piers of their pipeline bridge and other piers were damaged. This bridge carries a 24 inch line. The Phillips Company's bridge is three-quarters of a mile downstream from our main line Canadian River crossing. The Huber Petroleum Company's 16 inch single line failed during one of the first rises. This crossing is three and three-quarters miles downstream from our main line Canadian River crossing.

I have referred to downstream. So that the record will be clear as to what I mean by downstream, I will explain that the Canadian River flows from the southwest toward the northeast.

The Southern Union Gas Company's 4 inch line parted at the center of the stream. This crossing is located three miles upstream from our Moore County crossing.

The Phillips Petroleum Company lost an 8 inch and a 12 inch line crossing the Canadian River near Sanford, Texas. These lines were located two and one-half miles downstream from our main line crossing.

The Rock Island Railroad Company's bridge near Sanford, Texas, was damaged to the extent of 250 feet. That is, 250 feet of bridge was washed out, and numerous piers were weakened. This bridge is downstream from our main line crossing. It is near Sanford, Texas, which is about a mile east of our Canadian River main line crossing. The Rock Island bridge is about two and one-half miles downstream from our main line Canadian River crossing.

There was additional damage done during the same floods on other streams in that same area, which I will not take time to detail now.

I wish to refer to a pipeline break which we had on the main line crossing of Canadian River in August, 1935.
684 We had Line No. 5, which is the fifth line counting from the downstream side, break. This line completely failed and broke in two at the north bank during a flood which reached a height of about eight feet.

We have checked the movements of the lines at the Canadian River main line crossing, and they have settled to depths of 15 feet and have moved downstream to the extent of 20 feet. On the Moore County crossing the downstream movement of the 12 inch lines has amounted to eight feet, the vertical movement to six feet. These movements are caused by the forces of this stratum of floating sand, which is approximately 25 feet deep.

When these lines move downstream there is a cold working of the metal which takes place. I mean that when a piece of metal is bent or deformed above the yield point of the steel, a new yield point is obtained. With each successive movement or cold working of the steel there will continue to be a new yield point until ultimately that yield point will reach the tensile strength of the metal. As each successive yield point is reached, the metal becomes more brittle, that is, more subject to fatigue, due to the vibration of the floating sand and of the water. This fatigue condition will eventually cause complete failure of the steel. Fatigue is caused by varying forces applied gradually, not by impact; and the resulting loads will cause the metal to fail at amounts of one-half to two-thirds less than the ultimate strength of the steel. If these variations in load are increased, and the repetitions are increased, the metal will fail at loads less than one-half of the ultimate strength of the steel.

I would like to cite a few examples of fatigue or the development of fatigue. I will assume first a sixteen gauge steel wire held between two hands. We have very frequently wanted to break a piece of wire in two pieces by bending it back and forth. If we bend this wire at small angles of deflection at a slow rate of speed, slow reversals, it will take some time for that wire to fail. We soon get tired of that and we speed up the operation. We increase the angles of deflection and increase the speed or number of reversals, and the wire will soon fail. If we take the same wire and attempt to break it by tension, it would be impossible for a human to do it without superhuman strength.

The cracks which appear in the fenders of our automobiles are the result of fatigue. We frequently read of railroad wrecks which are attributed to or caused by a break in the rail. This break is caused by or is the result of fatigue. The rail contains a flaw or defect from the time of its manufacture. The defect progresses or grows by the continuous travel or pounding on the rail by the wheels of the trains which pass over the track. The result is ultimately the broken rail.

To show how little a force may be to cause metal fatigue, it is known that the water dripping from a drainpipe in a railroad car into the axle of a truck will ultimately cause that axle to fail.

These examples are given to show and to explain the forces which are continually working on these submerged crossings.

685 As stated, the Moore County crossing is now laid with four 12 inch lines. At the time of its original construction in 1931, we made provisions for the installing of two additional 12 inch lines. The header and gate valve facilities are now in place. Due to the additional drilling which is scheduled to be done in Moore County and the additional amount of gas that will be delivered from the Moore County area, in 1940 we are going to lay two additional 12 inch lines. These lines will not only serve as additional protection to this crossing, but will also reduce the pressure drop which now exists at that place. We contemplated these two additional lines at the time we constructed this crossing, and provided for additional spaces on the header.

The next item is No. 5, entitled "Replace Drips, 24 inch Line," with expenditures in the years 1940 to 1954, inclusive. A drip is a facility for the collection and removal of condensate from a gas pipeline. The drip to which I refer consists of a tank 18 inches in diameter which is placed directly beneath and parallel to the center line of the 24 inch pipe. This tank is connected to the 24 inch line by means of two 10 inch vertical risers. By risers I mean 10 inch pipe. The ends of each of these two pipes are welded respectively to the tank and to the 24 inch line, the bottom of the 24 inch line. These 10 inch welds are reinforced with gusset plates.

(At this time counsel for defendants presented a document containing three photographs, the top one being labeled "Drip With Gusset Type Weld Reinforcement," one entitled "Split Steel Welding Sleeve Installed on 24 inch Coupling," and another, "Illustration of Gusset Plate Reinforcing; Not a Part of a Drip." At the direction of the Examiner, this document was marked Exhibit 106 for identification.)

The picture at the top of Exhibit 106 gives the end view of a drip. The drip is placed on its side. The pipe to the right of the picture represents the 24 inch line. The pipe of which you see the end at the left of the picture represents the 18 inch pipe. The pipe connecting these two pipes is the 10 inch pipe. At each end of the 10 inch pipe is a triangular shaped plate. This is known as the gusset plate. Four of these plates are installed at 90 degrees around the periphery of the 10 inch pipe.

This gusset plate can be better observed by referring to the lower right hand picture on Exhibit 106. That shows the method of welding the gusset plate to the riser and to the pipe. These drips are continuously subjected to fatigue, which has been previously explained. The purpose of the gusset plate is to reinforce the pipes where they have been weakened as the result of the removal of a section of pipe from the tank and the 24 inch line.

We will assume an 18 inch tank closed at the ends with ellipsoidal heads with pressure applied on the inside. There are circumferential lines of stress running around the pipe. There are also longitudinal lines of stress running from end to end. We cut a hole in the pipe for welding a 10 inch riser. A 10 inch piece of pipe is welded to the opening and is closed at the opposite end. These
686 circumferential lines of stress as they approach this opening separate and follow the edges of the hole. In other words, those lines of stress are concentrating at the edges of the hole which has been formed, and in a similar way the longitudinal lines of stress are separating and concentrating at the edges of the hole. The pressure down in that drip is the same as the pressure in the pipeline itself, and also in the 10 inch risers to which I have referred.

There is a continuous deformation of this metal due to the pulsating flow of the gas. That is, the metal is continuously working at the points where the gusset plates are welded to the pipe. We have actually had failures occur in headers at the Fritch compressor station and also at Station 6. We have a program for removing and replacing these drips in the gathering system on account of this fatigue and on account of external corrosion.

In 1940 we will replace three drips amounting to $3,673 and in the succeeding years, from 1941 to 1954, inclusive, we have a continuous program of replacing drips on the 24 inch trunk line of the entire gathering system. The drips which will be constructed to replace the present drips will be so designed as to be reinforced with a steel welding saddle.

(At this point counsel for defendants presented a document containing two pictures, the top one of which is entitled "Drip with Saddle Type Weld Reinforcement," and the bottom picture being entitled "Welding Saddle Reinforcement." At the direction of the Examiner, this document was marked Exhibit 107 for identification.)

Both of the pictures on Exhibit 107 represent the saddle type construction to which I refer. In the upper picture the two large pipes in the center of the picture connected with two smaller pipes represent a drip of the type with which we intend to replace the gusset type of drips. The lower picture is a close-up view of the saddle reinforcement.

(At this point EXHIBIT 107 was offered and received in evidence without objection.)

The replacement cost of these drips varies from $1,191 to $1,291, installed complete.

Line 6, entitled "Replace lateral drips," shows expenditures from 1946 to 1954, inclusive. The lateral drip is a drip installed in the lateral lines. These lateral lines vary in size from four inches to ten inches, and when I refer to lateral lines I mean to distinguish from the 24 inch trunk gathering lines to which I referred a moment ago. The lateral lines are the smaller lines leading off from the main trunk gathering lines to the wells or to groups of wells.

These drips are constructed with 18 inch pipe closed at each end with an ellipsoidal head. They are installed in a vertical position in the pipeline—in the lateral line. 687 The lateral line is welded to the upper portion of the drip. These drips are installed in low swales, in creek areas, so that the condensate which is flowing along the bottom of the pipe line in a liquid phase will drop out by gravity into the drip tank, from which it will be later removed by the chart changers or line walkers.

By necessity, these drips are located in areas which are subject to accelerated corrosion. Due to the corrosive action at these locations on the metal surface of the drips, we are going to replace these drips beginning in 1946 and ending in 1954. The expenditure in 1946 will be $1,418, which will include 12 drips. I have referred to the difference in cost, ranging from $1,191 to $1,291. The difference in cost accounts for the little variation in the figures shown. In 1944, $1,266 is for one drip. That is another point that I did not observe before. That little variation in cost is explained by the expense of excavation.

I have referred to corrosion and its effect on the pipeline. Corrosion is the physical loss of the weight of metal caused by uniform or non-uniform oxidation, commonly known as rust. This corrosion is aggravated by the galvanic action of the soil and pipe and by stray electrolysis.

(At this point counsel for defendants presented a piece of steel about six inches square. At the direction of the Examiner, this piece of steel was marked Exhibit 108 for identification.)

The piece of pipe metal referred to as Exhibit 108 was removed from the main 24 inch pipe line at the highway crossing north of the Arkansas River crossing east of Dodge City, in Kansas. The smooth part is that portion of the pipe which was inside the 24 inch coupling. The rubber of the coupling extended over this part which has not been affected by corrosion; that is, from the smooth edge about two inches to where we see a depression in the metal.

The remaining portion of the pipe, of which this is a section, was corroded to depths of approximately one-eighth of an inch. The remaining metal thickness is about three-sixteenths of an inch. At the time this was removed from the line we removed 45 feet of 24 inch pipe. The bottom segment of this pipe was corroded in a similar manner as is shown on this sample. We are continually inspecting railroad and highway crossings to determine the extent of corrosion. There was no break at this point. That condition was found as the result of one of our regular inspections.

That condition in the pipe presents a hazardous situation with reference to the pipe line. That corrosion is caused by galvanic action aggravated by the presence of water, and is more commonly known as the electro-chemical corrosion. The hazard is, we may explain, twofold. A failure of the pipe would result in a serious interruption of the flow of gas, and a failure of the pipe at that location, being adjacent to a highway, could result dangerously to traffic on the highway.

We have found through our inspections that the pipe coating has not been resisting the effects of corrosion
688 as well as it should. The operations of constructing a highway or railroad crossing are such that it is difficult to construct a crossing and maintain the full value of the protective coating, so we have paid particular attention to the crossings. We make inspections of the rest of the line as well.

This is a typical case of corrosion. That condition is more or less local along the pipe line. It does not exist continuously. When corrosion starts, it will progress, but not in a straight line curve. The rate of progression depends entirely upon the local and specific conditions that exist at each point along the pipeline.

I have completed my explanation of Item 6, and will proceed to Item 7, entitled "Install Tank Drips on 24 Inch Line," and showing expenditures from 1940 to 1952, inclusive.

At the time the 24 inch main trunk line was constructed in the Texas Panhandle in 1931, we made provisions for the installation of what we termed tanks. A tank is a reservoir which is constructed out of pipe, with the ends closed, with ellipsoidal heads. During the course of operating the gathering system we developed, through operating experience, that condensate will accumulate at points where no means for removing the condensate have been provided. At those places we install tank drips, and they are only installed at such times as we determine condensate is actually accumulating at those respective locations.

Beginning with 1940, we will install tank drips to and including 1952. The expenditure of $252 in 1940 is for the installation of two tank drips. The cost of one tank drip, completely installed, is $126. The amount varies with the number of drips installed. In 1945, 1946 and 1947 there will be three tank drips installed in each of those years, which will make a total of 29 tank drips installed during the 13 year period.

Item 8 is for installing new drips and tanks on lateral lines. It shows expenditures in 1943 to 1952, inclusive. My explanation for the installation of those drips is the same as that concerning Item 7 except that there will be additional condensate to be removed from the lateral lines as the field becomes older and the individual wells produce more water and moisture.

Question by the Examiner.

These figures represent tanks to be installed at five locations on the lateral lines, and 160 new drips will be installed on the respective lateral lines.

Direct Examination by Mr. Hedrick.

The expenditure of $1,880 in 1943 includes the construction of 16 new drips during 1943. The same number will be installed in 1944, 1945, 1951 and 1952. During the years

1946 to 1950, inclusive, we will install 16 new drips and one tank drip in each of those years.

689. Item 9 covers meters and regulators. These will be installed during the years 1939 to 1951, inclusive. Each time that a gas well is completed, it is necessary to install an orifice gauge meter and a regulator. The meter is used for recording the flow of gas from each well. The regulator is used for reducing the lateral line pressure to a four ounce pressure for the furnishing of gas to a heater which is installed on the inside of the meter house. This heater is used in the winter months to protect the meter gauge lines from freezing, which, if they did, would give an erroneous meter reading or registration.

The number of meters and regulators to be installed will be the same as the number of wells to be drilled in each of the years 1939 to 1951, inclusive. This is with the exception that in 1942 we will drill 20 wells but only purchase 15 meters and regulators. This is due to the fact that in 1942 we will reclaim five meters and five regulators which are now in service and which will make those facilities available for further installation. By referring to Exhibit 100 one could tell the number of meters and regulators that will be installed, since they are in harmony with the number of wells that will be drilled during the years in question, except for the year 1942.

Referring back to lateral drips, Line 6, and tank drips, Line 7, on the gathering system the gasoline has not at that time been removed from the gas, so there will be a larger amount of gasoline and moisture in the line at those points than after the gas leaves the Fritch station.

The unit price of those meters and regulators is $151, and you can tell by using that divisor how many are installed. In Line 9 on page 3 of Exhibit 105, starting with the year 1939, the number of meters and regulators to be purchased is as follows: 22 in 1939; 20 in 1940; 20 in 1941; 15 in 1942; 20 in 1943; 20 in 1944; 18 in 1945; 19 in 1946; 18 in 1947; 16 in 1948; 12 in 1949; 9 in 1950; and 1 in 1951.

Item 10, page 3, of Exhibit 105 is entitled "Skellytown Camp." Under that item we propose to construct a camp for the housing of personnel and equipment for the operation and maintenance of that part of the gathering system which is and will be in the vicinity of Skellytown, Texas. As additional wells are drilled and booster stations are installed, it is necessary to place our employees and equipment closer to the vicinity of their actual work.

In 1942, in Skellytown, we show an expenditure of $18,580. The detail of that expenditure includes the following: one house for a meter inspector; one house for a chart changer; a four car garage; the purchase of a camp site; the completion of a water well and installation of pumping equipment; an elevated water tank; a septic tank; and a pipeline warehouse.

In 1943 the expenditure of $746 is for the installation of pipe rocks for storing a supply of pipe. The expenditure
of $19,433 at Skellytown in 1944 will be divided as fol-
690 lows: one house for a foreman; one house for a truck
driver; two houses for maintenance men; six garage stalls; and recreation facilities.

In 1947 we have an expenditure of $5,547 at the Skellytown camp, which is for the construction of one house for a maintenance man and the construction of two garage stalls.

In 1948 we have an expenditure of $10,043 at Skellytown for the construction of one house for a maintenance man, one house for a chart changer, and two garage stalls.

The recreation facilities item on line 10 includes such facilities as a tennis court, croquet court, or teeter-totters for children. The amount involved for recreation facilities is $350.

Line 11 on page 3 of Exhibit 105 refers to the construction of houses and facilities at the Dumas camp, located adjacent to the town of Dumas, Texas. The reasons for increasing the facilities at the Dumas camp are the same as have been explained for Skellytown. In 1940, at Dumas, we have an expenditure of $36,061, which includes the construction of the following: a house for a foreman; one house for a truck driver; two houses for maintenance men; one house for a meter inspector; one house for a chart changer; a ten-car garage; three bays added to the present warehouse; a water well and complete pumping equipment; an elevated water tank; and recreation facilities in the amount of $350.

In 1942, at the Dumas camp, we have an expenditure of $4,655, which includes the construction of one house for a maintenance man, one garage stall, and the purchase of additional land at a cost of $163.

In 1943, at the Dumas camp, we have an expenditure of

$4,429, which includes the construction of one house and one garage stall.

In 1945 we have expenditures totaling $5,299 for the construction of one house for a chart changer and three garage stalls.

In 1946 we have an item of $4,080 for the construction of one house for a maintenance man.

In 1947 we show an amount of $4,757 for the construction of one house for a meter inspector and two garage stalls.

Line 12 on page 3 of Exhibit 105 is described as Kingsmill Camp. During 1943 we have an expenditure of $5,337 for the construction of one house for a chart changer and a two-stall garage.

Item 13 is entitled "Cathodic Protection," and shows expenditures in 1941 and 1942. Cathodic protection is an electrical method for preventing the corrosion of metal by impressing a negative potential on the pipe with respect to the soil or some other structure. That cathodic protection is on account of either electrolysis or electro-chemical action. When pipe is corroded by either of those, the corrosion is due to the current flowing from the pipe.
691 The pipe is positive to the soil or some other structure.

The cathodic method is for the artificial reversing of the flow of current. The equipment that is used is a power-driven generator. The power may be supplied by a gas engine or a windmill, or the power can be purchased from some electrical transmission line.

We will assume, for example, the installation of the windmill type of equipment. A unit of this kind is installed on a tower similar to a windmill tower. A ground bed is installed at a point remote from the pipeline. The current flows from the generating unit to the ground bed, thence to the pipe; that is, there is always a continuous flow of current from this ground bed to the pipe.

We have an installation of cathodic protection which is being made at the present time on a five-mile section of 24 inch line near Wilson, Kansas. We will have sections of the line, each section being one mile or more in length, located in concentration areas wherein cathodic protection will afford an economical method for arresting the action of corrosion. We have had experiments made and studies prepared in the past showing that electrolysis or electrochemical action does exist and that this method is an efficient method for protecting the pipeline against such action.

Questions by the Examiner.

We plan to generate our own power. The figure in 1941 is for the purchase of equipment for the protection of 3.8 miles of lateral line and two miles of 24 inch pipe line. It will consist of the wind driven generator, tower, ground bed, necessary wiring, and, in the case of the 24 inch pipe line, the copper bands which are installed at each coupling. They are welded to the pipe on each side of the coupling to provide for a continuous flow of current, thereby reducing the resistance of the pipe. We have not yet specifically located those sections; but we have determined their length from a study that we are making at the present time and work that we have done in Kansas during these last few years. That length is the result of those studies, based on a percentage of the amount of pipe installed. Those sections which are referred to here will be in the gathering system in the Panhandle field in Texas.

Direct Examination by Mr. Hedrick.

The equipment involved in the expenditure in 1942 is the same and we plan to protect a similar amount of pipe. It will still be in the gathering system in Texas.

On page 3 there are two other sub-heads, namely, "Book Cost of Property Retired" and "Salvage." Those are the amounts set out opposite each of the lines under those subheadings shown on page 3. For example, in 1942, under the heading of "Book Cost of Property Retired," Item 1, lateral lines, we show a property retirement of $7,500. In the same year under the heading "Salvage" there is an item of $1,800. That is the salvage that is involved in the
taking up of the lateral lines involved in the construc-
692 tion of lateral lines in Line 1 under the heading "Addi-
tional Capital Expenditures," and refers to the book
cost of the usable material.

(At this point EXHIBIT 108 was offered and received in evidence without objection.)

The information as to the stations to be installed and the units added, shown on page 4 of Exhibit 105, was obtained from Mr. R. M. Bussard, and is the information that is contained in Exhibit 100. Those booster stations are spotted on Exhibit 101 and are designated by solid red triangles.

The term "Stations Installed" means the construction of a building and the installation of an engine driven compressor unit. The term "Units Added" means the unit or units that may be added to the original station installation. The first line on page 4 of Exhibit 105 gives the number of stations to be installed in each of the years there shown. The second line indicates the number of engine driven compressor units that are to be added to the respective stations. When I say "Units Added" it means the same as the engine with its compressor unit referred to by Mr. Bussard. The terms are synonymous and refer to a 40 horse power complete unit. "Stations Installed" and "Units Added" compare to the "Stations Installed" and "Units Added" shown in Mr. Bussard's Exhibit 100. In other words, in 1940 there will be two stations installed in addition to the station that is now installed; and in 1942 an additional 12 stations will be installed, and in one of those stations an additional unit will be added, so that at one of the stations you will have the housing and contained in that housing will then be two units.

I have been requested to explain how I arrive at the cost of the stations installed and units added, and how much each unit costs as of June 1, 1939. In the year 1940 we have an expenditure of $10,640 for the installation of two stations. The unit cost of a station installed complete is $5,320. Using that unit cost as a factor, the figures in the first line on page 4 will give the amount of money to be expended under the item "Stations Installed" for each of the years shown. In 1940 the two stations will cost $5,320 each, and in 1942 there will be 12 stations installed at a cost of $63,840. The balance of the line is simply a multiple of $5.320. The units added, of which there will be one in 1942, will each cost complete $4,675. The other amounts set opposite that line are units costing $4,675.

In 1942 we will install an 8,000 gallon lubricating tank, amounting to $1,051, at Skellytown, which is the same Skellytown camp I have already referred to. In 1944 we will install a lubricating oil tank, 8,000 gallon capacity, at an expenditure of $1,051, at the Dumas camp. These tanks are installed for the purpose of purchasing lubricating oil in bulk quantities in order to take advantage of minimum purchase prices, and the oil so purchased will be stored in these tanks.

Under the heading "Book Cost of Property Retired" it is shown that 25 units will be retired in 1952, the book
693 cost of which is $116,875, and under the sub-heading

"Salvage" $99,875 thereof will be salvage. That figure merely represents the book cost of the usable material salvaged.

Cross-Examination by Mr. Slaff Interposed.

Those materials will be reinstalled in the same year at other locations. Those 25 units will make up part of the 37, and 12 additional units will be purchased. The difference between the amount of $99,875 salvage and the $116,875 book cost, comprises such items as labor, transportation, freight, and incidentals. In this case the book cost of the units happens to coincide with the installed price as of June 1, 1939.

Question by the Examiner.

I have been asked to explain how I correlate Item 4 under "Book Cost of Property Retired" and Item 4 under "Additional Capital Expenditures." The book cost of property retired, consisting of the two 12 inch Canadian River lines in the years 1945 and 1947, respectively, is $34,816 in each of those two years; that is, the book cost of the two original lines which were constructed in 1931. That does not refer to the two lines which we are going to construct in 1940. We are not reclaiming those lines in 1945 and 1947.

Direct Examination by Mr. Hedrick.

The reason that the two lines that will be constructed across the Canadian River in 1940 cost so much more than the book cost of the two lines to be retired in 1945 and 1947 is because of the increased cost of material, the increased cost of labor, and the increased cost due to the fact that the overhead and equipment is distributed over a considerably shorter section of line. During the construction of the gathering system one contractor had the entire gathering system, and he was able to distribute all of his overhead expense and his equipment expense over the entire project. In this case, in 1940, it will be necessary for a contractor to bring in men and equipment and organization specifically for a small amount of footage. Also in that figure there is expense for a more substantial design than we had in the lines that were constructed in 1931.

Questions by the Examiner.

These two 12 inch lines are on what we term the Moore County crossing. We do not plan to replace the two lines which we are retiring. The additional capital expenditure item represents somewhat an anticipation of the retirement of those two lines plus whatever operating benefit we gain by putting them in at this time.

Direct Examination by Mr. Hedrick.

The new lines will not be laid at any greater depth than the present line.

694 *Cross-Examination by Mr. Booth Interposed.*

My working papers will not disclose what items have been included in the book cost of the property to be retired. That data must be obtained from the accounting department. That information was furnished to me by the accounting department, and I do not myself know what is included in it. I am not in position to state specifically what is included in the book cost of the items of property retired.

Direct Examination by Mr. Hedrick.

In other words, when I retired the two Canadian River lines I went to the accounting department and was advised by them as to the cost of these two lines that were installed, and I used that figure in my retirement item. That applies with respect to the retirement throughout this exhibit.

Cross-Examination by Mr. Booth Interposed.

I am not able to answer for the accuracy of the book cost items. Those books are in the hands of the accounting department.

Cross-Examination by Mr. Slaff Interposed.

The price as of June 1, 1939, which I used for drips on the 24 inch line is about 100% more than the book cost of the drips which are replaced. When we retire equipment, the equipment is retired at the book cost. The reason that the book cost coincides with the cost for additions as of June 1, 1939, is that there are no additions until on and after June 1, 1939. In other words, there have been no booster stations installed to date outside of an experimental station. Book cost is the original cost of the item.

Direct Examination by Mr. Hedrick.

I now pass to page 5, entitled "Pipeline Department, District No. 2." The first item, "Install Six-Inch Blowoffs," is a pipe connection welded to the top of a 24 inch line and is used for the removal of gas from the line and for the purging of a section of line following a time when the line has been taken out of service for some repair. These blowoffs will be installed at three different locations, one on each side of the main line Canadian River crossing and one on the inlet of the Texoma sales meter near Gray Junction. Each blowoff will cost $346 installed.

I have already stated the necessity for replacing drips in connection with Sheet 3. The necessity for the replacement of these drips is the same as I testified concerning line 5 on page 3. One drip will be replaced in 1940 and one drip in 1941.

The third line is "Replace Headers." The lower picture shown on Exhibit 79, introduced through Mr. Floyd C. Brown, entitled "Typical Manifold for Submerged Pipeline River Crossing," showing a valve assembly and header connection for 24 inch main line, shows the construction of a typical header, which we term a 24 inch by 12 inch six run header. We have headers of different sizes, depending upon the number of multiple lines constructed across a stream. The very short line leading from the left side of that picture is the 24 inch line, and that is connected
695 onto another 24 inch line, out of which emerge six
smaller lines, on each of which is a valve. That is a typical header installation.

As to the necessity for the replacement of the headers in 1940 and 1941, shown on page 5 of Exhibit 105, I have already described in my testimony the effect of corrosion on drips and the fatigue of metal as a result of gusset plate construction. These same factors are applied in the same way in discussing deterioration of headers.

There are additional factors, however, which are working toward the destruction of river headers. There is a continuous pulsation which comes from the operation of the compressor station. That pulsation causes a variation in line pressure, which in turn creates vibration which actually accelerates the fatigue action. The expansion and contraction of the river lines due to temperature changes is dissipated normally in the sinuosity of the lines. At the ends of the river lines, where they are attached to the respective headers, this expansion and contraction due to temperature changes is dissipated in the header, resulting in deformation of the header, which is also contributing toward the physical destruction of that header.

There is another factor which is working on the header, and that is the weight of the gas which passes the header every 24 hours. The approximate weight of this gas is 5,250 tons. I have figured that on 210 million cubic feet per day. At a pressure of 14.65 pounds and a temperature of 60 degrees, 1,000 cubic feet of gas will weigh slightly more than 50 pounds. In my calculations I have used 50 pounds.

The gas as it passes through these headers has a change in direction. In fact, it changes in direction twice, two complete 90 degree changes.

We do not normally think of gas as having weight, and I would like to give one or two examples. This weight is equivalent to a 100 car freight train, each car loaded with 52½ tons of material. Another example is that a stream of automobiles would involve 3,500 cars passing over the header each 24 hours, traveling at the rate of 14 miles per hour. That is only by way of explanation in order to better visualize that there is weight passing through that facility.

The change in direction of this tremendous weight of gas causes part of the vibration in the header.

For the reasons I have enumerated, we plan to replace a header in 1940 at a cost of $2,805 and a header in 1941 at a cost of $2,322. That difference in cost is due to the fact that there is a difference in the design of each of the two headers. The reinforcement of the welds on the headers that were originally installed was the gusset type reinforcement, and on the headers that will replace the present headers the saddle type will be used. On all construction work which we have done since the completion of this line, the saddle type of reinforcement has been used. It was not available at the time of the construction of this pipeline.

One of these headers will be at the main line Canadian
696 River crossing and one at the Moore County check
meter, near Gray, Oklahoma.

Item 4 is "Install 12 Inch Loop Lines," and shows expenditures in 1940 and 1941. A loop line, as I shall use the term, is a pipeline designed to be laid across a stream or an overflow area, or a combination of the two. This line will be laid parallel to the present 24 inch line and will be so installed with gate valve facilities that either of the two lines may be removed from service in the event of failure of one of the lines. 24 inch valves will be installed as block valves in the 24 inch line. Block valves or gate valves are used to stop the flow of gas, to take a section of line out of service.

In the installation of these block valves it is necessary to install a concrete anchor in close proximity to each valve. When a valve is closed with pressure against the closed valve, there develops an enormous total pressure against that closed valve, the amount depending upon the prevailing pressure in the pipeline. For 700 pounds it is in the neighborhood of 300,000 pounds which is tending to push that valve off the line, or rather, it is a thrust rather than a pressure. A thrust is the result of this pressure force.

So that to protect that facility from blowing off the line, so to speak, we install these concrete anchors, which will prevent the movement of the valve when it is in the closed position and a force is acting against it. I am confining myself to Item 4 and am not referring to Item 5.

Questions by the Examiner.

There will be a valve on the loop line itself. For example, for a 12 inch loop line there will be a 12 inch valve installed at each end of this loop line just ahead of the respective connections to the 24 inch line. These loop lines are installed across streams and overflow areas which are susceptible to heavy washing, and those that are inaccessible.

Assuming that we will have a pipe line failure in a 24 inch line with no auxiliary protection in an isolated location, we would have a serious interruption of service, and this is a reinforcement or insurance against the interruption. The loop line construction is a continuation of a program which we have been carrying on. Some of the loop lines that have been heretofore constructed after the original installation are also shown on page 18 of Exhibit 105.

The loop line in 1940 will be constructed at Survey Station No. 605 plus 88. This is a branch of Kit Carson Creek. This survey station is shown on Exhibit 103 on the first line. The second loop line in 1941 will be constructed at Survey Station No. 654 plus 51 and is also indicated on Exhibit 103. These two branches of Kit Carson Creek are unnamed, and that is the reason for designating them by the station number.

Direct Examination by Mr. Hedrick.

In 1940 we have an expenditure of $2,711 for the installation of welding sleeves and concrete anchors. This work will be done at a third branch of Kit Carson Creek at Survey Station 459 plus 78. This work will be done to
697 reinforce the 24 inch line across this creek by making it
more stable and more resistant to the buoyancy of the water under flood conditions. This is also a continuation of work which we have done at various points on the pipe line.

The sixth item is "Lay Six New Lines, Canadian River." I have already testified as to the conditions at Canadian River, and the only additional reason I desire to add is the fact that at the point at which we cross the Canadian River on the main line, the width of the channel is about one-half the width of the channel where the Moore County crossing crosses the Canadian River. This increases the velocity of the water flowing, the depth of the water flowing, and the subsequent increase in force of the moving body of sand.

Those are 12 inch lines. We have six 12 inch lines across that river at the present time, and the six new lines will be laid as a complete new crossing. There are certain improvements that have been made in the construction of river crossings, and these improvements will be incorporated in the construction of the new crossing.

Line 7 is entitled "Cathodic Protection." Cathodic protection has been previously described and will be used in District 2 for the protection of the 24 inch main line. Approximately two miles are involved in each of the two years.

The book cost of the property retired and the salvage are shown at the bottom of page 5.

Question by the Examiner.

The plan is to lay three of these new lines across the Canadian River in each year. The reason for that is that we are limited as to the time during the year in which construction can proceed.

Direct Examination by Mr. Hedrick.

One of the counsel asked me a question with reference to the book cost of property retired on page 3 of Exhibit 105, being Item 4, "Retire Two 12 Inch Canadian River Lines," and inquired whether or not I had a breakdown of the retirement of $34,816 set out in each of the years 1945 and 1947. I told him I did not, but that I would get that information from the accounting department. I wish to make a statement with reference to that.

After having time to review my detail sheets, I found that I had those items shown under 1945 and 1947 in detail in one of my work books for the retirement of two 12 inch Canadian River lines, and I will be glad to review the details with counsel.

Page 6 of Exhibit 105 is entitled "Pipeline Department. Additional Capital Expenditures and Book Cost of Property Retired—Tools." The replacement of equipment to which I will subsequently refer will be done from time to
time. The reason for these replacements is due to the
698 fact that by continued use the equipment is wearing
out and deteriorating to the point where it is no longer advisable to continue its use at the time the replacement takes place.

We are also going to purchase additional equipment. The reason for that is that as the property becomes older there is more work of a remedial nature to perform, which will require the added equipment in connection with those repairs. There will be more maintenance to be performed in the future than there has been in the past because any structure that gets older with age requires more maintenance to keep it in operation. This pipe line structure is practically all a sub-surface structure, and, in addition to the normal wear and tear of the structure, it is subject to the destructive forces of corrosion.

~~The~~ first item is "Melting Kettles." These kettles are used for the heating and melting of the pipe coating material known as enamel, which is applied to the pipe and other sub-surface structures for the prevention of corrosion. In 1941 we will replace two kettles, both of which were purchased originally in 1931.

Item 2 is a 3P Jaeger centrifugal pump. This pump, along with the following pumps which will be referred to, is used for dewatering trenches, bell holes, or at any point where it is necessary to move water before repairs or remedial work can be done. A bell hole is a large opening excavated around the pipe to permit one or more workmen to perform their duty in connection with making repairs. In 1943 we will replace a Jaeger which was purchased in 1935. These are all portable pumps. The Jaeger pump is a gasoline engine driven pump. The bell holes I refer to are similar to the bell holes which were dug, to the extent of 100 or more, when Mr. Biddison, accompanied by Mr. Johannigsmeir of the Federal Power Commission, inspected the pipeline for visible depreciation a short time ago. They are the same type of excavation.

The next item is electric welding machines. Those are gas engine driven direct connected generators, used for the application of the electric arc in making what is called an electric weld. In 1942 we will purchase an additional machine. In 1943 we replace the machine which was purchased in 1937. In 1948 we replace the machine which was purchased in 1942. In 1949 we replace the machine that was purchased in 1943.

I notice I have overlooked two melting kettles and a Jaeger pump in 1951. In 1951 the melting kettles will be replaced which were purchased in 1941 and the Jaeger pump will be replaced in 1951 which was purchased in 1943.

The next item is a 4-inch Rex pump. This is a gas engine driven centrifugal pump. 40-M means the capacity is 40,000 gallons per hour. It could be used for oil, but we use it for water. In 1946 we will replace the pump that was purchased in 1938.

The next item is a 6-inch Rex pump of the same type,
699 except a larger capacity pump. It is a 90,000 gallon
per hour pump. It was purchased in 1938 and will be
replaced in 1946.

The next item is a rotary scraper. A rotary scraper is a piece of equipment similar to the Fresno, which we see used in construction jobs, road construction, railroad construction, or any excavation jobs. Practically the only difference between the rotary scraper and the Fresno is that the bucket can make a complete revolution when emptying the material from the scraper. These scrapers are used in connection with trucks, principally with tractors. This rotary scraper will be replaced in 1946. It was purchased in 1938.

Cross-Examination by Mr. Slaff Interposed.

According to the exhibit, a Jaeger centrifugal pump is to be installed or bought in 1951 to replace the 1943 pump. Counsel has inquired why the book cost of property retired, 3P Jaeger centrifugal pump in 1951, is $296 instead of $310, which was the book cost of that property in 1943. Apparently that is an error. It should be $310, just roughly checking it here now. The original pump that we purchased in 1931 will be replaced in 1943 and the book value or book cost of that pump was $296, and apparently an error exists by simply using that same figure for the pump that will be purchased in 1943. To be exact, it should be $310 under the year 1951.

Direct Examination by Mr. Hedrick.

The next item, a rotary scraper, is the same type of scraper but of heavier design, for a larger tractor, and will be purchased new in 1943. The purpose of that is to handle heavier excavations and more excavations as the property becomes older.

The next item is electric lighting units. These are gas engine driven direct connected generators generating 110 volts. They are used for the operation of the company's radio equipment and to furnish light for men working during emergencies or at night about the property. They are small portable units. The unit which was purchased in 1938 will be replaced in 1948.

I referred to radio equipment. We have equipped the north end of the pipeline system with portable telephone-radio equipment. We have transmitting and receiving stations at Station 6, Red Oak, Iowa, and at Stations 8, 9 and 10. We have receiving sets installed on trucks, superintendents' and foremen's automobile equipment.

This radio equipment was purchased primarily to facilitate the repair of this pipeline during emergencies, from a communication standpoint. We have found, and it has been our experience, that our pipeline breaks occur as the result of some natural force over which we have no control.

During those same periods communication systems are out of order. I am referring to floods, sleet, hail and tornado. The farm systems are not always adequate and are not reliable. Based on the experience we have had, we decided to use the radio equipment.

700. We have used this equipment several times since its installation in connection with shutouts and repair work that we have done on the line from time to time. In fact, last Sunday we had the line shut out at Grand River, which is in western Iowa, in District 5-W. This line was shut out for the installation of 24 inch gates and 12 inch gates for the connection of a 12 inch loop line which is just being completed. We have no company telephone communication in close proximity to that work. The telephone lines of the company do not follow exactly where the pipeline is across Iowa and Illinois. In Kansas they do not parallel the pipeline in a diagonal route. They do follow the section line roads, but zigzag across the pipeline across Kansas and Nebraska as far as Beatrice. At Beatrice, Nebraska, the telephone line is constructed on the Burlington Railroad right of way poles and from that point to Chicago the service is on the Burlington right of way.

During a shutout it is necessary for the dispatcher in the Chicago office to keep in close contact with the progress of the work. Obviously he is interested in when he will be able to return the pipeline to service for the continuation of the delivery of gas. The radio equipment is used to contact our stations on either side of the work, in order to keep them advised as to the progress of the work, to direct the activities of the men, and, if need be, to order additional material that may be required.

Question by the Examiner.

I said the farm systems are not so reliable. There are a number of telephone systems in the country that are not owned or controlled by the Bell Telephone Company, A. T. & T., or any of its subsidiaries. A group of farmers will combine and construct a telephone line in some local area for their own use. Those systems are usually constructed on very meager poles. Sometimes they follow the fence poles, and sometimes they are secured to trees along the fence line. They are not adequately maintained and they are subject to the elements or destruction more readily than the regular commercial lines.

We sometimes use those in getting a connection with the Bell system or our own system.

The next item is a one-half yard power shovel, dragline and pull shovel. This equipment is similar to the steam shovel type, except that it is gasoline engine powered. It is equipped so that a dragline can be used or a pull shovel can be used, depending upon the nature of the work to be performed. We are going to purchase this equipment in 1943 in order to handle the heavier excavations and remedial work on the pipeline that we will have to do in the ensuing years.

The next item is that of air compressor and tools. In 1946 we will replace an air compressor and auxiliary tools which were purchased in 1938. The air compressors are used for various purposes, such as rock excavation, 701 hard soil excavation, operating pneumatic tools, pneumatic motors and for excavating frozen ground.

The next item is a C. H. & E. diaphragm pump. C. H. & E. is just an abbreviation of the name of the company from which we purchased the pump. I don't have the name of that company here. It is a gasoline driven pump. We purchased that pump in 1937 and it will be replaced in 1945.

The next item is Goulds diaphragm pump, which is the same type of pump as the preceding one, and is hand operated. It will be replaced in 1944.

The next item, snow plow for trucks and caterpillar tractors, shows an expenditure in 1942 of $600 for snow plow equipment for a truck and a tractor. This equipment will be used for keeping the roads open in the gathering system so that the chart changers and men responsible for the operation of the booster stations will be able to carry on their duties in the gathering system. In 1943 we will purchase a snow plow for the tractor which is to be purchased also in the same year.

The snow plow is used for the removal of snow from the roads which exist through the gathering system. These roads have to be cleared to permit chart changers and maintenance men to cover their duties in the gathering system in connection with changing charts and maintaining and operating the booster stations in connection with the flow of gas. We haven't purchased the snow plows before because we haven't had satisfactory equipment on hand to use as a motive power for the snow plows. They can be used to some extent with trucks, but not satisfactorily. We did not have the caterpillars until 1938.

The next item is a bull dozer for an R-4 caterpillar tractor. A bull dozer is a piece of equipment for back filling an excavation. It is mounted on the front end of a tractor and is used to push the soil or excavated dirt into the trench.

The next item is an acetylene generator. This is used for the generation of acetylene gas used in the acetylene welding process. Such a generator was purchased in 1935 and will be replaced in 1943.

Item 16 is for small tools, additions and replacements. We have a number of smaller pieces of equipment and tools costing in excess of $25 which are not detailed on page 6. $500 per year is to be used for the purchase of small tools as they become worn out and of no further use, and for the purchase of additional small tools as and when they may be required.

The book cost of the property retired and the salvage are also shown on page 6.

The four-inch and six-inch Rex pumps which we now have were bought in 1938.

702 Page 7 is entitled "Natural Gas Pipeline Company of America, Pipeline Department, Summary of Capital Expenditures and Book Cost of Property Retired." Under "Additional Capital Expenditures" Lines 1 to 8, entitled "District No. 3," "District No. 4," "District No. 5-W," "District No. 5-E," "District No. 6," "Branch Lines," "Joliet Meter and Regulator Stations," and "Tool Account," are shown more in detail on pages 8, 9, 10, 12, 13, 14, 15, and 16, respectively. Under the heading "Book Cost of Property Retired" Lines Nos. 10 to 17, inclusive, are set out more in detail on pages 8, 9, 10, 12, 13, 14, 15, and 17, respectively. Under the heading "Salvage" Lines 19 to 26, inclusive, are explained more in detail on pages 8, 9, 11, 12, 13, 14, 15, and 17, respectively.

Turning to page 8, I have already explained what a drip is and also what a river header is. I have no additional reasons for replacing drips to add to those which have been previously stated. For the years 1940 to 1945, inclusive, there will be one drip replaced in each year. I have no further information regarding river headers with respect to reasons for replacements.

The item of $3,418 in 1940 is for the replacement of two 18 by 12 inch headers. In 1941 the expenditure is for the replacement of one 24 inch by 12 inch header, which is a six-run header. In 1942 it is for two 18 by 12 inch headers. In 1943 the amount is for the replacement of one 24 by 12 inch header. In 1944 the amount is for the replacement of two 24 by 18 inch headers. In 1945 the amount shown is for the replacement of one 24 by 16 inch header, which is a three-run header. In 1946 the amount shown is for the replacement of one 24 by 12 inch header and one 24 by 18 inch header.

With reference to Item 3 I have already explained what 6 inch blowoffs are. This item includes a number of 6 inch blowoffs represented by expenditures in the years 1939 to 1943, inclusive. The installation of a 6 inch blowoff costs $346. In 1939 four of these blowoffs will be installed; also the same number in 1940, 1941 and 1942. In 1943 there will be three 6 inch blowoffs installed.

Item 4 is "Install Two 16 Inch Lines, Beaver River," with an expenditure of $120,207 in 1941. Beaver River is located on Exhibit 103, and it is the third river named on the last horizontal line, third from the lefthand side of the exhibit. The crossing is located in Beaver County, Oklahoma, near the town of Beaver. This river is crossed at the present time with six 12 inch pipelines and one 16 inch line. On the north side of the river the six 12 inch lines are divided into two groups of three lines each. An 18 inch line connects each of these two groups of three 12 inch lines to the 24 inch main line through a 24 by 18 inch header.

Beaver River at the point of the pipeline crossing has a flood bottom from bank to bank of about 4,000 feet. That is not from bank to bank of the channel; it is from bank to bank of the entire flood area, the overflow area. This flood bottom during the first years of operation was well covered with vegetation. It was a meadow or
703 pasture. During the drouth years practically all of this
vegetation was destroyed. Floods which occurred deposited sand on these flood bottoms, which further destroyed the remaining vegetation. The wind erosion and lack of water during this two or three year period resulted in the wind actually filling the main channel with dry sand. The flow was all sub-surface. Following that, when floods occurred, the channel overflowed the surrounding flood plain, due to the fact that the elevation of the bottom of the channel was at that time higher than many portions of the adjacent flood plain.

In 1937 we experienced a series of floods in that river, which formed a new channel to the north of the channel which existed at the time we constructed the pipeline. These floods also formed a new channel south of the old channel, and near or adjacent to the south bank. This cutting and erosion action resulting from the floods and the formation of new channels undermined the six 12 inch pipelines, which left them completely exposed to the forces of the river. As an emergency measure, in July, 1937, we lowered sections of the 12 inch lines at a cost of $22,000. That expenditure is shown on page 18 of this exhibit.

Major operations of that character are performed by our own personnel. We supplement our regular forces by the employment of additional men. That is with reference to the type of work which I described on Beaver River, which is more of an emergency character. In the construction of pipelines, loop lines, or the extension of lines, where we have time to design and plan the work, those lines are practically always contracted for.

After this experience on Beaver River we were firmly convinced of the necessity of providing some adequate protection and insurance for continuity of service at that stream. We designed and prepared specifications and secured contracts for the construction of a 16 inch pipeline to be laid entirely across the overflow area at a depth varying from ten to twelve or fourteen feet below the normal surface of the overflow area and the stream beds at that time. This work was completed in 1937.

That is shown on page 18 of this Exhibit 105 under District 3, the third item under that district, for work which was performed in 1937 at an expenditure of $69,698.29. At the time that line was constructed we installed header facilities for the installation of two additional pipelines, having in mind at that time that at some future date we would install two additional 16 inch pipelines.

We have recently experienced another flood of the Beaver River which again formed a new channel north of the north channel, which was formed in 1937. This new channel is gradually approaching the north two 18 inch by 12 inch headers. We are at the present time making an emergency expenditure to protect those lines from forces that will develop in this new channel.

In 1941 we have an amount to be expended for the in-

stallation of two 16 inch lines which were contemplated
704 in 1937. If the flood conditions on Beaver River continue, we may be forced to spend that money at an earlier date.

As to whether a bridge would be practical at this Beaver River crossing, a bridge of the suspension type to be constructed at that location would require a clear span of at least 4,000 feet. We have not as yet seen a design for a suspension type bridge having a clear span of that distance that is satisfactory or acceptable to us for the carrying of a pipeline suspended across the entire flood area.

The next item is "Install 12 Inch Loop—Crooked Creek." Crooked Creek is shown on Exhibit 103, on the first pink horizontal line. The crossing is located south and a little west of Meade, Kansas, in Meade County. The creek at the present time is crossed with a single 24 inch pipeline. This creek is subject to overflow periods of as much as a week. A failure in the 24 inch line during one of these flood periods would result in considerable interruption of continuity of service. We have designed a 12 inch loop line to be constructed parallel to and connected to the present 24 inch line. This loop line will be 2,000 feet in length. The expenditure will be made in 1942, amounting to $28,444.

Item 6 is entitled "Install 15,600 feet—12 inch Extension—Arkansas River." The Arkansas River is crossed with six 12 inch lines, that is, the main channel. The overflow area to the south is crossed with two 18 inch lines, and the overflow area to the north is crossed with two 18 inch lines. This river is located east of Dodge City, Kansas, and is shown on Exhibit 103.

This river is a characteristic stream of the streams in Kansas and in Oklahoma and Texas. That is, the stream bed consists of sand and the overflow area consists largely of sand. Whe are going to be required to recondition the six 12 inch lines across the Arkansas River. During this operation, or at the time the lines are reconditioned, they will be lowered a depth of six to eight feet and the river headers on each side of the river will be extended back by extending the six 12 inch lines.

This river is attempting to widen its present channel, following the same general action that has taken place on Beaver River which I have just described. It is for the protection of this crossing against any interruption of service that we are going to extend the 12 inch lines and lower the 12 inch lines in 1943, at a cost of $139,227.

As to whether we now have any river work in progress such as I have testified about on Lines 4, 5 and 6, we have river work going on at the present time. We are lowering the 12 inch lines at the Republican River, on the south side of the Republican River, near Concordia, Kansas, in Cloud County. We are lowering the two 18 inch lines and extending the east 18 inch by 24 inch header on the east side of the Nishnabotna River.

We are constructing a 12 inch loop line at the Grand 705 River crossing in central western Iowa. You will find that name on the top horizontal line of Exhibit 104. We are lowering the six 12 inch lines across the Des Moines River in the central part of Iowa, near Tracy, Iowa. That covers the river work which is in progress as of the present time.

Item 7 is entitled "Raise Three-Inch Blowoffs." The three inch blowoff is the same type of facility as described for the six inch blowoff, except that it is a smaller size. They are installed on each end of each river line and are used for the purpose of removing gas from the river lines. These blowoffs are being raised. At the present time the piping and gate valve are below the elevation of the ground surface. The expenditure under 1939 involves 128 blowoffs, and that work is now in progress.

Item 8 is entitled "Install Gate Boxes." A gate box is a small galvanized corrugated iron building constructed on a steel framework and is used to completely house a main line valve or river valves at a river header. They are installed for the purpose of facilitating the operation of these valves during emergencies, to facilitate the servicing of the valves from the standpoint of lubrication, packing the stuffing boxes, and to protect the valves from the elements, such as ice, snow, sleet, and so on. That work is now in progress.

Questions by the Examiner.

These valves have not been housed in the past. We plan ultimately to house every valve. This program is a continuation of a program that has been going on for the past five or six years. We have all of the valves housed on the north end of the system, as shown on Exhibit 104.

I mean by that, all in Districts Nos. 5-W, 5-E, and 6. The expenditure in 1939 is to be made and is being made for the installation of gate boxes at the Cimarron River crossing, the Arkansas River crossing, the Saline River clossing, Willow Creek, Pawnee, Smoky Hill River, Beaver River, Walnut Creek, and Salt River.

Direct Examination by Mr. Hedrick.

Item 9 is entitled "Install Cathodic Protection," and I have already described what it is. The expenditure for 1939, in the amount of $5,154, is now in progress; that is, the work is in progress. That is for the cathodic protection of five miles of 24 inch line in the vicinity of Wilson, Kansas. We have additional sections of 24 inch pipe between the Smoky Hill River crossing and the Pawnee River crossing which will also be protected with cathodic protection in the years 1941 and 1942, respectively. There will be approximately four miles of line to be protected in each of those years.

The book cost of the property retired and the salvage are shown at the bottom of page 8.

Cross-Examination by Mr. Slaff Interposed.

The swage drains which I said were to be retired
706 are handled under maintenance expense and they are included in the operation and maintenance figures. They are originally in capital. The accounting department has a rule that when the item of investment is very small they do not consider it necessary to go through the mechanics of removing the items such as those swage drains from capital investment. The swage drain is all junk material.

As those swage drains are taken out of the plant and service, nothing is removed from the capital cost on account of those removals from plant, except that I should say that this pipe that is installed to replace the swage drain is, in a sense, a capital expenditure. In fact, such capital expenditure is more than the capital expenditure of the initial cost of the swage drain. The difference between the two items is comparatively small, and we do not make a charge and credit for capital as we do in items of considerably larger amounts. The pipe that replaces the swage drain represents an amount approximately equal to or more than the cost of the swage drain. The cost of the pipe which replaces the swage drain becomes part of the capital structure, because without that pipe the line would not be a whole pipeline.

The accounting of that cost is handled as a maintenance item. If we were to complete the details of that transaction it would mean that we would wind up with more capital investment on the books than we had originally with the swage drain, but the item is so small from the standpoint of money that the accounting department does not think it advisable to use the necessary routine mechanics in transferring that transaction.

Direct Examination by Mr. Hedrick.

Page 9 is entitled "Pipe Line Department, District No. 4; Additional Capital Expenditures," etc.

The first item, "Replace Drips," is for the replacement of one drip in each of the years 1940 to 1943, inclusive, showing an expenditure of $1,468 for each year.

The next item is one of replacing river headers. In 1940 one 18 inch by 10 inch header will be replaced. In 1942 one 24 by 18 inch header will be replaced. In 1942 one 24 by 12 inch header will be replaced. In 1943 one 18 by 12 inch header will be replaced. In 1944 one 24 by 16 inch three-run header will be replaced; and in 1945 one 16 by 12 inch header will be replaced. In 1946 a 24 by 12 inch header will be replaced.

The third item is "Install Gate Boxes." That work is now in progress.

The next item is to install 6 inch blowoff connections in the years 1940, 1941 and 1942. The amounts shown are for the installation of three 6 inch blowoffs in each of the years.

Item 5 is "Install 18 Inch Loop, Weeping Water
707 Creek." Weeping Water Creek is located just southwest of the Missouri River crossing, approximately
15 miles from there. It is crossed at the present time
with a single 24 inch pipeline, and for the same reasons
which have been explained for the installation of loop
lines, we will install an 18 inch loop line at this location
in 1942, involving an expenditure of $36,591.

Item 6 is "Raise 3 Inch Blowoffs." 47 three inch blowoffs will be raised in 1940 at a cost of $1,034.

Item 7 is "Install River Clamps, Reinforcing Straps, Republican River," requiring an expenditure in 1939 of $11,658. That work is now in progress.

Item 8 is "Cathodic Protection," requiring an expenditure in 1941 of $3,969 and in 1942 of $3,970. We are going to protect approximately three and eight-tenths miles of 24 inch line in each of those two years.

Item 9 is "Install River Clamps and Reinforcing Straps, Little Blue River," with an expenditure in 1941 of $21,315.

The Little Blue River is crossed with six 12 inch pipelines and is shown on Exhibit 103. It is the first multiple line crossing northeast of the Kansas-Nebraska state line. The reasons for this expenditure are that the river is changing its channel. The river is attempting to return to its former channel, which is north of the present channel. There is also a possibility that a new channel will be formed south of the present channel. These 12 inch lines will be lowered and reconstructed in 1941 for the purpose of reconditioning the lines and lowering them to a depth of six to eight feet below the present stream bed as a protection against washing when these new channels are formed. This work will be done at an expenditure of $21,315.

A reinforcing strap is a metal bar made of mild steel one-half inch thick by two inches by ten inches long. These bars are welded across the girth weld and are spaced 90 degrees apart; that is, there are four reinforcing straps for each girth weld. That is to strengthen the tensile strength of the girth weld. I should explain in connection with this item at the Little Blue River that this expenditure in 1941 is for the additional capital expenditure which will be required; that is, the additional clamps which will be installed and the additional reinforcing straps which will be installed.

The book cost of property retired and salvage are shown at the bottom of the page.

Under "Book Cost of Property Retired," Line 1 is "Retire Drips, 17-18-19-20." Those are the numbers by which the drips are referred to from an operating standpoint and are shown on Exhibit 103 in the horizontal line entitled "Drips."

708 *Cross-Examination by Mr. Slaff Interposed.*

The book cost of No. 17 of the drips appears to be about 35% more than the book cost of Nos. 18, 19 and 20. Drip No. 17 is on the discharge side of Station No. 5, and was not installed by the same contractor that installed the remaining drips. The difference is the difference in contract labor. The additional expenditure for drips Nos. 17, 18, 19 and 20 will be the same. That is an expenditure to be made by our own company personnel and we can control those expenditures. The contract labor, of course, is submitted by the contractor in his proposal for the performance of that kind of work. There is no physical difference in the type of construction or anything of that sort that would explain the difference in price. That does explain the difference in the cost of many items. In this particular case it was the difference in the unit cost the contractors submitted.

Direct Examination by Mr. Hedrick.

It is suggested that there may be some confusion with reference to the names Little Blue River and Big Blue River. The river I am testifying about on page 9 of Exhibit 105 is called Little Blue River and is located in District No. 4 in the southern part of Nebraska, and Item 9 on page 9 crosses that river. I have heretofore testified concerning a Big Blue River, and that river is located in Moore County, Texas, and is crossed by the main trunk gathering line of Texoma Natural Gas Company.

We have heretofore constructed a suspension bridge across the Big Blue River in Moore County, about which I have testified, and I have also testified that we will in the future construct another suspension type bridge across Big Blue River, which is designated on Exhibit 101 as Big Blue Creek, in lieu of the under-river 24 inch line that is there at this time. We also cross with a main trunk gathering line the Big Blue River in Moore County, Texas, at another point, but we do not contemplate any remedial work at that place.

Turning now to page 10 of Exhibit 105, I will explain Items 1 to 21, inclusive, on that page.

The first item is "Replace Drips." We will replace one drip in each of the three years, 1940, 1941 and 1942, at a cost of $1,468 in each year.

The second item is "Replace River Headers." In 1940 we will replace one 24 by 18 inch header; in 1941, one 18 by 10 inch header; in 1942, one 24 by 18 inch header; in 1943, one 24 by 18 inch header; and in 1944, one 24 by 18 inch header.

The third item is "Replace 24 Inch Line—Walnut Creek." Walnut Creek is a stream crossed with a 24 inch pipeline. It is located three and one-half miles west of the company's Red Oak meter setting. There are two reasons for the work to be done at this creek,
709 one of which is corrosion, and the second being to
lower the 24 inch line below the scouring gradient of the creek.

By reference to page 18, Exhibit 105, under District No. 5-W, it will be observed that we have been performing work of this nature since 1935. A large number of these rivers and creeks in Iowa have been straightened. The farmers will form a drainage district and combine their resources and straighten a section of a stream for the purpose of increasing the run-off, reducing flood conditions, and increasing the acreage of their fertile land. When a meandering stream is straightened, the velocity of the water increases. This increased velocity causes scouring of the stream bed. It is endeavoring to approach a normal gradient of flow. Our experience has been that this scouring has scoured to depths below the depth of the pipeline, which leaves the pipeline exposed to debris and ice jams and the forces of flood waters. We have had to do considerable of this kind of work in Iowa and Illinois, due to the straightening of channels and the scouring of the stream beds.

At Walnut Creek it is our judgment that this crossing should be reconditioned. It is not practical to recondition a 24 inch pipe while in service across a stream. We depend entirely for the stability of the 24 inch line on the back fill and on the soil adjacent to the sides of the pipeline and at the bottom of the pipeline. If soil or back fill are removed from this 24 inch line, it is subject to floating during flood conditions, and at vertical bends there is a resultant component of force, caused by the internal pressure of the line, which has a tendency to lift the pipe at that point.

To do the work desired, we are going to lay a new section of 24 inch line approximately 300 feet long. This new line will be laid across the stream at a depth of six to eight feet below the present stream bed. That depth to which I refer will depend entirely upon our survey of the stream at the time or prior to the execution of the work.

After this line has been constructed we will have a shut-out and connect the new line to the existing 24 inch line. The old line that is now across the stream will be removed from service. This work at Walnut Creek will be done in 1940, at an expenditure of $8,833.

The next item is "Replace 24 Inch Line—Middle Nodaway River." The Middle Nodaway River crossing is ten and one-half miles east of the Red Oak meter station, as shown on Exhibit 104. This stream is now crossed with a single 24 inch line. We are going to construct a new 24 inch section of line in 1941 at an expenditure of $8,833, which will be a section 300 feet long. 300 feet is about the minimum we can practically handle when replacing a section of line of this character.

The next item is "Replace 24 Inch Line—South River."
South River is three miles east of compressor station No.
8, and in this connection I will refer you to "Replace 24
Inch Line—Box Elder Creek," in Line 20. Box Elder
710 Creek is due west of South River and is a tributary to
South River. My explanation of one would apply alike
to the other, and the reasons for replacing the 24 inch line
at each of these points will be the same as those I have already mentioned.

In 1942 we will replace the single 24 inch line at the South River at a cost of $8,833, and also the 24 inch line at Box Elder Creek.

I stated that the Middle Nodaway River is ten and a half miles east of the Red Oak meter station. I should have said that it is located three miles west of main line gate No. 55, as indicated on Exhibit 104. It is the West Nodaway River which is located ten and a half miles east of our Red Oak meter station.

The reasons for constructing a loop line at the latter location are the same as have been given in connection with other loop lines. We will construct this loop line in 1940 at a cost of $26,362.

The seventh item is a 12 inch loop 1980 feet long. The overflow area is 1815 feet across the South River. We have flood periods of six to eight days at Box Elder Creek.

The latter is a tributary of South River and whatever condition there is on one stream will affect the other.

In 1941 we will construct a 12 inch loop line at South River at a cost of $24,703. Box Elder Creek has an overflow area of 3215 feet.

Item 8 provides for a 12 inch loop across this creek and overflow area a distance of 3415 feet at a cost of $35,523.

Squaw Creek is crossed with a single 24 inch line and is located 8½ miles east of compressor station No. 8, as shown on Exhibit 104. The overflow area at this point is 3500 feet. Item 9 provides for a proposed loop line 3650 feet long to be constructed in 1942 at an expenditure of $37,295.

At Otter Creek, located two miles east of main line gate No. 61, which is now crossed by a single 24 inch line, a loop line will be added in 1942 at a cost of $19,652. This is Item 10.

The overflow area of that creek is 1100 feet. The loop line will be 1310 feet long. With one exception all of these loops in 5-W are 12 inch loops.

Item 11 refers to 115 coupling sleeves. We have a number of locations along the pipeline in western Iowa where the 24 inch line crosses small streams with varying amounts of overflow area. At some of these points we cannot justify loop line construction, but we are going to reinforce the line and provide more stability by installing sleeves around the 24 inch couplings.

The picture in the lower lefthand corner of Exhibit 106 entitled "Split Steel Welding Sleeve Installed on 24 Inch
Coupling" shows a steel forging made in two halves.
711 It is swaged out to accommodate and provide clearance
for the 24 inch coupling. This coupling is installed at a place where the joints are coupled and not welded. The 24 inch sleeve is welded at each end circumferentially to the 24 inch pipe. There are two longitudinal welds but these cannot be seen in the picture since they are at the 90 degree point from the top center of the pipe. Our first sleeve installation was made in 1932. We started to develop the design for this sleeve at that time. It was designed so that it can be installed on the pipeline under full operating pressure conditions. This enables us to do considerable remedial work on couplings without removing the pipeline from service.

(EXHIBIT 106 was offered and received in evidence without objection.)

These 115 coupling sleeves will be installed in 1939. The work has been approved by the management and the actual physical work will be done as soon as weather conditions permit.

Item 12 provides for the installation of 6 inch blowoffs. We will install two blowoffs in each of the years 1939 and 1940; three will be installed in each of the years 1941, 1942 and 1943; and in 1944 two blowoffs will be installed.

Item 13 refers to the replacement of 5,000 feet of 24 inch pipe at Keg Creek, which is located just south and west of Glenwood, Iowa.

(A document containing two pictures, one numbered 20-3, entitled "Showing Location of 24 Inch Line Along CB&Q Tracks West of Keg Creek," and the other numbered 20-4, entitled "Keg Creek, Looking Upstream from South Bank. Rock in Stream Shows Location of Pipeline," was produced by counsel, and at the direction of the Examiner it was marked Exhibit 109 for identification.)

At the time the 24 inch main line was constructed east from the Missouri River in western Iowa in 1931, we were not able to secure rights of way for the projection of a straight line over the farm property shown in the top picture of Exhibit 109, No. 20-3. It is that small cleared area just to the left of the righthand edge of the picture approximately 1¼ inches from the bottom of the picture. The land in the lower righthand corner is not the land to which I referred. It is the land as indicated by a horizontal line which is above what seems to be some rough vegetation. It is approximately directly opposite and on a horizontal line from the two flags shown on the picture.

We were fortunate in securing a right of way, however, from the Burlington Railroad, which permitted us to construct the 24 inch line along and on their right of way. The 24 inch line leaves the private right of way at the fence line indicated by the fence posts in the lower righthand corner of the picture. It enters the railroad property at the point indicated by the white flags. It proceeds down
the railroad right of way to the right of the adjacent
712 track to a point beyond the semaphore. It continues
further along the right of way between the opening in the trees about the middle of the picture from top to bottom. It is to the right of the horizontal center of the picture. Immediately after the pipeline enters that point where the opening in the trees exists, it makes a bend to the right, or south, and crosses Keg Creek. This creek is shown in the picture at the bottom of Exhibit 109. It flows

toward the lower lefthand corner in a general northeasterly to southwesterly direction. A rock will be noted at the point where the 24 inch line crosses this creek. Within two or three hundred feet after crossing this creek the pipeline returns to what was the original projected line.

The owner of the property across which we were at first unable to obtain a right of way has passed away within the last year or two and we have now ascertained that we can purchase a private right of way across this particular section of land. A hazard exists in having a pipeline parallel to and on the railroad right of way. In the event of a railroad wreck at that location, serious damage to the 24 inch line might result. Conversely, if the pipeline should have a failure at any point along the railroad right of way it would imperil the railroad property as well as life.

It will be necessary to recondition the 24 inch line across Keg Creek and for that reason it will be necessary to construct a new section of line. It is our judgment that the 24 inch line should be removed from its present location along the railroad right of way and relaid on a private right of way, with a new crossing at Keg Creek.

It will be noted in the picture in the lower part of the page of Exhibit 109 that the rock protection which we have placed in the stream is an obstruction to the stream flow. It can be observed that the gradient of the stream, both below and above the crossing, is lower than at the crossing. If this rock protection should be washed out by flood the results would be serious to the single 24 inch pipeline. The stream was straightened out about five years ago and scouring has been taking place since that date. We are going to reconstruct this section of 24 inch line, 5,000 feet in length, in 1942, at a cost of $58,696.

The railroad is shown to the left of what appears to be the spoil bank, or what remains of an old levee, on the left side of the bottom picture on Exhibit 109. There is a short overflow area in the immediate vicinity of the Keg Creek crossing. This overflow area is not shown on the picture but would appear at the right if the picture were extended.

(EXHIBIT 109 was offered and received in evidence without objection.)

Cross-Examination Interposed by Mr. Slaff.

The physical conditions under which the 24 inch line is to be replaced at Keg Creek are practically the same as those at Walnut Creek.

You ask why the large difference in the unit price
713 per foot of pipe in the case of the two installations.

The line to be reconstructed at Walnut Creek involves a section 300 feet long. At Keg Creek we are constructing a line 5,000 feet long, approximately a mile. The unit costs of the latter will therefore be less, due to the additional footage involved in the project. The reason for this is that we will have practically the same amount of equipment to reconstruct the Walnut Creek crossing as will be required to construct the new section of line across Keg Creek and to the west. The overhead cost of the moving in and out of equipment, equipment rentals, personnel, overhead, and office rent will all be spread against 5,000 instead of 300 feet. Both items will be built by contract.

The same explanation would apply to the replacement of 300 feet in the Middle Nodaway River and the replacement of 300 feet at the South River. The replacement at Box Elder Creek is also of 300 feet, and the same explanation applies there.

Direct Examination by Mr. Hedrick.

If we were laying 300 feet across Walnut Creek and 300 feet across Keg Creek, the cost of that work would be almost the same. As I recall these two stream crossings, Keg Creek would be more expensive than Walnut because of the depth of the stream, which can be observed from the picture. The laying of the greatest percentage of the 5,000 feet will be west of Keg Creek and will be what we term nominal construction, which also tends to decrease that overall unit cost.

I will now pass to Item 14. The Missouri River is crossed at a point south of Plattsmouth, Nebraska, as shown on Exhibit 103. The channel is crossed with 10 inch pipelines. At the time of construction we considered the Missouri River to be the most treacherous stream with which we had to deal. At that time we did not consider the Canadian River as serious a stream as the Missouri. We have changed our minds since that time. We designed a 10 inch crossing across the Missouri for the reason that we did consider it a very treacherous stream. We based our judgment on our past experience in constructing pipelines across the Missouri River, as Mr. Floyd C. Brown has testified.

The characteristic of the Missouri River is to shift in its channel course. It is known to shift in its stream bed. There will be much shifting of sand bars. The same factors are working on this crossing which we enumerated for the lines in the Canadian River, namely, fatigue, corrosion, structural weakness, and the natural forces of the stream as a result of floods and ice jams.

We have no way of determining the amount of corrosion that exists on the Missouri River lines. In order to reinforce this crossing and provide the insurance that is required for continuity of service, we are going to construct four new 10 inch lines in the years 1943, 1944, 1945 and 1946, as shown here, at an expenditure of $54,158 in each of the four years. One line will be constructed each year.

We are limited in this construction program on account of weather conditions and the drainage situation at
714 the Missouri River. This is a safety measure and we
cannot afford to take any chances on losing this river crossing. The physical work on the Missouri River crossing was started in the fall of 1930 and it was not completed until some time in the summer of 1931. The work was completely shut down during the winter months on account of ice in the river. If we should lose the Missouri River crossing, in my judgment it would take not less than thirty days, and more likely sixty days, to complete a satisfactory crossing for the resumption of service.

The 18 inch loop line, Missouri River to Horse Creek, referred to in Item 15 is to be constructed from the east 18 inch by 24 inch header at the Missouri River on to Horse Creek. Beginning at said Missouri River header, there exists approximately a mile and a half of overflow land. During flood periods water accumulates in this area and the only outlet is by evaporation or seepage.

We have a serious condition at Mays Creek, which is located approximately three-eighths of a mile east of Keg Creek, and also at Horse Creek, about one and one-third miles east of Mays Creek. The 18 inch proposed loop line is to be constructed to provide additional insurance to the 24 inch line across this four mile area. We have spent to date considerable sums of money in maintenance at Mays and Horse Creeks. Within the past three or four weeks we have had a flood which damaged the protective structure at Mays Creek. There is a direct drop or difference in stream bed elevation immediately below the 24 inch line crossing of approximately fifteen feet. We have a similar condition at Horse Creek. We propose to construct an 18 inch loop line, as explained, in the year 1942, at a cost of $147,995.

The work referred to in Item 16 for the relocation and extension of the 18 inch line at West Nishnabotna River is now in progress. That is also true of the work referred to in Item 17 pertaining to the laying of a 12 inch loop at Grand River.

Item 18 refers to cathodic protection which we propose to install on approximately three miles of the main line in each of the two years 1941 and 1942..

Item 19 provides for the raising of 36 three inch blowoffs in 1940 at a cost of $792.00.

Item 21 covers the installation of 24 inch pipe to replace gates Nos. 49 and 53. This work has been completed.

Page 11 shows the book cost of property retired and salvage with reference to the capital expenditures shown on page 10.

Passing to page 12 of Exhibit 105, Item 1 provides for the replacement of drips. These drips are to be replaced for the reasons already given in connection with other drips. There will be one drip replaced in each of the three years, 1940, 1941 and 1942.

The second item reads "Replace River Headers."
715 One header will be replaced in 1940 at an expense of
$1,696, and one in 1941 at a cost of $1,709. Other headers will be replaced through the years 1942 to 1945, inclusive; one in 1942 at a cost of $2,805, one in 1943 at a cost of $1,709, one in 1944 at a cost of $1,696, and another in 1945 at a cost of $1,696.

Item 3 provides for the installing of six inch blowoffs, beginning in 1939 and ending in 1944, at a cost of $346. Two of these blowoffs will be installed in 1939, three in each of the succeeding four years, respectively, and one in 1944.

Item 4 provides for replacing the 24 inch line at Bridge Creek. Bridge Creek is crossed with a single line. The crossing is about one mile north of Sigourney, Iowa. The reasons for replacing this 24 inch line at Bridge Creek are the same as have been given for the replacing of other similar crossings, such as those at Walnut Creek, Middle

Nodaway River, South River and Box Elder Creek. This work will be done in 1941.

Item 5 refers to the construction of a 12 inch loop line at English Creek. This work will be done for the same reasons that have been given for the construction of a loop line on Box Elder Creek. English Creek is now crossed with a single 24 inch line one-half mile east of main line gate No. 63 on Exhibit 104. The loop line will be installed in 1941.

Item 6 has to do with the installing of 161 coupling sleeves. These coupling sleeves will be installed for the reasons stated in explaining other coupling sleeve installations. The expenditure has been approved and the work will be done as soon as weather conditions permit.

Item 7 provides for the purchase of land in fee in connection with coal mining operations. At the time the rights of way were purchased for the construction of this 24 inch pipeline, it was necessary to include in some of the grants a special provision relative to the pipeline company's obligation to purchase land if and when coal is mined on the respective properties. In 1937 we were required to purchase in fee some land along the pipeline in order to prevent coal mining operations near by and under the pipeline. This is strip mining ordinarily, although there is some shaft mining involved. In the year last mentioned we purchased a strip of land containing 20 acres across the Northeast ¼ of Section 20, Township 75 North, Range 18 West, Marion County, Iowa.

The right of way grants under which these fee purchases must be made to protect against coal operations either specifically state the price that we will be required to pay or state that we will be required to pay the price that a coal operator would pay for the purchase of that particular land. In the 1937 purchase we made at the rate of $300 an acre, or a total of $6,000.

We have reviewed the right of way grants and have
716 found three grants which contain specific provisions
requiring the company to purchase the land as a protection from coal mining operations. In these grants the number of acres is specifically set forth. We are required to buy only as mining operations approach.

There is a strip mine now in the Northeast ¼ of Section 20, Township 75 North, Range 18 West, Marion County, Iowa, and shaft mine operations in the Northwest ¼ of that same section. There are also coal mining operations in the Northwest ¼ of Section 21 and the North ½ of Section 22, same Township and Range. The strip mining operations are already in reasonably close proximity to the pipeline. In Sections 21 and 22 the mining operations are practically adjacent to the pipeline at one point and approximately an eighth of a mile from the pipeline at another point. The shaft mining operations are now in progress in the Northeast ¼ of Section 20. There is a shaft on the south side of the pipeline and an air shaft on the north side of the pipeline. The program of this coal operator calls for the connection of these two shafts, which will place shafting or tunneling directly below the pipeline.

This grant provides that we are to purchase all of the land north of the pipeline in the North ½ of the Northeast ¼ and a strip ten rods wide south of and parallel to the pipeline at the price which a bona fide purchaser would pay for coal mining purposes. We have determined that price to be approximately $300 an acre.

We have a right of way grant in Section 19, same Township and Range, which would require us to purchase the land at $300 an acre, to the total amount of $36,000. In our grant in the Northwest ¼ of the Northwest ¼ of Section 21, same Township and Range, the purchase price of the land is fixed at $4,650. These three amounts total approximately $50,000. We have provided an amount of $5,000 for each of the ten years from 1939 to 1948, inclusive, for the purchase of this coal land. It is our judgment that some time during that ten year period we will be required to spend that sum of money for the protection of the pipeline from coal mining operations. It may be spent in two years, or it may cover a three or five year period.

Questions by the Examiner.

The 1937 purchase covered one tract consisting of 20 acres, at $300 an acre, which with these other three tracts would make four tracts in all.

Direct Examination by Mr. Hedrick.

(August 2, 1939)

We will proceed now to Item 8, which provides for the replacing of three 12 inch lines across the Mississippi River in the years 1944, 1945 and 1946. The Mississippi River

crossing is located south of Muscatine, Iowa, and con-
717 sists of six 12 inch lines. The overflow areas on each side of the river are crossed with two 18 inch parallel lines. This crossing was constructed in 1931, and the time of construction was approximately two and a half months. Those lines were constructed by a separate contractor from those constructing the main line. We had a contractor who was experienced in handling submarine and subsurface construction to construct this particular crossing. These lines across the Mississippi are laid at depths below the river bed varying from zero to four feet. We were required by the War Department to place the line nine feet from the mean low water elevation to the top of the pipe across what the War Department describes as the main channel. We have a warning sign to navigation installed on the west levee of this river, right opposite the pipeline crossing. This sign is large enough to be read from any vessel in the navigable channel. This is to prevent the dragging of anchors in that particular area, which might damage the pipeline.

The reasons for installing three new lines across the Mississippi are identical with those which have been given for installing new lines across the Missouri and Canadian Rivers, namely, to guard against loss by corrosion, fatigue, structural weakness, and direct action by the force of the stream or changing river bed.

As we approach the larger markets the necessity for continuity of service increases. In other words, if we had a break causing an interruption of no more than a day or so on the south end of the line, we might have enough gas packed into the line so that Chicago would not be entirely without gas. If, however, the break occurred near Chicago, the period through which gas would be available to Chicago would be very much shorter. In order to reinforce the Mississippi River crossing, in our judgment it is absolutely necessary to construct three new 12 inch lines across the river, one in each of the three years already stated.

Cross-Examination Interposed by Mr. Slaff.

We have spread out all of the work which we have proposed to do for the reason that there are limited times during the year that such work can be done. We are limited by weather conditions, by time and load conditions.

These are the three main factors that limit us. We can't build a crossing at the Mississippi River when the river is frozen over. It is not practical to do so in the light of the requirements of the War Department. The period during which we can do this character of work with economy starts the latter part of April and ends in September. About September our domestic and heating load comes on. Thus we have four or five months within which to do this character of work.

Then we have considerable work going on over the entire pipeline each year in addition to these particular items. Our organization must inspect and supervise all that work. If we had only one project like the Mississippi River crossing, we could handle it ourselves satisfactorily. This work would be contracted.

Nevertheless we must have proper supervision and inspection of the work that is going on. We inspect all construction work let to contractors.

Item 9, captioned "Cathodic Protection," calls for an expenditure in 1941 and 1942 for protecting approximately 3.2 miles of pipeline in each of those two years.

Item 10 provides for raising 60 three inch blowoffs in 1940. These blowoffs will be raised for the same reasons we have given for the raising of other blowoffs.

On page 12 is shown the book cost of property retired and the salvage as related to the additional capital expenditures shown.

You ask what is the matter with the weather at this time that prevents our installing the coupling sleeves referred to at page 10, Item 11. In order to install coupling sleeves and recoat the pipeline with a paint protective coating, it is absolutely necessary to have the pipe thoroughly dry in order to apply the coating efficiently. The moisture accumulates on the outside surface of the pipe on account of the difference in temperature between the pipe and the atmosphere. This occurs for the same reason that moisture gathers on the outside of that water pitcher there. It is condensation. Condensation is more severe when the humidity of the weather is high. We have attempted to devise means to dry off water from the outside of the pipe in order to apply the protective coating. The efforts have been unsuccessful, and we have to wait on a proper relation between humidity and temperature of the air and pipe before this work can be done. That will occur in the cooler months of the year, beginning about September.

Questions by the Examiner.

You ask why on page 12, in connection with the 24 inch line over Bridge Creek, the ratio is about seven to one between the capital expenditure and the book cost of property retired, whereas in the case of the Mississippi River crossing the ratio is two to one. Bridge Creek shows a capital expenditure in 1941 of $8,833 and a retirement of $1,499. When Bridge Creek was originally constructed in 1931 the contractor submitted unit costs for the construction of an entire section of the pipeline. When he bid on the particular section of the pipeline which he constructed, he did not bid a specific item for this crossing, like he would at a multiple river crossing, for example. The unit costs that applied to the construction of this crossing were the same that applied to any normal crossing.

It is more expensive to construct a pipeline across a stream than on dry land, and that expense we are now discussing is averaged out in his entire unit price. Now, we have to construct this line at one specific location, and it will cost considerably more than if we were constructing a normal pipeline across level country. The added ex-
pense is due to the cost of moving in and out equip-
719 ment and is in effect an overhead cost. The added
cost in there at the present time is also due in part to
increased taxes, shorter working hours and higher wages. All those items affect the cost of doing work as of June 1, 1939, as compared with doing it in 1930 and 1931.

You ask as to the type of equipment ordinarily used in constructing such a crossing. It takes dragline equipment; and in the majority of this work in Iowa, which is detailed on page 18 of Exhibit 105, we have had to use steel sheet piling in the excavation of a trench to get the line deep enough below the future gradient of the stream.

The retirement of $1,499 represents the average cost, that is, what it actually cost us, in money paid to the contractor plus the cost of material that actually went in there, at the time of the original construction. At the time the line was constructed across Bridge Creek the contractor submitted a bid which was accepted for the construction of 100 miles or more of pipeline, which included some of the streams that necessarily would have to be crossed. He submitted unit prices per foot for that work and did not submit special bids for any of the stream work.

In the case of the Mississippi River crossing he submitted a bid only for a river crossing and that contemplated river work only, the unit costs for which are considerably higher than the unit costs for construction of a hundred miles of pipeline. I can illustrate that by referring to the manufacturing of automobiles. If a machine shop be designed to construct a single automobile, the expense would be many times more than the expense of manufacturing automobiles in a plant such as that of Buick or Ford.

Direct Examination by Mr. Hedrick.

Turning to page 13, we find the first item is captioned "Replace Drips." The necessity for this replacement has already been explained. One drip will be replaced in each of the years 1940 to 1944, inclusive.

The second item is entitled "Replace River Headers." The necessity for the replacement of river headers has been explained. In 1940 we will replace one 18 by 12 inch header; in 1941 one 24 by 18 inch header; in 1942 one 24 by 12 inch header; in 1943 one 24 by 18 inch header; in 1944 one 18 by 12 inch header; in 1945 one 24 by 18 inch header; and in 1946 one 24 by 18 inch header.

The third item provides for the installation of 14 six inch blowoffs. The necessity for those has been explained. Two will be installed in 1939, two in 1940, two in 1941, three in 1942, two in 1943, two in 1944, and one in 1945.

Item 4 involves an expenditure at Brush Creek. That creek is now crossed with a single 24 inch pipeline at a point two-thirds of a mile east of main line gate No. 76, north of Depue, Illinois, as shown on Exhibit 104. The installing of a 12 inch loop line at this crossing is
720 necessary for the reasons already stated with reference to the installing of similar loops which I have already discussed. The only difference is that this crossing is near the Chicago market, which, as I have explained, makes it even more necessary as insurance of continuity

of service. The overflow area is 350 feet, and the loop line will be 1000 feet long. The difference is due to the fact that in order to secure an adequate location for the gate valves and for proper blocking, it is necessary to install those valves on the hills on each side of this overflow area. We try to place the headers outside of the overflow area and on ground where the conditions are entirely stable.

Item 5 provides for the installation of 31 coupling sleeves in 1939. This work is approved and will proceed as soon as weather conditions permit.

Item 6 provides for installing 42 coupling sleeves in 1940. I have explained the necessity for installing coupling sleeves in connection with my testimony concerning the installation of similar coupling sleeves in Districts 5-W and 5-E.

Item 7 provides for the replacing of 24 inch line at Devils Slough. This slough is crossed with a single 24 inch line and is located less than a mile west of the I. & M. canal in Illinois. We are particularly concerned with erosion in this area. At the present time we have a program for replacing 165 feet of 24 inch pipe, the work to be done on Labor Day. We have chosen this day because load conditions are low. Another reason is that we have a delivery to the New Jersey Zinc Company at Depue, Illinois. They are unable to take and accept a reduction of gas flow until that date. In fact, they have required this advance notification. This is due to the time involved in the shutout in connection with this work. We notified the customers that we proposed to do this work, and the New Jersey Zinc Company advised us that they could not accept reduced deliveries until Labor Day.

The pipe to which I referred is located between Devils Slough and the I. & M. canal. Soil conditions in that area are of a peat bog nature. There is considerable moisture in that section of the country, which aggravates the corrosion conditions. This is similar soil to that where the pipeline break occurred last year near Sheffield, Illinois, to which Mr. Floyd C. Brown testified. For these reasons we are going to replace the 24 inch line across this slough and at the same time lay this line at a depth of six to eight feet below the present elevation of the stream. About 300 feet of pipe will be involved in this replacement.

Item 8 refers to the replacement of three 12 inch lines across Fox River. That river is now crossed with six twelve inch lines located just northeast of Ottowa, Illinois, as appears on Exhibit 104. The overflow area on the west side of Fox River is crossed with two 18 inch pipelines. Fox River is a navigable stream, and the crossing of this stream was done in accordance with the specifications and requirements of the U. S. War Department.

721 Those War Department requirements provided that the top of the pipe should be two feet below the elevation of the stream bed. The stream bed in Fox River is solid rock. In order to construct this crossing the contractor was required to excavate a trench in solid rock for each of these six 12 inch lines by dynamiting under water. Due to the roughness of each trench in which the 12 inch lines are laid, this rock causes penetration of the protective coating on the pipe, which is breaking down. The result is corrosion.

I might add that the covering above the pipe in the trench is also rock, which is the only material available at that place. We are going to replace three of the 12 inch lines across this river, one each in the years 1943, 1944 and 1945. In fact, we are going to install three new lines across the river as a safety measure. We are unable to determine specifically everything that is taking place in each of those river lines. In such a situation we cannot take a chance of interruption of service at any time for any reason. This work is to be done as a result of our best judgment in the proper and efficient operation of this pipeline system. That is also one of the reasons for the replacement of the lines across the Mississippi and Missouri Rivers.

Cross-Examination Interposed by Mr. Slaff.

Yes, these lines will be replaced at the same location which they now occupy. It will be more economical in this particular instance to remove the present lines from these rock excavated trenches than it would be to have to excavate additional trenches. We will not have to blast new trenches across the river. Naturally, there would be some danger in blasting close to the pipeline.

Direct Examination by Mr. Hedrick.

Item 9 presents another instance of cathodic protection, the need of which has been explained heretofore. In each of the years 1941 and 1942 cathodic protection is to be installed for approximately four miles of 24 inch line.

Item 10 provides for the raising of three inch blowoffs, to be done in 1940. The necessity for this work has been explained. 46 blowoffs are involved in this item.

Item 11 provides for the replacement of 24 inch line across Brush Creek. This is the same creek as referred to in Item 4 on page 13. The reasons and the necessit for the replacement of 24 inch line across this creek are identical with those given in support of the replacement of similar line crossings, with the exception that again we are approaching closer to the main delivery points of the system. This work is to be done in 1941 at a cost of $8,833 for a section of 300 feet of 24 inch line. This line is in addition to the loop line that will be installed under Item 4. When we get through with this replacement we will have two lines across Brush Creek.

722 *Questions by the Examiner.*

You ask if we would not be in the same fix if we had an interruption any where along the line between Chicago and Texas as if it were near Chicago. That is true, except that if we assume an interruption in the vicinity of Beaver Creek, Oklahoma, we would have available all the line pack which is in the line from Beaver Creek to Chicago. If we have an interruption at Fox River, which is within 30 or 40 miles of Chicago, obviously our line pack would be very, very small from which we could draw in supplying the market. Also we have other loads along the pipeline for which we are committed for delivery.

Direct Examination by Mr. Hedrick.

We can no more cut off the firm load for Davenport, Iowa, for instance, than we can for Chicago. We can cut off all the industrial loads. The load along the pipeline, not counting Chicago, including industrial sales, amounts to approximately 30 million per day, as against a delivery of 185 to 190 million cubic feet to Chicago. What I am trying to say is that in case of an interruption that has a short duration, we can stand an interruption on the south part of the line better than we can on the north. If we had a major interruption lasting a period of several days, regardless of whether it was near Chicago or in Oklahoma, the results as far as Chicago and the eastern points of delivery are concerned would be the same.

It is these major interruptions we have in mind in taking these precautions. A major interruption might be repaired in 24 hours or it might require three or four days for repair, depending entirely upon its nature and location, the condition of the soil, and the weather conditions prevailing at the time.

I can give you an illustration of what I am trying to say. In the testimony of Mr. Floyd C. Brown he referred to what we know as the Sheffield break. This break occurred at a point approximately three miles northwest of Sheffield, Illinois, about 7 A. M. on Sunday, February 13, 1938. The failure resulted because the ground was frozen and then thawed out by a warm period which took the frost out of the ground. During this period of warming up we had continuous rains, which created a very unstable soil condition at the point of failure. The exact location of the failure was on an old lake bed and the soil was of a peat bog nature. The result was that the moisture got under the pipe, resulting in buoying or floating it out of the ground, causing an angular deflection at the coupling at that location. The pressure of the gas within the pipe was then sufficient to cause a vertical component of force and a complete failure of the line.

The failure was observed immediately at the discharge gauge at Station 10, just west of the break. A report of the failure was immediately made to the dispatching office in Chicago. The dispatcher got in touch with Mr. Kesinger, Mr. Davidson, Mr. Bulla and myself—in fact, all men in the organization who are responsible for continuity of service. At that time each customer was 723 notified that a disruption existed in the pipeline; and immediate steps were taken to remove the interruptible loads and also to protect all domestic firm sales. Customers like the Peoples Gas Light & Coke Company immediately put their standby equipment in operation.

The next step in a situation of that kind is to notify the field organization responsible for that part of the pipeline. They in turn notify all subordinate organizations down to the maintenance men. All the emergency repair equipment is immediately placed on trucks and cars and started for the location of the break. We also arranged for the use of tractors, horses and wagons, trucks, pumps, and all other equipment which we thought might be needed in making the repair. That included welding machines.

This particular repair was located approximately three miles from a concrete highway. As a result of the continuous rains the roads were very muddy and rutty. We were required to move all this equipment from this concrete highway to the location of the break over these muddy roads. After we delivered our material to the road, that is, the dirt road immediately west of the location of the break, we were required to move that equipment in to the location of the break across a peat bog soil condition. Meantime the break had to be isolated immediately by closing the main line gates on either end of the break.

In moving the equipment over these muddy roads, I personally went in over my knees in this peat bog soil, so it is apparent what would happen in the necessary hauling of heavy equipment across that same area.

We started to build a wood or corduroy road through this bog by hauling in railroad ties obtained from the Rock Island Railroad in Sheffield and the towns and areas adjacent to Sheffield. In fact, we did haul in from 800 to 1000 ties.

Exhibit 85, introduced in connection with the testimony of Mr. Floyd C. Brown, contains a number of pictures of the Sheffield break. The location of the break is shown in the top picture, or picture No. 1, just west of the trees which are in about the center of the picture. Picture No. 4 will give you a better idea of the water condition existing at the exact location of the break. The rupture of the pipe was practically in the exact center of this water. The parted pipe will be observed in Picture No. 5, which shows the pipe after it was pulled out of the 24 inch coupling.

Referring back to picture No. 1, the water in the ruts reflects the elevation of the water table. Picture No. 2 shows the nose of a large tractor partially submerged in the unstable soil. You will note the entire radiator is practically covered. Picture No. 3 shows the construction of this corduroy road, using railroad ties. A tractor is used in placing those ties.

Within two or three hours men and equipment started to arrive at the point on the road near the location of 724 this break, and we at once took means to transport the equipment across this unstable soil condition to the location of the break, which is shown in picture No. 4 and also in pictures Nos. 5 and 6. We were able to get a few small pumps to the location of the break by Sunday afternoon and place these pumps in operation. They were not sufficient to handle the large volume of water, however. We at that time made arrangements for securing or bringing additional larger pumps to this location. We immediately took steps to secure two cars of cement. This we could not obtain closer than LaSalle, Illinois, which is east of Sheffield. We made arrangements with a local lumber and supply dealer at Sheffield to have this cement hauled from the plant at LaSalle to the location of the break. This had to be done on Sunday. In fact, there was a time when the cement company refused to permit cement to be hauled from their plant by trucks. They advised that it would have to be handled by railroad. We were able to persuade them of the emergency existing and they did permit the hauling of this cement by trucks on Sunday night. The cement was needed for constructing cofferdams or dams to confine the water so that we could pump it out.

We were aided considerably by the freezing temperature of the night following the break. This permitted a more ready movement of the equipment into the location. On Monday morning we had sufficient material on hand to proceed with the dewatering of this excavation which was blown out by the gas escaping from both ends of the pipe, forming the lake shown in picture No. 4.

The break was finally repaired on Monday evening about 11 P. M. We took immediate steps then to weight the pipeline across these peat bog areas. The emergency protection was gravel filled sacks. We installed final or permanent protection by the use of concrete anchors and by installing steel welding sleeves on each coupling.

That break influenced the policy of the company in purchasing additional tractors, pumps and trucks for such occurrences as might happen in the future. Before leaving this, I would like to mention that we employed over 300 men to assist with the repair of this particular break.

Cross-Examination Interposed by Mr. Slaff.

Yes, our firm supply to Chicago was interrupted. We had partial interruption from Sunday morning about seven A. M. until the completion of the repair, which was about 11 P. M. Monday, February 14. I am referring to the domestic load. Mr. Floyd C. Brown stated in his testimony that the cost of this interruption by loss of gas and including the cost of repair was some $248,875. The cost of the physical repair was slightly in excess of $42,000.

Direct Examination by Mr. Hedrick.

Item 12 provides for installing six 12 inch automatic valves at Fox River. As pipeline operators, we have 725 realized for a number of years the necessity for providing some means or device for shutting off gas when a pipeline break occurs, thereby retaining the maximum amount of gas in the pipeline after the break and preventing the flow of that gas to the atmosphere. In 1934 we made our initial tests and did our initial experimental work and made our initial contacts with the various valve manufacturing companies for the design and manufacture of automatic valve equipment. By automatic I mean that the valve will close completely without the aid of manual operation. Although they encountered several difficulties in the design, such a valve was finally successfully designed and manufactured, beginning about March or April, 1939. We made a number of tests, simulating as near as possible actual main line breaks and resulting loss of gas. As a result of these tests, we were satisfied that the valve with the automatic feature would perform the duty desired. We have formulated a program for the installation of automatic valve equipment. The first equipment of this nature is scheduled to be added this year by the installation of six of these valves at the east side of the Fox River crossing. The management has given approval to this installation and the valves have been ordered.

Item 13 provides for the installation of two 18 inch automatic valves at the I. & M. canal. This canal is in the central part of Illinois, as appears on Exhibit 104. The expenditure is to be made in 1940.

Item 14 is for the installation of two 18 inch automatic valves at Mud Creek, just west of the I. & M. Canal. This work will also be done in 1940.

Item 15 provides for the installing of two 18 inch valves at Mill Creek, 21 miles west of Mud Creek, in the year 1940.

Item 16 provides for the installation of two 18 inch automatic valves at the east 18 by 24 inch header of the Mississippi River crossing, in the year 1940.

Item 17 is for the replacement of main line gate No. 76, as shown on Exhibit 104, with 24 inch automatic valve equipment. It is in the vicinity of Depue and Princeton, Illinois.

This work is scheduled to be begun in District 6 only at this time. This is in accordance with our policy of protecting the east end of the pipeline system, due to the lack of line pack as we approach Chicago. As already stated, it is the policy of the company to protect the line at the north end more than at the south end.

Question by the Examiner.

You ask what is the actuating principle of these automatic valves. This valve is actuated by a piston. It is what we term the plug type valve, manufactured by the Merco Nordstrom Company. We have directly installed on this valve a cylinder and piston. The valve is operated by means of this piston, through a rack and segment gear.

The gear is directly connected to the stem of the valve.
726 There is an auxiliary tank installed close to the valve installation which is connected to the main pipeline. The pressure which exists in the pipeline also exists in the tank. The tank contains gas.

There is a 1/32 inch orifice between the tank and the 24 inch line. This orifice permits fluctuation of pressure in the tank as the pressure fluctuates in the main line, which may be 10 to 15 pounds in a 24 hour period.

There is another connection made from this tank to the piston actuated valve. In case of break, the pressure on the pipeline decreases suddenly and the pressure on one side of the piston likewise decreases. The force of the pressure in the reservoir will be exerted against the opposite side of the piston. The gas cannot flow back into the pipeline due to this orifice restriction. The major flow is into this piston actuated valve. The principle in general is identical with the air brake installation on a railroad train. Contrary to general belief, when the engineer makes a service application in his locomotive he does not increase the air pressure on the train system. He releases or decreases the air pressure. That sets in motion what is known as a triple valve, which in turn admits pressure contained in an auxiliary reservoir installed under each car. The force of that pressure actuates the piston under that car, which controls the entire braking mechanism.

Direct Examination by Mr. Hedrick.

The book cost of property retired and the salvage as related to the additional capital expenditures are shown at the bottom of page 13.

Cross-Examination Interposed by Mr. Slaff.

The construction of the pipeline in District 6 was handled by one contractor, unless the Mississippi River crossing be regarded as in District 6. That crossing was handled by another contractor. The explanation for the difference in book cost of drips shown on line 1 and in book cost of property retired is that those two drips which will be retired in 1943 and 1944 respectively were installed by the company and not by the contractor.

Direct Examination by Mr. Hedrick.

Turning now to page 14, the first item is "Replace 8 inch River Lines, Davenport, Mississippi River." This river crossing is a part of the branch line which connects the 24 inch main line with our meter setting at Linwood, Iowa, for the delivery of gas to Davenport, Iowa. Two 8 inch lines are now installed across this river.

The channel of the Mississippi at this point is divided by an island. The flow of the river is generally east to west at this point. The main channel is at the north side of the island. An 8 inch line is to be constructed across this river in 1945 for practically the same reasons that have been given for constructing three new lines across 727 the main line Mississippi River crossing. The two original 8 inch lines were constructed in accordance with the U. S. War Department's specifications. The new 8 inch line in the main channel will be laid in rock. We propose to reclaim the old line when the new line is laid. We will still have two 8 inch lines across the river.

Item 2, "Raise Three Inch Blowoffs," relates to work to be done in 1940 for installations of four 3 inch blowoffs. The necessity for this work has been explained. The book cost of property retired and salvage as related to those two items are shown at the bottom of the page.

We pass now to page 15, which is entitled "Pipeline Department, Joliet Meter and Regulator Stations, Additional Capital Expenditures".

Item 1 refers to the replacement of vacuum pumps. A vacuum pump is a small piece of equipment directly connected to an electric motor. The pump is used for removing gas or air from the specific gravity balances. The specific gravity balances are used for determining the specific gravity of the natural gas.

With the exception of Item 7, "Replace Water Softener System," considering Items 1 to 13, inclusive, that equipment and apparatus was all purchased in 1931 at the time the pipeline system was placed in operation. The equipment is used either for determining the measurement of the gas or correcting for the measurement of the gas. It is our judgment that this equipment will become worn out and deteriorated to the point where it is no longer serviceable and will be replaced in the respective years as set forth in the exhibit. Item 7, the water softener, was purchased about three years ago and will be replaced in 1946.

Item 14 provides for the construction of a porch at the Joliet regulator station. This work has been approved and is now in progress.

The book cost of property retired and the salvage in connection with the expenditures on this page are shown at the bottom of the page.

Page 16 deals with additional tools for the use of the pipeline department. Use will result in the deterioration of this equipment and will wear it out to the point that it is no longer serviceable or safe to use. This, of course, will necessitate their replacement. That applies to the melting kettles in 1942.

The district numbers shown on this page are the same as those shown on Exhibits 103 and 104. The melting kettles will be replaced in 1947 and 1948 for the reasons given. In 1940 the Sterling pumps are to be replaced on account of the worn out equipment. In 1945 a diaphragm pump is to be replaced. In 1946 the Sterling pumps purchased in 1938 will be replaced. In 1948 the Sterling pumps purchased in 1940 will be replaced.

In District 3 an electric welding machine has been
728 purchased in 1939. In 1942 another will be purchased to replace one purchased in 1936. In 1943 another will be purchased to replace one installed in 1937. In 1944 another welding machine will be added to the present equipment. In 1945 another will be purchased to replace the one purchased this year. In 1947 an additional welding machine will be purchased. In 1948 another will be purchased to replace the one to be purchased in 1942. In 1949 another will be purchased to replace that to be purchased in 1943. In 1950 and 1951, respectively, machines will be purchased to replace those to be purchased in 1944 and 1945.

In District 4 a welding machine will be purchased in 1943 to replace one purchased in 1937. A welding machine will be added to the equipment in 1947. In 1949 one will be purchased to replace the one purchased in 1943.

In District 5 a welding machine will be added in 1942, and in this district two machines will be purchased in 1943 to replace those purchased in 1937. In 1947 two welding machines will be added to equipment, and in 1948 and 1949, respectively, welding machines will be purchased to replace those to be purchased in 1942 and 1943.

In District 6 a welding machine will be purchased in 1942 to replace that purchased in 1936. This is a smaller machine, which accounts for the difference in cost. In 1943 another welding machine will be purchased to replace that purchased in 1937; and in each of the years 1944 and 1947 a welding machine will be added to equipment. In 1948, 1949 and 1950 welding machines will be purchased to replace those to be purchased in 1942, 1943 and 1944.

The adding of new welding machines to the present equipment will be necessary on account of additional maintenance which the pipeline will require in future years, as I have heretofore testified.

Items 4 and 5 provide for the replacement of Rex gas engine driven centrifugal pumps. The present pumps were purchased in 1938 and will be replaced in 1946.

Item 6 deals with rotary scrapers which will be purchased in 1946 to replace those purchased in 1938.

Item 7 provides for electric lighting units to be purchased in 1948 to replace those purchased in 1938.

Item 8 provides for air compressors to be purchased for District 3, one to be added in 1944, one to be added in 1945, one to be purchased in 1946 to replace the one purchased in 1938, and one to be purchased in 1952 to replace the one purchased in 1944. The reason for the difference in cost of the last item is that the compressor to be replaced in 1946 was equipped with a number of auxiliary tools.

In District 4 the air compressor purchased in 1935 will be replaced in 1943; and in 1951 we will replace the compressor, less the tools, to be purchased in 1943.

729 In District 5 we will add two air compressors in 1943. In 1946 and 1951 air compressors will be purchased to replace those purchased in 1938 and to be purchased in 1943.

In District 6 an air compressor will be added in 1943, one will be purchased in 1944 to replace one purchased in 1936, and compressors will be purchased in 1951 and 1952, respectively, to replace one purchased in 1943 and one purchased in 1944, less the tools.

Item 9 deals with a one-half yard power shovel with drag line and pull shovel equipment. This is new equipment, the necessity for which was explained in the testimony under Texoma Natural Gas Company system, referring to heavy excavating equipment for repairs which will have to be made to the pipeline in subsequent years. I refer to Item 9 on page 6 of Exhibit 105. Full shovel equipment will be purchased in 1947 for each of Districts 4, 5 and 6 in addition to the purchase of such equipment in 1943 for District No. 5.

Item 10 provides for snow plow equipment for trucks and caterpillars to be purchased for the clearing and removing of snow from highways and roads to permit emergency repairs and also to provide the opening of the roads for maintenance work necessary to be carried on. I might state that in the early winter of 1936 we utilized snow shoes and skis in Iowa for covering the pipeline and performing such work as could be done under snow and snowbound conditions in the field.

Item 11 deals with Gould diaphragm pumps. The pumps to be purchased in 1944 are to replace those purchased in 1934. Those to be purchased in 1948 will replace pumps purchased in 1938.

Item 12 deals with a bench drill, which has been approved by the management for purchase. Likewise, Item 13, a pipe cutting machine, has been approved for purchase by the management.

Item 14 shows small miscellaneous tools to be purchased. These are small tools costing in excess of $25.00, to which reference has not been made in the above mentioned items. Our judgment is that these tools will have to be replaced and additional tools will have to be purchased in order properly to maintain and equip our respective gangs in the carrying on of their duties in connection with the operation and maintenance of this pipeline system.

The book cost of property retired and salvage relating to expenditures shown on page 13 are shown on page 17.

Questions by the Examiner.

You ask how this compares with the tool account on page 7. The latter is a summary. You will note that on page 7 for the year 1939 we show expenditures for tools of $3,581. If you will refer to page 16, you will find the total of tools purchased in 1939 in the same sum. In other words, Item 14 on page 16 is for miscellaneous small tools, and Item 8 on page 7 is the total for all tools, including small tools.

730 You ask why I have a diaphragm pump under centrifugal pump instead of down with the others. That pump came under the classification of small pumps. It was just placed in that classification for no specific reason that I can give. This diaphragm pump is a small pump. The Gould diaphragm pumps are hand operated pumps, as shown in Item 11. The C. H. & E. diaphragm pump is a gas engine driven or power driven pump.

Direct Examination by Mr. Hedrick.

It is my considered judgment, based on my experience and upon my knowledge of the pipeline, machinery, equipment and other property of defendants, of the demands upon the same in the course of defendants' operations, and of the physical condition of this property and equipment, that at the prevailing costs of labor and material as of June 1, 1939, the amounts set forth in Exhibit 105 will be expended by defendants for additional capital equipment on or before the respective dates set forth in the exhibit.

(EXHIBIT 105 was offered and received in evidence over the objection of counsel for each of the two Commissions, to whom an exception was allowed.)

Passing now to Exhibit 93, Item 2 on page 2 provides for an expenditure in 1939 of $4,101 to construct one four room cottage for the pipeline department. That is a house for the proration clerk located at Fritch, Texas. As the number of wells increases we need additional clerical assistance in handling the proration of the wells over the entire gathering system.

Item 4 provides for a similar house in 1940 at the same cost, $4,101, this house to be for a gas engineer employed to determine rock pressure, open flow and back pressure in connection with the operation of the wells over the entire gathering system.

Item 6 provides for the construction of a four room cottage in 1941 at a cost of $3,815. That house is for a pipeline maintenance foreman to be added to the organization in that year. These foremen have immediate charge of the maintenance gangs and handle all maintenance work throughout the gathering system in connection with lateral lines and booster stations.

Item 7 provides for the construction of four 4-room cottages in 1942 at an expenditure of $15,260. One of these houses will be for a welder who will be required on account of the increased welding work for the pipeline and for the compressor stations. One will be to house an automobile mechanic, who will be required for the added automotive equipment. The third house is for an assistant meter superintendent. The work of this division of the department will increase as the number of wells increase along the gathering system. The fourth is for a gas engineer.

Item 8 provides for the construction of two 4-room cottages at an expenditure in 1944 of $7,630. One of these
731 is for an assistant pipeline superintendent who will
be needed in connection with the added work and responsibilities due to the added investment to be made in the gathering system in connection with additional wells, lateral line construction and booster station operation. The other will be occupied by a chart changer, who will be added to the organization in 1944. Chart changers are

used for replacing the orifice meter gauge charts and to assist in the servicing of booster stations.

Item 9 provides for the construction of two 4-room cottages for the pipeline department in 1947 at a cost of $7,630. These houses are for a maintenance foreman and a truck driver, who will be added to the organization in that year to meet the requirements of the system.

Item 10 provides for the construction of one four-room cottage in 1949 at a cost of $3,815. This house will be occupied by an additional chart changer who will be required at that time.

Item 1 on page 6 of Exhibit 97 provides for the construction of eight 4-room cottages in 1939, at a cost of $33,576. We are endeavoring to locate the pipeline organization closer to the actual operations because they are needed there for emergencies. The houses also provide for the welfare of the personnel. We are particularly interested in the welfare of each employee from the standpoint of continuity of service and their value to the organization.

In 1940 the pipeline department will require a house at Station 3 for a pipeline welder. In the same year a house will be constructed for an additional pipeline welder at Station 4. During the same year at Station 2 the bunk house will be converted into a dwelling for a line welder; and at Station 5 a house will be constructed for a pipeline welder. In 1941 a house will be constructed for an additional pipeline foreman at Station 5, and during the same year a house will be constructed for a pipeline superintendent and one for a pipeline welder at Station 6. During the same year a house will be constructed at Station 8 for a truck driver, and one at Station 9 for a meter inspector. A meter inspector is responsible for the operation and maintenance of the meter equipment.

(Counsel handed the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Operation and Maintenance, Pipeline Department, Witness R. G. Strong," which, at the direction of the Examiner, was marked Exhibit 110 for identification.)

The subject matter dealt with on page 1 of Exhibit 110 is set out more in detail on page 2. Line 2, entitled "Natural Gas Pipeline Company of America," is set out in more detail on page 7 of the exhibit. The detail of

Lines 1, 2 and 3, page 2 of the exhibit, entitled "Gathering System, District No. 1;" "District No. 2," and "Booster Stations," is set out more fully on pages 3, 4 and 5 of the exhibit.

Passing to page 3, the items on Lines 1, 2, 3, 4 and 5,
for the years 1939 to 1954, inclusive, were calculated by
determining a unit cost per mile of pipeline installed
as an average in the years 1936, 1937 and 1938. In
732 other words, the unit costs were prepared from the
actual cost of operating the gathering system in those
three years.

I mean the unit cost per mile of pipeline installed was calculated in that manner. That factor unit cost per mile per year was applied to the miles of pipe which are to be added in each year from 1939 to 1954. The same explanation is given for material, for car and truck, and for damages, with the exception that when we are required to pay damages or to pay for repairs to equipment such as pipe repairs, coupling repairs, repairs that have not heretofore been done, those damages and repairs will be added to the unit cost as projected in each of the years. The traveling expense shown in Line 5 is projected on a unit cost per mile basis.

Under Line 6, "Meters and Regulators," a unit cost was developed from the actual expense from 1936 through 1938 based on the number of meters serviced during each of those three years. That unit cost was applied in projecting the cost from 1939 to 1954, inclusive, based on the number of meters to be added to the gathering system in each of those years. That in turn is, of course, based on the number of wells to be drilled, as shown by the testimony of Mr. Bussard and set out in his Exhibit 100.

The cost of material and labor was arrived at by a unit cost, not by using the prices of June 1, 1939, representing an average actual cost during the years 1936, 1937 and 1938. We have certain items such as repairs to pipe, repairs to drips, the cost of replacing a drip, that is, the reclaim cost of replacing a drip, the reclaim of lateral lines, the cost of the reclaim, repairing river lines, all of which is work that is not represented by the actual unit cost arrived at for these years 1936, 1937 and 1938.

In determining the cost of labor that goes into operation and maintenance, we developed a unit cost from actual expense incurred from actual operation over the three year period, 1936, 1937 and 1938. We applied that unit cost to the number of miles of pipeline we expect to have in place during the years 1939, 1940, and so on. That would apply to the material as far as the unit cost developed is concerned.

The labor costs on June 1, 1939, were practically the same as for the years 1936 to 1938, inclusive. I think I can say they were the same, as I do not remember any changes that may have taken place during that period of time. The only difference would be the decrease in the number of working hours, which might affect the cost of operation, and that would tend to increase the labor costs above the average that I have used in projecting this expense. In other words, if I had used the June 1, 1939, labor cost, taking into consideration the decreased labor hours, it would show a greater amount.

Items 8, 9 and 10, under "Maintenance," were arrived at in the same manner as explained under "Operation," by determining the unit cost per mile of maintaining
733 the lines during the years 1936, 1937 and 1938. To those costs as shown for the years 1939 to 1954, inclusive, I have added the expense of material, labor, transportation, and car and truck applying to the additional miles of pipe that would be added to the gathering system.

Cross-Examination Interposed by Mr. Slaff.

For each of the years after 1939 we have two factors, one the unit cost per mile that we have developed over the three year period 1936 to 1938, inclusive, applied to the number of miles of pipe we expect to have in place. Then there is an additional item of expense for each year for certain operation and maintenance for which we cannot or have not developed unit costs. There is no detail of that breakdown. The detail is shown in my working papers.

Direct Examination by Mr. Hedrick.

These working papers will be available to counsel and their engineers at their and my convenience.

Line 11, "Meters and Regulators," was calculated from the unit cost of actual maintenance of the meters and regulators installed during the years 1936, 1937 and 1938, applied to the meters and regulators to be added to the gathering system in the years 1939 to 1954, inclusive, which is based on the number of wells that are to be added to the gathering system during those years, as shown in Exhibit 100.

Cross-Examination Interposed by Mr. Slaff.

The total mileage of pipe in the gathering system as of January 1st of each of the years to which I will refer is as follows: 1939, 230; 1940, 248; 1941, 272; 1942, 288; 1943, 309; 1944, 321; 1945, 336; 1946, 357; 1947, 382; 1948, 398; 1949, 411, 1950, 419; 1951, 426; 1952, 426; 1953, 426; and 1954, 426.

The miles of pipe in the gathering system as of January 1, 1936, were 191; 1937, 206; and 1938, 220. The number of meters and regulators as of January 1, 1936, was 110; 1937, 128; and 1938, 149.

No, I did not use the figures of pipeline in existence as of January 1, 1939, January 1, 1938, and January 1, 1937. I used the figures as of January 1 of the years 1936, 1937 and 1938. Those are the methods that two different people might use. In arriving at this cost I used the pipe that was in place the first of those three years. The pipe that was installed during 1936 was picked up and used as an average during the year 1937. The pipe that was installed in 1938, added to the pipe that was in place on January 1 of that year, will give you the pipe in place as of January 1, 1939, which, with these factors applied, will give you the amount shown under the column "1939."

734 I took the total amount of pipe in place as of January 1, 1936, the total in place on January 1, the following year, that is, the sum of the pipe that was installed during the year 1936 added to the amount that was in place January 1, 1936. That gives you the quantity of pipe which I used for the year 1937.

You ask if in order to get the amount of pipe for that full year 1938 I had to take into consideration the figure I gave you of pipe in place as of January 1, 1939. The answer is no. I gave you the figure of pipe that was in place January 1, 1938. The pipe added during 1938 was not picked up until the year 1939, and then was applied to the January 1, 1939, figures. To be absolutely correct I think you have this in mind: it would be necessary to calculate a weighted average by months or to the extent of weeks, if we want to carry it that far. I realize there is a chance for confusion in here, f

Direct Examination by Mr. Hedrick.

Proceeding to page 4 of Exhibit 110, Line 1, entitled "Horse Power," during the years 1938 to 1954, inclusive, refers to gas engine compressors which are to be installed in what we have termed the booster stations. These have a nominal rating of 40 horse power for each compressor gas engine driven unit.

Under the sub-head "Operation" on page 4 of this exhibit, the cost of operating labor was determined from the actual operating expense which we have had in connection with servicing meters and regulators throughout the gathering system. We have determined that a booster station will require twice the amount of servicing that a meter will require; therefore, we have doubled the operating labor expense shown for the years 1936, 1937 and 1938 and applied that as a factor for determining the cost of booster station operation labor, as shown in Line 2, page 4, in the years 1939 to 1954, inclusive. The year 1938 reflects the actual operating labor expense. That expense is by no means comparable to what in our judgment will be the future expense of operating booster stations. It is much higher on account of the experimental type of operation of the booster station which is now in place. We have been required to pay considerable attention to that unit to determine its operating characteristics. I do not expect the 1938 cost to continue throughout the years 1939 to 1954, inclusive.

Line 3 shows the cost of material for operating the units. This consists largely of lubricating oil and expense for small tools, gasoline, kerosene, waste, rags, etc. We have determined this expense to be $4.50 per horse power per year, wich applied to the horse power installed for each of the years shown, with the exception of 1938, will give the total material operating cost. The 1938 cost of material is lower than the 1939 cost of material for the reason that the station was placed in operation in May, 1938, and was not operated for the full year.

735 Referring to the sub-heading "Maintenance" in Line 6, we determined the cost for maintenance labor by the expense of maintaining personnel, that is, foremen, mechanics and helpers to be used in the maintenance of this equipment. This also includes the transportation of these men about the gathering system. From that study we determined that the cost per horse power per year would

be $4.60, and that factor was used in determining the expense of maintenance labor for the years 1939 to 1954, inclusive.

The maintenance material cost shown in Line 7 was determined by listing the repair parts which in our judgment will be required for the proper maintenance of these units during their existence in the gathering system. The maintenance material cost per horse power per year was determined to be $1.65, and, with the exception of 1938, which reflects actual expense, maintenance material costs were arrived at by multiplying this factor times the horse power installed for each of the years 1939 to 1954, inclusive. In 1954, 80 units will not be operated. Therefore, the total horse power operated will be decreased to the extent of 80 units.

As the additional booster station units are installed, as shown by Mr. Bussard's Exhibit 100 and as shown in the first line on page 4 of Exhibit 110, the costs for the operation and maintenance of those stations and units will increase in accordance with the increase in number of stations and units. I wish to explain that in 1952 the maintenance cost for labor and material has an added amount to cover the cost of reclaiming 25 forty horse power units. That amounts to $4,125 for labor and material, so in checking the expense for 1952 that cost of reclaim will have to be considered.

Cross-Examination Interposed by Mr. Slaff.

The fuel cost for operating the booster stations was determined by actual metered measurements of the gas used in the presently existing booster station. These quantities were applied to the adidtional units as they were installed in the respective years, or are to be installed in the respective years, 1939 to 1954. The cost of that fuel was calculated on the basis of 4¢ per MCF.

Direct Examination by Mr. Hedrick.

Referring to Lines 1 to 6 on page 5 of this exhibit, for the years 1939 to 1954, inclusive, those amounts were determined from our actual past experience as to expenditures and the work represented thereby. In addition, we have determined what in our judgment will have to be done to properly operate this pipeline system and to maintain the efficient organization and personnel that will be required to operate it under the load factors that will obtain. In this connection, as the property becomes older, more operating expense will be required. This includes additional expense for patrolling and walking the line and for the determination and finding of defects in the underground structure. The operating material and car and truck will have additional expense caused by the added program for patrolling and walking the pipeline.

736 The difference between the 1936-1938 average of $3,461 for operating labor and the 1939-1954 average of $4,350 is $889 per year, or approximately $75 a month. That represents one man employed about 50% of the year for additional patrolling.

Cross-Examination Interposed by Mr. Slaff.

You ask what is the explanation for the large figure shown in Line 2 for operating material for 1938. There is an item of expense in operating material for 1938 that in our judgment will not reoccur. The expense shown for 1939 represents more nearly, in our judgment, what the actual expense will be in that year and in subsequent years. If I had used the 1939 figure in 1938, instead of being $968 it would be around $450 or $460.

Direct Examination by Mr. Hedrick.

The car and truck expense is for additional transportation used in patrolling the pipeline as the necessity for patrolling increases during the succeeding years.

"Damages" represent the item of payment to landowners or farmers for the damage to land and property, fences, private roads and so forth, crops, cattle and other stock.

Except for the gathering system, we have used prices of labor and material as they existed on June 1, 1939.

The item of "Traveling Expenses" is the expense of personnel from the Chicago office making inspection trips to the field to determine what work should be done, how it should be done, and when it should be done. That expense does not include the field personnel expense.

The next item is "Meters and Regulators." Those amounts are for the operation of the meters and regulators, and, in our judgment, will have to be expended for the years 1939 to 1954, inclusive, as shown in this exhibit.

"Maintenance Labor" covers the labor expense of making all repairs to the pipeline structure, such as repairs to back fill, erosion protection, repairs to roads, repairs to pipe, repairs to couplings, repairs to valves and fittings, and also the cost of retiring structures from the pipeline as explained under capital expenditures. The whole program of maintenance is one of prevention, that is, the determination of what work has to be done from time to time is based upon a program of prevention rather than cure.

The average for maintenance labor for 1936-1938 was $5,757, and the average for 1939-1954 is $15,637, or a difference of approximately $9,880 a year, or $824 a month, for the line represented by District 2. That represents a personnel of one foreman and six men, the additional average that will be employed for maintenance labor over the subsequent years of the project as represented by this exhibit.

737 For "Maintenance Material" the amounts represent the cost of all material entering into the proper maintenance of the pipeline system, such as material for the construction of erosion dams, repairs to fences, repairs to roads, repairs to back fill, repairs to valves and fittings, repairs to pipe, repairs to couplings, and all material costs entering into maintenance of any part of the pipeline system.

The term of "Car and Truck" shows amounts to be expended in the operation of the company for automotive equipment, including trucks, teams and wagons, or any items of transportation that will be required in connection with the maintenance program.

The item of "Meters and Regulators" includes the maintenance labor and material for the maintenance of the meters and regulators as they become worn and deteriorate over the years 1939 to 1954, inclusive.

Through inadvertence in typing, there is no page 6 in this exhibit.

The recapitulation on page 7 includes the amounts shown on pages 8 to 14, inclusive.

The figures set forth on pages 7 to 12, inclusive, concerning operation and maintenance in Districts 3 to 6, inclusive, were determined in the same way as I determined the operating and maintenance costs of District 2.

This recapitulation on page 7 includes the operation and maintenance of the branch lines shown on page 13 and the

Joliet meter and regulator stations shown on page 14, as well as on pages 8 to 12, inclusive.

I arrived at the cost of operation and maintenance of the pipeline of Natural Gas Pipeline Company, Districts 3 to 6, inclusive, in the same manner as I have described in connection with the operation and maintenance of District 2 of Texoma Natural Gas Company, about which I have testified in detail and which is shown on page 5 of Exhibit 110.

It is my considered judgment, based on my experience as I have stated it, upon my knowledge of the pipeline, machinery, equipment and other property of defendants, of the demands upon the same in the course of each defendant's operations and the physical conditions existing along the course of each of the companies' pipeline and property, that, at the prevailing costs of labor and material as of June 1, 1939, as I have described, and at the unit costs which I used and which I have described in my testimony, these amounts set forth at the respective dates shown in Exhibit 110 will be expended by defendants in the operation and maintenance of their properties.

(Exhibit 110 was offered in evidence.)

I stated that in so far as gathering lines of Texoma
738 Natural Gas Company are concerned, I used the average of 1936 to 1938, inclusive, in determining unit costs and applied those costs to the future expenditures for operation and maintenance of the gathering lines of Texoma, which costs I stated were about the same or less than the prices as they existed on June 1, 1939; but so far as the balance of the operation and maintenance of the properties of defendants are concerned I used the prices that were in existence on June 1, 1939.

When I stated that in my judgment the figures shown in Exhibit 110 would be expended as set forth therein, I was referring to unit costs in those places where I actually used unit costs in my testimony. I was using the prices as of June 1, 1939 as to future property in accordance with my testimony.

(EXHIBIT 110 was received in evidence over the objection of counsel for each of the two Commissions, who were allowed an exception.)

Cross-Examination Interposed by Mr. Slaff.

The figure for labor and maintenance expense shown on page 7 of Exhibit 110 includes labor cost incurred in the retirement of the property.

The item of $144,613 for material cost in 1936, shown in Line 9, is substantially different from such costs for the years 1935 and 1937. This is due to the fact that in addition to the regular maintenance expense that item includes material used in reconditioning and relaying the Cimarron River crossing, and reconstructing, reconditioning and relaying 12,545 feet of 12 inch pipe and 3,636 feet of 24 inch line and installing 294 chance anchors, and replacing of the 24 inch line with two 18 inch lines in Silver Creek. That is the cost of the reclaim or retirement, including both labor and material used in the connection. It would include the cost of the material used in the reclaim or the retirement of the 24 inch line and the lowering of two 18 inch lines across the North Skunk River. Those are the items which go to make that up. There may be additional items for which I do not have the details here. That is something that would have to be taken from the accounting records of the company.

Those are the items a statement of which is contained along with a statement of other items on page 18 of Exhibit 105, and those items, as I have stated, were charged to maintenance expense rather than to fixed capital. Our maintenance expense, labor and material, for the year 1938 includes some $42,000 expense incurred in connection with the Sheffield break of which I spoke this morning.

Direct Examination by Mr. Hedrick.

When I stated that the items which I have mentioned are
included in the expenditure of $144,613.02 in 1936 for
739 maintenance material in response to Mr. Slaff's question as to whether all the items on page 18 of Exhibit 105 were maintenance, I meant that only those items which I mentioned were charged to maintenance.

The other items on page 18 were expenditures direct to capital investment for additions to the physical property which did not exist prior to that expenditure.

The total amount shown on page 18 for work on river lines and loop lines for defendants is approximately $1,008,110, and of that amount approximately $206,820 was charged to maintenance material and labor. The difference, approximately $801,289, was charged to capital investment.

Cross-Examination Interposed by Mr. Slaff.

The expense of retiring the old line is charged to maintenance and that is all that was charged to maintenance expense in connection with that item.

I testified in a lawsuit to which Mr. E. V. Kesinger referred in his testimony, at Tulsa, Oklahoma, Henry L. Lemons *vs.* Natural Gas Pipeline Company of America. I also testified in a damage suit referred to by Mr. W. H. Davidson, in the County Court at Joliet, Illinois. I have not testified in any rate case before coming with defendant.

740 W. T. BULLA, a witness for defendants, testified:

Direct Examination by Mr. Hedrick.

(August 2, 1939.)

My name is W. T. Bulla. I live at Western Springs, Illinois. I am 44 years old.

My grammar school education and business school course, including telegraphy, was completed in 1911, at Parsons, Kansas, after which I completed a number of home study courses covering communication engineering, mostly courses of the American Telephone and Telegraph Company.

From September 1, 1911, until August 1, 1917, I was employed by the Missouri and Kansas Telephone Company, which later became known as Southwestern Bell Telephone Company, in various capacities. I worked as a line man for a little over a year in Parsons, Kansas; as construction clerk and telegraph operator at Joplin, Missouri, for approximately one year; as wire chief in charge of plant facilities at Chanute, Kansas, for approximately two and one-half years; and as toll tester, handling special circuits, at Kansas City, Missouri, for a little over one year. During my employment with this Bell system company I had the opportunity to gain experience in several phases of communication service.

From August, 1917, until June 1, 1930, I was employed by the Empire Companies, with headquarters in Bartlesville, Oklahoma, in the telephone and telegraph department, six years of which I was in charge of telephone and telegraph operations, carrying the title of wire chief; and four years of which I was assistant superintendent of telephone and telegraph, during which time I had general supervision of operation and maintenance as well as a number of construction projects; and three years of which I was superintendent of telephone and telegraph.

During my service with the Empire Companies I continued my experience in operation and maintenance and also supervised the construction of several hundred miles of pole and wire facilities in Kansas, Oklahoma and Texas.

Between January and the latter part of April, 1930, I covered the territory between Amarillo, Texas, and Chicago, Illinois, some of it the second time, to secure data, on the request of Mr. E. V. Kesinger, with which to make a recommendation for a communication system for the proposed gas pipeline, which is now the property of Texoma Natural Gas Company and Natural Gas Pipeline Company of America. This information was transmitted to Mr. Kesinger, Mr. Floyd C. Brown and others at conferences held in Bartlesville, Oklahoma, New York City and Kansas City.

From June 1, 1930, until July 1, 1931, I was employed by the Continental Construction Corporation, the name which has been changed to Natural Gas Pipeline Company of America. My duties were to supervise the construction of the communication system as it now exists. 741 I am designated superintendent of telephone and gas dispatching.

As the supervisor in charge of gas dispatching I have a group of dispatchers under my supervision, one of whom is on duty at all times. By that, I mean 24 hours per day in the Chicago office, to coordinate the activities of the various departments of these companies in so far as delivery of gas is concerned through the system, and to issue orders pertaining to the operation of this system in accordance with the instructions and policy outlined to them.

It comes within my jurisdiction and is my responsibility to give orders through these dispatchers covering the operation of gas compressor stations, the number of engines to be operated, and the speed at which these units are to run; also to give orders or authorization prior to the opening or closing of any valves or gates that can affect in any way our ability to deliver the maximum rated capacity of this gas pipeline. We necessarily contact each of the ten compressor stations, and also the Joliet measuring station, each hour of each day and night.

If, for instance, Mr. Strong, superintendent of the pipeline department, should wish to close a pipeline gate and shut out the flow of gas in order to make a repair to the pipeline, he is required to obtain authorization from me to close that gate. That is the common practice of the company. If Mr. W. H. Davidson or Mr. Powers should wish to shut down an engine, outside of an emergency, the operator of the station would have to obtain an authorization from me before shutting it down.

To facilitate our work, we have a company owned communication system over which we are able to contact the various departments and operators and over which we dispatchers have right of way. The set-up in general might be compared to the train dispatching system of a railroad. To function properly in my work I must have, and I do have, contact with various utility customers to whom we sell gas in order that I may ascertain the quantity of gas that they require, so that, if gas is offered to a customer and he is unable to use it, I may endeavor to sell it to some customer who is in position to use it.

For the same reason as previously given, the dispatcher must authorize the shutting down of a compressor station when the operators desire to do repair work on equipment, such as the cooling system. In fact, the operating departments and the construction departments must cooperate to the fullest extent so that we may plan considerably in advance any work that is contemplated, so that it will occur at a time when we anticipate the requirements of the utility customer to be the lowest, or at a time when the curtailment to these utilities will have the least effect. Plans are made months in advance for most of such work. When I refer to utility customers, I refer to any customer with whom we have a contract to deliver gas.

Several months ago, Mr. R. G. Strong, superintendent of pipelines, advised me of work on the 24 inch main line
742 which his department would like to do during the summer of 1939, stating that sections of pipe or main line gates were to be replaced due to faults found. Also Mr. R. T. Powers and Mr. W. H. Davidson, in charge of compressor stations, advised of work at various compressor stations under their jurisdiction, all of which would re-

quire shutting out sections of main line or being unable to operate certain compressor stations for a few hours while the work was being completed.

Having this data I was then able to contact our utility customers and secure their estimates for periods when we might expect their gas requirements to be less than normal, or when they felt that curtailments to them would be the least harmful, and with this information I was then in a position to work out a program with the other departments for the work contemplated.

It is with a great deal of satisfaction that we find on consulting a calendar such holiday periods as we had, combining the weekend and July 4th into a three-day period when customer utility requirements would be at a low ebb. A great deal of work both on the pipeline and at compressor stations was accomplished at this time. The same will be true for the weekend of September 2nd, 3rd, and Labor Day on the 4th. Such periods allow us to complete the work scheduled and to get the line pack back to a condition where we can again make normal deliveries to our customers.

The most recent work on the line or stations was on Sunday, July 23, and Sunday, July 30. The work on July 23 as scheduled included work on the pipeline and also some work at compressor stations. Authority had been granted for a certain maximum period of time in which to do the work. The Chicago District Pipeline Company and other utilities had been advised in advance that the quantity of gas available to them would be 25 million less than what was normally offered them on each of two days in which the work occurred. I say two days, because although the work was done during the daylight period of one day, that affects what to us are two days, inasmuch as our contract day starts at 12 o'clock noon.

Compressor Station No. 6 was one of the stations involved, and they were engaged in cleaning their cooling system, taking advantage of the fact that the pipeline was shut out just east of Compressor Station No. 8. They had been authorized to be inoperative for the same period of time, which was deemed necessary for the pipeline work.

However, as mentioned by Mr. W. H. Davidson, a lack of water or water facilities caused a delay which has been felt, or which was felt, for the week following the work, inasmuch as we operated without our usual line pack and we found it necessary to limit some utility customers to quantities less than what we normally tendered them.

In the case of individual compressor stations being inoperative, the location of the station makes considerable difference in our ability to deliver. If Station No. 1 is down, our entire source of supply for the system is cut off.

However, Station No. 2 being down would necessarily
743 have a much less effect on immediate deliveries than
would Station No. 10.

I understand there are a number of jobs to come up in the future by the pipeline and compressor station departments which will require more or less curtailment in our sales during the time or following the time that such work occurs.

(Counsel for defendants handed to the reporter a small map entitled "Natural Gas Pipeline Company and Texoma Natural Gas Company, Telephone and Pipeline System," which, at the direction of the Examiner, was marked Exhibit 111 for identification.)

Exhibit 111 is a layout of the telephone communication system. It shows the relation between the communication system and the pipeline. The broken line indicates the general route of the pipeline, whereas the solid, or, I might say, the crooked line indicates the communication facilities.

This system is divided, in that that part of it south of the point indicated by the arrow in the corner of Nebraska is our own company owned pole line, whereas that part of it from that point east across Nebraska, Iowa and Illinois consists of company owned wires and necessary fixtures in place on other companies' poles, for the most part, with the exception that each of the branch lines has a portion of them on company owned poles. For instance, in Iowa, where the figures 7, 8 and 9 occur, and in Illinois where the figure 10 occurs, part of the line is on our poles and part on the poles of other companies.

I might best describe the wire facilities by saying that so far as the main line is concerned, it consists of a four wire system by which we derive three talking circuits, and it is possible to derive a number of telegraph circuits. In so far as we are concerned, we have only one telegraph circuit set up. This system, in general, is known as a magneto system. You might liken it in that respect to the farm lines. In other words, the telephones used are of the hand generator type which you crank to signal other stations or the operators. The circuits are metallic circuits. The conductivity is very high, and the transmission equivalents are good. It is likened to a long haul toll circuit of commercial telephone companies. We use telephone receivers, telephone ringing equipment which pick up weak signals and re-amplify them on, as is necessary on any long haul circuit.

(EXHIBIT 111 was offered and received in evidence without objection.)

Cross-Examination Interposed by Mr. Slaff.

On the main line, the pole line from just south of Station No. 6 up to Chicago is on the property of the C. B. & Q. Railroad. Some of the branch lines are on telephone company poles and some are owned by us.

744 *Direct Examination by Mr. Hedrick.*

From Station No. 6 to Chicago, the wires of the company are generally, so far as the main line is concerned, on the C. B. & Q. poles.

(Counsel for defendants handed to the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Additional Capital Expenditures and Operation and Maintenance, Telephone Department, Witness W. T. Bulla," which, at the direction of the Examiner, was marked Exhibit 112 for identification.)

I am requested to refer to Exhibit 112, page 1, and, under the sub-heading "Additional Capital Expenditures," explain Line 1, entitled "Radio Communication Equipment," showing expenditures in 1940, 1943, 1945, 1948, and 1950, and state the necessity for those expenditures.

By referring to Exhibit 111 you will note that the route of the telephone line deviates somewhat from that of the pipeline, and we found it necessary in 1938 to secure certain radio equipment to use in addition to our other communication facilities so that communication might be provided whereby we could better coordinate our work, particularly in emergencies, so that line breaks or emergency work could be completed in the minimum time and thereby limit the loss in revenue due to decreased gas sales on account of breaks.

It is the general feeling that the north end of the pipeline system is the more important, the reason for this being that it is closer to the markets, so that if an interruption occurs due to a main line break it will affect the customer so much quicker that it behooves us to make repairs as quickly as possible on that end of the system, even more quickly than is required on the south end of the system.

We decided in the early part of 1938 that it would be helpful if we provided a limited amount of radio telephone equipment, and proceeded to secure licenses from the Federal Communication Commission, and purchased and installed the necessary equipment to so equip radio transmitting stations at each of Stations 6 to 10, inclusive. We had practically no difficulty in convincing the Federal Communication Commission of the necessity for the operation of these radio sets.

We also provided one additional set as a portable emergency unit. By that I mean a transmitter. We also provided receiving sets to go with each transmitter, also automobile type receiving sets similar to that used by law enforcement bodies, and after equipping a number of company cars and trucks, we were then in a position to broadcast information when emergencies occurred.

When an emergency occurs it behooves us to notify pipeline department supervisors, their crews, and others who may have receiving sets in their company cars as quickly as possible. With this equipment we are able to broadcast information when emergencies occur to give them the location, if it is known at that time or as soon as it
745 does become known, and thus to coordinate the work of getting men and material to the emergency as quickly as possible.

It was rather difficult to secure equipment for this particular purpose, due to the fact that the Federal Communication Commission placed certain limits on the type of equipment that can be operated by the class of operators which we can afford to provide and have the project be economical. What I am getting at is that these stations are limited in power, and to increase that power so that one large station might be used instead of several smaller power stations would require the constant service of operators so qualified that we would have to employ specialists for this duty, whereas with the type of equipment which we have secured we can use a limited amount of specialists, which, for the most part, we already had in our telephone organization, and with some home study courses and the passing of a somewhat easy Federal examination, we can take our regular employees, such as clerks, and qualify them to handle this equipment.

In 1938, as before stated, we purchased equipment costing $6,000. We have since that time been endeavoring to sell the management of our company on the idea of placing additional equipment on the south end of the system of Natural Gas Pipeline Company and on the system of Texoma Natural Gas Company. I am of the opinion at this time that they will allow that expenditure in 1940, and it has been set forth in that year to cost $8,000. We do not estimate the life of this equipment to be more than five years. Therefore, the same amount reoccurs in 1945 and in 1950, being replacements of the radio communication equipment to be purchased in 1940. The expenditure in 1943 will be to replace the radio equipment purchased in 1938, and the same also applies in 1948. The equipment to be purchased in 1940 is for a different group of locations, so that it would not necessarily be the same as that purchased in 1938.

I feel that the expenditure in 1938 for the north end of the line has been fully justified. The radio equipment has been instrumental in providing communication which facilitated the work previously mentioned on July 23rd and July 30th, in that it allowed one supervisor to keep in contact with several repair jobs that were in progress at the same time in various locations.

Counsel has inquired how we would communicate with the compressor stations or the Chicago office without the radio communication equipment if we had a shutdown or a break where the line crosses the Mississippi River between Iowa and Illinois, which is considerably removed from the telephone line.

We have already had an experience where supervisors and trucks were traveling along the highway when they were needed elsewhere on the system, and when information was broadcast to them that an emergency existed, giving them the location, they acknowledge the receipt of
the radio request within fifteen minutes of the time it
746 was broadcast. If it had not been for this means of
communication it would have been necessary to send a
messenger by car or to endeavor to intercept these employees at some point they might pass on their way to their destination.

I do not believe I answered the question I was asked about means of communication if we had occasion to call cars and trucks for an emergency existing over on the Mississippi River. Using the radio, we would be able to call those employees immediately, whereas if we did not have that, it would be necessary to send messengers to the locations where they were thought to be, telling them of this, which would cause considerable delay.

The operators are not able to get the base ball games on these radio receivers. So far as the transmitting equipment is concerned, we are definitely limited to a certain wave length and assignment of a certain kilocycle on which we can operate. We cannot operate on any other wave length. The receiving equipment is not quite the same. We have to convert it, but it is locked on one frequency. They cannot listen in to regular program broadcasts. It is impossible for them to do that.

As to how we would locate a man who had radio receiving equipment on his car, we know the car numbers. There is a car of a certain number assigned to that employee. We know that employee is driving that company car. If we wanted that individual we would call for car number so and so. An example of that would be if an employee working out of Station No. 10 was en route somewhere or working at some place on the system, the operator in charge of the transmitting equipment would go on the air, announce his call letters, and say that he was calling Car No. 350. "Calling Car 350," repeating that until he felt sure that the employee who had such car had heard it.

If he does not have his receiving equipment switch turned on, we do not have a device for notifying him to turn it on. We have experimented on some such plan; but we do not have anything in operation. Our present plan of operation is that on the half hour of each hour when an employee driving a car so equipped with a receiving set is out away from his headquarters, he will turn that set on for a reasonable period, say about five minutes, on the half hour of each hour, so that he might hear any information that might be sent out.

Cross-Examination Interposed by Mr. Slaff.

I believe it is true that the price of the equipment which I used as of June 1, 1939, speaking of radio equipment, is identical with the price of the equipment installed in 1938.

The prices of June 1, 1939, were used in determining the prices for the labor, material and equipment referred to in Exhibit 112, for the entire exhibit.

Line 2 is entitled "Voice Repeaters." These voice
747 repeaters are in reality voice amplifiers. In other
words, in talking out over the telephone circuit, after traveling a certain distance, the volume will be dissipated. We pick up the volume and repeat it or reamplify it, so that it will carry on in about the same volume at which it originated. We contemplate that it will be necessary to replace the existing voice repeaters, nine in number, in 1943, at a cost of $4,650. These voice-repeaters wear out so that they need replacement. They are rather delicate instruments, consisting of transformers, small relays with minute parts on them, and due to constant wear on these parts we anticipate it will be necessary to replace them entirely. It is our experience that they wear out within the period of time described by me. Those are Western Electric repeaters.

Line 3 is entitled "Ringing Equipment," and shows an expenditure in 1943. The ringing equipment as used on our communication system is somewhat similar to voice amplifiers, in that we pick up the ringing current when it becomes dissipated and resend it over the same cycles in an added volume so that it may be heard over long distances. This item is the replacement of the present existing signal equipment, which is also rather delicate equipment, and I anticipate that it will be necessary to replace it wholly in 1943, or prior to that date, on account of its wearing out. Most of the equipment was installed in 1931.

Line 4 is entitled "News Crossing Canadian River," and shows an expenditure of $3,000 in 1945. This is the Canadian River aerial telephone crossing on the part of the system of Texoma Natural Gas Company near Sanford, Texas. At the point where we cross, the span from fixture to fixture is some 2400 feet. It is very rocky and rugged country. Extreme winds are experienced there and we have had difficulty at or near the same location in previous years. This crossing has been replaced once since it was originally constructed, and we deem it necessary to replace this crossing again, probably before 1945. It is pretty much of a guess as to when it will be necessary, but I doubt if it will last any longer than 1945. The figure we have used for 1945 is equal to the figure that stands for our actual expenditure on the first replacement. If you will look at Item 11 on page 1, you will see that in 1946 we have the retirement of this crossing, which on our books is $2,792. We will retire it in 1946, the following year. We cannot retire that crossing until the new one is erected and ready for service.

The part of the crossing that wears out is principally the wire. The wind load, or ice load, when that exists, causes a continual flexing of that wire so that it will crystallize. That is principally at the points where it is tied in. However, we do not deem it advisable to splice that wire in the middle of the span or out in any part of the span. It is so difficult to erect those wires across that stream that we feel that we should put in new wire, and the old wire is taken away in such condition that it cannot be used. I think we would still have that flexing if we suspended the wire from a cable. We would have it in the cable then, as well.

Line 5 is entitled "New Lines Telephone Service—Skellytown," and shows an expenditure of $3,019 in 1942. Skellytown as referred to in this exhibit will be found on
748 Exhibit 101. We contemplate the construction of approximately five miles of pole line, with the necessary wires and pole facilities, to extend a telephone line from the present existing gathering system to a proposed camp to be established by the company in the vicinity of Skellytown, Texas, in 1942.

On Exhibit 101 the existing telephone lines are indicated by a solid green line. The proposed lines to be constructed are indicated by a broken green line. The proposed camp site at Skellytown is in the northeastern part of Carson County. We propose to extend that line west from Skellytown a half mile and then south to the present telephone lines.

The proposed booster stations in the southwest part of Moore County will have as a central location a booster station known as M-26, which will be located in Section 29, Block P.Mc., E.L.R.R. Survey, in Moore County, Texas. The expenditure in 1945 of $4,472 for new telephone service at Kilgore is to extend communication service to those points where it is felt it is needed.

Page 1 of Exhibit 112 shows the book cost of equipment retired in connection with the additional capital expenditures shown on that sheet.

You ask me to refer to Line 2 under "Additional Capital Expenditures," which shows $4,650 expenditure, and Line 9, under "Book Cost of Equipment Retired," which shows an amount of $2,694, and explain the difference in those two items.

At the time this equipment was placed in service, the only reliable source of supply was the American Telephone and Telegraph Company, which had these items of equipment manufactured for their use or for leasing to customers, where they approved of the use of such equipment, so that for a number of years we secured the use of this equipment on a rental basis. However, after we used this equipment for a few years it became the policy of the American Telephone and Telegraph Company to sell such equipment to us and to give us certain credits for rental which had been paid on this equipment, which would be applied to the purchase price. That is the reason why the retirement cost is less than the purchase of new equipment. It is my judgment that the equipment cost about the same money, or probably more, at the time we started leasing it.

Cross-Examination Interposed by Mr. Slaff.

I do not have the definite date when the change-over was made from a leasing policy to an outright sales policy. It occurs to me that it was about 1936 or 1937. I could determine that, but I do not have it. That was the A.T. & T. itself.

Direct Examination by Mr. Hedrick.

I have broken down the additional capital expenditures
of the telephone department on pages 3 and 4 of Ex-
749 hibit 112, page 3 being the additional capital expendi-
tures of Texoma Natural Gas Company and page 4
being additional capital expenditures of Natural Gas Pipe-
line Company of America, and the totals of the two pages
are shown on page 1, from which I have just testified.

I am asked to refer to page 2 of Exhibit 112, entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company. Telephone Department. Operation and Maintenance," and under the heading "Operation" where the first line is entitled "Labor," and to explain how I arrived at the various amounts set out in that line from 1939 to 1954, inclusive. By using the average of the years 1936 to 1938, inclusive, I determined what the actual expense had been, and knowing the contemplated changes or additions to labor for operation, I was able to project the amounts as shown for the years 1939 to 1954, inclusive. With reference to both operation and maintenance labor shown on page 2, it is my judgment that the cost of those two items will increase somewhat in the years to come.

As to how I arrived at the amounts set opposite Line 2, entitled "Material," on page 2 of Exhibit 112, having the benefit of the record of previous expenses, I was able to project the amounts as shown for the years 1939 to 1954, inclusive, in the same manner as I determined the operation labor.

Line 4 indicates traveling expense of the superintendent of telephone when covering the system supervising operation and maintenance, and in my judgment this expense will materially increase over the average of 1936 to 1938, inclusive, due to the additional time and expense that will be incurred in traveling from point to point to determine work to be done. By this I mean work to be done on our communications system.

Line 5, "Leased Facilities," covers the rentals paid for the use of leased communication circuits, telephone, telegraph, repeaters, and miscellaneous telephone relays, and the principal items are such leased facilities as we have with the C. B. & Q. Railroad Company, where we pay an amount for the privilege of space on their poles and cross arms for our wires.

I arrive at the amount involved by having the benefit of previous costs chargeable to this item, and anticipating that certain rates would be increased or certain additional facilities would be required on which we would pay rental. I might say that we are operating on a contract with the C. B. & Q. Railroad Company which expires in 1945, after which I do not know what the rate will be that we will be required to pay this company for this privilege. We do know that the rate we are now paying, and have been paying, is a rate that is used quite generally by commercial companies to lease space. If anything, it would be my judgment that this rate might be increased, in which case the figures which I have projected will be too low.

Inasmuch as there are no other main pole lines following the general route of our pipeline, if we should be unable to secure a further contract with the C. B. & Q. Railroad 750 Company, it would probably be necessary that we construct outright a pole line of our own, and a rough estimate of that cost would be in the neighborhood of $1,000,000. At the moment I do not anticipate any difficulty in renewing that contract; but I do not know what the attitude of the railroad company is, inasmuch as I have not consulted them.

Leased circuits from the regular telephone companies would cost a prohibitive amount. With the commercial telephone companies, the practice is to charge for channels rather than physical circuits. In our case, where we string four wires and derive three talking circuits and one or more telegraph circuits, they would not allow such a condition to exist under one of their rental agreements. It would be necessary that we pay for each talking circuit and for each telegraph circuit, and it is my opinion that that would cost double the $32,200 which I have listed as the cost of leased facilities.

Cross-Examination Interposed by Mr. Slaff.

It is true that in that case they would have the burden of capital investment involved which we now have for such wires, poles and so forth.

Direct Examination by Mr. Hedrick.

Our maintenance labor as shown in Line 7 covers the salaries of linemen, groundmen, helpers and other laborers used in maintaining and repairing telephone lines. The average of 1936 to 1938 for those items is materially increased in and after 1939. The reason for that is that our pole line facilities are becoming older, requiring a greater amount of maintenance. As poles become older they will deteriorate, breaking off, causing excess trouble, which will require that we not only clear the trouble, which is an added expense, but also that we use more men, put in more hours, in endeavoring to repair these poles and wires and keep them in an operative condition.

That is partially responsible for the increased cost in 1938 over 1937. Also, in the spring of 1938 we suffered a severe sleet storm which demoralized communication facilities of our company and all commercial companies between the western part of Illinois and central Kansas.

The principal part of the poles in our system are basically 20 foot poles, with a 5 inch top. That is to most people who erect poles a very small pole. Naturally, the circumference at the ground line is small, and although they are treated poles, the rotting condition, the deterioration, will cause the strength of those poles to deteriorate so that the cost of replacing the poles will be much greater as they become older. They are completely treated poles.

The explanation I have given for maintenance labor is about the same explanation I would give for the cost of maintenance material, shown on Line 8 of page 2 of Exhibit 112. I might amplify that by reminding you that
751 basically our pole line consists of 20 foot poles. They cannot be cut off and reset. The amount of clearance that you derive between the surface of the ground and your wires is so small that you cannot follow the practice of cutting off and resetting, as generally practiced by telephone companies.

We use cross arms except on the gathering system, where there are only two wires, and there we use a bracket. We use one cross arm for a pole except at angle points, where we use two cross arms as a matter of safety.

Line 9, covering car and truck expense, covers gasoline, oil, tires, and so forth, for company cars and trucks, and covers hired cars, trucks and teams necessary to provide transportation for linemen and others who have occasion to maintain the telephone system. It is based on information we have as to previous costs, also anticipating that our cost for transportation will increase as we use additional men in maintaining these lines, and in 1946 or 1947 it will cover the additional expense of an additional car for this same purpose of maintaining the lines.

The information contained on page 2 of Exhibit 112 is broken down on pages 5 and 6 of the exhibit, so that on page 5 the operation and maintenance of the telephone department of Texoma Natural Gas Company is shown, and on page 6 the operation and maintenance of the telephone department of Natural Gas Pipeline Company of America is shown. These two sheets merely divide the expense so as to show each company separately. The totals of pages 5 and 6 are shown on page 2, about which I have been testifying.

Cross-Examination Interposed by Mr. Slaff.

In the replacement of poles the labor is charged to "Labor", as shown here on Line 7, and the material is shown under "Material" on Line 8. It is charged to maintenance expense rather than as an addition to the capital account. The same would apply to cross arms, anchors, guys, and all equipment in connection with the pole line. The only time that it might be different is if due to some local condition we had to re-route a line or build an additional mile or two, we would put that under capital.

If it is necessary to replace a pole, the new pole is charged in here as indicated on Line 8. The old pole is taken out of service. Any labor involved in either putting in the new pole or taking out the old pole will be charged to "Labor" as on Line 7. No credit is made to fixed capital for the pole which is taken out of service, and neither is there a charge for the new pole. The charge is made to maintenance expense of the pole which was installed, and no credit is made to fixed capital. We still have one pole. We charge to maintenance the expense of removing the pole which is taken out of service.

Direct Examination by Mr. Hedrick.

It is my considered judgment, based on the experi-
752 ence I have stated, upon my knowledge of the telephone system and other property under my supervision, concerning which I have testified, the demand upon this property in the course of each company's operations, and upon the conditions which exist along the line with regard to weather particularly, that, at the prevailing cost of labor and material as of June 1, 1939, the amounts set forth in Exhibit 112 will be expended by defendants for additional capital expenditures and in the operation and the maintenance of the telephone department property on or before the respective dates set forth in Exhibit 112.

(EXHIBIT 112 was offered and received in evidence over the objection of counsel for each of the two Commissions, to whom an exception was allowed. Motion by Commission Counsel to strike testimony of Mr. Bulla denied.)

Cross-Examination by Mr. Slaff.

I have not testified in any other cases.

753 **S. E. CAMPBELL, a witness for defendants, testified:**

Direct Examination by Mr. Morgan.

(August 2, 1939.)

My name is S. E. Campbell. I live in Kenilworth, Illinois. I am secretary and assistant treasurer of Texoma Natural Gas Company and Natural Gas Pipeline Company of America. I have been in the employment of these two companies since they originated in 1930.

I graduated from the University of Kansas with a B.S. degree in mechanical engineering, and immediately after that I joined the employment of the Cities Service Company in what is known as the Empire Companies at Bartlesville, Oklahoma. That was in July, 1916. I was first an engineer in what they term their junior engineering course. Shortly after that I was taken off the course and placed on the construction and operation of a gasoline plant at Caney, Kansas. I was later superintendent of that plant until May, 1917, when I was transferred, as assistant to the construction engineer, to Okmulgee on the construction of a cracking plant.

From there I joined the army and was in the army until July of 1919, when I returned to the employment of the Empire Companies at Bartlesville, as an engineer. Shortly after that I was placed in charge of their estimating department in the engineering and construction division, and had charge of preparing all their construction estimates.

In 1922, as I recall it, I was made chief clerk of the engineering division, having charge of all of the office personnel and all of the field accounting in connection with the construction work of that engineering division.

In 1926 I was taken off that work and placed in charge of the design and construction of compressor stations and gasoline plants. In 1928 I was made assistant purchasing agent for the Empire Companies, in which position I remained until I joined the Continental Construction Corporation on this Chicago project in the capacity of assistant chief engineer under Mr. Kesinger, the chief engineer.

When the line was completed and put in operation I was assigned the position of superintendent of operations of both Texoma Natural Gas Company and Natural Gas Pipeline Company of America, which position I occupied until

December, 1933, when I took over the duties of the secretary's office. I was assistant secretary for a short period of time, and later, in 1934, I was made secretary and assistant treasurer.

As secretary of these two companies, I have general supervision of the accounting work of the companies. I have the custody of the records of these companies and their books of account, and the accounting personnel perform their duties under my direction.

754 I caused my personnel to give to Mr. Strong and the other operating heads the figures carried into their respective exhibits as book cost of retirements of capital items which they testified would have to be retired from service from time to time during future years. Those figures were taken directly from the books and represent the cost of those items as reflected by the books. I have examined and am familiar with all those exhibits.

In addition to the books of account and the records of the company, I have in my custody the furniture and fixtures for the entire Chicago office and field offices of both defendants. We keep a record of where all this material is, and the field office or other office using this material reports to us its condition. We pass on whether it should be repaired or overhauled or replaced. As a matter of fact, no article of furniture or equipment of any kind can be purchased until I say so.

I have made a study of the future requirements of these two companies for office furniture and fixtures in the various offices maintained by the two companies over their system. This equipment consists principally of desks, tables, chairs, files, drafting room files, or files for maps of the larger type, typewriters, calculators, adding machines, comptometers, duplicators, ditto machines, and, in the Chicago office, water coolers. We find that the mechanical equipment needs replacement periodically. By mechanical equipment I mean such items as adding machines, calculators, comptometers, typewriters, duplicators, drinking fountains, ditto machines, and we also include law books in that category. Some law books become obsolete periodically, and are replaced by later editions, and we consider that a replacement item.

(Counsel presented the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Additional Capital Expenditures, Furniture and Fixtures," which document, at the direction of the Examiner, was marked Exhibit 113 for identification.)

Exhibit 113 reflects the additional furniture and fixtures that will be required by defendants from 1939 to 1954. It also reflects the replacements of the necessary furniture and fixtures for the same period of time. It reflects the book cost of furniture and fixtures retired and the salvage of the equipment replaced.

Page 1 of this exhibit is a recapitulation of the additional furniture and fixtures, replacement of furniture and fixtures, book cost of property retired, and salvage, for both Natural Gas Pipeline Company of America and Texoma Natural Gas Company combined, for the years 1939 to 1954, inclusive.

Page 2 shows in detail for Natural Gas Pipeline Company only, the additional furniture and fixtures, replacement of furniture and fixtures, book cost of property retired, and salvage.

755 Page 3 represents the same type of detail as page 2 except it is for Texoma Natural Gas Company only.

On page 2 the first item, "Additional Furniture and Fixtures," followed by lines 2 to 5, inclusive, which have the sub-heads "Calculating Machine," "4-Drawer Filing Cabinets," "5-Drawer Map Filing Cabinets," "Law Books," refers to furniture and fixtures in addition to that which Natural Gas Pipeline Company now has. That is in addition to existing equipment, and is not to replace equipment now on hand.

The calculating machine, in the amount of $585 in 1939, has been purchased and is now in use.

The four-drawer filing cabinets are required in the executive offices and legal department for the filing of corporation records and legal files. Four of these will be required in 1939, and two each in 1940, 1942, 1944, 1946, 1948, 1950 and 1952. The purpose of these files is to take care of the normal growth or increase in the volume of the papers that are put in those files, assuming the normal operations of the company.

The next item, Line 4, referring to 5-drawer map filing cabinets, is to take care of the additional maps in our drafting department in the Chicago office. One of these will be required in 1939, one in 1943, one in 1948, and another in 1953. Those files are to take care of the normal accumulation of maps and other records which are filed away.

The next item, Line 5, entitled "Law Books," is to take care of our additional requirements in our legal department. This item is for the most part an annual service which costs $720 per year. That will be necessary in each of the years from 1939 to 1953, inclusive. That covers the cost of the current bound volumes of the reporter systems that are contained in our legal library. It covers also the text books and other current books that are added to the library each year. This is all in line with our past experience and our present budget.

The item "Replacement of Furniture and Fixtures," the second sub-heading, followed by Lines 8 to 13, inclusive, captioned as shown here in the exhibit, refers to replacement of furniture and fixtures that have become worn out and unserviceable. It does not embrace desks and things that will be used indefinitely, but deals particularly with mechanical equipment.

The first item is "Adding Machines." We have computed the number of machines that will be replaced each year on the basis of our past experience as to the life of these machines and the number of them we have on hand. Two are scheduled to be replaced in 1939 and each of the years following, at a cost of $848 for two machines. This schedule shows the time when those machines will have arrived at the end of their useful lives based on the experience we have already had with that character of equipment and the number of machines which we have in service. This item does not provide for an increase in the number of adding machines at all.

756 The next item shown, Line 9, under the caption "Calculators," provides for replacements likewise on the basis of our past experience as to the life of the machine. Two of these machines will be replaced in 1939; one in 1941, 1942 and 1943, respectively; two in 1945; and one in each of the years 1946, 1947, 1949, 1950, 1951 and 1953.

The next item, Line 10, "Comptometers," is likewise based on their average useful life from our own past history. One will be replaced in 1939, two in 1940, one in 1941, two in 1942, and one in 1943, and so on, as indicated here on the exhibit. I will not repeat the detail.

The next item is "Typewriters." The replacement of typewriters is likewise based on the company's past experience as to the useful life of this equipment. We will replace five in 1939, three of which, I believe, have already been replaced; five in 1940; six in 1941, and so on throughout as shown, to the year 1953.

The next item is a duplicator which we use to run copies from stencils. It was replaced in 1938. We feel that it will have to be replaced again not later than 1946, and at a cost of $500.

Line 13 refers to drinking fountains. They are the General Electric type, and we have three of them in the Chicago office, one of which was replaced in 1937, one in 1938, and a third will be replaced in 1940. These three machines will again be replaced in 1945, 1946 and 1950, respectively, at a cost of $225 each of those three years.

The next sub-heading is "Book Cost of Property Retired." That refers to the mechanical equipment which I have just testified to under the sub-heading "Replacement of Furniture and Fixtures." Those are the items to be replaced by the items under the sub-caption just mentioned. The amounts set opposite the various items under this caption were taken from the books so far as the items which we now have are concerned. There is an item of $175 for law books under this caption. We have certain services that become obsolete from year to year and retire those services from our furniture and fixtures account. These services are commonly known among the lawyers as advance sheets. When the bound volume comes out the advance sheets are discarded.

The item of "Salvage" represents the trade-in value of the property retired as of June 1, 1939. When we trade in a typewriter or a calculator or a duplicator, or some of these mechanical items, we get an allowance for the old one. This is the schedule of allowances which we receive, assuming that they continue as they were on June 1, 1939.

Going back to the item of "Law Books" for just a moment, the $720 which is scheduled to be expended for law books each year includes the cost of the advance sheets which are discarded when the bound volume comes out.

We will pass now to page 3, which refers to the additional furniture and fixtures and the necessity for replacement of furniture and fixtures of Texoma Natural Gas Company. This refers to those items of equipment listed here which
will be required by Texoma Natural Gas Company at
757 its Amarillo office, Fritch office, the field office at Du-
mas, and the proposed field office at Skellytown. The items listed are directly in line with the drilling program to which Mr. Bussard and Mr. Dickinson have testified,

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which will require additional personnel in the Amarillo office and in the Fritch office due to the extension of gathering lines, additional meters, the upkeep of those meters, and additional personnel at Dumas on account of additional gathering lines, requiring additional field foremen. At Skellytown there will be an office established due to the increased gathering system in that vicinity.

The equipment listed is based on the actual requirements of the personnel which will have to be added as the result of the drilling of additional wells and the building of additional gathering lines and the installation of booster stations, all of which we know is inevitable. It is applicable only to that type of personnel that requires office furniture.

In preparing this data I worked directly with Mr. Dickinson and Mr. Strong, as they are the only department heads that will require additional furniture and fixtures. This program is based on their requirements. In my judgment those amounts will be expended on or before the dates indicated here for such items.

Our calculations as to replacements of furniture and fixtures shown on this page have the same meaning as they did on the prior page. It is exactly the same type of equipment. This equipment wears out down there just the same as it does up here. In fact, it wears out more rapidly down there, due to the lack of service facilities and the bad dust conditions under which it has to operate. We have to replace it oftener.

The figures for adding machines, calculating machines, comptometers, typewriters and ditto machines, and so on, are based on the actual schedules for replacing equipment now in service and on the actual cost of that equipment as of June 1, 1939.

The figures under the caption "Book Cost of Property Retired" are arrived at in the same manner as were the figures under the same caption on page 2. The very same procedure was followed in this particular and also in the matter of salvage. The figures shown there represent the trade-in value as of June 1, 1939. All the figures shown here are based on prices as of the date last mentioned.

Cross-Examination Interposed by Mr. Slaff.

The cost figures for capital expenditures, for replacements, and for the trade-in allowances, are based on prices as of June 1, 1939. I am not talking about the book cost of the property retired. Those costs I have already stated are the actual costs of the articles to be replaced in so far as equipment is now on hand.

758 You ask how it happens that the figures for book cost of property retired coincide with the figures for replacement of furniture and fixtures, the latter being priced as of June 1, 1939 and the former being priced as of the time they were entered on the books of the company. That figure was pulled by the men in our department in charge of the books; and I assume the prices we paid on the equipment we now have are the same as the prices as of June 1, 1939.

Direct Examination by Mr. Morgan.

That would indicate that there has been no change in the prices of adding machines, calculators, comptometers, and so on, from the time we bought them to June 1, 1939. They have all been purchased in the last few years. Those that we originally bought were traded in and replaced some time ago.

(EXHIBIT 113 was offered and received in evidence over the objection of counsel for each of the two Commissions, to whom an exception was allowed. Motion to strike testimony of Mr. Campbell denied and exception noted.)

I have been somewhat familiar with the expenditures known as regulatory expense since 1937. I have made a study of the past and future requirements of defendants for that character of expense incident to regulation to which these companies may become subject. I have made a study of our past cost and have prepared an estimate of what in my judgment this cost will be in the future for both companies.

(Counsel for defendants produced a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Regulatory Expense," which, at the direction of the Examiner, was marked Exhibit 114 for identification.)

The figures shown in Exhibit 114 for the years 1937 and 1938 were taken directly from the company books and represent actual expenditures. In arriving at my estimates for the years 1939, 1940, an so on through the remaining life of defendants, or rather, down through the year 1950, I have consulted with my co-executives, the general manager, the general superintendent, the general counsel, and others, in an effort to arrive at the best estimate I could of the nature of the regulation to which we may be subjected and the probable cost in connection with such regulation.

At the present time the defendants are subject to regulation by several tribunals, namely, the Federal Power Commission, under the Natural Gas Act; the Securities & Exchange Commission, under the Public Utility Holding Company Act; the National Labor Relations Board, under the Wagner Act; the administrator of the Wage and Hour Act; and, in connection with our radio equipment, the Federal Communication Commission.

These are Federal bodies. We also have the Texas Railroad Commission, which has jurisdiction to some extent in the production and transportation of gas to the point
759 that it is necessary for us to carry on litigation. The Iowa State Commission has regulation of our pipeline only to the extent of the safety requirements. That is all of the state commissions, as far as I know, that have any jurisdiction requiring regulatory expense.

Our estimates of this expense for 1939 and subsequent years are merely our best judgment after consulting with the representatives of defendants as above stated. We have no past history other than 1937 and 1938 on which to base this judgment.

In the light of our expenditures for this year, including those that are already incurred and will necessarily be incurred in connection with the further proceedings in these cases in which this hearing is being held, and from what we can foresee in the future, we feel that $250,000 is a minimum expense this year for the two companies. 20% of that nature of expense is charged to Texoma and the remainder is defrayed by Natural Gas Pipeline Company. No part of these expenses was charged to Texoma in 1937 and 1938. The expenses in those years were incurred in connection with the intervention of Natural Gas Pipeline Company and Texoma in the case between the Illinois Commerce Commission and Chicago District Pipeline Company, which we considered entirely a pipeline matter. We did not charge any part of it to Texoma. Both companies are parties to the present proceeding and we have adopted the policy of apportioning the expense 80% and 20% as above stated. That apportionment applies throughout the remaining years covered by these estimates.

We have incurred no expense as yet in connection with the National Labor Relations Board or any of these other regulatory bodies which I have mentioned. Our expenses in connection with litigation with the Texas Railroad Commission were charged as straight legal expense at the time they were incurred. As a matter of fact, it was expense incurred in connection with the efforts made by the Texas Railroad Commission to regulate our production down there and is propertly chargeable as regulatory expense.

In the light of the consultations I have had with my associates and in the light of my study concerning the probable regulations to which we will be subjected, it is my judgment that these figures represent a reasonable estimate of the expenditures we will be required to make in connection with regulatory bodies.

(EXHIBIT 114 was offered and received in evidence over the objection of counsel for each of the two Commissions, who were allowed an exception. Motion by Commission Counsel and Counsel for Illinois Commerce Commission to strike testimony of Mr. Campbell relating to Exhibit 114 also denied.)

Cross-Examination Interposed by Mr. Slaff.

You ask me to explain the difference for the year 1938 between the figures shown on page 18 of Exhibit 15, put into evidence by Mr. Woodford, which totals $190,788.47 for regulatory expense for the year 1938, and my figure of $175,572.13 for that year. I will check that figure and furnish the explanation, if I can find it, through counsel tomorrow morning.

760 (The following day counsel, in open hearing, explained that the figures shown in Mr. Campbell's exhibit were taken from the books as of September 30, 1938, instead of December 31, 1938, and that the exhibit should be corrected to read: the second line, 1938, $190,788.47; the total to read as of the same amount; and the total at the bottom, 1937 to 1954, inclusive, should read $792,256.10 for Natural Gas Pipeline Company; and should read for both companies $932,256.10 instead of $917,039.76.)

Cross-Examination Interposed by Mr. Booth.

Our estimates include our judgment of what all regulatory expense will cost us in the years between 1940 and 1954. We have made no provision, however, for other rate cases than the existing rate case. They are just investigations and items of that nature.

Direct Examination by Mr. Morgan.

I have included in these figures my judgment of what the cost of all forms of regulation, all investigations to which we may be subjected, and things of that kind, will be. These estimates, as I have explained, are made in the absence of any history on which to base the figures.

Cross-Examination by Mr. Slaff.

I testified before the Internal Revenue Bureau on the subject of deductions for the determination of income tax for the year 1935 for Natural Gas Pipeline Company of America.

I also testified before the Securities & Exchange Commission in a case of the Texas Company, where they requested exemption from the Public Utility Holding Company Act.

I testified in a tax case between Natural Gas Pipeline Company of America and the State of Kansas on state income tax matters.

You ask for the dates of my testimony. I am not sure that I can give the date I testified before the Securities & Exchange Commission. I will furnish these dates through counsel tomorrow morning.

(Counsel, in open hearing, in compliance with the request with reference to the dates on which Mr. Campbell testified, made the following statement:

Mr. Campbell testified before the Securities & Exchange Commission in re the Texas Company application at Washington on May 8, 1936; and before the District Court of Shawnee County, Kansas, in a proceeding by the Kansas Tax Commission against Natural Gas Pipeline Company of America, at Topeka, Kansas, on March 28, 1938. He testified before the Bureau of Internal Revenue in a proceeding styled "Re Natural Gas Pipeline Company of America" on three occasions at Washington: October 1, 1937; October 12, 1938; and July 5, 1939.)

761 (August 3, 1939.)

(Counsel for defendants made the following statement to the Examiner:

At the time Mr. Kesinger was on the stand, Mr. Booth requested the names of the industrial customers furnished directly with natural gas by Natural Gas Pipeline Company. Mr. Kesinger has prepared this list and I will read it.

New Jersey Zinc Company, near Depue, Illinois, under a contract dated October 15, 1938, expiring October 28, 1939. Darby Petroleum Company, near Great Bend, Kansas, under a contract dated May 3, 1938, expiring May 3, 1940. Stanolind Pipeline Company, near Great Bend, Kansas, under a contract dated April 6, 1938, expiring April 8, 1940. Northern Gravel Company, near Muscatine, Iowa, under a contract dated August 24, 1936, terminable on thirty days' notice. Palmer Oil Corporation, near Great Bend, Kansas, under a contract dated February 7, 1938, expiring February 7, 1940.)

762 G. M. DAVIDSON, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(August 3, 1939.)

My name is G. M. Davidson. I live in the Village of Wilmette, Illinois. I am chief engineer and superintendent of operations for defendants, which position I have occupied since December, 1933. I have been employed by defendants since July 1, 1931. My first position was that of chief engineer, which position I have held since the beginning of my employment.

I am a graduate in mechanical engineering of Stanford University. I volunteered with the California National Guard in June, 1917, and was drafted into federal service in July, same year, and was overseas from October, 1917, until June, 1919. I served as a second lieutenant and later as a first lieutenant in an engineering regiment with the Rainbow Division. On returning from the army, I was occupied for a few months in a refrigerating plant. I joined the Empire Gas and Fuel Company, engineering department, in November, 1919, and remained with that company until coming with my present employers. From 1920 to 1923, I was field superintendent of a gasoline plant. From 1923 to 1931, I was respectively an engineer in charge of design for the engineering department, superintendent of construction, superintendent of operation, and the last three or four years I was the general superintendent in the division.

When I first came with defendants, I was not familiar with their pipeline system. It required some time for me to become completely familiar with all of the work that had been done. As chief engineer, I found myself largely occupied in engineering problems of the operating division. Although I was in charge of the engineering department I assumed the work that had not been completed by January 1, 1932 with reference to organizing the operating personnel and matters of that sort. There were many operating problems relating to organization. Since the companies were put in operation, I have had executive supervision of the operating deparments, which includes the communications department, pipeline department, compressor station division, pressure dispatching department; and I also have charge of the purchasing department and the engineering department. I have supervision of the operations at Fritch, of the Texoma gasoline plant and all other activities of that company, except those of the production department in the Panhandle field. Engineering activities are varied in nature and often involve matters of special problems relating to new construction or new economic studies of one character or another. I find that I have to keep up with advances in the industry. That is, I have found it advisable to do this. I think I have told you I work with Mr. Kesinger. The automotive equipment is one branch of our activities which is not delegated to any other operating head. The chief clerk and I keep track of all the automobiles, and have charge of replacements and additions. The purchase and replacements of automobiles, as well as all types of automotive transportation facilities. for both companies, come directly under my supervision. I recommend the purchase of new equipment, but it has to have Mr. Kesinger's endorsement before it is finally approved.

763 I have prepared a study showing the schedule of replacements of this automotive equipment and the probable requirements of the two companies for additional automotive equipment in future years. I don't believe that the exhibit indicates the amount of equipment that we now have in the system except indirectly in that it indicates that which is to be replaced.

(At this point, counsel for defendants handed the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Additional Capital Expenditures, Automotive Equipment, Witness—G. M. Davidson," and requested that it be marked for identification as Exhibit No. 115. At the direction of the Examiner, the document was so marked.)

I have before me Exhibit No. 115. Page 1 indicates in three general groups the additions that will be made to capital by reason of automotive equipment. The first group includes all automobiles which will be replaced. The second group on the same page indicates the amount of property retired; that is, the original cost of this equipment written from plant account. The final group is the salvage group for both companies. This really is the trade-in value of the equipment which we are retiring on the purchase of new equipment. This statement includes all additional equipment, whether it is a replacement or an addition to present facilities. The statement is a combined statement for the two companies.

Page 2 is the supporting detail for the recap submitted on page 1, and indicates the equipment which will be replaced and the equipment which will be added by Natural Gas Pipeline Company of America.

Page 3 is a comparable sheet for Texoma Natural Gas Company. These latter two pages indicate the number of units to be replaced and added, but do not indicate any amounts. Turning to the first sub-heading on page 2, referred to as "Chicago Office," you will note that in Lines 1 and 2 there is an R in brackets after these titles. This indicates a replacement of original equipment now on hand. From experience, we have found that these cars are most economically replaced at certain periods of time and mileage. There is a compromise between the two factors, and the replacement of the cars noted in all of the items followed by this bracketed R is based on an experience table. In the light of that experience, we have adopted a definite policy with reference to the time of replacing this equipment. This statement is based on this policy and shows replacements at definite intervals throughout the life of the project, at which times the equipment will be replaced exactly on the basis of our past experience. All purchases following the bracketed R are to be replacements of equipment now in existence or equipment to be acquired hereafter.

Coming to Line 8, you will find that there will be some additional Chevrolet pick-up equipment being added to the

system and, following that through, you will note that there are five Chevrolet pick-ups to be added to all of our equipment in 1947. Following that notation in Line 9 you will find a replacement. The replacement in that instance is a replacement of the equipment which has been added to the system. In other words, on Line 9, the figure 5 under the caption 1949, refers to the same five Chevrolet pick-ups shown under the caption 1947 on Line 8. The necessity for the purchase of five additional Chevrolet pick-ups in the year 1947 I believe has been very well substantiated by Mr. Strong in his evidence. This is additional equipment which the superintendent of the pipe line system has determined will become necessary by reason of the additional requirements of personnel, such as requiring automobiles for added patrol service, and other added features, concerning which Mr. Strong has testified. There will be an added foreman, I believe, in
764 District No. 3 and another in District 4 and another in
5 West; another pick-up will be necessary in 5 East and another in District 6. These are for general maintenance and added maintenance which will be necessary by that time. I concur, without qualification, in Mr. Strong's judgment.

These other items down to Line 12 have to do with replacements of existing equipment and are subject to the same explanation made with reference to Items 1 to 7, inclusive. Item 12 is a reflection of our required added maintenance costs by the addition of two International five ton trucks in 1943 and two in 1947. The same explanation which I have made with reference to the added equipment noted in Line 8 explains these requirements for added equipment. I have considered the subject of this added equipment in detail with Mr. Strong and I am in full accord with his judgment. Line 13 is subject to the same explanation as Line 9.

In the normal operation of truck equipment on the pipeline, it is necessary to furnish trucks with a semi-trailer or occasionally a complete four-wheel trailer for hauling pipe. When we buy an additional truck, it is necessary to supply the trailer that accompanies it. That item is set out in Line 15. The equipment there shown will be acquired in the year 1948. The reason for supplying the additional truck explains the necessity for the additional trailer and we have arrived at the necessity for this additional equipment in consultation with Mr. Strong in the same manner as stated with reference to equipment already discussed.

Line 17 reflects the replacement of ten light tractors now in use on our system. These tractors are used in emergency work and for rather heavy maintenance, requiring the service of a winch somewhat more substantial than that which we have on our trucks. There are nine of these tractors on the pipeline properties and one on the Texoma properties.

Tractors are used for erosion control where we have to move a lot of dirt. We have in the field what are termed tumble bugs accompanying these tractors for moving the dirt; that is, they scoop up about a yard of dirt at a time and haul it and dump it in another location to refill, dams and things of that character. We have a definite policy with reference to trading in and replacing this type of equipment, as in the case of automobiles, trucks and trailers. That equipment will be replaced as indicated on Line 17, three in 1945, three in 1946, and three in 1947. In addition to the uses already mentioned, these trucks are used quite extensively in emergency repair work. We depend on the tractor for getting over the ground that the truck could not get around on at all. We have had some experience with that. All of these tractors have proven invaluable in an emergency of that character, particularly where it is wet and soggy.

On Line 18 is shown a R-4 tractor. This is a little heavier type of equipment than No. 22, noted in Line 17. We know from our experience with these light tractors that we can justify a heavier tractor for some of the work which they are doing, and that is reflected in the additional equipment on Line 18.

765 Our analysis and study of the future requirements discloses that we will require additional Caterpillar tractor equipment in the years 1943 and 1947. We know definitely we are going to have a heavier maintenance program. We believe that the use of the tractor equipment will facilitate the use of trucking equipment to an economical degree. We can justify a tractor over a truck in many heavier items of maintenance. It is our purpose to add larger tractors at the time we make these additional purchases. The same situation is reflected in Lines 19, 20 and 21, and the same explanation applies to these items. These few items of additional equipment set forth here have all been carefully considered and studied with the operating

head, Mr. Strong, and I concur in the latter's judgment as to the necessity for these items. In fact, I go further than that. We ~~have~~ had requests already from the field for this heavier type of equipment. It is being delayed on account of heavier maintenance. In other words, I am already convinced that it will have to be provided but feel justified in deferring it.

There is no additional equipment contemplated for the compressor station department. It has one car now stationed at each one of these plants and we believe that it is sufficient for all time. This program contemplates the replacement of that car at such time as the mileage and condition of the car indicates that it is due for replacement. This is in line with our fixed policy.

Under the telephone department, there are three lines, "Chevrolet Coupe, Additional and Replacement". In this department, we are replacing the equipment in line with our established policy. An additional car is required in that department largely due to the fair wage and hour law. This is a department which only has six active field men and we are already experiencing some difficulty in getting emergency work done because of the forty-four hour week limit. I know that we will have to give this department an additional man next year when our weekly limit will become forty-two hours of work. Line 26 shows the replacement of that additional car which is noted in Line 25.

The telephone cars are subject to a great deal more mileage service than some of the other cars. These boys put mileage on their cars that averages, I would say, about twenty-five hundred miles a month, and it is not unusual to find it up to three thousand miles a month. I believe that is the explanation for not having a replacement in 1941, having a replacement in 1942 and in 1943 of that car, skipping a year and replacing it, skipping it another year and replacing it, replacing it in 1948 and 1949 and having two replacements in 1950, 1952 and 1953. It is due to the factor of mileage as well as time entering into the future use of these cars.

Questions by the Examiner.

The description of the automobiles set up in Items 4 and 5 is not stated in detail. I have the description by passenger cars. We have in operation ninety-one units on both companies. Of these there are forty-three light passenger cars, Chevrolet sedans and coupes. We have eighteen Chevrolet pick-ups, thirteen trucks, seven large passenger cars, ten tractors and, I believe, ten trailers, a trailer not being considered as a power unit. There might be twelve trailers.

Page 3 is quite comparable to page 2 in its explanation, that page applying to the equipment of Texoma Natural Gas Company. The items noted in here are the replacements and additions with respect to the cars on the gathering system and the pipeline. Page 4 is a continuation of page 3 by departments. The third page covers the gathering system and pipeline requirements and page 4 the production department, telephone department, compressor station, and gasoline plant.

Those additional units to be acquired in the future for Texoma have been determined in the same manner as have the additional units already referred to. I have consulted with the department heads working with me concerning the additions to and replacements of all department cars except those of the production department, and on these requirements I have consulted with Mr. Dickinson. I am in accord with these department heads as to the additional units that will be required by Texoma. These replacements will be made in pursuance of our already established policy as to replacements. As already stated, the summation of those pages is shown on page 1. Going back to the second subhead on page 1, the term "Book Cost of Property Retired" indicates the original cost of the equipment, which we are retiring from plant in the two properties. We have used the basis of cost of the automotive equipment referred to in this exhibit the price prevailing as of June 1, 1939.

Under the caption "Salvage Value", Lines 7, 8 and 9, on page 1 of the exhibit, is reflected the trade-in allowance which we have been able to obtain in replacing our equipment on both properties, and also for the combined system. The trade-in values used are those obtaining as of June 1, 1939.

We establish the figures for the trade-in value by reflecting what we have been able to obtain from the equipment traded in. We have been able to get considerably higher trade-in values than those indicated in the automobile industry's blue book. This is due, I believe, to the fact that we have found the economical point for trading in our equipment. There is a compromise between mileage and the age of the car, and we are getting the maximum economical benefit from the use of any piece of equipment and the maximum trade-in allowance when we replace it. General Motors have told us that we are operating our fleet as economically as any fleet operator that they are acquainted with.

There is one thing that I might add in explanation here. If you will follow through you will notice that cars are being replaced on Texoma's system more often than they are by Natural Gas Pipeline Company. That is largely a reflection of the condition under which the cars are operated in the Panhandle field where we lack good roads. There are some roads, of course, but most of the travel is done over that part of the field where we depend on pasture roads, with very few bridges, and it is necessary to gun the cars in crossing creeks. In fact, I have not been able to get the salvage values from cars traded in for Texoma that we have those traded in for Natural Gas Pipeline Company. We have had the experience of replacing motors entirely on account of the dust.

767 (EXHIBIT NO. 115 was then offered and received in evidence over the objection of counsel for both Commissions, for whom exceptions were noted at the direction of the Examiner. Motion to strike testimony also denied.)

Cross-Examination Interposed by Mr. Slaff.

Salvage value, as reflected in Exhibit No. 115, is based on our past experience on trade-in values. From trading in these cars we have had the experience of getting so many dollars in trading two or three cars. Now, we would expect to get the same trade-in value had we traded this car in on June 1, 1939. This is, in effect, the average of trade-in prices for the type of car under consideration.

Direct Examination by Mr. Morgan.

I have heard the testimony of Mr. Bussard, Mr. Kesinger and the various operating heads concerning the study that has been conducted over the past year and a half and more, concerning the future requirements for additional capital expenditures and capital expenditures to replace existing equipment, and for maintenance and for operation. I have had considerable to do with these studies. I would like to review some of the facts that pertain to this forecast which has been made. This work started in February, 1938. Mr. Kesinger outlined a program to us for forecasting our future operation, maintenance and capital requirements. We attempted to carry this to completion, while continuing our regular operating duties, by calling in men from the field who were closely associated with the actual work to be done. It was apparent along about the first of the year that we were not getting the results that Mr. Kesinger expected, and it was decided to relieve these operating heads from their normal operating duties, and have them devote their time exclusively to this estimate. Since that time I have been consulting with these men and coordinating the work of one department with another. My opinion has been asked in many instances, and I think I am very well acquainted with this whole estimate so far as the operating departments are concerned. I could not devote as much time to it as I would have liked, because it was incumbent on me to keep this pipeline going. We still have to operate. In addition to my consultations with the operating heads, Mr. Strong, Mr. Powers, Mr. Bulla and Mr. W. H. Davidson, I have consulted with other men who I think are qualified to give an opinion on whether these costs are justified or not. In addition, I have gone to the field and have tried to get the independent judgments of the boys actually on the job in many of these forecasts. I worked with the department heads on occasion and on some of the detail itself. On some of the major matters I would like to think that I contributed something toward a more substantial figure than would have been obtained otherwise.

Now, I have done considerable estimating in my time, but I have never had the problem of forecasting an expenditure to the degree that Mr. Kesinger was insisting on in this budget. The exacting character of this forecast, as originally outlined to me, led me to believe that it was going to be the greatest job of crystal gazing that any engineer ever had. As this thing has turned out, I sincerely believe it is a conservative estimate, far from being a boiler-house guess. By a boiler-house guess is meant, in
the vernacular of the oil field, a rather violent
768 assumption. You might appreciate it if I tell you
that a pumper on a lease in the middle of the winter
is inclined to stick pretty close to the boiler house, where

it is warm, and particularly if there is a lot of snow on the ground and a blizzard outside. He will open a crack of the boiler-house door and he will guess his production for the day, instead of going out and measuring it. Maybe you can sympathize with the boy, if he has to walk over a foot or a foot and a half of snow on an 80-acre lease; possibly he is justified in making a boiler-house guess then.

But this thing is far from being a boiler-house guess. It has received concurrence through a sifting process that has repeatedly gone on, with Mr. Kesinger's perusal of all of these factors. Mr. Brown has been in on it, too. I really believe there is nothing to qualify in the future costs that we have reflected in this estimate.

Now, there are many items of contingencies which have been eliminated in this sifting process which to my mind are justified in the actual estimate which we have prepared. I think in my own mind that many of these things which we have called contingencies are so probable that personally I would put them back in there. Walt Davidson has testified that he has a large number of cracked cylinders on his compressors. They are operating satisfactorily at this time, but we cannot tell when they are going to break. He has indicated that he is going to try to weld these cylinders. He has estimated that he is going to be successful in replacing half of them. I believe that is a speculation. This six-ton casting that we have got there is an intricate thing that is difficuult to weld under any circumstance. There is no doubt in my mind that we are not going to be able to successfully weld half of these cylinders, and I believe that in an estimate of this character it is within the realm of probability to call for the complete replacement of these cylinders. Walt, however, has included the replacement of just one-half of these cylinders. I think that in providing for the replacement of half the present number of cylinders and for the welding and saving of the other half we have been too conservative, because the probability is that we will have to replace them all. It will cost more to replace them all than it would to weld half of them and replace the other half. The replacement of those cylinders is a major item of expense, which we have not included in our estimate at all.

I will tell you another instance where I personally think there is some reason to doubt the low cost that we have reflected here. We have initiated a program of installing booster stations. I believe the lay-out has been described

to you in sufficient detail. There was no such booster unit available when I had this idea of putting individual boosters on wells. The Cities Service Company had put a booster at a central point where they collected the gas from a large number of wells. Now, such a station as that will require attendant labor; it will require the maintenance of heavy equipment; it will require large horse power, because the intake of that station is dictated entirely by the delivery requirements of the lowest pressure well in that particular group. Now, contrast that with this idea that we are advancing here. We have developed
this unit through the cooperation of the Cooper Com-
769 pany and have installed one of these boosters that has
been running now since last October. We contemplate that these boosters which will be installed, with such safety devices as are capable of protecting the machine within a reasonable degree, will operate without attendant labor. It will not be necessary to develop any water supply for the station; the housing problem is eliminated; but there is a big speculation on whether that unit is going to work out successfully or not without this attendance. When we get ten of these units all strung out on a line and depend on automatic devices to shut them down if anything goes wrong, whether they will run continuously without attendant labor is something to speculate with. Now, if we find out that we have to go to such a station as the Cities Service Company have installed in that field, it will require at least twice the investment that we have allowed for these booster stations and twice the horsepower.

I could go on indefinitely, within reason, with any number of these contingencies that I believe should be contemplated in this budget, and for these reasons I believe that this cost that we have reflected, both in operation and in future capital cost, is the minimum. Now, there is one thing to bear in mind. When you compare this system with any other that is operating in the country, to my mind there is no degree of comparability at all. We have got something more than a hole in the ground from Texas to Chicago here. We have a line that is operating at high pressures. High pressures in themselves do not mean anything, if you have the steel to hold them. The reflection of the high pressure is only what may happen in the event of a rupture. The merit of this pipeline system, however, the very economy and the very reason which justified it is the fact that we work this steel at stresses far beyond those on any pipeline that is in existence. When you are working this steel as we are, you just cannot take a chance on having anything happen.

Now, this factor of reliability is, I think, reflected in the load factors that we have carried. We could not have convinced these industries along our line and in Chicago that it was worth while hooking up to this natural gas supply, unless we had demonstrated that this reliability means something to them. The only way that we can get this reliability into the system is to keep forever after the trouble that we may anticipate, so there is a continual round of inspection, inspection of this and of that, just to establish that it is all right. The compressor station equipment is overhauled completely every year. I think I can say this, that I know it as a definite fact that there is no natural gas company in the country that goes to the extent that we do to insure the reliability of this service in the degree of overhauling compression equipment. The boys in the field right now are active on all of their erosion control on this pipeline, anticipating what may happen with snow, ice and what not this winter. The summary is that we are not taking any chances at all with any part of this equipment that we have. Our instructions are to keep it up to the highest degree of safety, not only for this reliability that I have indicated, but also for the safety of the personnel that operates it. In other words, eternal vigilance is the price of safety, if I may make a pun on a famous expression. (Motion by Commission Counsel to strike so much of witness' last answer that goes to any period beyond the immediate future denied.)

770 STANLEY GILL, recalled by defendants, testified as follows:

Direct Examination by Mr. Morgan.

(August 3, 1939.)

I have already stated my qualifications at the time I testified before. My first work in the Panhandle field was in connection with oil operations. I was employed by the Gulf Production Company; and from sometime in 1927 on I was more or less actively engaged in work in connection with oil operations, principally corrosion studies related to the sulphur water produced in the oil areas and also certain evaporation studies and studies of corrosion or gathering lines; and studies on gas lift operation, which was apart from corrosion. We were not much interested in gas. I was generally familiar at that time with the gas, but the gas did not amount to much in the beginning. The operation of the gas field was not of particular interest to the Gulf organization. That work continued until the end of 1931, at which time I started my consulting practice.

Since 1931 I have been engaged a considerable part of the time with some job or other relating to gas in the Panhandle, and have been in and out of the field intermittently over the period of years since January, 1932. My work since 1932 in the Panhandle has been concerned entirely with the gas operations, both in the sweet and sour gas areas. I am familiar with the producing conditions, existing pressure conditions, and the various problems that are incident to the drilling and operation of gas wells and the gathering of gas in the field.

You ask what part I had in making the engineering studies which have been brought into this proceeding through witnesses, namely, Mr. Kesinger, Mr. Bussard, Mr. Dickinson, Mr. Powers, Messrs. Davidson, Mr. Strong, Mr. Bulla, and others. My primary contact has been with the problems related to the study of field operations; that is, up to the time the gas goes into the compressors at Fritch. I have not had any particular contact with the detail of the estimates from that point on. My first contact with this particular job was, I believe, in January or February, 1938, at which time I was employed by Mr. Kesinger to advise with him and with Mr. Bussard and with Mr. Kuhne on the method to be employed in making forecasts of production development programs. Mr. Kuhne is a production engineer for Texoma Natural Gas Company at Amarillo. I don't remember the exact sequence of the thing. I think my first conference on that was in Chicago. I made two or three trips to Chicago, and several trips to Amarillo in this connection. Mr. Kuhne had made a more or less rough preliminary estimate, based on a study of back pressure curves, for Texoma wells; and employing an arithmetical averaging method for predicting future performance. I reviewed that work with him and with Mr.

Dickinson, and took the Texoma back pressure test data and used that and the Railroad Commission's rock pressure and open flow figures, over a period of two or three months, and developed a method based on weighted averages which I applied to the same problem. I developed a lot of calculations and certain generalized conclusions. I conferred with Mr. Kesinger, Mr. Bussard, and Mr. Dickinson on those methods, and sent numerous curves, calculated in various ways, to both Amarillo and Chicago; and sat in on conferences in Chicago and in Amarillo, in which the basis of the methods used by Mr. Bussard was discussed and decided on.

771 I am familiar with these back pressure curves that were presented here by Mr. Bussard in his Exhibits 89, 90 and 91, which were used in connection with his testimony. No. 91 is the back pressure extrapolation, and No. 90 is the map.

The application to wells of back pressure tests and the computing of curves from data contained in these back pressure tests are relatively new things. They have been applied ten years or so. There is nothing new however about the principle. The principle on which the Bureau of Mines based the development of their tests is, of course, the same principle of computation of gas flows and pressure drops as has been used for a long time; and it is the principle of our formulae, such as the Weymouth formula, for the computation of flow of gas in pipes. The basic principle there is that the rate of flow of gas is a function of the difference between the square of the absolute inlet pressure and the square of the absolute exhaust pressure.

The Bureau of Mines' engineers recognized the need for a test method which would give the information that the industry needed from these test results; and working from the principle that the rate of flow would be the function of the difference in the squares of the absolute pressures, made a rather exhaustive series of well tests. They developed methods for computing the pressure at the sand face; and found by a study of their test results that in general the rate of flow of gas was a direct mathematical function of the difference between the square of the absolute formation pressure and the square of the pressure which existed at the bottom of the well against the sand face while the well was producing.

Having confirmed their hypothesis, that it would be a function of that difference in squares, they then presented their method; and all that these back pressure curves are, this straight line on logarithmic paper, is simply a graphical method of expressing that one thing, that the rate of flow is a function of the difference between the square of the formation pressure and the square of the pressure within the well at the face of the sand. Mathematically the formula is that the rate of gas flow is equal to a constant times the difference between some pressures raised to some power, which is "n". That is equivalent in saying in lay terms that there is a constant or definite relation between open flow of the well and the pressure for a given set of formation conditions.

Questions by the Examiner.

This is in substance exactly what is set forth in Monograph No. 7. I am not sure that it is all set forth in Monograph 7, or whether it is more fully covered in the early reports of the investigation; that is, in Reports 2929 and 2930. But what they did was to develop methods of calculation of pressure at the sand face, which were essential. They then studied their experimental data, working from the hypothesis that the rate of flow would turn out to be an explanation of the function of the difference in squares of the pressures, and found that it was true. The formula, of course is $Q = C (P_f^2 - P_s^2)^n$. That, of course, is the type of relationship which is expressed by a straight line on log-log plotting paper.
772 The industry needed a test which would give this additional information; and the Bureau of Mines provided a formula and method which gives the information that the industry needed. I do not remember whether the introductory paragraphs of either report 2929 or report 2930 or Monograph 7 indicate the object or purpose of the Bureau of Mines in making those reports. Those publications do point out uses which can be made of the method and the data which can be derived from those test results, which were not available under previous methods of testing. By what I have said I intended to state that this work of the Bureau of Mines supplied a need in the gas industry.

Direct Examination by Mr. Morgan Resumed.

There was a very definite need for a type of information which could not be secured by the then existing tests. This back pressure test method accomplishes essentially two things that were not accomplished prior to its introduction. The first is to give a substitute for the old method of determining the potential by measurement with the well flowing wide open. That has been referred to as the Pitot Tube method. The Pitot Tube method was a method of measuring gas flowing out of the well while it was flowing wide open. This method was wasteful and dangerous. It was recognized as a poor method for those reasons. The industry did not care so much about it being wasteful particularly, but they did not like it on account of the danger in it.

From the waste point of view, there are two common methods of running these back pressure tests. One is by the use of what is called the various critical flow pressures or orifice tester, which is a device which is described in Monograph 7. It is a small orifice which is put on the head of the well, and through which the well is allowed to produce against atmospheric pressure. By that means a certain amount of gas is wasted, but it is a small amount, since the production has to be taken through a small orifice. The test can be qually well conducted, and is very frequently conducted by using meters which are regularly installed on the wells, and by producing gas during the test period into the line. In that case the waste is entirely eliminated.

From the standpoint of dangers, the hazard of running potential tests is practically eliminated. In running open flow tests there is a fire hazard, because we have a well flowing a lot of gas into the open air; and my own thought is that the greatest hazard is the hazard of tearing out the bottom of the well, because I had a lot of work in a country where you can't flow wells wide open. They have loose sands, which will simply tear the bottom hole fittings all to pieces, and you simply cannot do it by using the open flow on those wells. In fact, the deterioration of open flow potentials was impossible prior to the development of this method.

The use of this back pressure method of making these tests results in additional information besides that dis-

closed by the Pitot Tube test. It does two things. The second to my mind is the most important. These back pressure test curves are frequently referred to as delivery capacity curves, rather than as back pressure test curves. That nomenclature, delivery capacity curves, indicates what is probably their greatest value as operating information. The curves can be applied, not only as they have been applied here, for the prediction of potentials at any future time when pressure has declined to an assumed value; but they also show directly how much gas a well in the condition in which it was at the time the test was made will deliver against any specified
773 back pressure. That is, we can take a gas well, and from the delivery capacity curve or back pressure test curve, we can see how much gas that well is capable of delivering into a line at 200 or 250 or 300 pounds line pressure. Now, that could not be determined at all from open flow tests; and that is the type of information which is invaluable in the operation of gas properties, which could not be obtained previously, prior to the development of this test method. I think the greatest use of the information that is gained from such tests is in determining the present flowing capacities of wells at any given or assumed back pressure. For example, if a well is being produced into a line, the working pressure of which is 200 pounds, you can take the back pressure curves, or the back pressure test information, rather, and determine how much gas that well will put into that line against that working pressure. That is the information that is of greatest value in its practical application.

I have examined the procedure which Mr. Bussard adopted in dividing the areas in which Texoma has wells and properties yet to be developed into groups—I believe thirteen groups—as reflected on Exhibit No. 90 now on the board before me. In the method of calculation and prediction that Mr. Bussard employed, that division into groups was really essential to the planning of the development, gathering and boosting program. The boosting program particularly could not have been developed on the basis of county averages, or anything of that sort. What he did was to divide the Texoma holdings into groups of wells in which the performance of the wells in a given group was comparable, and in which the geographic location of the wells in the group was such as to enable him to plan the future program. There were advantages in using these groups as opposed to counties, from the standpoint of producing conditions because the wells in any group will have rather comparable performance. In other words, the probability is that a well drilled in any one of those group locations will conform in its performance more closely to the average performance of the wells in that particular limited area than it would do to the average of the performance of the wells spread over the entire field or over a county. In any group the pressures are comparatively uniform throughout. In any county that you could name in this field you will find pressures approximating original pressures and pressures that are very low. You will also find productive areas and areas of comparatively small productivity. This is reflected by Mr. Hughes' maps which were put in earlier here. We would also find the conditions as to inside and outside drainage from Texoma's leases entirely different and wide variations if you took it by counties. Some of these difficulties have been overcome by the breaking of this area in which Texoma owns producing properties and properties to be developed into groups as Bussard has done. I am in accord with the conclusion reached by Mr. Bussard that the average of the back pressure curves of wells to be drilled in those areas, together with the wells that have already been drilled in those areas, will approximate the average back pressure curves that he computed and that he shows on his Exhibit No. 89. I think that is the only sound and reasonable conclusion. I think Mr. Bussard has made an entirely sound and scientific application of good engineering principles in determining the potential producing capacity of wells to be drilled in the future at the pressures which would prevail at the time those wells were drilled. I agree with his methods.

774 The estimates of the future producing capacity of wells as indicated by these back pressure curves and as calculated by back pressure tests which form the basis of those curves is based on the assumption that the producing characteristics of the wells will remain unchanged over future years. Now, as a practical operating proposition in the field, they won't, and the productivity of the wells in the future as a practical matter will be lower than the productivity that is predicted by this strictly scientific method.

I think the method employed by Mr. Bussard in computing the number of wells that will be required to meet the market outlets of Texoma on a basis of back pressure curves as he has stated he used those curves in those computations is scientifically correct; but I do not think that the number of wells that that scientific calculation calls for will, down the years, produce as much gas as those calculations say they will. We know as a matter of fact that the back pressure curve of a given well does not stay the same over a period of years, that due to effects which act to reduce the effective permeability of the formation surrounding the well bore the back pressure curves tend to shift to the left. In other words, the productivity some years from now will be less for a given pressure difference than would be predicted from a test made today. Now, the effects that serve to bring that about are, in general, effects which reduce the permeability of the formation immediately surrounding the well bore. Those effects are, so far as we know, occasioned principally by two things: One of them is simply the effect of the velocity of the gas moving into the hole, and the second more important class of effects is that related to water, both salt water from the bottom or from above, and fresh water, which is condensed out of the gas as the pressure is reduced in the movement of the gas into the well bore.

Salt water will produce various effects, of which one is the clogging of the capillary pores by liquid water. Some of the pore space, through which this gas can move, is shut off unless room is left for it to come around. Or salt water from above trickling down over the face of the well bore is evaporated by the gas leaving a deposit of solids—that is, salting up,—which also clogs the formation. Water in the formation, and particularly fresh water which is contained in the gas and which tends to condense out of the gas as pressure and temperature are reduced, causes the formations, and more particularly shale, to flake and powder, and this broken formation, if it is dropped out back from the well bore clogs the pores and reduces the permeability of the formations.

Shale and other formation matter from up the hole also falls back down into the hole, either dislodged by the gas stream or loosened by water condensing out of the gas stream, falling down to the bottom of the hole, and has to be cleaned out periodically by blowing or other methods. But some part of that over a long period of time apparently stays stuck to the walls of the hole and clogs the pores still more.

Salt water which comes in laterally through the producing formations will take up a certain amount of pore space, just fill up a certain number of pores through which gas is moving now, and just won't give gas a chance to get into them.

775 Salting up is more a matter of salt water trickling down from above and leaving a deposit of solid salt on the face of the well bore. This formation of salt operates to reduce the productivity of the well or the producing capacity of the well by closing up or reducing the pores or channnels through which the gas flows.

As a practical matter, there is no way to counteract those influences that happen in the producing formation. We know that the productivity of wells decreases with time. All of those factors act to decrease the productivity. Now, theoretically there might be a change where some of the formation on the walls of the hole down at the bottom might come loose and fall in and open up a little bit more pore space, but as a practical matter, as far as I know, if it does happen at all it is over-balanced by these other things, because the actual effect is the reduction of productivity with time. I know of no data on the basis of which such correction can be made through which we can ascertain how much this interruption or interference with the predicted open flow indicated by scientific calculation in conjunction with the application of the back pressure test principle. I think the proper scientific procedure is to take conditions as they exist today and calculate your prediction on the basis of those conditions. If the data were available, correction could be made, but there is no way to be sure of just how much that shift will amount to.

Mr. Bussard recognizes that it is going to take more wells than his study indicates to supply the quantity of gas which will be required by these pipelines. It is no criticism of Mr. Bussard to observe that more wells will be required and that it is going to cost more to get that gas than Mr. Bussard's figures indicate. The drilling of additional wells would increase costs all up and down the line. There would have to be additional meter settings, more gathering lines, more men to operate those gathering systems, to change charts on those meters, more people to calculate the charts. Then it will also require more booster horsepower, not because of any changed total quantity of

gas, because the quantity of gas would be the same, but because these wells at the reduced delivery capacity will have to be opened up wider to produce the same quantity of gas That will mean lower working pressure and, consequently, greater booster horsepower in order to ram the gas into the main gathering line. I have heard Mr. Dickinson's testimony concerning what he termed the orderly distribution of this drilling over the years instead of waiting until it was a physical necessity to have the production. He assigned two major reasons why that was done. One was to minimize the cost and to keep the supervision of this drilling under the eye of the trained personnel, which could not be accomplished if the wells were all drilled, or a comparatively large number of them were drilled, over a short period of time. The other reason he assigned was that from an engineering standpoint it was desirable to postpone as long as possible the production of these wells up to the limit of twenty-five per cent allowed under the Texas statute. I think Mr. Dickinson is entirely correct in this last observation. As a matter of general practice, it is bad to operate a gas well at too high a percentage of its open flow. Twenty-five per cent is the established statutory limit in Texas, as in many other gas producing states. That is an absolute limit, and is a much higher percentage of open flow than is best for good well performance. All of
776 the troubles that occur in gas well operation are accentuated as you operate at progressively greater percentages of the open flow rate. You just have a great deal more difficulty and expense in keeping the wells in good operating condition.

Referring to Mr. Dickinson's testimony that Texoma has operated its wells at a rate of less than ten per cent of open flow throughout the history of that company, in my judgment, it is a very good practice. It reduces the amount of work that is necessary to keep the wells operating and the cost of keeping the wells in operation. It operates to postpone the time when these complications about which I have testified as occurring in the bottom of the wells will overtake the operator. Take, for example, the problems that result from condensation of water out of the gas in the hole. When a well is operated at a lesser percentage of its open flow the drop in pressure and temperature as the gas moves into the hole is much less than when it is operated at high percentages and, therefore, there is much less condensation of moisture in the hole. The same is true of velocity. Essentially the velocity of the gas through the formation is a function of the percentage of open flow, because maybe one well will have an open flow of fifty million and another well will have an open flow of ten million. The velocity in the formation is not five times as much on the fifty million well as it is on the ten million well. It is pretty much the same. That difference of potential means principally that the fifty million well just has about five times as much open passage for delivering gas to the hole. That difference then between those two wells does not make any difference practically in the formation velocity, but if you operate either of those wells at twenty per cent of its own open flow capacity, you will have about twice as high a formation velocity as if you operate that same well at about ten per cent of its own open flow, and that increaseed velocity has an increased tendency, of course, to break down the formation.

I am familiar with the charts contained in Exhibit No. 91. I have gone over and examined the method employed by Mr. Bussard of extrapolating the course of the weighted average pressure curves of the respective groups set forth on Exhibit No. 90 and continued over to Exhibit No. 91. I think that is a reasonable basis of extrapolation of the possible method of predicting the future course of rock pressures in these groups. It is the method which, first, seems to be most in accord with the performance of the wells up to the present time and, second, it is the method which leads to an indication of the best future well performance; that is, it is the basis of extrapolation that indicates Texoma will require the least number of wells in the future. By that I mean this: On these pressure curves you have certain fixed data. First take this Figure 8 that is curved for group 8 on Exhibit 91. You have the data on past performance of the weighted average rock pressures of the wells in the group. That runs from 1935 to 1938. That gives you as basic data the course of the actual decline of rock pressures for a period of years. The other fixed point is fixed by the basic estimates of reserves. Mr. Peterson's estimates ha been used by Mr. Bussard in preparing those curves, and the predicated rate of withdrawals from the field as a whole is from the estimate which I believe Mr. Dickinson presented here. He did a great deal of work in connection with it. That gives you then another datum of pressure and time at the end of this extrapolation, so that the extrapolation consists of 777 getting from the 1938 point to the terminal point, which is 1954, with twenty-five pounds per square inch gauge pressure at the wellhead.

Now, there are three ways the extrapolation could run. It could run from this 1935 to 1938 curve, running convex upwards, or the 1938 point could be connected to the 1954 point by a straight line, or the extrapolation could be made concave upward. It is apparent from both of these groups, both Group 1 and Group 8, that the extrapolation in the form that has been made, convex upwards, runs along reasonably in accord with the course that the pressures have taken so far. From point of view that looks like the most reasonable means of connecting these fixed points. This form of extrapolation of a curve convex upwards, which of course means that the pressures will fall off at a lower rate in the beginning than they do towards the end, is also in accord with reasonable expectation of what will happen in the Panhandle field as a follow-up to what has happened. That is, as has been mentioned before, the heavy withdrawals up to the present time have been from those parts of the field in which the reserves were greatest. Now, later on in the life of the field there will be more and more development and withdrawal out in areas which are now the higher pressure areas and those withdrawals from those higher pressure areas will bring about an accelerated decline in average pressures.

We have already gone pretty thoroughly into the reason for this. It is a matter of the size of the container in relation to the withdrawal. The circumstances that many of the high pressure areas are of low productivity, or what is called lean areas, will involve the future behavior of pressures. Withdrawals of the kind that have occurred could not have taken place if the reserves had been equal. I mean, if you step out into the higher pressure areas and move your withdrawals into the higher pressure areas you will get a higher average decline. Looking at the picture from the standpoint of potentials or the producing capacity of Texoma's wells in the future and taking the course of that curve as interpreted by Mr. Bussard, and comparing that course with a straight line or a line which has a concave curve upward, either a straight line or, to a greater extent, a curve concave upward would indicate that the pressure at any point between the 1938 pressures and the terminal pressures, which are the same for each of the three, would be lower than the pressures which are indicated in the form of extrapolation used. At any point of time between 1938 and 1954 on the other forms of extra-polation would indicate a lower pressure. Take, for example, this Group 8, and say for 1945 the form of extrapolation used indicates a pressure of slightly over 300 pounds per square inch, a straight line would indicate a pressure below 250 pounds. Now, taking those two lines for the time being, the curve used by Bussard, which indicates an average pressure for group of 300 pounds per square inch, would indicate a higher producing capacity for Texoma's wells as of 1945 than would a straight line which indicates a pressure of less than 250 pounds per square inch. This is due to the circumstance, of course, that the relation between the potential and the pressure remains constant, using those average composite curves. And since the pressure is lower, following it down the straight line, the potentiality or producing aggregate of Texoma's wells at any given time will follow that pressure down in the same relationship and will indicate a lower available potential for Texoma.

778 Applying that principle to the drilling program of Texoma, the use of a straight line extrapolation would call for a considerably heavier drilling program than does the use of the extrapolation which was employed. The conception or interpretation of Mr. Bussard of the course of that line operates to convince him that there will be a fewer number of wells required than would be the case if that line went down on a straight line from its position on January 1, 1939, to its position at the end of 1954. (Motion by Commission Counsel to strike the testimony of Mr. Bussard with respect to results which would have been achieved or might be expected through the use of other line projections denied.)

If the decline of pressures was strictly proportional to withdrawals, in other words, in any field to which the pressure decline method can be properly applied for the estimation of reserves, a straight line extrapolation would be proper. That is, where there is the condition of equal withdrawals ratably over the field to reserves in place, so the pressure decline is uniform all over the field, and where the condition of every acre in the field is such that it originally had the same reserve as every other acre, then a straight line extrapolation and a straight line decline of pressures are experienced. That is not the situation in the Panhandle, and I do not believe that this curve will take the course of a straight line from where it is found on January 1, 1939, to the point which it will reach at the end of 1954.

Questions by the Examiner.

The charts in Exhibit 91 represent a function of Boyle's law, as modified by the sub-surface conditions. What I have just pointed out are conditions that would affect the operation of Boyle's law one way or the other. Under the strict application of Boyle's law, these declines would have a straight line relationship.

Direct Examination by Mr. Morgan (Resumed).

I am familiar with the terms "liners", "tubing" and "clean-out tools", mentioned by Mr. Dickinson in his testimony, in which connection he stated that it will be necessary to install liners on some of Texoma's wells, that in other wells and in perhaps some of the same wells it will be necessary to install tubing and that it will be necessary for the company to equip itself with clean-out tools and equipment going with clean-out tools, for the purpose of keeping those wells in reasonably good producing condition. Basically, the function of a liner in a gas well is to let the gas through and hold the formation back to keep cavings from coming into the hole. Looking over Mr. Dickinson's estimates I got the general impression that he probably did not provide for enough liners. I think the need for liners is going to be the rule rather than the exception, especially in the set up of Texoma's wells. Most of the wells will require liners, especially later on in their life when the pressure gets down to the point where you cannot blow them clean so well and when water conditions in the formation are causing more and more cavings.

The use of tubing is to facilitate the operation of blowing the wells clean of water, cavings and scale which fall into the well bore. By the use of tubing you are able to clean the wells by blowing more readily, and thus avoid cleanout jobs with tools. It is not particularly necessary in the early life of a gas field or a gas well to use tubing,

because the well produces a large enough quantity of
779 gas so that when you open it up through the big pipe
you get a velocity of gas flow sufficient to carry this foreign matter out of the hole. Later, as the wells decline in productivity, the volume of gas produced when the wells are opened up is not sufficient to give a velocity sufficient to carry the heavier materials out of the hole. By installing tubing and by blowing through a small tube string, instead of through large casing, the velocity of flow with the same volume of gas being produced is greatly increased; that is, approximately, comparing an 8-inch casing with a 2-inch tubing, the velocity for the same total volume of gas will be sixteen times as great in the two-inch tube, so it will carry out this stuff when it will not carry it by flowing through the 8-inch casing. Thus, by putting in tubing when it gets so that you can't blow the well satisfactorily by blowing through casing, you are able to clean in later life and thus reduce the number of clean-out jobs with tools which are necessary.

Mr. Dickinson testified that in his judgment it would be necessary to install tubing in two hundred and four wells out of the total of three hundred and fifty wells. If I were guessing at it, from what I know of the field, I would guess three hundred and fifty. I think it probably will be necessary to install tubes in all of them. I think that is somewhat of a guess. I think Mr. Dickinson probably made his estimate based on a detailed study on each individual well. I base this on what I might term a broad gauge estimate, though it is not one of those boiler house estimates that Mr. Dickinson was talking about. I have been guilty of boiler house estimates, as everybody else has around the oil field, but this is not a boiler house estimate. It is probable more wells will have to be tubed than Mr. Dickinson has estimated.

As to clean-out tools in the declining years of a gas field, I have never yet seen a gas field where you did not need them. They are essential. Mr. Dickinson has provided for two strings of clean-out tools and the essential equipment for use in the clean-out operations on Texoma's wells, numbering one hundred and thirty-five on January 1, 1939, plus those which have been added since January 1, 1939, and the wells to be drilled, at the rate of approximately twenty a year for the next several years. I think Mr. Dickinson is pretty optimistic. I don't think that one string of clean-out tools will take care of one hundred and thirty-five wells. In general, I would say under conditions such as those in the Panhandle that barring accidents that will occur on an occasional job, it would keep one clean-out rig humping to keep up with a hundred wells. It is doubtful if one clean-out rig can keep up with more than seventy-five or eighty wells satisfactorily. That would call for four or five strings of tools.

Speaking of the personnel employed by these pipelines and the policy of the companies in furnishing housing facilities for their regular employees, I am familiar with that policy and have seen some of their camps. I have heard of their other camps but have not seen the compressor camps up the line. I have visited the camps at Fritch, Kingsmill and I seem to have a recollection of having seen their camp at Dumas. In the latter camp there are only one or two houses. It has been my experience and observation that it is not an unusual procedure on the part of pipelines to furnish their field personnel with housing facilities. It is practically the universal practice in all field activities of oil and gas companies everywhere. I do not mean in the Panhandle only but you will find this practice wherever there are oil or gas fields. It is the usual thing among pipelines,
780 gasoline plants, or field refinery operations. I don't
know just where this policy or practice started. There are a number of reasons for it. For one reason, you just can't keep the men you want unless you have those facilities. It is such a thoroughly recognized custom in the field that men want to live on the job. That is fine from the standpoint of the employer, because it is highly desirable, and in the case of some operations, absolutely essential to have the key men housed close to the job. That is necessary and desirable principally for the emergency phase. There should be men who know the job, and who are capable of handling an emergency, on the job almost instantly in case anything should come up. It also makes the day by day operation that much easier. The men are closer to work. They get there on time, regardless of weather or road conditions. Road conditions are more often than not awfully tough around these operations. In the Panhandle it is pretty bad. The roads are bad and there is a lot of bad weather. I have gone out in the morning in the middle of a big sand storm, and come back in the afternoon through mud, heavy rain, and sleet freezing when it hit my windshield, sliding all over the road. That

is an area of high altitude and is subject to very severe weather conditions. Extreme and very sudden changes in weather occur. Also, in the Panhandle field as a whole, there are very few spots where a high class man would care to raise a family at all—in the towns outside of the company camps. To illustrate that, take the town of Borger. This town grew up thirty or thirty-five miles from a railroad to a town of thirty or thirty-five thousand people, in the middle of a big oil boom. It was a boom town of the worst sort. Every place that you ever heard of was rampant in the town, and I think still is. It is a dump I should say. It is a very undesirable place. There are no decent residences. There are shacks, and a few fairly nice business buildings, and more that are far from being decent. Here is what happens in a situation of that sort. The Phillips Petroleum Company have a big refinery which is just a mile or two from Borger, and so far as I know none of the employees of the Phillips Company live in Borger. The Phillips Company have a camp which is practically a city. It is a city, it is a separate town called Wittenberg. It is completely a Phillips town. There is a school, elaborate recreational facilities; and so far as I know none of their employees live in Borger.

781 G. M. DAVIDSON, recalled by defendants, testified as follows:

Direct Examination by Mr. Morgan.

(August 3, 1939.)

I have prepared a list in compliance with the Examiner's request that I give him a break-down of the number of automotive units by classification and by name. It should be cross-referred to page 2 for Natural Gas Pipeline Company and pages 3 and 4 for Texoma Natural Gas Company. This list of equipment includes the following: For the Natural Gas Pipeline Company there are ten International trucks with trailers; thirteen Chevrolet pick-ups; twelve Chevrolet coupes; sixteen Chevrolet sedans; and there are nine No. 22 Caterpillar tractors; and four heavy passenger cars, a total of sixty-four units. Referring to Texoma Natural Gas Company, there are three International trucks; five Chevrolet pick-ups; eleven

Chevrolet coupes; four Chevrolet sedans; one No. 22 tractor; and three heavy passenger cars, a total of twenty-seven units.

This morning in a hasty glance at page 2, pertaining to Natural Gas Pipeline Company, I failed to notice, it being rather difficult to read across these lines, that there was an additional car for the telephone department to be purchased in 1947, making two additional cars, noted on Line 25. Now, the question I think also was brought out as to why we replaced a car in 1942 and 1943. I think this can be explained by considering the car's life as being twenty months. Then if you were to buy it early in 1942 you would replace it by the end of 1943. There is the required stretch of twenty months in there. It is rather complicated to clear it up when it becomes two cars purchased at different intervals in there. It is just a matter of following our fixed policy of replacing these cars at regular intervals, rather than running them until they are ready to fall to pieces.

782 P. McDONALD BIDDISON, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(August 3, 1939.)

My name is P. McDonald Biddison. I live in Dallas, Texas, where I have resided since the fall of 1931. I am a consulting engineer, specializing in natural gas and petroleum work.

I graduated from Kansas State College in 1904 with the degree of Bachelor of Science in electrical engineering. After about one year of work at Iola, Kansas, as a draftsman, electrician, instrument man, and stationary engineer, and a few months at Ziegler, Illinois, as an electrician, I began to do engineering work in the natural gas industry at Columbus, Ohio, in 1905. I was employed first as a draftsman on plans for work for the Kansas Natural Gas Company under the chief engineer of the Logan Natural Gas and Fuel Company, who was the consulting engineer for the Kansas Natural Gas Company. I later succeeded him as chief engineer for the Logan Natural Gas and Fuel Company.

In 1907 I went to Joplin, Missouri, with the Hope Engineering and Supply Company, and was engaged upon designs for natural gas properties proposed to be constructed. Late in that year I moved to Independence, Kansas, as assistant to the chief engineer of the Kansas Natural Gas Company, and was engaged in supervision of construction and in the design of compressor stations and pipelines.

In the fall of 1908 I went with the Columbia Gas and Electric Company as construction engineer, and built for them a compressor station at Kenova, West Virginia, and supervised the construction of the western end of their 20-inch line into Cincinnati.

Following this I was employed for one year as construction engineer by the Ohio Fuel Supply Company in Ohio. That system is now a part of the Columbia Gas and Electric properties.

Following this I was employed for a year as construction engineer by the Texas Company at their Port Arthur works on the installation of the steam generating equipment, electrical generating equipment, and water supply for the refinery, and as consultant on the design of concrete building foundations.

In 1912 I again became associated with the Ohio Fuel Supply Company as construction engineer, and remained with them until the spring of 1919. My duties were design and construction of the gas engine driven compressor stations, measuring and regulating stations, distribution systems, pipe lines and shop buildings. While I was employed by the Ohio Fuel and Supply Company I also acted for a four-year period as consulting engineer to the Lone Star Gas Company in Texas. I designed for them and supervised the construction of compressor stations at Petrolia, Texas, a gasoline plant at Petrolia, Texas, and laid out their programs of additions to lines and station capacity. I predicted for them each year for a four
783 year period the number of wells required to be drilled
to maintain their gas supply.

During the time that I was with the Ohio Fuel and Supply Company I also conducted research upon the extraction of gasoline from natural gas in cooperation with the United States Bureau of Mines; and for a period of about three years I had supervision of gasoline production for the Ohio Fuel Oil Company in West Virginia.

During the period of the War I also acted as consulting engineer to the United States Bureau of Mines on war gases, and supervised the helium production program to the point where helium plants at Fort Worth were ready to begin operations.

In the spring of 1919 I went to Mexico and was there for two years on the construction of oil pipe lines and oil loading facilities; the first year I was with Atlantic Gulf and West Indies Steamship interests, and the next year I was with Tide-Mex Company, a subsidiary of the Tidewater Oil Company.

Returning from Mexico in 1921, I became associated with the interests who owned the Dallas Gas Company and some producing properties in north Louisiana. I acted as consulting engineer to the Dallas Gas Company and to the County Gas Company, an affiliate. I supervised the development of production and the marketing of production from the Louisiana fields. During this period I constructed some pipe lines, some distribution systems, made gas sales contracts, and reported upon pipe line projects to such markets as there were available to lines out of the Monroe field area; some of which lines were subsequently built, and one of which I started construction on, but sold the properties before construction was completed. Upon the sale of these producing properties, I remained with the properties for about one year and participated in negotiations leading to the construction of pipe lines to New Orleans, to Memphis, and to St. Louis, as an engineer for one of the parties in interest in those lines, and supervised the construction of the pipe line from New Orleans to Baton Rouge.

In the fall of 1928 I severed my connection and opened an office in Monroe, Louisiana, for the practice of consulting engineering. During that fall I reported to the financiers upon the project for a natural gas line into Salt Lake City, which was constructed, and made a valuation of the property of the Lone Star Gas Company's distribution plant at Fort Worth. Following this I became associated about the first of January, 1929 with the Southern Natural Gas Corporation, for which I acted as consulting engineer during the construction of their pipe line system extending from the Louisiana gas fields across Mississippi and Alabama into Georgia, and down past Mobile, Alabama, into Pensacola, Florida. Upon completion of their construction work and the substantial completion of their sales contract arrangements, I severed my connection and moved to Dallas, Texas, where I have been located since, engaged in consulting work. I have been very largely connected with valuations of natural gas properties and with testimony before courts and commissions with regard to values of that class of properties.

784 I have knowledge concerning the properties of Texoma Natural Gas Company and Natural Gas Pipeline Company of America. This knowledge I acquired by making two inspections of the properties of these two companies. The first inspection was made in March, 1938 and the second in May, 1939. The purpose of these inspections was to determine the condition of that property, to familiarize myself with the methods of construction used, the methods of maintenance used, the degree of care used in maintaining the property, the degree of safety maintained in the companies' operations, and the degree of safety of their installations. I have in process of preparation a study dealing with the condition of the pipe line, which is to be introduced later in connection with the reproduction valuation.

I was asked in connection with my employment to observe the personnel and to make a confidential report on the personnel to the management. I have made such report.

On both of these inspections I began at the field on the system which is the property of Texoma Natural Gas Company. I inspected down there wells, well measuring stations, pipe lines, and telephone lines, to determine their condition. The inspection of pipe lines was accomplished by having sections of pipe line exposed by digging a bell hole. A bell hole is simply a hole big enough to get down in and see and work around a joint of pipe. The bell holes which we requested to be dug on this property for that purpose provided for approximately six feet or more of length of the pipe to be exposed, of which four feet was to be cleaned of any protective coating or rust or scale. They were large enough so that the pipe was exposed for its full circumference so that the entire body of the pipe could be seen and inspected. The clearance under the pipe was sufficient that one could get down under the pipe and look up at it. The clearance on the sides was ample to permit free access to the pipe all around. Since the pipe is of varying size in the field lines, of course the holes were of varying sizes. For the first inspection the intervals at which these bell holes were opened were approximately five-mile intervals over the pipe line and over the gathering system. When I went back to inspect it a little over a year later those bell holes had been filled up, but on the second inspection they opened new bell holes to the number of about half as many as those opened on the first inspection. Taking the two inspections together, an aggregate average of about three holes was opened for each ten miles of pipe line. This obtained throughout the main line and the gathering system.

I inspected and examined the field facilities, the wellheads, the various plant equipment, as well as the personnel out in the field. I saw their automotive equipment, their tools, their clean-out equipment, and looked at their installation of stream crossings to see what their condition was and what the prospects were of their maintaining those stream beds in the status quo. I inspected the residences and warehouses at Dumas and Kingsmill. I inspected Fritch station, including the compressor station and the agsoline plant and the dehydration equipment, the residences and the warehouses there. Proceeding up over the main line I inspected pipe at locations as I have previously outlined, looked at gate boxes, and as I came up on to the property of the Natural Gas Pipeline Company of America I stopped at each compressor station and noted the condition of the various classes of equip-
785 ment in each compressor station, of the automotive equipment which was available on locations to be seen. I inspected the telephone line. I made notes as to the amount of hours of operation of engines. I examined their records of engine repairs, became acquainted with their scheme of maintenance and with the personnel in charge of operation at various stations. My inspection also included their housing facilities. I ascertained the stresses at which the pipe and the equipment on this pipe line were operated, the load factor, and other kindred features of information. I have gone over that data and made calculations from the operating pressures and the character of pipe as to what the stress in the pipe walls was and as to the degree of safety of operations.

This pipe line is not operated along the same lines as other lines from the standpoint of pressure conditions and stress conditions. It is something far in advance, from the standpoint of technical engineering, from the standpoint of economy, and the use of steel, of anything that has heretofore ever been constructed or even conceived.

Instead of basing the safe operating pressure or the factor of safety upon the ultimate strength of the steel, as has been the common practice in the design of pipe lines and of pressure vessels in general, this pipe line has had its operating pressure fixed by a ratio of operating stress in the pipe walls to the yield point of the metal, and in selecting the materials to be used the engineers who built this pipe line secured production on a large scale of steel for pipe line purposes having a relatively high yield point compared to steels previously used for such purposes. The net result was that they secured pipe which could be used for pressures very much higher than ordinarily had been used previously on pipe of this size and of the wall thickness used. The result is that they have secured a capacity per pound of steel far above anything previously obtained.

The use of these higher pressures and the use of higher stresses in the pipe walls means that on this pipe line failures must be foreseen and avoided by taking precautions in advance of their failure, otherwise serious interruptions to service will occur, and otherwise the employees and the public in the areas traversed by the lines will be subjected to risk of loss of property and of life. There is a difference in the result of the parting of a pipe line or the explosion of a compressor or of some equipment through which gas passes at the high pressures used by these pipe lines, and the result of such occurrences in the case of a pipe line utilizing pressures up to three or four hundred pounds. With the pressures at which this line is operated, the pressure being something like twice that commonly used on pipe line transmissions, the damage that would be done would be twice as much as ordinarily, by virtue of the difference in pressure.

Now, this is a large line, a 24-inch pipe line, and upon rupture the amount of energy which would be suddenly released from a line of this size and at the pressures existing would be in the order of five or six times more than that on a 16-inch line at 350 to 375 pounds. So the amount of damage that could be done by a rupture on this line would be many times that which you would expect from the usual sized pipe line at the usual pressures.

786 I have seen a number of pipe line ruptures. A pipe line rupturing at high pressures will generally throw a joint or two joints of pipe out of the ditch and will hurl it a hundred yards or more, and the escaping gas will scour out in a few minutes a hole that you can set a big truck down in. A line rupture on these properties would scour out a hole that you could get a good sized dwelling in. If a fire does not occur the area damaged would ordinarily not be so great, but the chances for fire and explosion on one of these line ruptures are generally quite high, because sparks generated by pebbles hitting upon steel may set off an explosion, under which conditions a very large area may be damaged and structures somewhat adjacent to the right of way may be damaged or destroyed. If a fire of that sort occurred at a compressor station with these high pressures, there might be an extremely high loss of property, accompanied by serious injuries and loss of life.

I have conferred with most of the men who have testified in the last few days in regard to the probable capital and maintenance requirements of these pipe lines and their operating expense over the next ten or twelve or fifteen years. I refer to the studies conducted directly under the leadership of Mr. Bussard, concerning which I have heard other witnesses testify. I have conferred with them while they were preparing the data and studied the data as they were preparing it. I am familiar with the exhibits which they have prepared and which have been introduced in evidence in connection with their testimony, particularly the exhibits of Mr. Powers, Mr. Davidson and Mr. Strong.

In my trips over the properties of Texoma Natural Gas Company I saw a stream called the Big Blue in Moore County, Texas at several points. The reason I happened to see it at more than one point is that Texoma has pipe lines crossing this stream at I think three points, and I crossed it at other points besides those locations where the pipe line crossed it. I have heard the testimony of Mr. Strong concerning the item shown on page 3 of Exhibit 105 which refers to a bridge across the Big Blue River to be erected in or prior to 1942, at a cost of $54,508.

The bed of that stream has shifting sand bars and the banks are eroding away, and changes in the banks could be detected between the inspection I made in the spring of 1939 and the one I made in the spring of 1938. I think a suspension bridge is the only way in which they can secure a permanent installation across that stream any place near the point to which Mr. Strong testifies that a suspension bridge will be erected. The revetment work and bank protection work which Texoma has done and is doing, while it retards erosion of the bank and retards the shifting of sand bars, does not and cannot prevent it. I think this improvement should be made at an early date because Texoma is dependent upon the use of the line which crosses that stream at that point for a large portion of its gas supply and to maintain continuous service that line must be kept in continuous operation. It is my judgment that about one more flood on Big Blue Creek down there will see that bridge go in in a hurry.

The next item on that page is "Two 12-Inch Lines Across the Canadian River." That stream, like practically 787 all streams in that general area, has a wide bed, with shifting sand bars and a channel which may be at one bank for a while and after a flood shift to the opposite bank. These shifts cause the movement of acres, hundreds of acres of sand in those river beds. Since a large portion of the gas supply of Texoma Natural Gas Company must cross the Canadian River through this line, it is essential, for the continuity of service, that they have lines installed across this stream bed in sufficient amount that if, upon some of those shifts of the sand bed, lines are washed out, they will have enough remaining lines to maintain operations close to full schedule. In my judgment it is a necessary engineering step to provide additional pipe line capacity at the Canadian River crossing. The only question in my mind is whether they have provided all that they would be justified in providing. They could quite readily justify providing more lines. That stream is notable for its treachery and has been as far back as the history of that territory runs. It is almost impossible to enumerate the railroad bridges, the pipeline crossings and the ordinary highway bridges that have gone down that stream. Under dry conditions it is possible to walk across that stream. Under flood conditions it just takes everything in front of it.

Another item shown on page 5 is the replacement of river headers. I am familiar with the river headers up and down this pipe line. My judgment is that these headers should be replaced. These headers were of good design at the time they were built. They were probably the best design that could have been obtained at that time. Since then, other methods of construction have become available, which enable now a design which will avoid some of the weaknesses of these headers, and it is just good judgment and good engineering to eliminate the chance for fracture in these old headers of the gusset type construction and replace them with something which is amply safe for the working conditions to which they are subjected.

The same situation and observation applies to drips. There have been improvements in the design of drips presenting an exactly parallel case to that of the headers. The headers are subjected to the greater stress, but the drips are subjected to more action from corrosion because they collect moisture.

Another important item included in Mr. Strong's program for improvements is the installing of welding sleeves at stream and gully crossings to give rigidity to the line at those crossings. These welding sleeves are not installed in lieu of the existing couplings, but are a reinforcement to the couplings. When the sleeves have been installed over the couplings, the couplings no longer have any function to perform. They can be installed in this fashion without shutting down the line. This procedure adds strength and safety to the pipe line at the coupling and is a cheap form of insurance against difficulty at those minor stream and gully crossings. These sleeves are a little thicker than the pipe and are composed of the same type of metal.

On the same page there is another item on line 6 for the laying of six new pipe lines at the Canadian River. That is the same river but not the same crossing about which I testified a little while ago. The crossing referred to on page 5 of the exhibit is the crossing of the 24-inch main line leading from Fritch up to Station No. 2. The same conditions exist at this point on the Canadian River crossing as exist on the 24-inch line leading to Moore County and there are additional reasons for providing
788 stability at this point over those pertaining to the 24-inch Moore County line, in that this line carries all

the gas which leaves Fritch station for the Chicago area. It is on the main line and if that crossing is out the whole system is out.

Passing to page 8, I note an item of 15,600 feet of 12-inch line at the Arkansas River, at a time not later than 1943. I saw this crossing upon both inspections. The river at this point has a wide flange, subject to overflow, and the river crossing there should be extended back safely out of the overflow territory. The banks on this stream, at the location of the crossing, are caving and it has shifting sand bars. I think this work should be done, and I think, further, that if between now and 1943 there is another bad flood on the river, the work proposed there will be done prior to the date for which it has been estimated.

On the same page is an item which occurs in several places in Mr. Strong's exhibit, that is, the installation of cathodic protection. That has something to do with electricity and corrosion as a result of the electricity, and is an electric method for the mitigation of corrosion. I think it highly desirable to install cathodic protection for this pipe line. There are locations along this line where the protective coating has been penetrated and where corrosion has begun. A line constructed as this line has been, with a high grade of protective coating, is the type to which cathodic protection can be economically applied. If some means be not taken to check corrosion, large percentages of pipe will become pitted, to the extent that replacement will be necessary. The installation of units for cathodic protection at the proper points along the line, where the indications are that corrosion will become severe, will very materially curtail the rate at which pipe will need to be removed and replaced in this system. It is the cheapest form of protection that can be obtained for pipelines of this character. It has not been necessary in the past to install this protection because the coating has functioned, except in the instances referred to, but there are already a few locations at which the protective coating has begun to show failure. There will be more of them.

There is also quite an item on page 8 entitled "Install Two 16-Inch Lines, Beaver River." Beaver River is in a wide valley. About three years or so ago, during a severe flood, it just simply went wild, changed its course in some locations as much as a mile, took out some stream crossings of some other pipeline companies, and is apt to do the same again. The crossing of this system's line on the south side has headers up fairly close to the south bank of the river. The river crossing lines, when I inspected them in the spring, had had some work done on them, but a new channel was working upstream toward those lines. That was in the spring of 1939. Some additional protection against interruption at this stream is necessary, and this is an economical method of achieving that result.

On page 9 of the same exhibit there is provision for installing river clamps and reinforcement straps at the Republican River.

The Republican River is in a wide valley and the stream flow at one time was confined to a narrow portion of the valley by good levees, but severe floods a few years ago took out large portions of those levees, and they have not been replaced. The result is that there are large diameter
lines in a valley that is subject to overflow, and any
789 large diameter lines that are apt to become submerged
must be stiffened up at the joints to prevent rupture
of the joints and must be weighted down to prevent their floating out. In my judgment this is a necessary precaution.

On page 10 are references to various types of replacements at river crossings, namely, Walnut Creek, Nodaway River, South River, Box Elder Creek, Squaw Creek and other creeks. I have seen most of these crossings but don't think I have seen every one of them. For the replacement work on these streams I think that it is a wise precaution to keep those wide diameter lines across these comparatively small streams well down below stream bottom. I think it is essential to do that. I think, further, that since corrosion does generally take place at the approaches to streams, it is advisable, on a line of this size, where the amount of gas that can be packed into the line to take care of interruptions is small compared with the market demands, that stream crossings should be investigated and relaid at periodic intervals to insure continuity of service. I have seen Walnut Creek, Middle Nodaway and Squaw Creek, but I am not sure whether or not I saw the others, although I am definite about those I have named. What I have said here applies to any of the streams of that character across which this pipeline runs. At periodic intervals these crossings should be reworked, and the way to re-work them, since you must maintain service, is not to repair the old, but to take the old out and lay new line.

Mr. Strong, in his Exhibit 105 and in his testimony concerning that exhibit, has made provision for future replacements of approximately six per cent of the pipe line on the main system and three per cent on the gathering system. We have no history of a pipe line with the kind of protection which has been used on this line, covering a period long enough to give any conclusive data as to the reasonableness of that estimate of pipe replacement. The estimates which have been made as to the amount of pipe to be replaced on this system are based upon the expectation that the protective coating will, in large measure, continue to afford protection in the future as it has for the eight or nine years of past life. If the company is disappointed in that, then the amount of pipe replacement which will be required will be several times this six per cent for the main transmission lines and three per cent for the gathering lines. Pipe replacement will then begin to approach that experienced by other companies, because when this protective coating is gone, then this pipe is subject to the same effects of soil conditions as would be a pipe which had been protected with something inferior to begin with, and from that time on the pitting rate will be the same as if it were bare pipe. Then, unless this coating continues to function as Mr. Strong in his study has assumed it will, my view is that his estimates are far below the actual replacements that will be required. Assuming that this coating does continue to function as Mr. Strong assumed in making up these figures, I think his estimates are reasonable. They are conservative. I think he has allowed for this purpose less than will be required, rather than more, as the future will develop. (Motion to strike above testimony denied.)

In the testimony of W. H. Davidson and in his Exhibit 97, provision is made for future investments for the renewal of red wood cooling towers in Stations 2 to 10, inclusive, and Mr. Powers testified to a similar replacement necessity in connection with the cooling towers at the Fritch
station. I am certain these installations will be required
790 Because these towers are wooden structures, bolted
together. They are high, and they are subject to shaking and to being stressed by wind and snow loads. While red wood itself is a material of long life, yet the joints in the structures become loosened and weakened, and the

method of repairing those conditions is to take them down and put up new ones. It is inevitable that they will be replaced. I think the time he has set out in this exhibit is a reasonable expectation as to the period in which that will be done. I have seen work in progress at several of the stations, repair work, and from my knowledge of structures of that sort I know that they have to be repaired and work must be done on them practically every year.

Referring to another item, shown in line 24 at page 2 of W. H. Davidson's exhibit, providing for the construction and equipping of a central machine shop for heavy machining in connection with the operations of the compressor stations, I think this item is essential. They have ten compressor stations. As these engines grow older, and in the near immediate future, the amount of work required to be done to maintain them in operation is going to show a substantial increase. The repair work to be done requires equipment that is not found in very many machine shops. To get the work done expeditiously, economically and properly, they need a shop of their own of that sort. Other concerns have found it necessary, and I would think that they should certainly have one by the time predicted, if not before.

Pipe lines generally provide these facilities because of the necessity of having their work done when the occasion arises to do it. If the repair of machinery is needed to get an engine into operation tomorrow or the next day, having some machine shop available to do it a week from some Thursday will not help you out much.

The commercial type of machine shop is not designed for this particular class of work. There may be some railway shops that would be equipped with machines for handling railway locomotives, and some manufacturing shops with equipment designed for the manufacture of their particular product; but no shops that I know of have the equipment designed for handling the specific character of material that this company has. Ordinarily, machine shops are not found in a county seat town, and even if they exist, my experience has been, when I was with the Ohio Fuel Supply Company, that we needed a shop of our own, and we built one practically right in the middle of a manufacturing district, in the town where some of our engines were manufactured. This was done for reasons of economy and for reasons of continuity of operation. By that I mean the saving of time to get a part which goes out of commission back into service.

Without referring to any other particular items shown in the exhibits introduced in connection with the testimony of the three witnesses, Strong, W. H. Davidson, and Powers, I have made a careful study of the schedules of additions to plant, replacement of plant equipment and maintenance, as well as operating charges, set forth in these exhibits and concerning which they have testified. In my judgment the sum of money set forth in these schedules of additions to plant, replacement of plant equipment, and the items of maintenance and operating costs are reasonable, and in the future course of events will actually be expended by these pipe lines in connection with their operation. I think in the
preparation of those schedules that allowances have
791 been made for various expenditures which could be
foreseen; but I do know that there are many contingencies arising that can't be foreseen and that some of these contingencies entail the expenditure of tremendous sums of money, and that no allowance has been made for that in the preparation of these exhibits. It is my judgment that the companies should have an allowance for contingencies above the amounts which they have estimated, because they estimated only the items which they could definitely foresee. This allowance for unforeseen contingencies should be not less than ten per cent of the maintenance and of additional capital items. (Motion by Commission Counsel and Counsel for Illinois Commerce Commission to strike testimony of Mr. Biddison denied.)

Cross-Examination by Mr. Slaff.

I have never prepared a list of cases in which I testified since going into private practice, but since 1928 I have testified in the Federal court at Fort Worth in the case of the Lone Star Gas Company involving their Fort Worth distribution properties. I have testified before the Railroad Commission of Texas in a number of cases involving both distribution systems and the gate rate for the Lone Star group of properties. I have testified before the Railroad Commission of Texas in the Laredo distribution case. I have testified in the State District Court at Austin, Texas, in the case of the United System, involving the Laredo rate, and in the case of the Lone Star Gas Company involving their gate rate; and in the case of the International Gas Company involving the Wichita Falls rate. I have testified before the New Mexico Commission in regard to the Albuquerque Natural Gas Company. That was a case involving the application of the state law as to pipe lines being common carriers. I testified before an examiner for the Federal Court of the Western District of Arkansas in the case of the Arkansas-Louisiana Gas Company involving the Texarkana, Arkansas, rates, and again in a case for them involving the proposed municipal pipe line for Texarkana, Texas. I testified in the Federal Court in a case with respect to the Community Natural Gas Company's rate for gas involving Royse City, Texas.

Of the cases in which I testified before the Texas Railroad Commission involving distribution plants, there were Wichita Falls, Denton, Sherman, Waco, Fort Worth, and Greenville, Texas, and a dozen or more similar communities which have had cases up before that Commission. I testified before the Oklahoma Commission in a case involving rates at Sapulpa, Oklahoma, in a case involving rates for Avant, Oklahoma, and in cases involving the distribution rates in twenty-six towns of the Community Natural Gas Company, an affiliate of the Lone Star Gas Company. That was in Oklahoma. I testified in the State District Court at Austin in a case involving the Public Service Corporation of Texas, as to their transmission properties and as to distribution properties in Perryton and Canadian. I testified in the District Court at Waco in three cases for Texas Cities Gas Company involving damages as a result of explosion and fire.

I will prepare a list of the cases which I have given to the reporter, as well as any others that I may find in my files, together with a list of the dates of my testimony. This will have to wait, however, until I am back in my office and have access to the information. I will have this information available at the next hearing at which I am present.

792 I was a joint author with Burrell and Overhold of Bulletin No. 120 of the U. S. Bureau of Mines on the extraction of gasoline from natural gas by the absorption process. I believe that was in 1916. About the same time, the same data essentially was presented as a paper before the Natural Gas Association of America. Then I had a paper before a joint meeting of the American Society of Mechanical Engineers and the Natural Gas Division of the American Gas Association at Shreveport about 1930 on some of the economic phases of pipe line design. I had a

paper before the Natural Gas Division of the American Gas Association at Dallas about 1927 on limiting factors for pipe line projects. I had a paper at the Memphis meeting, about 1931, of the Natural Gas Division of the American Gas Association on some of the economics of pipe line design, and I have had some later technical publications of one sort or another. I had a paper at the last meeting of the Natural Gas Division of the American Gas Association at Tulsa this year on the subject of "Fair Rate and Fair Return." The paper I presented at the Dallas meeting dealt with the cost of construction of natural gas pipe lines. This was about the year 1928. Two or three of the gas journals reprinted this paper.

793 R. M. BUSSARD, recalled by defendants, testified as follows:

Direct Examination by Mr. Morgan.

(August 4, 1939.)

When on the stand before, I testified that certain of the detailed studies concerning future costs for additions to plant, replacements of plant equipment, and maintenance and operation would be presented by the various department heads and that other of these figures would be presented by me. I have prepared exhibits showing the future expenditures not accounted for in the various exhibits brought in here by the department heads who have testified.

(At this point counsel handed to the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company; General Expense, Taxes, New Business Expense; R. M. Bussard—Witness", with the request that it be marked for identification as an exhibit. At the direction of the Examiner the reporter marked such document Exhibit 116 for identification.)

I have Exhibit 116 for identification before me. This exhibit relates to the general expense, the taxes, and the new business expense of defendants. There is a detailed sheet on each one of the items for each of the companies, and a combined sheet for the three items I mentioned.

Page 1 of the exhibit relates to the new business expense of the Natural Gas Pipeline Company of America. Page 2 is a summary of taxes to be paid by the two companies, showing a column for each company and a total for the two companies. Both of these pages show the sums already paid out in that same connection down to and through the year 1938. The details of the figures summarized on page 2 for Texoma are shown on page 3, which covers that company's taxes from the years 1932 to 1954, inclusive. The same detail is shown on page 4 for Natural Gas Pipeline Company of America over the same period. On page 5 appears a summary of the general expense of the two companies, and the total or combined general expense. The supporting detail for Texoma is shown on page 6 of the exhibit and for the Pipeline Company on page 7 of the exhibit.

Going back to page 1 of the exhibit, the figures opposite the years 1932 to 1938 are the amounts of expenditures for new business that were incurred by the company during the years named and are taken from the books of the Natural Gas Pipeline Company of America. The figures opposite the years 1939 to 1954, inclusive, are our estimates of the future costs of this activity of the Pipeline Company. This department was originally named the new business division but its duties have been extended to include other activities. They merely maintained the name that it was given at the beginning. The estimates for the year 1939 are based upon the amounts of expenditure incurred to date, plus our estimate of the amount that will be incurred during the balance of the year. This estimate of the amount that will be incurred during the remainder of the year is based solely upon the amounts of payroll now being incurred by that department. That is the present payroll
794 at the current rates, with a slight allowance for miscellaneous materials and supplies used by the department. This is the normal allowance for such items. The advance in the first column as between the years 1938 and 1939 comes about by a non-recurring item of expense which was paid in 1939. The reduction which is shown in the second column between the years 1938 and 1939 results from an adjustment of salary expense for a part-time employee of that department. The figures projected from 1940 forward are based on the present status of that payroll.

The explanation of the circumstance that in the second column no amount is set out for the years 1952, '53 and '54 is that we do not expect to have sufficient gas to meet the full market requirements of the companies during those years. Inasmuch as this part-time employee is concerned with the marketing activities of the company, we felt that we would not be justified in continuing his cost through the years of declining sales volume and, therefore, we have eliminated that particular item of expense in the years named. In other words, the business will be getting less at the point when we are no longer in position to have gas with which to load our lines, and his services will no longer be required.

Turning to page 2, which is a summary of the taxes, and the detailed breakdown of the different taxes to which these companies are subjected, I point out that these taxes are based upon the present tax liabilities or present statutes levying taxes of the various kinds to which these companies are subjected, as applied to the personnel, the property, and the volume of gas to be produced and sold by the company as set forth in the studies which have already been introduced at this hearing. We have made no provision for any increase in the rates of taxes or any increase of levies of taxes, but have adjusted the computations to meet the existing statutes governing the levying of taxes.

Texoma Natural Gas Company is now subject to seven types of direct taxes, namely, ad valorem taxes, franchise taxes, gross receipts tax, unemployment tax (both federal and state), capital stock tax, old age benefit tax, and income taxes (both state and federal). The two items, seven and eight, are not projected in the future for the reason that the federal gasoline production tax is no longer in force, and the automobile license tax was simply an accounting matter in the year 1932. This latter cost is now reflected in the departmental expense rather than in the tax expense. It is a tax incident to the operation of the automotive facilities.

Texoma's item of franchise taxes relates primarily to a tax imposed by the State of Texas. In the years 1932 to 1937, inclusive, the company paid a very nominal tax on the basis that the principal amount of its business was interstate, and hence not applicable to the Texas tax. But the State of Texas now is engaged in litigation with some corporations relating to the amount of franchise taxes which these corporations are paying. As a consequence, we paid a higher franchise tax in the year 1938, taking into consideration some of the points raised by the State.

795 The fact that the tax declined after 1938 is principally a reflection of the shifting between the gas and gasoline revenues, inasmuch as these revenues have an effect upon the franchise tax. If the State of Texas succeeds in its

litigation, our franchise tax will be materially increased above the amount of $1,663.90 set forth in the schedule. They will also claim back taxes for those years when the nominal amounts of $93.50, $71.00, and so on, were paid. The $1200 in 1939 and thereafter is the company's interpretation of its liability. That amount is less than the State claims we should pay. On page 3 the caption "Total 1939-1954" should read "Average". This is a typographical error.

There is one tax to which Texoma is subject and to which Natural Gas Pipeline Company is not subject. That is the tax set out in Line 3 and is a production tax levied by the State of Texas, based on the value of the gas at the wellhead.

Questions by the Examiner.

The history of Item 9 on page 3 and the reason why that item starts up in 1940 and terminates in 1946 is as follows:

When we take into consideration the estimated income of the Texoma Company and the deductions which will be allowed under the existing income tax law, we find that Texoma is subject to an income tax, and then we apply the rate in the existing law to the amount of the taxable income. Texoma is a non-profit corporation. (Company Counsel made the following statement: Its business is to produce gas and deliver it to Natural Gas Pipeline Company at cost. Cost includes all expenditures, including bond retirements from year to year. The reason the tax is payable in those years and not other years is due to the rate at which the bond retirements are to be stepped up in the year 1940. All of the bonds will be retired by the end of 1946 according to the present maturities.)

Direct Examination by Mr. Morgan Resumed.

On page 4 of this exhibit I have enumerated the different taxes to which Natural Gas Pipeline Company is subject or has been subject, and have shown the amounts of taxes that have been paid down to and through the year 1938, just as I did in the case of Texoma on page 3 of the exhibit. These taxes have been projected for the years 1939 to 1954, inclusive, on the basis of the existing tax laws.

The Natural Gas Pipeline Company is subject to nine types of taxes at this time, if we distinguish excess profits from federal income tax. In other words, there are nine types if we say there is one type of tax which is called income tax and another type of tax which is called excess profits tax. Actually, they are both income taxes. Texoma does not have a pipeline permit tax, such as is shown on Line 3 of page 4. Texoma has not been paying any use taxes, as shown on Line 5. It is subject to such a tax in the State of Oklahoma, but has not had to pay any tax because its purchases for use in the State have not been sufficient to create a tax. The State of Oklahoma permits a $100 per month exemption.

On Line 8 is shown an item "Mortgage Registration". That had to do with the registration of a mortgage in the past and is not recurring. That is true also of the automobile licenses and miscellaneous taxes, which are subject to the same explanation as that made in the case of the same items heretofore paid by Texoma. The item shown in Line 11 as "Excise Profits Tax" is not projected for the reason that we do not anticipate that Natural Gas Pipeline Company will pay any excess profits tax in the future. The undistributed profits tax shown in Line 12 is no longer effective.

796 *Cross-Examination Interposed by Mr. Slaff.*

The federal and state income tax shown for Natural Gas Pipeline Company on page 4 is the result of estimated income less the allowable deductions under the existing revenue acts. The remaining income, which is called "Net Taxable Income", has been multiplied by the tax rate in the present federal revenue act, and also by the average rate that we have been paying in the various states. The explanation for the increase in 1947 and for five years thereafter of the federal and state income tax to about double what it is annually in the period 1939 through 1946 is in line with my explanation for the Texoma Company, where we show no income tax after 1946. This particular item of bond retirement under the contract between the two companies enters into the gas bill paid by the Pipeline Company, and when repayment to Texoma for that expense is no longer included in the gas bill, there will be no further expense imposed on the Pipeline Company for that item; hence, the taxable income will have an increase commensurate with the decrease in the expense, resulting in the increased tax after applying the effective rates.

Direct Examination by Mr. Morgan Resumed.

The total tax liability for the period 1932 to 1954, inclusive, aggregates $31,861,859.44 for the two companies.

The general expenses shown on page 5 are those overhead expenses of the company in connection with the operation of the Chicago office. They cover the payroll in the Chicago office, the rent, the materials and the supplies, traveling expense, telephone expense, telegraph expense, and other items that we incur in our Chicago office operations. The general direction of both companies is handled from the Chicago office. No part of the expense of the Amarillo office is included here. That expense is in addition to that of the Chicago office. In general, Natural Gas Pipeline Company of America pays all of the costs of the Chicago office, and then, while there are some expenses which it stands alone, the bulk of the expenditure is prorated partially to the Texoma Natural Gas Company. Twenty per cent of the expenditure is prorated to the Texoma Natural Gas Company. That determination was made before I had anything to do with it. I do not know why it was done that way. It was made by the management or by executive direction. When I made the estimate of expenses for these two companies, I simply took the accounting procedure that was in effect. I do not know why that percentage was chosen.

The first column of figures on page 5 has to do with the general expense which has been assigned and will be assigned to Texoma Natural Gas Company. The second column has to do with the expense which has been assigned and will be assigned to the Natural Gas Pipeline Company of America. The third column is the total.

The salaries projected in the first three classifications of general expense shown on page 6 are based upon the now existing amount of payroll costs without giving any reflection to any increase in wages or salaries to the individual man, and without reflecting any increase in the number of personnel in the Chicago office staff. It merely provides for the same personnel now employed in the Chicago office at the same salaries, and makes no provisions for increases.

797 The item "Office Supplies and Expense" is projected at slightly higher than the 1936-1938 average, but I note that there has been a steady increase in that item of expense through this three-year period. We feel that $1,450

is a very nominal allowance for this expense, particularly when we take into consideration the many additional reports which we have to make now but did not have to make a number of years ago. The unemployment tax, the old-age benefits tax, and other such items, have caused us a considerably increased amount of clerical work, and necessarily then we have to provide stationery, pencils, and other supplies for that type of work, and the stationery and printing, which is Line 5, is made up of that same type of expense and will require at least as much expenditure as we have made in the past three years. As a matter of fact, it has been projected at $23 less than the average for the last three years.

The item of "Legal Expense" may be divided into three parts. I will call the first part the company payroll. The company payroll part has been projected at exactly the level that now exists, without reflecting any increase in the payroll rate of the existing personnel and without including any additional personnel on the legal staff. As between the years 1938 and 1939 there is a difference in the number employed in the legal department. An additional man has been employed in the legal department in 1939 as compared to 1938, and that has been reflected in our estimate of payroll costs. The second part of the legal expense is created by the payment of the retainer fees of outside legal talent, and we have included in our estimated expenses the normal amount that we pay to this outside counsel. This refers to litigation in Texas and other states where the company is doing business. When I say normal, I have in mind the amounts that are reflected on the books of the Texoma Company, and I have studied the past payments that have been reflected on Texoma's books. The items of litigation are not the only legal costs incurred by Texoma. I meant that this item covers any character of legal service that is not performed by the legal staff of attorneys. The third item of expense under this caption is miscellaneous, for the various loose-leaf services, and other items which the legal department finds necessary in its business. This is in addition to law books, which are not included in the item of "Legal Expense." That voids any duplication with this office expenditure and equipment that we had the other day.

The item "Injuries and Damages" shown in Line 7 is just another way of saying workmen's compensation insurance required by the several states, and we have projected the particular item of expense under the existing law without reflecting any increase in the rate. The fact that the item increases from year to year is solely due to the fact that there is an increasing amount of payroll expense from year to year as more men are needed. The rates at which compensation insurance is procured depend upon the payroll directly, and the latter is an important element in the amount of workmen's compensation insurance which we have to procure.

The item of "Insurance" is classified in two parts, roughly; the insurance which relates to the property and the insurance that relates to the payroll. We have projected our payroll rates and our property rates upon the basis of the existing statutes relating to these particular insurance items. We have had to show some increase in expense because we have some additional property which will be constructed in the future, and we also have additional payroll as we hire employees to take care of this additional property. My reference to statutes means
798 the statutes in Texas and to that type of insurance the
rates for which are affected. Rates for ordinary fire insurance, and insurance of that type, are fixed by contract. In this estimate the contract rates projected are those which prevail at the present time.

The item "Rent" shown in column 9 refers to the lease between the Natural Gas Pipeline Company and the operators of the building in which the company offices in Chicago are located. The costs shown here are exactly in conformity to the existing lease and do not reflect any increases above the rates stipulated in this lease. They do not provide for any additional expense, and the space which we have to provide from time to time for certain matters, such as we are now providing for the Commission, and the expense thereof, is not included in this item of rent.

The item "Miscellaneous" is more or less of a catch-all account, in that the expenses which are not readily allocated to other accounts are included in "Miscellaneous". Our projection of miscellaneous expense is slightly higher than the 1936-1938 average, but I would call your attention to the fact that we have incurred practically $7,000 of expense each year within this three-year period which we used as an average. That is a rather indefinite class of expenditure. I have no specific way of determining the exact amount. It has been materially higher than $7,000 and has been somewhat lower than that amount.

The item "Traveling" covers the expense accounts of the executive staff and the clerical staff and the engineering staff when they are out of the Chicago office on the company's business. We have projected this expense at a few dollars less than the 1936-1938 average.

Going to the next item, "Telephone and Telegraph" covers the expenses we incur in connection with the services provided by the Western Union Telegraph and similar service. We project this expense at $15 a month more than the three-year average. This projection is less than the 1936 expense and a little more than the 1938 expense.

Drafting expense is incurred in connection with maps and plats and charts, and other items. I have shown an estimated cost of $10 more than the three-year average. This last item is increased by $10, which is a very nominal allowance and it would provide for very little paper or a very small tool that we might have to have in that time in that activity. I have no specific reason for thinking there will be an increase in expense.

The auto expense covers the cars assigned to the executive staff and has been projected at only $6 above the three-year average.

"Engineering and Research" is an item which is quite erratic and occurs from time to time, but we have projected it at only $8 in excess of the three-year average.

The item "Employees' Retirement Plan" relates to what is in effect a contract between the company and its employees. There is a life insurance company, which handles the funds accumulated under the contract. This contract between the company and the employees provides for pensions for these employees, and we have reflected the cost here in accordance with the provisions of the pension plan.

799 The increase between 1938 and 1939 comes about due to the fact that the plan was put in effect late in the year 1938. Therefore, 1939 is the first full year of cost on this item. The decrease in this item as we go from 1941 through 1942 and 1943 comes about because of the operation of the contract, under which by 1943 the company no longer has any obligation to pay to the insurance company any sums representing the cost of insurance covering past service as of the time the contract went into effect. All of these charges are in conformity with the contract.

Questions by the Examiner.

In Item 12, "Telephone and Telegraph", there is no Western Union lease mixed in that item. The lease expense in relation to Western Union is not in the general expense account of Telephone and Telegraph. My understanding of that particular item about which you ask is that it is located in the telephone department expense. There is no duplication involved there.

Among the various types of insurance which the company carries is a type called group insurance, which is a life insurance and a disability insurance, and the rates in the insurance contract are applied to the payroll of the company.

Direct Examination by Mr. Morgan Resumed.

Page 7 of the exhibit relates to the general expense of the Natural Gas Pipeline Company and is, in effect, the same kind of a page as page 6, relating to the Texoma Company. We followed the same procedure in determining the amounts shown along the respective lines on page 7 as we followed in determining the amounts shown on page 6.

(Thereupon EXHIBIT 116 was offered and received in evidence over the objection of counsel for complainant and the Commission who at the same time moved to strike this exhibit and all exhibits of a similar character, and the witness' testimony in connection with such exhibits. The objection and motion were overruled and the counsels for both Commissions were granted exceptions.)

Going back to Exhibit 116, there is no duplication between the item of "Legal Expense" as shown on line 6 on pages 6 and 7, and that shown in the exhibit offered through Mr. Campbell concerning regulatory expense. The legal expense, outside of the regular staff, connected with this case is not included in line 6 on pages 6 and 7 of Exhibit 116. This expense is included in the regulatory expense.

I have prepared a consolidation of the amounts to be expended, as determined by the economic study which others and I have conducted concerning the future operations of these two companies, which have been offered in evidence by the various witnesses here during these hearings.

(At this point counsel for defendants handed the reporter a document captioned "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Summary of Additional Capital Expenditures and Operation and Maintenance", with a request that the Examiner cause it to be marked as an exhibit. Thereupon, at the direction of the Examiner, the document was marked Exhibit 117 for identification.)

800 Exhibit 117 shows the consolidated figures to which I referred in my testimony a moment ago. The exhibit is divided into two general parts, one relating to the capital expenditures and items incident thereto and the other part relating to the question and maintenance of the companies.

On page 1 of the exhibit we find the consolidation of the capital expenditures, the book cost of the property retired, and the salvage items of the combined companies. At the bottom of this page there is the word "Note" and following that an asterisk, after which the language "Includes 1938 carry-over as follows," and then some details. The explanation of this note is that certain construction work which had been started in 1938 was not complete as of the first of 1939, or the charges therefor had not come onto the books at that time. The work was finished during 1939, and the cost of completing the work was called the 1938 carry-over, which is a term which we use to indicate the fact that the work was incomplete as of the first of the year.

The department heads were requested to omit from their estimates any work incomplete as of January 1, 1939. Their estimates covered only work that was commenced on or after the first of January, 1939. In order to give a complete picture of the property requirements of the two companies, it was necessary that we bring in the expenditures made during 1939 for those items which were in progress at the beginning of the year; such items not being in operating department statement. The amounts shown here have come from the books of the company and are not estimates.

Page 2 of the exhibit is a summary of the capital expenditures of the Natural Gas Pipeline Company. The expenditures are shown by years from 1939 to 1954, inclusive, and are shown by the several operating departments of the company, and also by the automotive and furniture and fixture items. The first column is captioned "Exhibit No." and underneath that caption are the figures 97, 105, 112, 115, and 113. These figures refer to the exhibits that were offered by the various department heads, and they are placed here as a matter of identification. We thought this would assist anyone in understanding from whence came these figures. They occur through successive pages of the exhibit, and the same explanation is applicable to that caption and the figures underlying it wherever it occurs in the exhibit.

Page 3 of the exhibit is a summary of the book cost of property retired incident to the construction work of the Pipeline Company. The information is given by years and also by departments.

Page 4 of the exhibit is a summary of the items called salvage, which are accomplished in connection with the additional capital expenditures referred to previously. This sheet relates to the Natural Gas Pipeline Company. The figures are shown by years and by departments.

Sheet 5 of the exhibit is a summary of the capital expenditures of Texoma Natural Gas Company, and here again we have shown the figures by years and by departments. We consider the automotive and furniture and fixture items just as if they were departments within themselves.

801 Page 6 of the exhibit is a summary of the book cost of the Texoma property retired in connection with its additional capital expenditures. The figures are shown by years and by departments.

Sheet 7 relates to salvage incident to additional capital expenditures of Texoma, which we show by years and by departments.

Page 8 of this exhibit is a combined statement of the Natural Gas Pipeline Company and the Texoma Natural Gas Company, and is a summary of the operation and maintenance expenses which have been presented in several exhibits offered by the various operating heads, with the exception of one item. That one item is gas purchased from Colorado Interstate Gas Company. That is the first line of figures across the top of Page 8. These figures cover the cost of gas purchased by Natural Gas Pipeline Company from Colorado Interstate Gas Company, constituting one-fourth of the pipeline's requirements. The figures underlying the caption "1932" and successively through the year 1938 show the amounts of expenditure actually made during those years, and are taken from the books of the company. The figures underneath the captions "1939," "1940," and so on through the year 1954 relate to the costs which will be met in the future for the purchase of gas from Colorado Interstate. The rates are those now in effect, and the volumes are the results of the estimates presented by Mr. Kesinger. The prices are fixed by the existing contract.

Page 9 of the exhibit is a summary of the operation and maintenance expense of Texoma Natural Gas Company. These items have been presented in various exhibits that were brought in by the operating personnel, and we show the figures here by year and by operating facilities. We also show the figures for regulatory expense, taxes and general expense.

Page 10 of the exhibit is a summary of the operation and maintenance expense of Natural Gas Pipeline Company. Except for the item of purchased gas, these expenses have been presented in previous exhibits and are merely a consolidation and compilation of those figures.

The caption "Completion Cost of Work in Progress January 1, 1939, None" referred to in a note at the bottom of page 4 means that there is no salvage occurring in the year 1939 for the work that was in progress as of the first of the year. On page 2, the last column, the first figure under "Total 1939-1954" is $1,055,990.

(At this point EXHIBIT 117 was offered and received in evidence over the objection of counsel for both Commissions who moved to strike the exhibit and the witness' testimony in connection therewith. The objections and motion were overruled and the exhibit was received in evidence. The Examiner allowed counsel for both Commissions exceptions.)

(Motion by Commission Counsel and Counsel for Illinois Commerce Commission to strike portions of Exhibit 98 denied.)

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802 G. M. DAVIDSON, recalled by defendants, testified as follows:

Direct Examination by Mr. Hedrick.

(August 28, 1939.)

My name is G. M. Davidson. I am the same G. M. Davidson who testified in this case at Chicago on August 3. Supplementing my testimony as to qualifications and experience, particularly with reference to the natural gasoline business, I spent twelve years directly in that business prior to joining the defendants. In the last four or five years of that twelve years, I was general superintendent of what is now Cities Service Oil Company, which had extensive natural gasoline plant operations. Since joining defendants, I have been responsible in an executive capacity for the operation of Texoma's Natural Gasoline Plant. I have been largely responsible for all negotiations in the sale of the product from this plant. I have kept informed during the past several years as to the going prices on the market of natural gasoline. I have prepared for presentation in this case information as to the prices which have been paid in the past for the purchase of natural gasoline. I am familiar with the revenues which Texoma has received for its gasoline and am acquainted with the places at which it has marketed its natural gasoline. I have an opinion as to the prospects for future marketing of that product. I am acquainted with the uses to which natural gasoline is put. This product is an extremely volatile gasoline. Most natural gas, whether produced with oil or as a dry gas, contains certain constituents which can be separated and liquefied, and these constituents are called natural gasoline. Natural gas, produced with crude oil, called casinghead gas, may contain from a fraction of a gallon up to twelve gallons of natural gasoline per thousand cubic feet. Dry natural gas generally contains about one-third of a gallon per thousand cubic feet. The average natural gasoline plant operating in the oil field, called a casinghead plant, will recover about two gallons per thousand cubic feet. The gas which is processed or handled at the Fritch plant is a dry gas. Normally the casinghead plants are operating on gas which is produced strictly with the oil with reasonable gas-oil rates. In the Panhandle there is a good deal of gas being produced from the stratas above the oil, not directly associated with the oil, but produced in the same wells as oil. This is called casinghead gas in the Panhandle. The gasoline which we manufacture is manufactured from a dry natural gas, and is the same gas which in turn goes into the pipeline of defendants.

In 1938 the natural gasoline production of the country was 5,800,000 gallons a day on the average. About 60 percent of this was produced in the Mid-Continent.

Natural gasoline is incorporated into motor fuel, and of the national motor fuel sold in the country in 1938, natural gasoline contributed 7.2 percent. Most of the natural gasoline produced is produced at casinghead plants, that is, plants processing gas associated with oil production. There is a very close relationship between the production of crude oil and the production of natural gasoline. That is to say, as the production of crude oil goes up or down, the quantity of natural gasoline produced in the country goes up or down. The gasoline plant operator contracts with an oil producer to treat his gas. They perform a service to 803 the oil producer in collecting the gas, and in redistributing the residue back to the leases for fuel purposes. The oil producer depends upon this service and he cannot afford to have many interruptions because it would affect his oil production. The quality of the fuel would change, and his apparatus, pumping engines, etc. would not be readily accommodated to the raw casinghead gas, or gas not processed for the removal of the natural gasoline, and he would suffer some loss in oil production. He is not willing to see many interruptions in the gasoline plant.

There is another factor contributing toward the continuous operation of the gasoline plant. That is the whole efficiency of these plants depends upon their continuity of operation. They cannot be interrupted at every price fluctuation of natural gasoline, because it takes time to get all of the distillation and fractionating equipment readjusted. Also, the gasoline plant operator cannot shut down because he would lose his experienced help and also his regular channels of market outlet. For those reasons, natural gasoline production is very closely related to the production of crude oil, and this relationship will hold regardless of price fluctuations.

In most oil production, though less true in the older fields, any field of recent origin will probably have a natural gasoline plant associated some place in the field with the oil production.

Natural gasoline can be produced by a number of processes. They are dependent upon pressure and temperatures. The larger number of plants are of the oil absorption type.

Going back to the relationship between the production of natural gasoline and crude oil, in the Panhandle field, and in other large gas fields, there is a relationship that exists between the production of natural gas and the production or manufacture of natural gasoline, because most of the dry natural gas produced in the country is processed for natural gasoline extraction. The carbon black plants in the Panhandle field, for instance, under the laws of Texas, first process the gas for the production of natural gasoline before burning the gas in the manufacture of carbon black.

The only market for practical purposes for natural gasoline is to refiners for blending with their gasoline produced from crude oil, so that all natural gasoline finds its outlet through the motor fuel market. It can not be used in its raw state as a motor fuel. The refiners of motor fuel use natural gasoline to improve its volatility and to increase its octane number. This use, however, has been gradually decreasing in recent years. There still remains a seasonable demand by refiners for natural gasoline, particularly in the fall months, but even this demand is decreasing. I know of no other market for natural gasoline, other than the use by refiners.

By the term "volatility," I mean an evaporating characteristic of the liquid. Ether has a low boiling point and a high volatility. Mercury would have a high boiling point and a very low volatility. Gasoline is composed of a number of hydro-carbons, all of which have different boiling
804 points. However, the relation of volatility still holds
by reason of more or less lighter fractions in the gasoline. Volatility can be gauged by distillation in an apparatus and procedure prescribed by the American Society of Testing Materials, and it can be gauged by its vapor pressure. Vapor pressure is a gauge of the total volatility of the product.

Octane number of the gasoline is a relative figure indicating its tendency not to knock when used in an engine. This octane number is obtained by operating a laboratory engine under prescribed conditions, with octane, a pure hydro-carbon, having a number called the octane number 100. All other fuels are referred to this octane rating, and depend upon the intensity of knock in this particular engine.

Many of the refiners are forced to use tetra-ethyl lead in their gasoline. However, they would like to avoid the use of this compound as it is extremely expensive. Natural gasoline having a high volatility and a high octane number is used by the refiner to increase the volatility and octane number of the products of his refinery. The necessity for the use of natural gasoline, however, is decreasing, as I have already stated.

Natural gasoline is quoted at two base points. It is quoted on a North Texas basis, and on what is called a Group 3 basis. North Texas are the quotations applying to all gasoline produced in New Mexico, Texas and Louisiana. Natural gasoline produced in Group 3 would include all that produced in Oklahoma, Kansas and Arkansas. The freight charges on a shipment of natural gasoline will be such that the gasoline produced in each of these areas will have its market outlet. I mean by that, that North Texas cannot economically ship to the Chicago market in competition with natural gasoline being shipped from Group 3. I want to make the point that it is obvious that the freight rate for the North Texas Group may be different for gasoline shipped from the Panhandle to the Gulf Coast than from the Gulf Coast fields themselves. There is a difference in the freight rate within the area, but it would cost more to ship natural gasoline from the North Texas area than it would from the Group 3 area to Chicago. This term "Group 3" was developed between the railroads and the oil industry. The only groups that we have to deal with in the sale of gasoline from our plant are Group 3 and North Texas. I can't answer the question as to what is Group 1 and Group 2; I have never heard of them; I don't believe that is in the Mid-Continent area, or I would have knowledge of it.

Natural gasoline prices are quoted in Platt's Oilgram daily. Those prices are based on natural gasoline of a specification known as Grade 26-70. I should say that these quotations are based on spot shipments for the day. I mean by that, all sales that were made outside of contracts existing between, say, a natural gasoline manufacturer, his marketer, and the refinery. There are a number of different grades of natural gasoline. All of them are referred to this one grade which is quoted, with a percentage differential fixed by agreement between the buyer and the seller and based on the quoted price for this grade 26-70. Grade
805 26-70 specifies a grade of natural gasoline which has a
vapor pressure of 26 pounds at 100 degrees Fahrenheit and a minimum distillation of at least 70 percent at 140 degrees Fahrenheit under the American Society of Testing Materials standards for distillation.

Ordinarily natural gasoline is shipped in special tank cars, equipped with an insulated jacket on them and with unusually large expansion domes on the tops of the cars. Some gasoline is shipped by pipeline, some as natural gasoline and some is put into the crude oil for transportation to the refineries and later distilled along with the crude oil distillation. The freight charges are paid by the buyer. The larger producers maintain their own sales organization and own their own tank cars. The smaller producers use the services of marketing companies who supply these tank cars, and find a buyer for the product. Generally, the natural gasoline manufacturer pays from ⅛ to ¼ of a cent per gallon, as a marketing charge, and in addition he is charged with outage and freight on outage and freight equalization, if any. In other words, if the price of natural gasoline is 3 cents, there would be a deduction from that price of this marketing charge, which ranges from ⅛ to ¼ cent per gallon. That is in the case of a small producer that is using a marketing agency; I was also speaking of an integrated company where the charge is probably interdepartmental and of no consequence.

We do not have a marketing organization, but deal through outside marketers. At the present time Texoma has two marketing organizations: Phillips Petroleum Company and the Columbia Gasoline Company.

By "outage" is meant the volumetric loss of the natural gasoline in transit. In spite of the insulated tank car, an outage percent occurs because of the increase in temperature while the car is in transit, and also because it is necessary to reduce the pressure in the car at destination by venting the car before it can be gauged. An average tank car holds 8100 gallons. The outage will probably average 50 gallons a car for the year around. In the summer, it may get up to 5 percent, or 400 gallons. The 50 gallons is a very rough average. It would range considerably less than that up to about 400.

"Freight on outage" is occasioned because the refiner or the buyer is paying the freight. He is charged freight by the railroad on the basis of the tank car capacity. If the car holds 8100 gallons he will pay on that basis. If he receives but 8000 gallons, there will be an outage of 100 gallons for which he will charge the natural gasoline manufacturer the freight on that volume loss.

"Freight equalization" is brought about when the normal outlet for the gasoline being shipped, say from North Texas to Gulf ports is closed. That is, the marketer cannot find a market in the normal competitive area for that group. Now if the marketer can find a market, say in Chicago, for his gasoline produced in Texas, then the gasoline manufacturer will absorb the difference in freight between Group 3 to

Chicago and North Texas to Chicago. Thus, in addition to the marketing charge of one-eighth to one-quarter cent per gallon, the manufacturer must stand or pay for the outage, freight on outage, and freight equalization, if any.

806 The reason for the decreasing necessity for natural gasoline in the refining of motor fuel is that in previous years natural gasoline was an absolute necessity for a refiner if he was selling a competitive grade of motor fuel. The improvements made in refining technique are so marked that there has been a decreasing necessity on the part of the refiner for the use of natural gasoline, with a consequent reduction in the price of natural gasoline. It is true that there is still a seasonable demand for natural gasoline in a few fall months, but I have already stated that such demand is decreasing. Through the remainder of the year the refiner purchases natural gasoline for its merit, but he will not pay any more for that natural gasoline than the cost of manufacturing his finished product. By this I mean, in saying that he will not pay any more for it, to include his purchase price and his own costs in handling natural gasoline.

For instance, a refiner, through all of the improvements which have been made in refining technique, is able to turn out a finished and acceptable competitive motor fuel, and he has another gasoline which he can bring up to the same specification with the use of natural gasoline. He will buy natural gasoline for the improvement of this product, but he will not pay any more for it than what his finished cost would be for the product which he can make with his own facilities. To state it differently, the refiner during the past few years, through increased efficiency and refining technique, is able to manufacture a product which is a substitute for natural gasoline, and he is able therefore to make a motor fuel of at least equal quality to what he formerly made when he purchased natural gasoline as a blending agent, and that motor fuel so manufactured costs him a certain amount of money, and he is not willing to pay more for the natural gasoline, as a blending agent, than it would cost him to manufacture the same quality of motor fuel in his own plant without the aid of natural gasoline.

The improvements in refining technique which have

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reduced the necessity for using natural gasoline as a blending element have to do with the cracking processes recently installed. These include the tail gas recovery plants at the refineries, the reforming plants, the catalytic cracking plants, polymerization and hydrogenation processes, and the general improvements in fractionating at these refineries, besides the improvement which has been made in the quality of the crude being delivered to refineries. These improvements have the effect of enabling the refiner to increase the volatility and the octane number of his products.

The cracking process in general is the destruction of the heavy molecules into lighter ones, and in making a light gasoline from what formerly may have been fuel oil or gas oil, or something of that character.

A tail gas plant is in effect a natural gasoline plant operating on the uncondensed vapors at a refinery. The modern refinery will have the equivalent of a substantial natural gasoline plant operated in connection with its operations. Tail gas simply means what has heretofore been left over which the refiner was formerly not able to use but which he now processes.

807 A reforming plant to some degree is comparable to the cracking plant in that it changes the molecular structure of a liquid from a heavier liquid to a lighter liquid, making an acceptable motor fuel. Within recent years, in addition to the normal cracking processes which were dependent upon elevated pressures and temperatures, a number of processes have been developed which use a catalyst. In the process this catalysis has the effect of accelerating the breaking down of the molecules, and in several of these processes there have been rather remarkable results, particularly on the high octane values.

"Polymerization" process and the hydrogenation process are the reverse of the cracking process, in that they take the lighter molecules and re-combine them in a process which will make a gasoline. Hydrogenation process is quite comparable with the polymerization process in that it converts lighter hydrocarbons to the heavier and makes an acceptable motor fuel.

There has been a remarkable adaptation of all these improvements in refineries in late years. Trade journals such as the Oil and Gas Journal indicate the expenditure of a hundred million dollars already made by refiners for such improvements. I expect that these improvements will be accelerated. I have an opinion as to whether or not the decreased use of natural gasoline in the manufacture of motor fuel will have an effect on the volume of natural gasoline which will be manufactured in the future. Natural gasoline will be produced in the oil fields so long as the natural gasoline man can show a profit on his transaction. The contractual relationship between the natural gasoline manufacturer and the oil producer is such that with a decreasing unit price for natural gasoline the payment to the oil producer for the privilege of extracting the natural gasoline will decrease. Naturally that will contribute towards a larger profit for the natural gasoline manufacturer and he will be able to manufacture natural gasoline down to a very low figure.

In spite of the lower return to the oil producer the service performed by the natural gasoline manufacturer for the oil producer is still conducive to the sale of casinghead gas by the latter. The decreased necessity for the use of natural gasoline will have no effect on the amount of natural gasoline produced from the gas transported by the pipelines. This is true because the natural gas pipeline transmission systems process their gas to improve the efficiency of transmission, as well as because of the profit motive in their operation of natural gasoline plants. For instance, if the price of natural gas were cut down to a point where it was not profitable for a natural gas company to manufacture natural gasoline, it would continue to extract the gasoline, regardless of price, so long as we had a market outlook.

(At this point counsel produced a document, in graph form, entitled "Monthly Average Price of Natural Gasoline and U. S. Motor Fuel", which the Examiner directed the reporter to mark as Exhibit 119 for identification.

Counsel also produced a graph, entitled "Ratio of the Yearly Average Price of Natural Gasoline to the Yearly Average Price of U. S. Motor Fuel", which the Examiner directed the reporter to mark as Exhibit 120 for identification.)

I have prepared a graph showing the prices of natural gasoline in the past and the prices of motor fuel in the past. Exhibit 119 shows the monthly average price of natural gasoline and U. S. motor fuels. The source of this information is indicated on the graph as published

by "National Petroleum News". That is one of the trade journals of the oil industry. It shows an Oklahoma
808 price of motor fuel between January, 1919, and November, 1922. It shows the comparable price of natural gasoline for that period. The North Texas market was indefinite at the time and the point I am trying to bring out by these graphs can be brought out with the relationship of the Oklahoma prices within that period. The graph shows the predominant grades of natural gasoline and motor fuel being traded in since that time based on the North Texas market. For instance, you will note "Grade A-72-78 North Texas, Natural Gasoline, December, 1922, to September, 1924." At that time natural gasoline was being graded on a different system than it is today, but that grade was the predominant product being sold. The same applies to the motor fuel being sold since that time. You will notice the point that I was making, that the octane rating of motor fuels has been increasing and the grades specified in November, 1931, to July, 1934, were made on a 65 octane rating, whereas today the octane rating of the motor fuel being dealt in mostly is 70 to 72.

The types of natural gasoline under the heading "Sources of Information" on the left side refer to the top graph on Exhibit 119 entitled "Natural Gasoline" and the types of gasoline on the right side refer to the lower graph on Exhibit 119 entitled "U. S. Motor Fuel". The horizontal scale in both the upper and lower graphs is a time scale between the years 1919 and 1938, each inclusive. In each year we have 12 divisions for the months of the year and the initial for the month is plotted on the top line of the top graph. For instance, in March, 1919, the price of natural gasoline was 24 cents. If I am reading this correctly, for that same period, motor fuel was selling for about 18 cents per gallon. The vertical scale in both graphs indicates the monthly average price, for natural gasoline on the top scale and for motor fuel on the lower scale. These are prices, in the case of natural gasoline, at the gasoline plant, and in the case of U. S. Motor Fuel at the refinery, without tax or without freight.

It is very obvious that the price tendency has been downward from 1919 to 1938, inclusive. I would like to make one other point with reference to these graphs.

Within each year on this graph we have plotted a small circle which shows the average price prevailing for the year. That is true on the top graph as well as the bottom graph on Exhibit 119. For instance, on natural gasoline in 1919 the average price was approximately 23 cents, and in the same year for motor fuel the average price was 17½ cents per gallon. In the year 1938 the average price of natural gasoline was slightly over 2½ cents per gallon and for motor fuel the average price was slightly less than 5½ cents per gallon. The average price tendency for natural gasoline for the last seven years, as is shown on Exhibit 119, remains the same or has gone up.

Exhibit 120 shows the price relationship that has been existing between natural gasoline and motor fuels. It is expressed as a ratio of the yearly average price of natural gasoline as a numerator and the yearly average price of motor fuel as the denominator. For instance, with a ratio on the vertical scale of one, the price of natural gasoline and the price of motor fuel would be the same. The horizontal scale in this graph covers the same period of years as that for Exhibit 119, and the curve shown is the relation between the circle points in Exhibit 119. I call your attention to the period between 1920 and 1926. There is some variation in this ratio, but you will find that the price of natural gasoline was approximately equal to the price of motor fuel. In
809 that period the refiner had to purchase natural gasoline at a loss to him, because in addition to the purchase price itself the refiner had to pay the transportation and the handling cost at his refinery. Now you will notice that there is a decided increase in tendency to decline in this ratio to the point where for the year 1938 the ratio was less than one-half. In other words, the price of natural gasoline is now less than half the price of motor fuel. If the tendency of this curve continued it would indicate that the value of natural gasoline would soon be zero. However, I do not predict that that is going to occur. There is some price at which these refiners can purchase natural gasoline at some profit to themselves. Prior to the year 1926, the price of natural gasoline exceeded the price of U. S. motor fuel. Since 1926, the price of natural gasoline has been less for each year averaged than U. S. motor fuel. The average year

in question to which I refer is directly above the figures showing the year. It is on the line. There is no significance particularly in the slope of the line itself for the intervening period because the points themselves indicate the average for the year. I simply connected the points with a line. The ratio between natural gasoline and U. S. motor fuel, say in 1929, is shown directly above the figure "1929" and is approximately 97. That represents the relationship between the circles shown under the columns marked "June, 1929", of Exhibit 119 in the natural gasoline charts and the U. S. motor fuel charts. By motor fuel, I mean gasoline sold through service stations.

I obtained the average price for the year for natural gasoline and for motor fuel, shown on Exhibit 119, by computation of the average for each month, and adding these computations together and dividing them by 12. It is a numerical average of the monthly averages and not a weighted average on the basis of the fuel consumed. I believe these exhibits show decidedly that the value of natural gasoline to the refinery is decreasing. I have an opinion or judgment as to what price as a maximum will prevail in the future during the life of this project. My judgment is that natural gasoline will sell at some differential below the price of motor fuel in the future. I have stated that the average price which we can expect the refiner to pay will be that which will be not greater than he can pay on an exchange basis, that is without profit. It may be that in the future he will demand a profit. However, I have not taken that into account. I have used as the basis of my prediction a differential which will be at no profit to the refiner.

I have computed the cost to the average refinery for handling natural gasoline. I know that this cost will be 2.2 cents per gallon. Now the average price of motor fuel in the North Texas field within the period of 1931 to 1938, inclusive, is 4.85 cents per gallon. Deducting the 2.2 cent cost to the refiner for handling I arrive at a price for natural gasoline at the manufacturer's plant of 2.65 cents per gallon. I chose the price of motor fuel over the period from 1931 to 1938 because that is a period when we have had some wide fluctuations in the price of crude oil. It is a period when there has been an abundance of crude oil, which situation prevails today. In fact, there are more crude oil reserves in sight at this time than there ever have been. In 1929 or 1930 there was some 8 or 9 years' supply of crude oil in sight. Today that figure is 15 or 16 years, at the present rate of consumption. I see no apparent reason for the price of motor fuel to increase with this abundance of crude oil. I mean at least during the 16 years of defendants' life.

810 In arriving at the 2.2 cents, I have taken into consideration the freight cost to the refiner in shipping the natural gasoline between the natural gasoline plant and the refinery. I have included the refinery blending losses and the labor involved in handling the tank car, in testing it, and his overhead cost. The difference in price between motor fuel and natural gasoline in 1938 was 2¼ cents per gallon. The price of 2.65 cents, which I have testified to, is substantially the average price of natural gasoline on the North Texas market in 1938, which was 2.63 cents per gallon. Up until the end of July, 1939 the average price was 2.60 cents per gallon. These are the last full months on which I have the figures.

Texoma's plant is what is known as an oil absorption plant, originally designed to handle 190,000,000 cubic feet but we have put as high as 230,000,000 cubic feet a day through it. The average production would probably be 70,000 gallons daily. A 70,000 gallon plant would probably be rated among the first ten in the country and I think third in the Panhandle. I have prepared an exhibit showing the future revenues which Texoma will receive from the sale of natural gasoline.

(At this point counsel handed to the reporter a document entitled "Texoma Natural Gas Company Future Gasoline Recovery, Sales, and Revenue, G. M. Davidson, Witness," and at the direction of the Examiner the reporter marked such document as Exhibit No. 121.)

Exhibit 121 is divided into five columns, the first column showing the years between 1939 and 1954; the second column indicates the average recovery which will be made at this plant in gallons per million cubic feet on a 14.65 pound pressure basis. This recovery has been established on the basis of our experience for the past three years in which we recovered 326 gallons per million cubic feet. I have obtained the figures for the gas production of Texoma for the future from Moore County as one general area and from Carson-Gray area as the other and have included the Canadian River gas. That is the gas which we purchase from Colorado Interstate Gas Company, amounting to one-fourth of the requirements of Natural Gas Pipeline Company of America. I used the term "Canadian River Gas Company" because that happens to be the company which produces the gas purchased by us from Colorado Interstate Gas Company. This natural gas is delivered to the Fritch compressor station of Texoma and is processed for the extraction of natural gasoline.

Questions by the Examiner.

When I gave these other figures on the quantity of gasoline that would be recovered from dry gas and casinghead gas I was stating figures based on 14.65 pounds pressure.

Direct Examination Resumed by Mr. Hedrick.

The proportion of gas which Texoma will produce in the future will change between Moore County and the Carson-Gray area. In other words, a lesser quantity of gas will be produced from the Carson-Gray area and more will be produced from the Moore County area in the future than in the past. That will have the effect of decreasing the aver-
811 age recovery in gallons per million cubic feet. We
have established that we can recover 316 gallons per million cubic feet from the gas produced in Moore County, 347 gallons per million cubic feet from the gas produced in the Carson-Gray area, and 311 gallons per million cubic feet from the gas produced from Colorado Interstate Gas Company.

I arrived at the figures shown in the third column captioned "Volume Gas Through Fritch MCF/Year (14.65#)" from the sales for the future plus the fuel requirements of the system, plus the line losses, and also the handling or processing losses through the gasoline plant. The quantity of gas which will pass through the gasoline plant will be in excess of the quantity which finally reaches the market. I have heard the testimony of the witnesses who have testified as to the reserves of defendants. These reserves were computed on a pressure basis of 16.4 pounds per square inch. In Mr. Kesinger's testimony, his basis was 14.65 pounds. There is no conflict between Mr. Kesinger's and my own testimony on the pressure basis.

I arrived at the figures contained in the fourth column entitled "Sales Gals/Yr.", which of course means sales in gallons per year, by multiplying the volume output in million cubic feet times the recovery per million cubic feet and then deducting a processing loss at the plant of 4.1 percent, which is the loss reflected by our experience and is accounted for by the treating, transferring and loading of the product.

I arrived at the figure in the fifth column under the heading "Gross Revenue Dollars Per Year" by multiplying the sales in gallons times the price of 2.65 cents per gallon less 2 percent, which are the terms of our present marketing arrangement effective until June 1, 1940, and after that period I have deducted 3/16 of a cent per gallon to cover the marketing cost; that is, to cover all of the merketing cost not only the direct charge of the marketer but also the outage, the freight on outage and the freight equalization. The reason I did not deduct 3/16 of a cent from the first of 1939 until June 1, 1940 is that our present market outlet is with the Columbian Gasoline Company for 50 percent of the plant production. This natural gasoline is shipped in tank cars. The remaining 50 percent is sold to Phillips Petroleum Company at the gasoline plant by pipeline delivery, the pipeline belonging to the latter company, the pumping equipment belonging to us. The present marketing arrangement that we have is one that is exceedingly favorable to us. The only cost for marketing is a deduction of 2 percent of the volume being shipped to each of these companies. It has been brought about by a competitive situation which has existed between these companies. These contracts expire on June 1, 1940. I have a definite opinion that we will not be able to renew the contracts under such favorable terms.

My opinion is based on the circumstance that at the time of the execution of the contract covering the period ending June 1, 1939, Phillips Petroleum Company found itself short of natural gasoline and competed with Columbian Gasoline Company for that year on a basis which gave us the same contract which is now in existence. It was strictly a competitive situation. At the termination of this last contract we were busy with this hearing and at the
812 first opportunity after recess we contacted the Phillips Petroleum Company and rather forced the issue on a settlement for the following year's production. It was a question of either take it or leave it almost, and on such short notice the Phillips Petroleum Company could

not readjust their supply to any other source, so they accepted the renewal of the contract which had been made the year previous.

In this last deal with Phillips Petroleum Company, I formed an opinion that we are not going to renew that contract. The basis of that opinion is that on the occasion of the last renewal we gave them such short notice to say yes or no to the renewal of the previously existing contract that they could not readjust their source of supply. They came to us with a proposition whereby the marketing charge would be considerably greater. It was turned down. However, with another year in which to make arrangements for another source of supply for natural gasoline I do not believe they are going to renew that contract. Now with the Phillips Petroleum Company out of that competition I also know that the Columbian Gasoline Company are not going to renew their contract for the remaining half of our gasoline under that former basis. We have in the past paid as high as 5/16 of a cent for this marketing charge.

Cross-Examination by Mr. Slaff.

When I say "I know that Columbian is not going to renew its contract," I mean that that is my impression; I feel that strongly about it in my judgment.

Direct Examination by Mr. Hedrick Resumed.

(At this point EXHIBITS NOS. 119, 120 and 121 were offered and received in evidence, the latter over the objections of counsel for complainant and the Commission, who were granted exceptions. Motion by Commission's counsel and counsel for Illinois Commerce Commission to strike testimony connected with the exhibits denied.

At this point counsel handed to the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Salvage Value as of December 31, 1954." At the direction of the Examiner, the document was marked Exhibit No. 122 for identification. Objection by counsel for the two Commissions overruled.)

I have prepared an exhibit showing an inventory of the salvageable materials and properties, both real and personal, which each of defendants will have on December 31, 1954.

Page 1 of this exhibit marked 122 for identification is a recapitulation of the salvageable material of Natural Gas Pipeline Company of America in the property which it owned as of June 1, 1939. The details of that sheet are set out in subsequent pages of the exhibit. On page 1 are shown Accounts Nos. 1000, 1002, 1005, etc. Those account numbers are carried forward for identification purposes.

This first page shows the total salvage value of the property, the cost to reclaim that salvageable property, and the net salvage value of the property in existence on June 1, 1939.

Page 2 is a recapitulation of the salvageable material of Natural Gas Pipeline Company to be added after June 1, 1939. I secured the information as to the additional property to be added after June 1, 1939 from the testimony and exhibits of those who have testified to that effect; namely, Strong, W. H. Davidson, W. T. Bulla, R. M. Bussard, S. E. Campbell, myself, Powers and Mr. Dickinson. In listing the salvageable property of these companies, I have taken into consideration replacements of present existing property. For instance, if a river crossing were taken out and another river crossing put in, that would be a replacement. Only net additions to plant are reflected in this exhibit.

813 Page 3 is a recapitulation of the salvageable property of Texoma as of June 1, 1939.

Page 4 is a recapitulation of the salvageable property of Texoma to be added after June 1, 1939.

Page 5 is a statement of the salvageable warehouse stock of Natural Gas Pipeline Company of America, the top items being as of June 1, 1939, and the lower items property acquired after June 1, 1939.

Page 6 is a statement of the salvageable warehouse stock of Texoma as of June 1, 1939.

On page 7 is a recapitulation of the salvage values as shown by pages 1 to 6, inclusive. I have simply taken the salvageable property of the two companies and added those together to get the totals here.

Page 8 shows the value of No. 1 heavy melting steel in the scrap market at Chicago, as quoted from the Chicago Journal of Commerce in dollars per gross ton of 2,240 pounds between the period August 31, 1925 and August 31, 1938. It shows at the bottom of the page that the mean average for the past 14 years is $11.50 per net ton, a ton of 2,000 pounds, and that the price prevailing on June 1, 1939, was $11.38 per net ton. A footnote at the bottom indicates that the value of mixed scrap, a combination of cast iron and steel, is valued in the trade at $2 per ton less than the value of No. 1 heavy melting steel. This deduction has been uniformly used throughout this period. These quotations from the Chicago Journal of Commerce, the market prices for No. 1 heavy melting steel, are as of the dates shown on page 8 at Chicago. By "gross ton" I mean a ton of 2,240 pounds, and by "net ton" I mean a ton of 2,000 pounds. In the exhibit I have used net tons, and the cost per gross ton is only shown for information purposes, and for the reason that that is the tonnage figure used in the Chicago Journal of Commerce. The term "mean average" simply means arithmetical average.

Page 9 shows the freight rates as they existed on June 1, 1939 for scrap iron and steel in minimum carload lots of 75,000 pounds from the shipping points along our pipeline, described as Station 1, Fritch, Texas, etc., to the market at Chicago, which is practically the only market for the scrap material available. In figuring freight rates when the material is shipped from Texas we used the Fritch freight rate of $7.20 per net ton. When the material would be shipped from Joliet, Illinois to Chicago, we used $1.06 per ton. When the property would be shipped from any of the other points shown, that is Perryton, Texas, Minneola, Kansas, and so forth, we used the freight rate applying to a mid-point on our line located as of Beatrice, Nebraska, Station No. 6, $4.40 per ton. We found that that is the average freight rate that would apply to the salvageable material that would be sold as scrap. By a minimum carlot of 75,000 pounds is meant that if you do not fill your car to that 75,000 pounds, you still pay the freight on 75,000 pounds.

Page 10 shows the market value of No. 1 scrap copper at
Chicago as quoted by the Chicago Journal of Com-
814 merce over the period from August 31, 1925, to Au-
gust 31, 1938. It is expressed in cents per pound and
shows the spread of prices. For instance, on the line
August 31, 1925, it shows a spread of 11.75 cents to 12 cents per pound. The 14-year average on the next to the bottom line shows that the average has been a spread between 8.53 cents per pound and 8.87 cents per pound. On June 1, 1939, there was a spread from 7.25 cents to 7.75 cents. We have used, in our salvage study, the average of 7.5 cents per pound.

Pages 11 to 102, inclusive, contain a breakdown of all the property shown in the recapitulation, pages Nos. 1 to 6, inclusive. Page 11 shows Natural Gas Pipeline Company Account No. 1000—Lands in Fee. We have listed the fee lands of that company on that page of the exhibit. Line 1 of this exhibit shows that at Compressor Station No. 2, located in Oklahoma, we own in fee 30 acres. We are going to sell the equivalent of seven and a half acres at a going value of $15 per acre. We will realize cash from this sale of $112, and the last column shows that the cost to demolish and clear the foundations on this site will be $3600.

Cross-Examination Interposed by Mr. Slaff.

We are going to give the other 22½ acres to whoever will buy them; we are going to sell the 30 acres and are going to receive from the sale of that acreage $112. The reason we will spend $3600 to demolish and clear the foundations on this site is that, upon advice from our legal department, we cannot leave this site in a hazardous condition because of the liability that we could incur before the sale, and they have advised us that it would be necessary to clear the site to eliminate any liability from this source. It will be sometime before we can sell this land after the property on it is salvaged. While it is in our possession we would still be liable. A reasonable estimate of how long it is going to be in our possession before we will sell it would be from a period of months up to five years; during that time we figure there would be a hazard in maintaining the property and leaving it there; that is the explanation of why we are going to demolish the property before we sell the land.

Direct Examination Resumed by Mr. Hedrick.

Page 12 shows the salvage cost of the railroad crossings of Natural Gas Pipeline Company at the 57 railroad crossings owned by that company.

Page 13 shows, under Account No. 1005, the main lines and the gate valves and other similar property of that company as of June 1, 1939. With a few exceptions, we have shown the length in feet of the main pipe-line, for instance, and the tonnage of that pipe. Where we were in-

volved with the weight, we showed it as pounds or tons. When we were involved with a percentage of the cost of thet product, we showed the cost of the product so that the percentage could be applied to that. That is on other pages of this exhibit and not this particular page. This particular page shows only the weight and in some instances the length of the pipe. Up towards the upper right hand corner, the words "not salvageable" occur. That information was secured from other witnesses who will testify as to that. In order to put this exhibit in one piece I conferred with those witnesses and from what they told me they would testify to, I put that information in here. Right below appears the terms $20 a ton, $15 per ton, and $5 per ton. $20 a ton indicates the total salvage value of 362.66 tons shown at the bottom of that page, which will be salvaged. The $15 per ton is shown under the column "Cost to Reclaim", and is the cost to salvage the equipment shown as a total of 362 and a fraction tons. Where the term "Not Salvageable" is used, we are not attempting to reclaim that property at all, but are leaving it
where it is. That particular segregation of data was
815 put in there only as a matter of interest because of
the large tonnage involved, and so as to account for it in summing up the salvage. The term "Net" between the caption "$15 a Ton" and "$5 a Ton" means that we will obtain the difference between the cost of reclaiming, $15, and the total salvage of $20 per ton, leaving $5 per ton net salvage value.

Turning to page 14, which is a continuation of Account No. 1005, under the last three columns appear the words "1138/Ton" "1106/Ton" ".32/100N". This is a typographical error and should have read "$11.38 per ton", "$11.06 per ton', and "$0.32 per ton'.

On page 16, the words "cor. ir.", on the first line, mean corrugated iron. The breakdown of the main compressor buildings, shown on the second line at $89,303, is shown directly below on the same page and the item of the auxiliary and other steel buildings at all stations, of $79,080, is broken down on pages 17 to 19, inclusive, of the exhibit.

The group of figures near the bottom of the page, the first one of which is "Station 2, Mississippi Valley Structural Steel Company, 68 x 168 x 28′ 9″" showing an original cost of $9,602, refers to the original cost of the salvageable material contained in the building alone. The next column to the right shows a 28 foot extension costing $2,435, which means that subsequent to the original erection of this building we added a 28 foot extension to one end. These extensions were all added in 1938, and of course prior to June 1, 1939. The original cost of the entire building, therefore, is the sum of $9,602 and $2,435, which is the total to which any percentage will be applied.

On page 22 the first line shows that at Station No. 2 we have two 15 horsepower General Electric 440 volts, 1,750 revolutions per minute, motors. The last line of that same group shows an item "2-40-50". This item is really a 40 horsepower motor, although this is more completely described in the valuation report which is to follow in terms of 40-50. We wanted to identify it so that it could be cross-checked for a more complete description. In other words, there are 2-40 to 50 horsepower motors.

On page 24, the top line, "48-1250 hp. Wor. Hor. G. D. Compr." means 48—1250 horsepower Worthington Horizontal Gas Driven Compressors. In the next line the initials "PIW" and the following initial in which there is a typographical error—that "D" should be an "O"—indicates the manufacturer, Petroleum Iron Works in one case, and O. A. Smith in the other.

On page 25, the initials in the first line, for instance, mean that we have 18 Cooper-Bessemer 175 Kilowatts generating plants, making a total of 2,250 kilowatts. Four lines below that, the words "Robbins & Myers" refers to the manufacturer of a generating set with panel. It is a motor-driven ignition set, a small unit. In the group of figures at the bottom of the page, the first line, the letters "C. P." stand for Chicago Pneumatic, a manufacturer.

816 Cross-Examination Interposed by Mr. Slaff.

Where I stated above that the figures in the first line show a total of 2250 kilowatts, the total should be 3,150 kilowatts. That will change the salvage figure from $11,250 to $15,750. The difference between $11,250 and $15,750 carries down into my first total of $18,499 and then into my final totals of $19,236 and $18,498.

Direct Examination Resumed by Mr. Hedrick.

On page 26, the first line, the abbreviation "Aux." means auxiliary. The letter "M." means main.

On page 27, fourth line, "Galv. Dom." means galvanized domestic.

Page 29, near the bottom, over at the left hand side, the figures "919,499" and "470,588" mean pounds. These figures are converted into tons in the first column.

On page 30, the first line means 2025 feet of 400,000 circular mil copper wire, weighing 1.24 pounds per foot. The next line means 70 feet of No. 0000 wire, 3-conductor, weighing 1.9215 pounds per foot. In the fourth line, the initials "DBRC" mean double braided rubber covered. In the seventh line below, the initials "TBWP" mean triple braided waterproof.

On page 29, in the column under "Total Weight," where I have 459.7 tons, there appears to be a comma or a blur or something right before the figure. That should not be there.

On page 34, the first line under the word "Oklahoma," the letters "BWG Cu." means B and W gauge copper wire. Cu. is the symbol for copper.

On page 40, the top line shows "Supercompressibility Apparatus: —" and right below that you will find the words "Special Gas Measuring Device." In mimeographing, this first line should have been put over two spaces. The "Supercompressibility Apparatus" was modified for further explanation by "Special Gas Measuring Device," which should have followed on the same line; and following "Supercompressibility Apparatus," there should have been a comma. There is no significance in the first line being set off by itself the way it is. In the second line from the bottom where it says "Dew Paint Instrument," and "a" should be an "o," and the expression should read "Dew Point Instrument."

Page 34 shows the entire salvage from the telephone system.

On page 42 occurs the expression "Total Salvage 30%." That should have read 20 percent. That 20 percent does not apply to the law library.

On page 71, the initials and abbreviations in the first line mean 1-300 horsepower, 60 cycle motor with compensator and breaker. Several lines below, there appears the item "2-Clark Eng. #2 Comp." et cetera, which means Clark Engine #2 Compressor. That "S. B." is an abbreviation for the size of the compressor cylinder, which is 6 by 20. The last line means one 8-½—that zero is a typographical error and it should be 8-½ by 12—Westinghouse steam air compressor. The amounts shown throughout the exhibit under the heading "Cost to Reclaim" were obtained from consultation with witnesses who are to follow, or they are based on my judgment and experience in a few cases, which I will explain later. The figures which express my own judgment are those in Accounts Nos. 1000, 1002 and 1008 for both companies.

817 Exhibit 56 is a picture of a typical compressor station on the main line. This one happens to be compressor station No. 6, located near Beatrice, Nebraska. It is rather unusual to have such a good road alongside of a station. All buildings and superstructures of all character have been treated as salvage, but there will still remain the foundations and pits for the buildings, the cooling towers, etc. The foundation for these buildings is about 24 by 30. I am referring to the cottages, at figure 17. These are concrete foundations that have walls 2-½ to 5 feet in height, with a center wall extending down the center of the building. They will have to be demolished to ground level. I should say that this picture does not reflect the additions which have been made in the plant to date; and when this plant is demolished or salvaged in 1954, there will be an average of 15 houses at each one of these stations. There has been an extension made to the cooling tower, shown as figure 12. There has been an extension on the main building, No. 1. There has been added a pipeline warehouse comparable to building 14, and there have been extensions on the garages noted as 16. In addition, there is a foundation about a foot high under these garages which have been extended since this picture was taken. This building is about 20 feet wide and now about 60 feet long, and the walls are about eight inches thick in this low building here. They are not made of reinforced concrete.

Now we have this elevated domestic water tank here at figure 15 which is supported on some concrete blocks which will have to be removed. They are about 18 inches square and are up above the ground about a foot or 18 inches. Now as to the pipeline warehouse, figure 14, this is a special warehouse to the extent that it is built to facilitate rolling trucks, and this foundation is elevated above ground practically four feet, and in some cases where the warehouse is on a slope, the walls get up to eight feet high.

This compressor station No. 6 is typical of other compressor stations, and the description which I am making of the work to be done is also typical of the other stations.

At one end of this pipeline warehouse we have a pit dug underground for the storage of pipeline rubbers and other material. This pit is about five feet below ground and 20 feet into the building itself. In addition there are two cross walls in these buildings which elevate an inside platform. This concrete foundation is about ten inches thick and is reinforced. At figure 13 we have typical pipeline pipe racks, and these have been extended since this picture was taken. To support these pipe racks there are numerous concrete blocks about 18 inches square and on about five-foot centers for a length of 40 feet. Then at the cooling tower we have a concrete foundation which now is 24 feet in width, about 100 feet long, and has a pit half of which is in this picture which is about 10 feet deep. There is some heavily reinforced concrete here including column supports for the tower itself.

Proceeding into the piping at figure 11, there are a great number of anchors to hold down the pipe from vibration in this vicinity. There are a number of anchors which cannot be seen in this picture, but I would say that there are about 25 or 30 concrete blocks, all of which extend above the ground a foot to four feet. We have in addition to that the main building which has been extended 28 feet more, as is reflected in Exhibit 122, and in addition at
818 Stations 2, 3 and 9 the building is 28 feet longer than that.
This building here is about 70 feet wide and has a basement extending half of its length down below ground about six or seven feet. There are walls running through this basement that are about 10 or 12 inches thick to support, along with the column foundations, the heavy type of building that we have here. It is very heavy concrete and rather difficult to break out. That pit would have to be filled up.

In the building itself the concrete blocks under these main units are rather massive affairs. They are about 15 or 25 feet in width, they are about 50 feet long and about 12 feet deep. They extend above the ground line approximately two and one-half feet. They are heavily reinforced concrete. Besides containing anchor bolts and the ferrules for the anchor bolts, it is chuck full of steel. They all have to be broken at least down to the ground line. We will have to get rid of the concrete by filling up the pits with it.

Going now to the auxiliary building, that structure is about 30 feet wide and approximately 130 feet long. It carries a foundation under it which has a 10-inch wall which extends clear around the foundation excepting at one end where we have a pit the width of the building and extending into the building 30 feet. That pit contains the pumps for the water circulating system. The floor line in this building is about 18 inches above the ground line. Then we have the two auxiliary units with a heavy concrete block under each of them about five feet wide and 18 feet long, and this block is under the engine and under the generators and has to be a very solid block to hold this engine from vibrating. Under the boilers we have a rather heavy foundation. It extends above the ground line about two feet. It is of reinforced concrete and will have to be broken out. Then we have the foundations under the machine tools in one part of the building. We have the foundations under the air receivers that will have to be broken out. Referring to the elevated water tank, at figure No. 9, this structure is reinforced concrete blocks about three or three and a half feet square. It extends into the ground about five feet, and then at the center, at the standpipe, we have a concrete block about eight feet square which extends up above the ground line 18 inches.

There is a pit under the building at figure 10, ten feet deep. This is a 10 by 10 sump house. At figure 6 we have a 30 by 30 concrete hot well which is 10 feet deep. The walls of this pit are about 10 or 12 inches thick and heavily reinforced: At No. 7 we have the foundations for the lubricating oil tanks. They will have to be knocked out. These are about 12 inches thick, five feet long, and they elevate the tanks about two feet above the ground. There are two such tanks. The office building is about 30 by 40 and is indicated by No. 4 on the picture. This is somewhat comparable to the foundation under the houses having a center wall throughout the building. In addition, there are some scrubbers located on the main line, not shown in the picture. These are heavy walled vessels and require a heavy foundation. The block under these scrubbers is about six feet wide and 18 feet long. No. 5 is the garage and warehouse for the station. This is a building about 24 feet wide and about 60 feet long. It carries a foundation about 10 inches thick and a concrete floor throughout the warehouse section of the building.

819 If some of these holes in the ground to which I have referred should become filled or partially filled with water and we should go off and leave the property in that condition, it would certainly attract the children across

the road and other places in the neighborhood. Counsel have advised us that it would be necessary to level off those places and fill up those holes to escape any liability from damages of that nature. This liability would continue so long as the company owned the property. As a construction engineer, it is my judgment that the figure of $3600 in the last column on page 11, which is headed "Cost to Demolish and Clear Foundations," would necessarily be expended in doing the work which I have described. This figure applies to each of the Stations 2 to 10, inclusive. On page 1 the total appears to be $32,400, while on page 11 it is $32,450; and under the caption "Cash from Salable Acreage," on page 1, line 1, Account 1000, the total salvage appears to be $3,488, while on page 11 this figure is shown at $3,538. The figures on page 1 are in error. The correct figures are shown on page 11.

At the bottom of page 11, opposite "Ottawa Warehouse Site, Illinois" is the sum of $50. This amount, in my judgment, represents the cost of clearing up one of these pipeline warehouse sites.

We worked all of these figures up in detail, so much for filling and so much for demolition. The details are shown in my working papers.

Referring to page 48, the last column, the first line shows the cost to demolish Compressor Station No. 1 of Texoma Natural Gas Company as $10,932. That particular station is shown on the picture marked Exhibit No. 92. This compressor station is practically three times the size of any on the main line. At the main building designated by figure No. 1, we have added, since this picture was taken, an extension to the building which will accommodate four more units, and the construction within this building is quite comparable with that which I have described on the main line. The auxiliary building is larger and contains larger auxiliary units.

The cooling tower has been extended, or, rather, we have built a new one altogether at the location of the cooling tower noted as figure 4 in this picture. This has extended the tower about 75 feet. The tower itself has underneath it a pit of a bigger character than those in the other stations. This station at figure 5 has an elevated water tank comparable with those on the main line. In addition we now have a new office building located just beyond the building marked 6. This is a building about 35 feet wide and 45 feet long, elevated above the ground about 3 feet. We are going to build a 200,000 barrel tank at that station. Under that tank, the foundations will be twice the bearing area at least of the ones that we have now, which should just about double their size as far as yardage is concerned. At the camp itself, shown as figure 7, we have added, since this picture was taken, ten more houses. Others are contemplated for the future. We have extended onto the garages shown in the picture and, in fact, have built a new one at the garage marked 8 in this picture. The foundations under these houses are quite comparable with those I described for the main line. We have the pipe racks and material racks located at figure 10, and these have been extended since this picture was taken. We also have a new pipeline warehouse located just beyond the warehouse shown as figure 11 in this picture. This is a warehouse comparable to the one shown and is about 30 feet wide and 40 to 45 feet long. It has an elevated concrete foundation.

820 In addition to all of the compressor station and pipeline equipment at the main line station at Fritch, we have this big gasoline plant, and all of the foundations and pits in this plant will have to be demolished and filled up. At figure 20, these absorbers have under them a block of concrete which is approximately 6 feet wide and 50 feet long, and is elevated above the ground 18 inches. They have holding-down bolts extending into this concrete to hold the absorbers against winds and other vibrations. At the right end of the absorbers is a pit about 20 feet deep, with reinforced walls, which extend above the ground line about 18 inches.

At figure 21 we have the refrigerating plant, the dehydrating plant, as some have been calling it, where we have concrete supports under heavy exchangers and reboilers. We have a building foundation at this point which is about 10 or 12 feet wide and 40 feet long.

At figure 22 there is a sump. That sump is about 30 feet square and 5 feet deep. That will have to be filled up.

At figure 19 we have the Clark engine room and the pump building. This building is about 30 feet wide and over 200 feet long now. It has been added to since this picture was taken. There are heavy concrete blocks under these engine compressors and there are heavy blocks under all of the pumps in the pump end of this building.

Referring to the distillation equipment at figure 18, we have numerous stills and fractionating towers in this area.

Also run tanks and accumulators, all of which require supporting foundations extending above the ground.

The cooling tower at figure 17 has been extended until it is probably twice the length that is shown in this picture. That would make the total length of that tower about 250 feet long. I am trying not to exaggerate these things, but that is the best of my recollection. Now this cooling tower is built quite comparable with the other cooling tower in the station and contains a pit in one end about 10 feet deep, and also numerous columns heavily reinforced to carry the cooling tower. The boiler house is a building about 40 feet wide and 60 feet long. Located in this boiler house we have a pit under one end which is 10 feet deep, the width of the building, and 25 feet long. This pit contains the water circulating pumps for the gasoline plant and other apparatus in connection with the boilers themselves. The floor of the building is elevated above the ground about two feet. In addition there are concrete foundations, bolts and so forth, under the two boilers.

At figure 16, we have the stack for the boilers, which is a concrete structure heavily reinforced and is something over 100 feet high.

At Figure 14, we have the office and laboratory which is being extended at the present time.

At figure 15, we have the gasoline plant warehouse and garage, which are quite typical of the station garages and warehouses described on the main line. When I say "main line," I mean the line of Natural Gas Pipeline Company of America.

821 The gasoline storage tanks located at figure 13 all have heavy reinforced concrete foundations under them. There are, as I recall, four walls extending lengthwise under each of the four rows of tanks. The length of these walls would be about 80 feet and the width about 12 inches, and there are a total number of 16 walls in there. In addition there is the foundation for the treating pump house, not shown on this photograph, and the foundations under the treating tanks just towards the site of the storage tanks in the picture. The tanks themselves are about 2 feet above the ground and the foundations extend around the circumference almost half of their height.

The pump house and tanks are at the rear end of the group embraced in No. 13. Surrounding this gasoline storage there is a dike which would prevent the flow of gasoline from any storage tank which broke in this area. This will have to be leveled down. I have described the large 55,000 barrel tank, which is No. 12, and there is little to demolish or to readjust after reclaiming the tank itself. At No. 23 we have five scrubbers and we are adding now three more. These are heavy vessels to stand considerable pressure and necessarily have to have big concrete foundations under them.

The loading rack, at figure 9, will also have some concrete foundations and steel to reclaim after the loading rack itself is salvaged. It is my judgment, as a construction engineer, that it will cost at least $10,932 to demolish and clear the foundations and to fill the holes which I have described.

On page 48 is shown the cost of demolishing and clearing the Dumas warehouse site. In my judgment, this work will cost at least $50. The next item is the Kingsmill warehouse site, showing the same cost for clearing. It is practically the same type of building as the Dumas warehouse. Down below is shown the Skellytown warehouse site, with a cost to demolish of $100. The Skellytown warehouse site will contain some houses and a pipeline warehouse. It is a larger camp than either the Kingsmill or the Dumas sites and, in my judgment, it will cost at least $100 to clear it. Those last two items are property which will be added after June 1, 1939, as shown on page 48 of this exhibit.

Account No. 1002, on page 12 of Exhibit 122 shows 57 railroad crossings that will cost $250 each to replace in their original condition in accordance with the crossing contract. We have agreed to remove all of the pipeline property from the right-of-way of the railroad. This involves the removal of the pipeline itself, the casing surrounding the pipeline under the road bed, the vents which are attached to each end of the casing, and the seal between the casing and the pipeline. The hole that is underneath the railroad tracks will have to be filled and tamped in order to restore the railroad right-of-way to its original condition. The same thing is true on the Texoma railroad crossings appearing at page 49. That company has seven railroad crossings. It is my judgment that in each instance it will cost $250 per crossing to do this removal work and put the property back in the same condition that we found it.

Account 1008, refers to the telephone system and appears
on page 34 for the Natural Gas Pipeline Company and
822 page 81 for Texoma Natural Gas Company. The lower
half of page 34 shows the cost of reclaiming lines. The

first item reads "Beatrice to Chicago, four wires C. B. & Q. poles," showing a distance of 623.07 miles, at a cost of $55 per mile, or a total of $34,269 to reclaim those lines. It is my judgment that such an amount will necessarily be expended in that reclaiming work. The next item shows $40 per mile to do the work, and some of the other items show $25 per mile, and $55 per mile.

The cost of reclaiming this wire will be dependent upon the amount of work that is necessary in removing the wire from the poles. On the C. B. & Q. system there is a great congestion of wires and a great many cross arms, whereas on the Natural Gas Pipeline system we have four wires on a single cross arm. On the C. B. & Q. system the Natural Gas Pipeline Company does not own the poles but only the wire. Care must be taken not to damage the property of the railroad. Page 81 of the exhibit, the telephone system of Texoma Natural Gas Company, shows in the middle of the page the cost to reclaim at only $19.50 per mile as against the cost which we have shown on page 34. That is due to the amount of work that is necessary to remove the wires from the poles of the Rock Island Railroad Company. They do not have the congestion that the Burlington has on the length of line between Beatrice and Chicago. We have only two wires in the first four instances in Texas and four wires in the last line of that particular group of figures. That makes a difference in the cost of reclaiming. Down at the bottom of the page is the cost of reclaiming certain wires that will be added after June 1, 1939, at $19.50 a mile. In my judgment, it will be necessary to expend that amount in order to reclaim this wire.

Somewhere in this exhibit, I have lost the page number, is the cost to reclaim certain engines with a considerable expenditure for that reclaim work. Page 13 of Exhibit 122, where I show that it will cost $15 per ton to reclaim certain of the items at the bottom half of the page, shows that. The explanation is that I have obtained these figures through consultation with others who are to follow on certain items of reclaiming salvage. These witnesses will testify on this point.

On page 84, the eighth line from the top, appears an item of $3,500 for reclaiming 175 well meter houses. Those are small galvanized iron buildings about 6 by 9 feet, sectional buildings which have a concrete foundation under them about 8 to 10 inches high and in which the lower girth of the steel structure is buried. We will have to knock them out and we estimate the cost of reclaim to be $20 each. That is also true as to the 197 well meter houses to be added after June 1, 1939, which is the second item from the bottom of the page.

I have obtained the information shown on page 24 concerning the cost of reclaiming the 1250 horsepower Worthington engines from other witnesses who are going to testify as to that.

On page 11, the first line shows compressor station No. 2 in Oklahoma, and the items below that under the heading "Location" show the other compressor stations and various fee properties that Natural Gas Pipeline Company owns. The second column shows the number of acres that will be salable as grazing or farm land, and the remainder, that is 22½ acres in the case of station No. 2, we consider to be ruined by the salvage operations and demolition that have gone on in clearing the site. This part of the 30 acre site will be ruined for farming and grazing purposes.

823 I am acquainted with the going prices for lands of a comparable character in the vicinity of these various stations and fee properties, and the figures I have set out represent my judgment of the going market value of that property. In the next column headed "Cash from Salable Acreage" the amount was reached by multiplying the number of acres by the market value per acre; in this instance by multiplying 7½ by $15. All the other items on that page were arrived at in the same manner.

The item entitled "Red Oak Warehouse Site, Iowa" shows 1,322 acres, and a cash value of $15. That site is on the edge of this small community, known as Red Oak. This site is not in the residential section but it is in the vicinity of the poorer dwellings of the town. It was a proper site for the erection of a warehouse in that it would not violate any of the aesthetic tastes of the people surrounding it, and it was also adjacent to a railroad. That $15 is, in my judgment, the going value of that property.

The next item is the strip on the main line in "Manon County," Iowa. That is another typographical error. It should read "Marion County." This property was purchased to prevent further coal operations in the vicinity of the pipeline. There was a strip mine operation which was approaching the location of the pipeline, and we found it advisable to purchase this 20 acres. My recollection is that that strip is 20 rods wide, or 10 rods on each side of the pipeline. It is located in an area where there is no farming and merely grazing land. It is a rough hilly country. When these strip mining operations are completed, it will leave the land in such shape that it is useless for any agricultural purposes at all. There will not be enough coal left in the strip we have purchased to justify any further coal mining operations, and the land could not be sold for that purpose.

The next item is "Joliet Regulator Station, 2 acres," followed by the item "Joliet Meter Station, 10 acres." The salvage value for this property is included in the sale of the buildings at these sites and is shown on page 38 of the exhibit. Those buildings are of brick construction, plastered interior, transite roof and are excellent buildings. They cannot be moved economically, but we believe they have some sale value and we have included within the salvage value of the buildings at the meter station and regulator station the fee land which will be sold along with the buildings.

On page 12, Account No. 1002, under the caption "Right-of-way," no salvage value is shown. Our right-of-way grants give us the privilege of locating the pipeline on the property just so long as gas is being transported. On the cessation of operations, we will have no further rights in the property. It is simply an easement privilege granted the pipeline company by the landowner. At page 49, no salvage value is shown for the right-of-way of Texoma for the same reason. This exhibit contains no page 58 and no page 83. This is due to typing and putting the pages together.

At page 48 is shown the Compressor Station No. 1 of Texoma, which site contains 80 acres. In my opinion 60 acres of that will be ruined for farming or grazing purposes, and the remaining 20 acres can be sold for about $15 per acre, or a total of $300. The Dumas Warehouse site has 10 acres and only 2.5 acres will be salable at a
824 price of $15 per acre, netting our company $38. The Kingsmill warehouse site contains 11 acres of which 2.8 acres will be salable at $15, netting our company $42. The Skellytown warehouse site of 10 acres can be sold only to the extent of 2.5 acres at $15 per acre. At Dumas, an additional 2.6 acres will be added to the site and only .6 of an acre will be salable. This portion will sell for $15 per acre.

Cross-Examination Interposed by Mr. Slaff.

I have investigated the sales of property in the vicinity of each of these properties and I have knowledge of the going value of the property at each one of these stations. I obtained this knowledge from superintendents of these stations and know that the figures are within reason from transactions which have taken place. I have never appraised any land or real estate. (Counsel for defendant concedes that the witness is not a real estate man.)

Direct Examination Resumed by Mr. Hedrick.

On page 11, I have set out a number of particular properties. Other properties not owned at the present time will be acquired in the future but are not shown at that point for the reason that they will have no salvage value. I refer to the testimony of Mr. Strong who showed that we will have to acquire some more property on the Natural Gas Pipeline Company system. These acquisitions will be made necessary to protect the pipeline against strip coal mining operations and the same situation will obtain as to these new acquisitions as that already explained with reference to the strip we acquired in Marion County, Iowa. There are several other small properties now at meter sites and regulator sites along the main line. These sites are so small and isolated and so located that we believe they can be turned back to the farmer without cost to us. I would say these sites range from about 50 to 80 feet wide and up to 100 feet long. They are usually located in the middle of somebody's farm in the country.

Cross-Examination Interposed by Mr. Slaff.

In our figures for total salvage and for cost to reclaim thoroughout Exhibit 122, we have used labor and material prices as of June 1, 1939. I am not prepared to predict that these prices will exist at December 31, 1954. I do not profess to give an estimate of what prices will be at December 31, 1954. (Motion by Commission Counsel to strike so much of the witness' testimony as dealt with the cost of reclaiming and with salvage of property not now in existence. Ruling reserved on Motion.)

Direct Examination Resumed by Mr. Hedrick.

At page 24 of Exhibit 122, the item "48 - 1250 h.p. Wor. Hor., G. D. Compr,," the sum $88,247 was reached by multiplying the total number of tons 9,408 by $9.38 per ton. The figure shown on page 57 for the 15 - 1250 Worthington Engines was arrived at in the same way. The next line, on page 24, "19 - PIW & ADS Scrubbers," the total of $4,324 was arrived at by multiplying the number of tons, 380, by the salvage price of $11.38 per net ton. That is true as to the 5 scrubbers shown on page 57, and the other scrubbers shown on that page. The Worthington engines will sell as mixed scrap for $9.38 a ton and the scrubbers will sell as plate steel or heavy melting steel at $2 a ton more. The prices are those at Chicago, as already stated.

825 I have already stated that we used an average freight rate for the reclaim of main line material. That freight rate being $4.00, comparable to the freight rate from Station 6 at Beatrice, Nebraska. That rate was applied to all material reclaimed on the main line except at Joliet and Fritch. In addition to the freight charge we have a handling charge of $3, which includes the cost of loading into the trucks, the hauling into railroad shipping points and loading into railroad cars. That is the average cost and was applied throughout all of the reclaim exhibit, regardless of the mileage from the place of salvage to the shipping point. Most of the expenditure, of course, goes in the loading and unloading of trucks. The amount of hauling itself is very small. It will be about 5 to 7 miles on the average. The distance will not affect the cost to any appreciable extent. This $3 charge is based upon our experience in hauling up and down the line. We paid in 1935 or 1936 $5 per ton for hauling some of these Worthington engine units. We think we can haul the salvage for $3, however, because we have in mind breaking up the units into very small pieces which will be easier to handle. This will reduce the cost of hauling.

At page 57 the cost of reclaim for the 15 Worthington engines is shown at $44,688. There is a difference in the freight rate from Fritch, where the freight rate is $7.20 a ton, to Chicago. This makes the cost of reclaim of the Texoma property, which is figured on the Fritch rate, for salvage $15.20 per ton as against the $12.40 average on the Natural Gas Pipeline Company property from Gray, Oklahoma to Station No. 10. All other reclaim charges are figured at the same rate for Texoma property at and beyond Fritch as for the main pipeline property. The $15.20 is broken down into $7.20 a ton for freight, $3 a ton for handling, and $5 a ton for demolishing or breaking up the heavy parts into smaller pieces which can be handled to advantage. Included in the figure of $116,659, shown on page 24, is a $5 demolition cost per ton, and that same demolition cost is included in the cost of reclaim on page 57 on the 15 engines shown there. This figure of $5 per ton demolition charge I have obtained through consultation with other witnesses who are to testify. The figure of $5,472, shown at page 24, is broken down into freight $4.40, the same handling charge of $3, and in cutting up this class of material we will have a demolition charge of $7 per ton, making a total cost of reclaim of $14.40 per ton.

The second item on page 57 shows the cost of reclaiming 5 scrubbers will be $1,803. This figure was reached by applying the freight rate from Fritch, $7.20, the $3 handling charge, and the same demolition charge of $7, making a total of $17.20 per ton. The difference between the cost of reclaim of the scrubbers at Fritch and the scrubbers on the line of Natural Gas Pipeline Company is accounted for by the difference in freight rates. Throughout this exhibit where any heavy melting steel appears it is given a salvage value of $11.38 per ton. Where the material is mixed scrap it is given a value of $9.38 per ton. I obtained the figure of $7 per ton for demolishing material which will have to be cut by torch, through consultation with other witnesses who will testify on that point.

826 I used the expressions "mixed scrap" and "heavy melting steel" in designating the salvage material. The difference is there is no cast iron in heavy melting steel but there is cast iron in the material classified as mixed scrap. The figures opposite the line near the bottom of page 24, referring to 9 scrubbers, 8½ tons, $97, $122, $25, and the next line showing one 5 foot by 75 foot water gasification tower, at Station 10, 135 tons, and so forth, should be reversed. The 9 scrubbers weigh 135 tons, and the gasification tower weighs 8½ tons. The figures should be reversed clear across the four columns.

At page 24 of the exhibit, the net salvage figure of $28,412 and, at page 57, the net salvage figure of $17,111 are shown in red figures; that is the cost of clearing the property. The reason this property will be salvaged under such circumstances is that we can not abandon this equipment in place for the reasons already stated. By shipping this material to Chicago, we will derive a gross salvage of $88,247, and thus reduce the cost of salvaging the property referred to on page 24 to $28,412. The reason we can not leave this class of equipment exposed is that it would constitute an attractive nuisance if left on the foundations. It would also make it impossible to sell it along with the land still usable for agricultural purposes.

(At this point counsel produced a picture marked on the back "No. 1154, Fritch, Texas Station, 12, 24 by 36, 1250 HP Gas Engines" and requested that it be marked as an exhibit for identification. At the direction of the Examiner, the picture was marked Exhibit 123 for identification.)

Exhibit No. 123 for identification is a view of the interior of the Fritch Compressor Station at a time when there were 12 engines located at that station.

Question by the Examiner.

On the back of the picture referred to the words "Natural Gas Pipeline Company of America" have been stricken and the term "1300 horsepower" has been changed to "1250 horsepower", the real rating of these engines.

Direct Examination Resumed by Mr. Hedrick.

The equipment shown in this picture would attract all the children of the neighborhood, farm children or children from nearby communities, to play "Engineer" or what not around it. I have children of my own and I think I know what they are inclined to do. Now if they ever got into this equipment they would be exposed to all of the pits that are under the cylinders and under the flywheels. That flywheel weighs 25,000 pounds and is 15 feet in diameter. It extends above the floor line about ten feet, and the pit under the wheel is about five feet deep. There is an opening down through the engine, underneath the flywheel, which a child climbing up on top might fall down through. There is danger that a child playing on top of that engine would fall off the engine around the cylinders. The footing is very insecure at

any place where the child could stand. The cylinders are round and there are many protruding parts of the equipment. The equipment is liable to be oily and greasy. It is painted and kept in a rather polished condition. In fact some of our own men have been hurt falling off of this equipment, as familiar as they are with it. In one case a boy broke his leg. I know it is dangerous
827 enough that it has played hob with our safety record.

There is a basement underneath this building that extends from end to end and covers the viewer side of this picture, that is, over to the center columns. This basement is dark and there are low-hanging pipes. Somebody is bound to get hurt down there if they ever go down there and are not familiar with what they are doing. There are children in the small community of Fritch within sight of the Fritch plant. The population is scattered, but I would judge it to be about 500 people. Many of them are ranching people in that territory. Many of the compressor stations are situated where schools are located within sight of the station itself, and I know that there are many children passing by the plant site on their way to school. I have known of two or three instances, when I was working for the Empire Companies, where children and other persons were injured on property left in an unsafe condition. I will give you two or three instances.

While I was superintendent of a gasoline plant on a Cities Service lease known as the Bell and Dixon lease, near Okemah, Oklahoma, a lease was abandoned at the edge of this field, and the only piece of equipment left, after tearing down rigs and filling the slush pits and so forth, was a 500-barrel tank. There were several children playing in this tank, attempting to swim and enjoy themselves, and a 9-year old boy was drowned in it. They sued the company that originally owned the lease. I am familiar with another incident on the Cities Service refinery operations at Cushing, Oklahoma. The plant was abandoned and a watchman was left on the site. However, some children were playing in the yard of the site, throwing rocks in the cooling tower pond, and running around the pit. One of them slipped into what was formerly a cooling tower basis. This was quite comparable to our own cooling tower pits except it had a 45 degree sloping side. This boy attempted to get out of this pit but the algae growth on the concrete surface prevented him from getting out and he was drowned. There was another instance that I am familiar with, which occurred on the Cities Service Gas Company's system near Hominy, Oklahoma. The company had temporarily abandoned a compressor station, and had gone so far as to board up the main buildings. The units were not entirely unlike our own. Children broke into this building after removing the boarding from the windows and were playing apparently in the building, running around it and climbing columns and what not. They found a box of dynamite caps. These are a very small article, about the size of a lead pencil eraser. They had been put away in a place where the operating men thought no one would promiscuously pick up this dangerous article. In fact, it was put up on top of a rather high cabinet, but these children found these caps and in playing with them one of them had his hand blown off. The company was sued for $3,000 in that instance. I can't tell you what the final outcome of those suits was.

I am not interested alone in what this might cost the company but I would feel that I had not fulfilled my responsibility unless these hazards had been removed because of the danger to the lives of children.

Near the top of page 13, appear a number of items shown as "Not Salvageable". The gross value that we can obtain for this pipe is $11.38 per ton, for No. 1 heavy melting steel. The average freight cost in getting this steel to Chicago would be $4.40 per ton, a figure that I have already explained. After this steel is delivered
828 into Chicago, it will cost $4 additional to reduce this pipe to open hearth sizes. By "open hearth sizes" I mean a steel plate with a dimension 18 inches wide and 5 feet long. It cannot be sold as scrap without breaking it up in addition to cutting it in certain lengths for shipment. Pipe will have to be cut up into such dimensions that it will lay flat and be not over 18 inches wide and 5 feet along. If we add those two costs we would get a total of $8.40. Now if you deduct that cost from the price for material sold as scrap, $11.38, we would gross $2.98 delivered at Chicago. Now there are many other costs involved in salvaging that material other than the freight and the cutting into open hearth sizes. Obviously we would have to remove this pipe from the ditch. This

would cost a total of 62.8 cents per foot, or $15.14 a ton, since the pipe weighs approximately 83 pounds per foot. From these figures we reach the conclusion that it would not be at all profitable to attempt to salvage those items. On the same page there is a cost to reclaim certain gate valves of $15 per ton. We have estimated that it will cost $15 per ton to salvage all pipe material, including the gate valves and other pipe fittings referred to at the bottom of that page. We had the same hauling cost that I have already referred to, $3 per ton, and a salvaging operation cost of $12 per ton. That salvaging or reclaim cost of $12 per ton will be covered by the testimony of other witnesses in this case.

Cross-Examination Interposed by Mr. Slaff.

We included in the estimate of $15.14 per ton for cost of reclaim, the ditching, cutting into 40-foot lengths, stripping the couplings, raising the pipe from the ditch, back filling, hauling and loading on cars, hauling excess dirt for the back-fill, cleaning pipe, and the labor cost in handling the pipe while cleaning, the average cost for damages, supervision, taxes and insurance. The figure is the average cost taking into consideration conditions as they exist up and down the line.

Direct Examination Resumed by Mr. Hedrick.

Referring to pages 30, 31, 65, 66 and 77 of this exhibit, the material shown in the group at the top of the page is scrap copper. It is generally insulated copper wire. That represents a salvage value of 7.5 cents per pound, or $150 per ton, for copper. The next column shows the cost to reclaim at $44 per ton. The figure should be $44.40 per ton; and in the next column where the net salvage is $1,816, or $106 per ton, the figure should be $105.60 per ton. In the preparation of the exhibit the even dollars were used instead of the cents out on the end, which will make some small difference in multiplication. The money figure is correct with the changed figure to which I have referred. I arrived at the cost to reclaim through consultation with other witnesses, who are to follow me. This cost is broken down into freight of $4.40, and 2 cents per pound for handling costs. The latter item includes the collecting of all of this insulated copper wire and burning the insulation from it, and the haul to the railroad. That is true with reference to all of this insulated copper wire shown on the pages above mentioned. In order to sell this copper at the prices stated, it is necessary to take off the insulation and wrappings so that it can be sold as copper, the price being for pure copper.

On page 31 there is another correction. The second group of figures from the top of the page shows $279 and a total of $2,869. Those figures should be pounds instead of dollars.

829 On page 38 of this exhibit, down at the bottom of the page is a group of figures showing the cost of certain structures at Joliet. These include meter station buildings, described under that heading at a cost of $70 for the by-pass meter house; and a brick garage at a cost of $2,014; the office, laboratory and meter house, brick transite roof at a cost of $11,842; and a well house at a cost of $910. There is also shown still lower down certain regulator buildings at a total cost of $11,987. I have an opinion as to the amount which these buildings could be sold for at this time if they were of an age that they will be on December 31, 1954. This opinion is based upon my own experience in my former employment with the Empire Companies, and experience I have had in selling buildings of this particular type. These are substantial buildings. They are of brick construction and for a specific pipeline use. They are not readily adaptable to reconstruction into houses, but we feel that we will be able to sell this property for 10 percent of the costs that we have in the buildings themselves, including the 10-acre tract of land on which the buildings are located. This 10-acre tract of land has never been farmed. It is in a wooded section 4½ miles west of Joliet. There are no residences in the immediate vicinity. We had to build a private road into the property. That property is what might be ordinarily termed as scrub oak country. There are scrub oaks on that site. The soil is yellow clay but it will grow crops to some extent. Nobody has ever found it advisable to farm it. The trees on the property, I would say, are about 40 years old. The regulator site of 2 acres is a very small tract on a hill side, rather rocky. That is, the rock comes practi-

cally to the surface. We have attempted to grow a lawn on this place and have had difficulty, but it looks all right.

Referring to pages 41 and 91 of the exhibit, we show certain automative equipment showing a salvage value of 30 percent in each case. I have a judgment, based on my own experience in purchasing and selling automobiles, of which I have direct charge for defendants, as to the salvage value of the automobiles, trucks, trailers, and other automotive equipment, which these companies will have on December 31, 1954, taking into consideration the average age of the equipment at that time. Those cars will be 18 months old at the time as an average, and although we are obtaining from 40 to 60 percent of their value on trade-in for new equipment, we could not get that on a cash sale. I believe we will be able to get about 30 percent of their original cost.

On pages 34 and 81 of the exhibit are shown the telephone systems of the two companies, respectively. I have already testified as to the cost of reclaiming copper wire. The salvage value is based entirely on the 7½ cents per pound price at Chicago, which is shown as a part of the exhibit. In addition to this copper wire, there is an item of $511 shown as the salvage value of certain telephone equipment to be added after June 1, 1939. We do not believe that there is any other salvage from the telephone system than a net salvage $97,068 for the telephone system of Natural Gas Pipeline Company of America net salvage of $15,521 for that of Texoma Natural Gas Company and an additional $511 for equipment added after June 1, 1939. We have other features of construction which were given consideration, for instance the poles, the cross arms, and the pins, the insulators, the guys, and the anchors, radio equipment, repeaters, test sets, and all of this we felt had no value whatsoever on reclaim. These are light poles, 5 inches at the top, 20 feet high, and they cannot be moved. The butts will all be rotted to the point where you cannot cut the 5
830 feet off and get any salvage for a 15-foot or a 14-foot
light pole of that character. The telephone poles are on the south half of the system. They are not in one place and would have to be picked up and loaded at some expense for hauling charge. The other equipment which is commonly referred to as "pole hardware" would not sell for the cost of reclaiming it. I am thinking particu-

larly of the insulators. These insulators are packed like eggs in an egg crate when we receive them and with the best of handling we break about 10 per cent of them on construction. It would be necessary to take these insulators down, many of them would be broken when we would detach them from the pins. We would have to make this arrangement for repacking them and that cost would just exceed anything that we could get out of them. The same would apply to the pole hardware, such as braces for the cross arms and the bolts that are screwed into the poles to hold those arms, and so on. Although the voice repeaters and the ringing equipment which Mr. Bulla referred to will serve our purpose, probably, until the end of the project, the chances are that there will be no resale of this class of equipment at all. They are built with radio tubes, transformers, and relayers and a lot of the small telephone equipment that we have seen on the telephone switchboards. I am sure they would be obsolete by the end of defendants' life. We own a limited number of telephone and test sets, but these will not be reclaimable and will have no value. This equipment will be from 15 to 20 years old at the end of 1954.

As to the radio equipment, we would have to find a buyer. Comparing it with existing conditions, I don't know who would buy that class of material. We have obtained a special permit to operate on a specific wave length from the Federal Communications Commission, and this equipment is not adapted to any amateur or other commercial work that I am familiar with. The radio equipment which we will have at the end of 1954 will be from 5 to 7 years old at that time.

Referring to page 16, and the breakdown on pages 17, 18, 19 and 20, those buildings and houses referred to on those pages will be sold as they exist on the property at the time. This property can be sold without reclaim cost but the buyer will come and get that property as it stands. That is true of other properties shown in the exhibit where no cost of reclaim is set out. Page 20 shows the buildings that will be added after June 1, 1939.

Questions by the Examiner.

In certain places, I have used the percentages of value based on my judgment and on consultation with other witnesses. In other places, I have used a certain money value per unit of weight. The money value per unit of weight in determining gross revenue is a published fact and, in determining the cost of reclaim, it is in some cases my own judgment and in some cases I obtained it through consultation with others. Wherever I have used a percentage of value, or a monetary amount per unit of weight, and wherever I have used my own judgment or consulted with others, I have applied the results of those four factors to the quantity set forth in Exhibit 122 and, thus, have gotten the net salvage value as shown.

831 Information as to the production of natural gasoline under the price trend shown on Exhibit 119 is available in the statistics of the American Petroleum Institute.

The Texoma contracts with the two marketing agencies were arranged on a competitive bid basis; that is, the disposal of gasoline through Phillips Petroleum Company and Columbian Gasoline Company was on a competitive bid basis.

(At this point EXHIBIT 123 was offered and received in evidence without objection.)

832 **M. E. FOSTER**, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(August 29, 1939.)

My name is M. E. Foster. I live in Bartlesville, Oklahoma. I am employed by the Phillips Petroleum Company, an integrated oil company.

In connection with its business, my employer manufactures and handles a commodity known as natural gasoline. I imagine we are the largest single producer of natural gasoline in the industry. This fact, I believe, is recognized by the industry. I have been with the Phillips Petroleum Company approximately sixteen years. My first position was that of a chemist in one of the natural gasoline manufacturing plants. That work lasted for a year and a half or two years, when I was transferred to the sales department, selling natural gasoline to refiners; and then, as we went into the refining business ourselves, I grew into the job of sales manager in charge of tank car or wholesale sales of both natural gasoline and refined gasoline and also fuel oil and all other products that we sold at wholesale. I remained in that position until 1932, when I was transferred to the position I now have, which is coordinator. In my present position, I attempt to see that all the activities of the company dovetail and fit in together, to see that supplies of various raw materials that we work with are adequate and will be, planning ahead to assure adequate supplies. I work under the immediate direction of the president of the company, and my duties cover practically the entire scope of the company's activities including being interested in the purchase and handling of natural gasoline.

I do not negotiate all of the contracts, however. We have a man in one of the other departments charged with that responsibility, but in connection with assuring adequate supplies of natural gasoline, I am very much interested in the amount that we do buy and when we buy it, for what period we buy it, and I advise with him and recommend what we do and what we do not do.

I have kept up with the price tendency of natural gasoline during the period I have been with Phillips Petroleum Company. I am familiar with the history of that commodity and of the price trend. I am shown Exhibit No. 119 on which have been drawn two tracings or curves or charts, tracing by months the fluctuations in the price of natural gasoline and of what is termed as "United States motor fuel." I am familiar with the term "United States motor fuel" as well as natural gasoline.

"United States motor fuel" is a term adopted by the industry to designate motor gasoline normally sold for use in automobiles. The name was adopted from the recommendations of the government for the specifications on which the various government departments buy their motor fuel.

It appears from Exhibit 119 that during the years 1919,
1920, and for several years after that the price of natural
gasoline was substantially higher than the price of United
States motor fuel. That conforms with the facts as they
actually existed. Natural gasoline is not a motor fuel
as that term is ordinarily used. Its principal use is for
833 blending with gasoline made from crude oil to produce
motor fuel. It is one of the constituent elements often
entering into United States motor fuel. There were several
reasons why this raw product was worth more than the

motor fuel into which it was blended. Naturally, the amount of it that was available, the supply and demand, fixed the price, but I believe probably the best explanation would be that back in those earlier days, 1919 and along there to 1922 and 1923, the refiners found that by the use of proper fractionating equipment they could cut more deeply into the crude oil and still maintain the end point specifications as set out for United States motor gasoline and increase the yield of gasoline from a barrel of crude. By so doing, even though they did not get it too heavy on the back end, the average of the gasoline produced in that way was not volatile enough to burn satisfactorily in automobiles. They could, however, buy the natural gasoline and blend with it, and build up the volatility to the point where it would burn satisfactorily as a motor fuel. They could well afford to pay a premium rather than reduce the amount of yield from a barrel of crude. By utilizing it and paying a premium for it, they were able to get more United States motor fuel out of a barrel of crude.

That is not the situation today. Back in that period, the industry had not discovered octane number. The automobile engines were of relatively low compression and fuel made in that fashion was entirely satisfactory. As the automobile industry developed, they found that they could make more efficient engines by increasing the compression ratio, and the oil industry found that gasoline made in that fashion would not work satisfactorily in these higher compression engines, so they started improving the octane number by cracking and reforming parts of the crude oil, and in more recent years even by cracking what was originally the best gasoline, the straight-run gasoline, no longer sold in very large quantities. They even put such gasoline into what is known as the reforming still for the purpose of changing the chemical structure of this gasoline to where it would have a higher octane number. In this cracking and reforming process, the refiners produced not only a gasoline that had a higher knock rating but also a more volatile gasoline, so that they found that the natural gasoline was not so essential as it had been formerly.

However, they did not discontinue using natural gasoline altogether. Natural gasoline is still produced and still used. The only difference is that now the refiners tend to use it only when they are able to buy it at a price which will afford them a profit on the use of it. One way of putting it would be to say that the situation has changed from the days when natural gasoline brought a premium and the refiners had to have it, from what was then termed a sellers' market to what is commonly known as a buyers' market. There are other factors of course, depending on the supply of the material available and the demand for it. That fluctuates, and you can see those fluctuations there, in fluctuations in price, but the trend has been gradually downward. The circumstances that I have reviewed account for the gradual downward trend of the price of natural gasoline.

The chart shows the price for motor fuel in 1938 was lower than it was in 1937. Those prices would seem to be in somewhat constant relation there over the last four years; but the natural gasoline prices are considerably below the motor fuel prices, bearing out what I said a moment ago, that the refiners now will use the natural gasoline if they can buy it at a price at which they can make a
834 profit, but they are not obligated to purchase it, and
they can make their motor fuel without the natural gasoline. They buy it now as a commodity on an exchange basis and not as a necessity. That is true in general. You understand that there are all sorts of refineries. Some operate in one way and some in another, and there may be and probably are a number of refineries today which are still buying it as a matter of necessity. There are refineries operating without cracking plants today, although they are in the minority.

What I am endeavoring to do here is to outline the trend of the industry, the vast majority of the industry. The apparent fluctuation in the price beginning about the middle or the latter part of the summer and moving up until about the holiday season or the end of the year and then dropping, which seems to be characteristic of the annual behavior of natural gasoline prices, is brought about by the fact that the natural gasoline production is for practical purposes uniform throughout the year. These plants run day after day and produce roughly the same amount every day. The demand for it, though, is not uniform. The refiners prefer to buy their natural gasoline in the fall and winter months when they can blend it with their own production to better advantage.

One major value of natural gasoline is volatility, and volatility in motor fuel is highly desirable in the fall and winter months. So there is more demand during the fall and winter months than at any other time of the year. It is rather a perishable commodity and due to its vapor pressure, it requires special storage and rather expensive storage to store natural gasoline. As a result, very little of it is stored. It is produced and disposed of currently. That merely means that without the demand in the spring, the price reacts and goes down to where refiners will buy, then in the fall, without much reserve in storage, as the demand increases the price naturally reacts. Natural gasoline is a seasonal demand product.

Cross-Examination Interposed by Mr. Slaff.

The demand for motor fuel of course begins to fall off rather sharply in November and December. The seasonal demand for motor fuel, and the periods of the best demand for natural gasoline, while they vary for individual years, are September, October, and November. Those are the best months. You will find some years that the price carried through January in fairly good shape, in other years, it breaks off in November, depending again on the supply that is on hand and the demand, and largely on what the price of United States motor gasoline is at the same time.

Direct Examination Resumed by Mr. Morgan.

They are still using natural gasoline for such motor fuel as is being consumed during the winter months, but in less quantities because there are parts of the country that get so cold that automobiles are kept in the garage for a large part of the time. In other words, the percentage of natural gasoline used on through the winter months remains high, but the total volume is down. The production of natural gasoline does not vary seasonally as refinery production varies. So far as it is produced by natural gas companies it is a by-product, but so far as natural gasoline or casinghead gasoline plants are concerned, it is a main product with those plants. It is an incident to the production of crude oil and its production varies directly 835 with the production of crude oil. There would be substantially the same quantity of natural gasoline produced in the casinghead plants, depending on the volume of oil produced, and also from the natural gas which goes into pipelines and into carbon black, regardless of the season of the year. I concur in the view that there is a direct and definite relationship between the price of United States motor fuel and the price of natural gasoline. The relationship is likely to continue. It is particularly true with reference to maximum natural gasoline prices. The refiners have a tendency to discontinue the purchase of natural gasoline when the price increases to the point where it approaches the value of United States motor fuel.

I stated that Phillips Petroleum Company is the largest producer of natural gasoline in this country. Phillips handles other gasoline than that which it processes itself from casinghead gas and natural gas. We purchase a large quantity in Oklahoma and Texas, including the Panhandle.

It is the usual practice and custom of those handling natural gasoline to make a brokerage charge for the handling of the product. Where the sales agency handles the sales for the manufacturer, it is customary for him to make a brokerage or sales charge to cover his expense and profit of the business. In the purchase of gasoline for our own purposes, whether it be to blend with refinery gasoline at our own refinery or to re-sell, we endeavor to buy at a differential under the posted price.

Concerning brokerage or differential, each individual contract is subject to negotiation. It depends upon the salesmanship of the buyer and seller. All sorts of different bases are used in the industry. At the time I was actively engaged in the sale of natural gasoline, I would say that the average commission in those days ran about ¼ of a cent a gallon. While I have not been so closely associated with sales in recent years, I am inclined to think that the same type of brokerage commission is still customary practice. However, I am inclined to think that it is somewhat smaller than it was then—somewhat smaller than ¼ of a cent. Although I am not directly engaged in that at this time, it is my understanding that the sales commission would certainly average ½ of a cent.

To that the gasoline plant owner would have to add other charges that would come out of the total quantity of gasoline which he shipped to the refinery. It is customary trade practice for any outage or evaporation loss in the shipment to be charged back to the plant owner, for which, of course, he is not paid. He must also stand the freight on the outage which the customer has originally paid, but which he bills back to the producer. As natural gasoline is usually sold in North Texas or in Texas based on the Breckenridge freight rate to the Gulf, if the producer's plant is so located

that his rate to the destination is higher than the Breckenridge rate, he would have to stand the freight equalization in addition. Of course, his loading losses would be for his account, but that could hardly come in here, since we would start from the point where he loaded the gasoline in the
tank car. Therefore, there are the three charges—out-
836 age, freight on outage, and freight equalization—and
in my judgment, ⅛ of a cent brokerage charge prevailing at the present time.

Phillips Petroleum Company has a contract at this time with Texoma Natural Gas Company for the purchase of natural gasoline. I know about the circumstances under which that contract was negotiated, because it so happens that I was personally present in most of the negotiations of this contract. As to whether there was an allowance for brokerage in that particular instance can best be explained by stating the basis of the contract. We agreed to pay them the low market price as quoted in the trade paper, National Petroleum News. That was the renewal of the price under the former contract, or I might say, that is the customary sales price of the industry, and the only sort of commission or concession we were able to get out of this particular contract was the 2 per cent volume allowance for losses in handling. We pay them for 98 per cent of the gasoline gauged in their tanks. That contract runs until June 1, 1940.

I dealt with Mr. Davidson of the Texoma company in the renewal of that contract at its last expiration date. There were some side issues or considerations involved in the renewal of that contract. In order to secure the gasoline at the price stated, we were obliged to lease 100 tank cars at a rental of $25 a month per car for the period of the contract. That amounts to $30,000 a year. We did not want the tank cars. We wanted to put the gasoline into a pipeline system which connected to our plants and refineries, but in order to get the gasoline we had to take the tank cars, and we wanted the gasoline. It was necessary for us to take the tank cars in order to get the gasoline because there was an understanding or informal arrangement, as I understand it, between the Texoma company and the owner of the tank cars. We were told by Texoma at the time of the negotiations for the contract that such was the case. They said they had a moral obligation with this other company to sell them the gasoline. They stipulated the terms in the agreement as to the use of those cars. (Objection and motion to strike by Commission Counsel overruled and denied.) We wanted the gasoline. Texoma told us that they had a moral obligation to this other company, which had acquired these tank cars with the understanding that Texoma would sell them this output, and Texoma was in the embarrassing position, if they sold us, of not keeping their agreement with the other company. The other company was willing to give up that part of the gasoline which Phillips bought, which was one-half of the total production of Texoma's plant, only on condition that one-half of those tank cars would be taken off their hands on a rental basis. This involved a cost to Phillips Petroleum Company of $30,000 in addition to the market price less two per cent, which Phillips agreed to pay. It is my understanding that Phillips has no use for these cars. (Objection by Commission Counsel to above testimony overruled.) We were willing to pay this rental at a cost of $30,000 a year because we wanted the gasoline. We had certain sales commitments which, together with our regular demand, necessitated the purchase of additional natural gasoline in this particular area where it was needed, and we naturally bought the gasoline on the best basis we could buy it at the time.

We have other gasoline facilities and plants of our own in the same general vicinity as the Texoma plant. We also buy from others in the same area. We are not now in the same situation with reference to a need for this gasoline that we were at the time we renewed the contract and agreed to pay this premium and the market price with only the two per cent allowance for brokerage or
837 marketing expense of which I have testified. We have installed transportation facilities from Oklahoma City to our Kansas City refinery whereby we can move gasoline produced in Oklahoma to our Kansas City refinery as economically as we can move it from the Panhandle area where the Texoma plant is located. (Objection by Commission Counsel overruled.) I have been hopeful that this contract would be renewed but not on the same terms. As I have testified previously, this is rather a high price to pay for natural gasoline compared to the average price prevalent in the industry. We bought it at a time when we needed it and we paid for it. If the contract was up for renewal now, we would no longer be in that position, for we think we have now achieved the desired position. It is possible by next June, which is some distance away,

that circumstances will alter so that we might even be willing to renew the contract on a more favorable basis, but in my judgment, that is extremely unlikely. By "on a more favorable basis" I meant on a basis more favorable to Texoma.

Questions by the Examiner.

I am enabled to make that statement because it is my responsibility to follow the estimates made by various operating departments with reference to future production of natural gasoline, refinery gasoline, and, in connection with those estimates of supply, the estimates of our sales department as to what quantities they will require. We are constantly planning future activities in order to be sure that we will have ample supplies of the required quantities and qualities of gasoline at the proper time in order to meet our sales commitments. We were very reluctant to renew this contract this year before we had the new facilities which we now have. We make a monthly forecast covering the next twelve months period. The last forecast made, as of the first of August, would cover the period ending July 31, 1940. That forecast covers the quantities which we will produce balanced against our estimated sales. We estimate what we have already contracted to purchase. We have definite contract commitments from a number of manufacturers which we can count on definitely as a part of our supply. This Texoma gasoline is not treated as a commitment beyond the terms of this contract. We count in this calculation only that gasoline which is firmly contracted for.

Direct Examination Resumed by Mr. Morgan.

So far as we can see today, we will not require that gasoline on the present terms by the time that contract expires.

Cross-Examination by Mr. Booth.

The principal use for natural gasoline is in connection with blending motor fuel. It is also used in blending to make aviation gasoline, or it can be used solely as an aviation gasoline without blending if the lighter end of the material be removed by fractionation. There are some other minor uses. It is sometimes used to pump down in oil wells in an attempt to dissolve parafin accumulations. It is used rather unsafely as a cleansing fluid to take grease out of clothes, and it can be used in cigarette lighters. The principal use, as I say, is for blending to make motor fuel.

While Phillips may use the natural gasoline it buys, or sell it to others, the deduction it makes below the market price is commonly called a brokerage charge because it is a concession that the gasoline plant is willing to make to avoid the necessity of organizing and maintaining a sales organization. 838

Cross-Examination by Mr. Slaff.

I do not believe I have testified in any other cases on similar matters. I have never testified in any other lawsuits or rate cases.

839 W. D. SMITH, a witness for the defendants, testified as follows:

Direct Examination by Mr. Morgan.

(August 29, 1939.)

My name is W. D. Smith. I live in Tulsa, Oklahoma. I am engaged in several different businesses. I am vice president of the Worthington Machinery Corporation of Oklahoma, a sales agency primarily engaged in the selling of new machinery. This company has dealt also in the buying and selling of second-hand machinery. I am vice president of the Dumar Oil & Gas Company of Shamrock, Texas, which for years engaged in the production of natural gas. I am a partner in the Gasoline Plant Construction Company of Houston, Texas, which company is engaged in the construction and operation of natural gasoline plants. I am also part owner of a small company in the vicinity of Monument, New Mexico, which is engaged in the distribution of electric energy.

I am a graduate mechanical engineer but have never engaged in the practice of engineering as such. Since leaving the university, I have been employed by the companies already mentioned, except for a period from 1923 until the end of 1926, when I was employed by the Worthington Pump & Machinery Corporation of Buffalo, New York. I took a student engineering course in this plant and was later field test engineer for that company. I have never been employed by the Natural Gas Pipeline Company of America or Texoma Natural Gas Company. I have never been employed by the Standard Oil Company (New Jersey), or The Texas Company, or the Columbian Carbon Company, or the Cities Service Company.

There is no relationship between the Worthington Pump & Machinery Corporation of Buffalo and the Worthington Machinery Corporation of Oklahoma, except that the Worthington Machinery Corporation of Oklahoma is a sales agency operating in the state of Oklahoma for the sale of the products of the Worthington Pump & Machinery Corporation and of other machinery manufacturers—namely, the Hercules Motor Company of Canton, Ohio—and at times we have sold the products of other machinery manufacturers.

I am familiar with the equipment referred to here in the room yesterday and today as the Worthington compressor units. I am familiar with practically all of the machinery and equipment shown in Exhibit No. 122.

Since 1927, I have been engaged in the states of Oklahoma and Texas in the sale of new machinery and in the purchase and sale of used machinery. I helped organize a company—namely, the American Natural Gasoline Company at Shamrock, Texas—in the early part of 1934. This is in the Panhandle field near the town of Shamrock, in Wheeler County. I was one of the original organizers and was in complete charge of the building and operation of that plant for several years. The plant was shut down by order of the Railroad Commission of the State of Texas in February, 1936.

Early in the year 1937, I was instrumental in forming the corporation known as the Gasoline Plant Construction Corporation, which operated under the name of Western Supply Company for a time, although it had no connection with the Western Supply Company. This Gasoline Plant
Construction Corporation has built ten natural gaso-
840 line plants in Texas and Kansas during the past two
and one-half years. These have all been turnkey construction contracts and I estimate about one-half of the total plants in the Mid-Continent area have been built under turnkey contracts. These plants were built for the Humble Oil & Refining Company, Cabot Carbon Black

Company, The Natural Gasoline Corporation, Southern Minerals Corporation, the Hammond Exploration Company, and Agua Dulce Company. The Gasoline Plant Construction Corporation has charge of the operation of the Natural Gasoline Corporation plant at Aransas Pass, Texas.

Cross-Examination Interposed by Mr. Slaff.

A turnkey contract is a contract whereby we as contractors undertake to design, supply the material and build the plant and then turn it over to the operator. In other words, we start with a level piece of ground, where there is nothing on it, and finish with a gasoline plant ready to operate and turn it over to the owner. We have done work both on a cost-plus basis and on a stipulated price contract.

Direct Examination Resumed by Mr. Morgan.

I am familiar with the character and cost of material that enters into natural gasoline plants and with the building and operation of such plants. I have seen the natural gasoline plant of Texoma Natural Gas Company as recently as last Wednesday. I have known about that plant for several years, in fact since the time it was built, and I saw it on one other occasion about six years ago. I went through the plant last Wednesday, viewed the equipment and ascertained the type of equipment that is used in the operation of that plant, observed the buildings on the premises, their location, their cost, their size, and other things concerning them. I have also seen the Gray compressor station in the Oklahoma Panhandle near the town of Perryton, Texas, and the meter station and regulator station near Joliet, Illinois. I did not go to the other stations north of Gray, Oklahoma and on up to Geneseo, Illinois, as I was told that the other stations are practically identical to the Gray, Oklahoma, station. I examined the station last named to see what type of equipment was utilized there and looked at the buildings to ascertain their size, their location, and so on.

The experience of Worthington Machinery Corporation of Oklahoma, and I as an officer of it, has been very poor in buying and selling used machinery. We primarily are not engaged in the buying and selling of second-hand machinery. Most of our business is in the selling of new machinery, but in the selling of new machinery we are frequently confronted by prospective buyers with taking in second-hand machinery which they have on hand. Frequently, in order to sell new machinery, we have had second-hand machinery forced on us. In other cases, we have bought some second-hand machinery as such and have resold it. We have found it very difficult to sell this second-hand or used machinery.

From the standpoint of a project like these pipelines which have constructed gathering lines in the Texas Panhandle, gas wells scattered over the Panhandle field, compressor stations at intervals of 90 or 100 miles from the Texas Panhandle up to Geneseo, Illinois, and some 950 miles of pipeline of the larger dimensions, besides the smaller pipelines, the owners would have to place their equipment in the hands of dealers or sell it to dealers who are buying and selling that type of material every
841 day in order to dispose of it, as the Texoma or Natural Gas Pipeline Company are not familiar with the markets for such equipment and machinery. This handling of used machinery and equipment is a specialized field and requires the maintaining of an organization to keep up with where there might be demands for that kind of stuff. I doubt if those who have been operating the pipeline would be in a position to know where to sell to the ultimate user that type of equipment. If the equipment was of a character that it could not be sold as used equipment, it would have to be junked and sold to the junk dealer or transported to a scrap market.

This picture, marked Exhibit No. 123, is a picture of the Fritch compressor station containing 12—1250 horsepower horizontal twin tandem gas engine compressors. These engines are approximately 46 feet long, 24 feet wide, 9 feet 4 inches high. The larger elements of these engines are the power cylinders of which there are four weighing approximately 13,000 pounds each, the main crankshaft weighing approximately 20,000 pounds, the flywheel weighing approximately 25,000 pounds, and the main frame, of which there are two, weighing 42,000 pounds each. The parts I have mentioned are all cast iron with the exception of the crankshaft. The latter, the connecting rods, bearings, and piston rods are steel, and also other parts of a smaller nature.

I had nothing to do with the sale of these units to defendants. In fact, I have never sold either one of these companies any equipment or machinery. The demand for this type of equipment is in the main for trunk pipelines only. It is in very rare instances that engines of this size have been sold for any other purpose whatsoever. The manufacturing of these machines is very erratic. It is either a feast or a famine. There are years when Worthington has not built any machines at all of this size. In the case of the Panhandle gas field, they built a large number of units over a period of a very few years. My own experience while at Buffalo during the years 1923 to 1927 was that I do not recall their building a single engine of this size during that period. We have had no experience at all with buying and selling used machinery of this type. Until last night, I never heard of a single instance of such a transaction. However, Mr. Davidson informed me last night that there was a case where, when he worked for Cities Service Company, they bought three units from the Ohio Fuel Company and moved them some place from the East to the Mid-Continent. He told me, however, that these machines had only been used for a short period of time. There is only one other instance I know of where such machines have ever been taken off the foundations, dismantled and re-assembled in another location, and that was in the case of the Oklahoma Natural Gas Corporation where they moved several units from Shamrock, Oklahoma, to near Ballinger, Texas.

Being in the machinery business, we have calls all the time for various kinds of second-hand machinery. To my knowledge, my company has never had any call for engines as large as these Worthington compressor units, which were second-hand and twenty years old. These units are not stock equipment. The manufacturer builds them to special order. The engines owned by the defendants were built to special order and on special specifications. Assuming that these engines were 20 years old, I would say 842 that they would have no value at all and I would not give a dime for these 63 engines as far as re-assembling or dismantling them and moving them to a new location and putting them back in service again is concerned. (Objection by Commission's counsel overruled.) The only outlet would be to break them up and sell them for scrap. I have never known of a pipeline which has installed used equipment of this kind as a part of its operating machinery. There is no other use for this type of machinery. Occasionally the manufacturer of such machines has built power engines of the same size for driving either generators or pumps. However, the cost of taking these compressor units and converting them into power units would be so much, it would not be a commercial possibility. I recall that I sold 16 engines of this same general type of a smaller size, 700 horsepower, to the Phillips Petroleum Company sometime in 1930. They now have a number of these units which are not operating and which they have tried to salvage themselves for other purposes, and at each time they have gone through the calculations of taking these compressor units and rebuilding them into power units. The cost of doing this work was more than they could buy new power units for, so they let them stand and bought new ones.

Questions by the Examiner.

We are engaged in the sale of products manufactured by the Worthington Pump & Machinery Corporation, which corporation is not connected in any way with the Oklahoma company. That was new machinery we sold to the Phillips Company but was of the same general type as that used by Texoma. The products of Worthington Pump & Machinery Corporation vary from engines of this type here, condenser engines, air compressors, gas compressors, motor driven, steam driven, centrifugal pumps, direct acting steam pumps, condensers, water feeders, a general line of machinery. I have handled that line personally in the state of Oklahoma and have actually sold machinery of all of those types. The sales of machinery in Oklahoma are naturally in large part to the oil companies and pipeline companies, including all branches of the oil and gas industry.

Direct Examination Resumed by Mr. Morgan.

I am familiar with the equipment referred to as PIW and AOS scrubbers which belong to defendants. I have seen these scrubbers at Fritch, Gray, and Joliet. I have also seen the Blaw-Knox scrubbers. I know of no salvage value for these scrubbers except as junk. They are especially built to remove the dust from the natural gas going through the pipeline and are highly specialized equipment and I know of no other place where they could be used as such. The same is true of the 98 horsepower Casey Hedges water tube boilers, and equipment of that kind, belonging to these companies. The cost of tearing down the brick settings and moving to a new location would greatly exceed the cost of new boilers of that style and size.

I have sold lots of equipment of the type listed under Account No. 1006-E, including engines, generators, and so forth, and including the Cooper-Bessemer 175 kw. generators, the 25 horsepower motors for air compressors, and the other equipment listed on page 25 of Exhibit No. 122. It is possible that defendants could sell equipment of this type. However, bearing in mind that it will be 20 years old when it is salvaged, or when that pipeline is shut
843 down, it means that this equipment will have to be sold to a dealer. The dealer in buying it would have to remove it from its location, take it off its concrete foundations, load it on cars, and move it to his warehouse. There is not a ready market for the number of generating units listed in this account. The dealer, therefore, would have to hold them a number of years, in all probability, before he could sell them and would have to recondition the engines and generators before he could make a sale. Ordinarily a plant of this character would cost approximately $100 per kilowatt, including the foundations, the building, the generator and accessory equipment, and I feel that machines of this age would not have a salvage value of over $5 per kilowatt. It is very doubtful if a dealer in buying such a plant, would realize anything from the engines themselves. His salvage would be more on the electric equipment than it would be on the gas engines.

It is necessary to recondition that equipment, even though it was used right up to the time the pipeline ceased to do business. A dealer could not afford to take any chance with the condition of these engines. In order to satisfy himself in his relationship with a prospective customer, he would have to protect himself and tear the engines down and rebuild them, do whatever work was necessary. After he had moved this type of machinery from its location on the properties of these pipelines, paid the hauling, the freight and handling charges and costs, the reconditioning cost, and things of that kind, he might over a course of years be able to sell equipment of this age at a price not to exceed $20 per kilowatt. During the time that he would have to keep it after reconditioning, he would have the expense of warehousing and paying taxes on the equipment. In this connection I might point out an example of a similar power plant which we purchased five or six years ago from the Carter Oil Company. This plant had three gas engine driven generating units approximately 125 kw. each. We paid $10,000 for this plant complete, including the buildings and water pumps, cooling towers, cooling coils, and everything else, and the switchboard in that plant. We reconditioned the engines but, due to their size, we did not feel like moving them from their location 100 miles from our warehouse, so we kept a watchman on the ground approximately three years. Then we finally sold this plant for $14,500 and considered ourselves very lucky to get out of the deal.

You might check back to the price per kw. We paid a greater price per kw. than is indicated here due to the fact that these were only four years old when we bought them, but even so it shows that it is very difficult to sell second-hand machinery of this type. There are very few companies that would buy it. None of the major oil companies themselves would consider the installation of second-hand equipment of this type, so we have got to go to the smaller, hardly able oil companies in order to sell it. By "hardly able oil companies" I mean companies operating on a shoestring with limited financial resources. This sort of transaction usually means that with equipment of this type, considering the type of companies you have to sell it to, you are taking a credit risk when you are finally able to make a sale, and at that time you usually have to put up with additional terms on it.

844 There are a large number of electric motors on page 25 and appearing elsewhere in this exhibit. Treating these motors as such, I feel that the salvage value of 10 per cent allowed is very high. This takes into consideration no reclaim value. The dealer would pay 10 per cent for motors which are 20 years old at their present location and then have to move them from their foundations, load them on cars, transport them to his warehouse, recondition them in some cases where the insulation would be gone, and take a chance on being able to realize not over 20 to 25 per cent of the new price of the motors after he has gone through this work. I feel, therefore, that a value of 10 per cent is more than a company could afford

to pay for such motors. The same thing would apply to all motors in this exhibit.

Referring to the item "Machine Shop Equipment" costing $24,824.43, which is given a listing of 15 per cent of cost, I know what machine shop equipment is. It consists in general of small tools, small lathes and drill presses, grinders, etc., which at times have a ready market, and I feel that a value of 15 per cent for such equipment is adequately high; that is, at its present location.

Referring to the tanks, I am familiar with that type of equipment. In general, tankage 20 years old has no value except as junk. However, I have allowed a price of 5 per cent of the original cost at its present location, which I feel is more than most dealers would give for such equipment. That applies to all tanks, except those which are too large to haul. On page 27, there are some nine 100,000-gallon elevated tanks which are immense structures and which could not be moved to a new location. They are riveted tanks. The smaller tanks, as a general rule, can be moved without tearing them down; but a large tank like a 100,000-gallon tank or a 200,000-gallon tank which has been riveted there on the ground—that is, the sheets are held together by rivets applied after the material composing the tank has been put on the ground—cannot be so moved. The only practical method of cutting down a tank of that character is to use acetylene cutting torches. It is impractical to go there and take a chisel and knock the heads of those rivets and get them out that way.

There are a large number of buildings at the Fritch plant and also a number of buildings at the Gray plant. These are structural steel buildings. The framework, trusses, and all parts are made of steel and the walls and the roof of the main compressor buildings are covered with transite, a fabricated material. The only way to dispose of buildings of that sort in large numbers is to sell them to dealers in this type of equipment. There are dealers who make it a business to go out and acquire buildings of that kind, dismantle them and then resell them. Referring to the smaller buildings, the auxiliary buildings, warehouses, garages and buildings of that type, I believe they could be salvaged for 10 per cent of their original cost on the foundations where they now are. I mean 10 per cent of the cost of the movable material. I base this on a general knowledge of buildings of this type in the Mid-Continent field, the going price of such buildings. These smaller buildings could be resold by a dealer to operators of natural gasoline plants; while such operators would not consider the use of second-hand machinery, they would feel that they are taking no risk in installing second-hand buildings.

845 The larger buildings, such as those which house these main compressor units and those other large buildings that I saw out there on those sites, could not be handled in this manner. There is no use for buildings of this size in the oil industry except for main gas line compressor station buildings. They would, therefore, have to be refabricated by a dealer into smaller sized buildings, and the dealer would not pay the percentage for the larger buildings that he would for the smaller ones. In all dimensions, these buildings are too large for rehandling and reassembling for ordinary commercial purposes. By "refabricating" I mean that the dealer would have to completely dismantle these buildings, move them to a shop and cut the various parts of the building into smaller sizes and then re-erect them at some new location as smaller buildings. That additional expense would cause the dealer to pay a smaller price for the larger buildings than he would for the smaller buildings. Ten per cent would be my judgment as to the small buildings and 5 per cent for the large buildings.

On page 25 of this exhibit is listed at the bottom of the page "18 C. P. Air Compressors" and "36 Dayton Dowd Centrifugal Pumps"; also, certain steam pumps, duplex pumps, and equipment of that character. This type of equipment can be overhauled and resold. However, it is my experience and the experience of others buying second-hand air compressors of this small size, centrifugal and direct-acting steam pumps, that if we were given this type of equipment free, considering its age, we could not replace the defective parts and pay the expense of hauling it from its location to our warehouse, and pay the machine shop charges and labor required to do the work, and sell it in competition with new pumps. I have had this experience in buying a large number of pumps of all sizes and types, and as a general thing it is impossible for us to recondition these pumps even though they are on our books at no cost. We have a warehouse full of them in Tulsa. We will sell them for scrap eventually. I might further add that on centrifugal pumps and direct-acting steam pumps, the cost of replacing parts greatly exceeds the cost of the complete new pump. If you would have to buy a complete set of working parts for a pump, the cost of these parts alone exceeds the cost of the complete new pump.

I am familiar with the type of equipment known as transformers, listed on pages 30, 31, 65, 66 and 77, under Account No. 1006-I, as "Electrical Material (Exclusive of Motors)". I have sold new transformers and have purchased some second-hand transformers. These transformers will have to be sold to dealers engaged in the buying and selling of second-hand electrical equipment. Considering the fact that they will be approximately 20 years old, a dealer would not pay over 5 per cent of the original cost at their present location. That is true of all similar types of equipment; that is, similar equipment of that type listed on the various pages above enumerated.

I have studied the list of equipment shown on pages 32, 33, 67, 78 and 79 of this same Exhibit No. 122 under Account No. 1006-J, "Miscellaneous Equipment", consisting of a large number of items. I am familiar with the types of equipment that are listed under this caption with the possible exception of one or two items. I know of no dealer who handles such a wide variety of equipment as is
846 shown on those pages. It seems to me that if a dealer could be found who would buy all this wide variety of material, he would not be willing to pay much of a price for it. There are very few companies that would consider buying second-hand material of this type and the price that I have given of 10 per cent of its original cost is, in my estimation, a high percentage to allow for equipment of this age.

On page 32 are shown 6 Maihak engine indicators which cost $1,056. I own one of these indicators myself and have it in Tulsa. I have had no use for it for the last 13 or 14 years and at various times have tried to sell it for as little as $25 without success. Due to the fact that it is 12 or 13 years old, there is no buyer for such type of equipment. The equipment listed on page 68 should be included in that covered by the observations I have made concerning that listed on pages 32, etc.

I have studied the list of material under the heading "Meters and Regulators", Account 1009, shown on pages 35, 36, 37 and 82 of the same exhibit. I am familiar with that type of equipment. These meters are all of a type that are not only used in gas pipe work, but they are used as field meters in the measurement of natural gas going to gasoline plants, and there is some market for such meters, although the larger oil companies would not consider their use. As an operator of gasoline plants, I would not install second-hand meters myself, due to the fact that I would not want to get into any squabble with the royalty owners over gas measurement, which would certainly follow if second-hand meters were installed. However, there are some companies which do move their meters around and buy second-hand meters. The price that I have allowed here of $25 a meter is the present market price of second-hand meters after they have been reconditioned and put in salable condition.

On page 35 and other pages listing the meters, I have used a price for the large meters of $25 and a lesser price for the smaller meters. It was my offhand guess that the regulators and governors shown on pages 36 and 37 would be worth 10 per cent of their original cost. This was before I visited the Joliet regulator station. After considering this matter further and visiting the site of the installation, I do not feel that these regulators would have any value as second-hand equipment. Such a type of equipment as this is very special and there is a very limited second-hand market for such equipment. Also, there have been many improvements on regulators of this type, and regulators 20 years old are, as a general thing, obsolete. It is now my judgment that those regulators at 20 years of age would have no value except as junk.

I have gone over and studied the list of miscellaneous equipment under the caption "Tools", Account 1013, appearing on pages 43 to 47, inclusive, and on pages 87, 88 and 89 of this exhibit. I have seen much of this equipment in the Fritch and Gray stations. I have indicated a 10 per cent salvage price on this equipment, which I feel is more than ample to allow for equipment of this type, since the same objections apply to this equipment as to that on the previous page, in that it could not be sold to one dealer except at a sacrifice in price. In other words, there is such a wide range of equipment listed on those pages that no one dealer could be handling all of it.

847 The equipment listed under the caption "Wood Frame Buildings" appearing on several pages of the exhibit—namely, pages 21, 56 and 84—consisting of 4-room cottages, 5-room cottages, duplex cottages, bunk houses, 5-room boarding houses, and office buildings, is listed at

$100 apiece. I have seen the houses at the Fritch and Gray stations. I am not a dealer in real estate and have never bought or sold any houses. However, my observation regarding these houses is that they are of the same general type of oil field cottage, of which there are thousands in the Texas Panhandle, which have been built since the discovery of oil and gas in this area. In time this oil field will be exhausted and there will not only be these houses for sale, but there will be thousands of other similar houses for sale. The population will dwindle to practically nothing, the same as it was before oil and gas were discovered in this area, which is what is commonly known as the "dust bowl" of the Texas Panhandle, Oklahoma Panhandle, and western Kansas. The population, outside of the people engaged in the oil and gas business, is practically nil and is confined to those engaged in ranching and dry farming. Instead of having a salvage of $100, it would be my judgment that the company would have to stand the expense of tearing these houses down and getting rid of them, due to the fact that there will be thousands of them available at such time. I had nothing to do with the salvage value placed on those items, but I am stating my judgment about it.

The figures about which I have been testifying, dealing with the salvage values of machinery, steel buildings, and things of that kind, are largely mine. (Motion by Commission Counsel to strike testimony with respect to estimates of salvage value which have been prepared by somebody else denied.)

My testimony concerning the salvage value of the wooden frame buildings is confined to those located in the dust bowl area above mentioned. I would have no judgment at all as to what these buildings would be worth on the north end of the line. I have no knowledge of conditions there.

I have lived in the Texas Panhandle for 2½ years and I am familiar with conditions in that area. I am familiar with the equipment shown on page 22 under Account No. 1006-C, captioned "Water Well Equipment", and on page 23 is a list of equipment of the same kind to be added hereafter. As regarding the motors, the same percentage is applied here as has been applied elsewhere in the exhibit; namely, 10 per cent of the original cost at its present location. Somehow or other a price of 10 per cent was allowed on the vertical deep well pumps. I do not know how that got into the exhibit as, in my opinion, these pumps are worthless except as junk. Vertical deep well centrifugal pumps are designed to handle a given volume of water at a certain depth through a certain sized casing and it is very doubtful whether pumps which are so special, and which have such special characteristics, could be moved to other water wells where they would be required to handle a different volume of water under different operating conditions. These pumps are operating in wells containing a certain amount of sand and at the time they are pulled for reclaim they require practically all new running parts. It would be my judgment that these pumps should be left in the wells where they now are rather than to try to salvage them for any purpose. We have been offered this type of equipment a number of times but have never purchased a vertical deep well centrifugal pump second-hand for the reasons above stated. I know of no dealer who would buy a second-hand deep well pump of this type.

848 I am familiar with the type of equipment listed on page 70, Account 1007-B, C, D, "Loading Rack, Siding and Absorbers". I see listed here an 8-car double loading rack, 265,198 pounds of railroad siding, totaling 132.6 tons, and 9 absorbers with controls. The first item, the 8-car double loading rack, is a fabricated steel rack, folded together, and has some market value. It is an item which an oil company would not object to installing second-hand because it is assumed that the steel is in good condition and could be torn down and moved to a new location. However, a double loading rack is less prevalent than single car loading racks. It is only in the larger gasoline plants, such as this, which manufacture daily a large amount of gasoline, that they require a double-car loading rack. For the average size natural gasoline plant which has about half the production of this Texoma plant, they would need a smaller loading rack. However, it can be broken down and shipped to a new location and sold. Considering its age, I have allowed a value of 10 per cent on this item. That is my judgment as to its value.

The absorbers are a questionable item. They are designed for high working pressure and are especially built to meet the needs of this gas pipeline. However, there are natural gasoline plants operating along the Gulf Coast which would use absorbers of this high pressure and this size and I have allowed a value of $1,000 per absorber, including the small controls that are on those vessels, as a reasonable going price for such an item of equipment. I certainly feel that they would not get more than that for those absorbers.

I have had only one experience with railroad siding. That was in the case of the gasoline plant that we built at Shamrock, Texas, where we constructed a spur track on the Rock Island right-of-way. When we shut the plant down and abandoned it, we gave the spur track to the Rock Island Railroad, as we did not feel that we were justified in the expense of salvaging the equipment thereon. In other words, we felt it would cost more to salvage it than we would have been able to sell the material for as salvage.

I think I have testified on the general character of equipment listed on page 71, Account No. 1007-E, consisting of pumps, motors and engines, with the exception of the Clark gas engine driven compressors. These are small machines, smaller than the main line units, and are used in the gasoline plant at Fritch. At the present time, the market price for engines of this size which are not over 7 or 8 years old is $2,500 each, after they have been thoroughly reconditioned by a dealer engaged in the buying and selling of second-hand machines. I have allowed a value of 5 per cent of the original cost for such machines at their present location. It must be borne in mind that these engines will have to be taken off the concrete foundations, moved to the railroad, and then moved to the dealer's warehouse where he would have to recondition them and make sure they were in salable condition before he eventually made a sale. I feel that 5 per cent is ample for these items. I am not talking about these items that are going to be junked, but only of those which show no cost of reclaim and which are dealt with as salvageable equip-
ment which can be sold on the ground to dealers for
849 resale. Those are the items which have percentages
opposite them instead of per ton prices. I am not in the business of buying and selling junk, so the prices where they are given on a per ton basis, I have had nothing to do with at all.

That brings us to the "Miscellaneous Equipment—Gasoline Plant," Account No. 1007-J, shown on pages 78 and

79. This is the same general classification of material as that covered on page 32 about which I have testified. All that I have said concerning the material listed on pages 32, 33, 67 and 68 applies to all of this gasoline plant equipment listed on pages 78 and 79. I cannot conceive of anyone who has a knowledge of the machinery business allowing a higher figure than I have indicated and set out in Exhibit No. 122 for machinery and other types of equipment and materials with which I have dealt in my testimony. In my judgment, these figures represent the fair and reasonable salvage values of that equipment if it was offered for sale at present prices, assuming that it would have the age and use that it will have had by the end of 1954.

In connection with my operating a natural gasoline plant in the Panhandle for a couple of years and with my firm's operating a plant at Aransas Pass, as above stated, I have had occasion to market gasoline. We did not maintain a sales organization but have sold it to brokers in that business. The principal buyers of natural gasoline in the state of Texas are the refineries who are the ultimate purchasers. I have mentioned how it is handled through brokers, who in turn sell it to the refiners. At Shamrock, Texas, we sold our gasoline to the Warren Petroleum Company, with whom we contracted the entire output. We paid them a commission of 3/16 of a cent a gallon when the posted price was below 3 cents a gallon and ¼ of a cent a gallon when the posted price was 3 cents and above.

At Aransas Pass, we are also selling our gasoline to Warren Petroleum Company and paying them a flat quarter of a cent a gallon as brokers. The brokers' commission does not include the outage, the freight on the outage, or the freight equalization. These items are paid by the owners of the gasoline plant. So far as I know, all gasoline plants with very few exceptions pay a brokerage for the sale of their products. We have our ideas as to the future price of natural gasoline. For the past 5 years I have spent most of my time in the building and operation of natural gasoline plants. We are frequently called on by people who do not own or operate gasoline plants but who have natural gas available. They call on us to make estimates as to the cost of building and operating these plants and ask us our advice as to the pay-out of such plants. For the past three or four years, we have consistently used a price of 2-½ cents per gallon net at the gasoline plant for grade 26-70 natural gasoline, and it is our judgment that the price in the immediate future will not vary very much from this. My judgment is in line with that of the other witnesses who have testified that there is a definite relationship between the price of natural gasoline and the price of United States motor fuel. There is no substantial outlet for natural gasoline except to oil refiners.

I am familiar with the type of equipment listed in Account No. 1006-G and shown on pages 28, 62 and 75 of Exhibit No. 122, in which are listed material called 850 Bentube cooling sections, size C-169, and also other sizes. These cooling sections are all of the same general type and are used for gas, water and oil cooling. These Bentube sections are installed in the bottom of the cooling tower and either gas, water or oil passes through the tubes and the cooling water from the top of the tower falls on these sections and cools the medium passing through the tube. These sections are used universally in all gasoline plants. I am assuming that at the time this plant is shut down, these sections will be in workable condition and as such, I have given them a value of 5 per cent of their original cost at their present location. The dealer buying these sections would have to remove them from the cooling tower, load them on trucks and haul them to the railroad and store them someplace in his own warehouses until he has a sale for them. He might also have to replace a number of defective tubes which are of admiralty metal. The gas coils are built for high pressure and have a very limited demand.

The fact that this salvage equipment runs into sizeable numbers of particular units or a very large quantity in terms of pounds or tons makes it more difficult to dispose of it. In a number of instances in this exhibit, it is conceivable that a buyer would pay slightly more than the percentages indicated here, if buying one or two items of the type. In order to dispose of this material piece by piece, it would be necessary for defendants to go into the selling end. A buyer purchasing it all has to consider the quantity that is available and, although he might pay a slightly higher percentage for one or two items, I consider the prices indicated here are very high, considering the vast amount that is going to be available on the market.

The type of equipment in Account No. 1013, "Tools," listed on pages 43 to 47, inclusive, and on pages 87, 88 and 89, was probably acquired by these pipelines one unit at a time, and in selling it out a dealer would have to sell it one piece at a time, or at the most just a few pieces at a time. I do not think a dealer buying all of this equipment would ever sell it all. I think the dealer would finally have to junk part of it. That is illustrative of other items shown in the inventory, especially in the case of laboratory equipment and special apparatus, thermometers and pressure gauges and equipment that is peculiar to this type of pipeline only.

The equipment called "Compressor Station Engine Parts" and "Warehouse Stocks" listed on pages 94 and 99, consists principally of the Worthington compressor parts. Assuming that the gas in the Panhandle is going to be gone, there are not only the engines involved on this one pipeline, some 60 engines, but there are half a dozen other pipelines going out of this same field. Therefore, all of these engines would be shut down and there would be no demand at all for repair parts, so that the manufacturer would not take them back even if they were new and unused, for no dealer would buy them as the engines would all be shut down. They would have to be junked and sold as ordinary scrap.

Cross-Examination by Mr. Booth.

I base my judgment as to the salvage value of the machinery and equipment on the fact that it would be about 20 years old at the time it is offered for sale. That was true as to all the equipment and machinery. The amounts stated are based on prices prevailing as of June 1, 1939. However, the valuation that I have made on most of the items is on a percentage basis rather than on a dollar basis.

It is stated as a percentage of the original cost. I should
851 not say original cost, I should say the present day
cost as of June 1. I did not obtain the figures shown under the caption "Original Cost Per Unit" on page 87. They were supplied by Texoma Natural Gas Company from their books. I merely estimated the percentage of the original cost that these items would bring if they had been in service for a period of 15 or 20 years. My estimates were based on the original cost which was intended to refer to prices as of June 1, 1939. I only estimated the percentage of value. It is my understanding that the prices shown on the exhibit were the prices originally paid for the material. There might be some difference between the prices in-

dicated and the prices as of the present day. What I did here was to price the salvage in terms of a percentage of the original cost in the light of present day salvage values. I related the present salvage values to the original cost and stated it in terms of percentages. (Motion to strike by Counsel for the Illinois Commerce Commission overruled.)

Cross-Examination by Mr. Slaff.

I intended to apply these percentages to the original cost of the material as paid by these pipelines, assuming that it is of an age of 20 years or thereabouts. The reason I applied those percentages to original cost rather than to present day cost of the same material or the same equipment is that the only information available is the prices that were paid by these companies for this material, and if they were applying those percentages to the present day costs they would necessarily have to go out and get quotations. I did not inquire if the company is preparing a reproduction cost estimate. Some of this material, as far as today's market, may be of higher price, and some of it may be of lower price.

Redirect Examination by Mr. Morgan.

(August 30, 1939.)

The only prices that I had available in estimating future salvage value were the cost prices that these pipelines paid for this material, and I applied a percentage, based on my judgment as of today, to these cost prices. However, this exhibit contains two bases of prices; namely, the original cost of the material installed before June 1, 1939, and prices as of June 1, 1939, for material that will be installed after June 1, 1939. There are very few items on which I have testified that will be installed on this pipeline after June 1, 1939. The bulk of the equipment, the main machinery, is already in place and the future machinery to be installed is a very small percentage of the total. I recognize that some of this material at the time the pipeline is salvaged will be from a few years old up to 10 or 15 years old. However, the main bulk of the machinery will be approximately 20 years old, and any dealer buying all of the equipment would not go through the stations and pick out and recognize just a few items which were 5 or 10 years old instead of 20 years old, because, as I say, the main bulk of the machinery will be approximately 20 years old. In other words, a dealer dealing with the whole mass of material concerning which I have testified would treat the entire material on a lump-sum basis.

Coming back to the Worthington engines, concerning which I testified yesterday, I have since I left the stand yesterday afternoon obtained some information from the general office, for which I had been looking prior to testifying yesterday, as to the number of these engines that have been manufactured and sold in the past. I have here a list received from the Worthington Pump and Machinery Corporation of Buffalo, New York, of all the engines of this size sold since the year 1913. That organization has manufactured at least half of all of that type of large engine units sold since that year. During that 26 years, they have manufactured 250 of these big engines. All except four of them were sold to natural gas pipeline companies. Approximately ¼ of all of them belong to defendants, who own 63.

852 *Cross-Examination by Mr. Booth.*

I determined the salvage value of the meters and regulators shown on page 35 of Exhibit No. 122. I do not know the dates when all of these meters were installed. I have assumed that most of them were installed when the pipeline was built. I did not go over every meter in the system. However, in that connection, I have given a value of $25 to these meters and even though these meters were installed as late as one year ago, I still would feel that that was a fair value for these meters. That in my opinion is a high value.

I determined the salvage value of the transformers but not of the copper wire shown on page 30 of this exhibit. The salvage value was arrived at on the basis of a percentage of the original cost. My understanding of the original cost figures used throughout this exhibit, is that they were for material only and not for any labor involved in setting the equipment up. The prices are those paid by the pipeline companies at the time they purchased the material, ranging back approximately 7 or 8 years ago. I do not have the exact dates when these various pieces of equipment were purchased. It is my understanding that these are the original costs and I am considering all of this equipment as being of an age of approximately 20 years.

The figure $75.50 shown under the caption "Net Salvage" for nine 25 K. V. A. transformers, represents 5 per cent of the original cost. It represents the price a dealer would pay for equipment approximately 20 years old in the light of present-day market for such equipment. Used machinery is bought on the basis of its original cost. The buyer considers the original cost and the seller has in mind what he has paid for such material, and if the cost figures vary, for example if these transformers were bought in 1931 and they have increased in price until today, I have applied a percentage of 5 per cent to the original cost. If I were using the price of today, I would apply a lesser percentage. The percentages I have used in connection with this exhibit are all based on the original cost figures.

In figuring these percentages, I have based them on my judgment of the market as of today and have applied them to the original cost price. That is the way second-hand machinery is sold, on the basis of its original cost. The consideration that the purchaser would give to present-day prices of similar new equipment is reflected in my percentage basis. In the case of a transformer which in 1919 cost $2,000 and which, as you state, in 1939 cost $100, I would not apply the same percentage I have applied here, but would apply a zero percentage. The prices used are the original costs and the percentages arrived at according to my knowledge of present-day values and markets.

The prices used in the exhibit are the prices that the companies paid for the material, but in estimating the percentages applied to these costs, I have used the percentages based on the market for such machinery today. In other words, Mr. Booth has drawn a hypothetical example and my percentage instead of being 5 or 10 per cent on such an item—he mentioned transformers which I have given 5 per cent—it would have no percentage value at all in the light of present-day markets.

853 *Questions by the Examiner.*

In fixing my net salvage value, I used original cost, which is the cost price paid by the company, but in estimating the percentage, I had in mind the present-day market for used machinery.

Cross-Examination Resumed by Mr. Booth.

I have used an arbitrary or definite percentage in practically all cases of 5 or 10 per cent, because it was my opinion that the purchaser of the old equipment would pay 5 per cent of the original cost of the equipment if it was approximately 20 years old.

Assuming that 9-25 KVA transformers were purchased in 1930 by the Natural Gas Pipeline Company for $1,510, I have arrived at a salvage value in the amount of $75.50, by taking 5 percent of the original cost. Assuming that in 1950, when the equipment is 20 years old, the cost new of similar equipment instead of being $1,510, is $15,010, a prospective purchaser would pay 5 percent of the $1,510.

If you assume, as you state, that the transformers cost the company $1,510 in 1930 and could be purchased new in 1954 for $150, the percentages would have to be varied then in the light of markets in 1954. I have based my percentages in the light of the market as it exists today and that percentage is related to the original cost, but the basis of the percentage is in the light of what the market is today for second-hand machinery.

Cross-Examination by Mr. Slaff.

When we go to buy a second-hand transformer, we determine the price that was paid at the time it was purchased, say 10 years ago. The seller has in mind the price that he has paid for the equipment; in every instance, when I am buying second-hand material, I first make an investigation to determine what the original cost of that material was in the year in which it was purchased by the seller; in machinery of this kind it is all tagged with serial numbers, and it is very simple to go to the manufacturers and get the specifications and the year in which it was manufactured. Most of the material of the nature in this exhibit is owned by the major oil companies and gas pipeline companies. They have very complete records of their material and specifications upon which they purchased it, and we can usually get their purchase orders and check the specifications and prices. So in that case we do not feel that it is necessary to go back to the manufacturer and find out what this company has purchased in the first place. However, this material sometimes moves around and some other company may have acquired it and maybe that company would not have the complete record. In that case, we would go back to the manufacturer and find out just what we were buying.

This material is of such a special nature that the average person looking at it cannot tell the specifications and how it was built in the first place, and we want to know what we are buying. So in order to determine the original cost, we go either to the books of the seller and take the original cost from the books, or else to the manufacturer and get the cost to the seller from the manufacturer. It is not necessary in all cases to go through that procedure. We know in the case of some of this material what the market is and what the net prices for this second-hand material are, regardless of going through the original cost and applying the percentages as related to present-day markets. We know the market, at least we think we do, for machinery of all ages. The market is based on the original cost, allowing for conditions as they exist at the time. There is a wide variation in cost, say, in two different years. For example, there was a wide variation in general price levels in 1920 and 1921, or in 1921 and 1922. Prices went up to a great peak point after the war and then dropped sharply. If there is a wide difference in original cost of equipment purchased in 1921 and equipment purchased in 1922 of exactly the same type, the same wide variation of cost is carried into the second-hand market for that material or equipment in 1939.

854 *Redirect Examination by Mr. Morgan.*

By my last statement, I meant that when one of these sellers has a lot of material of this kind to sell, he makes a list of it before going to seek a buyer and attaches to that list invariably what it cost him, so the buyer has the figures of original cost when the seller gets to him in the first instance. As a rule, the material list is so marked and in the event it is not marked, we ask the seller what he paid for it. We fix the percentages in the light of the present-day conditions or the present market for used material. There is a relationsihp between the market for new material of the same kind and the price the dealer in used material will pay for it as used material. That is what I mean when I say I take into account the marketing conditions as at the present time. When we take these into account, regardless of whether the seller bought in 1921 or 1922, we apply the percentage to what he paid for it that the present market justifies, and that is what I meant by saying that it is based on the original cost as a practical proposition.

Cross-Examination by Mr. Slaff.

The price we can get for used material today determines what we will pay for it, and the price that the purchaser will pay us for it depends, as far as he is concerned, on the relationship between the value of second-hand material and equipment and new material and equipment.

Redirect Examination by Mr. Morgan.

With the percentages stated in the exhibit, 5 or 10 or 15 per cent, I have used all three of these percentages, I have taken into account that very relationship about which Mr. Slaff was speaking. As of today, I feel that those percentages are proper percentages to apply. They might not have been the same percentages three years ago or they might not be the same in 1954.

855 G. M. DAVIDSON, recalled for defendants, testified as follows:

Direct Examination by Mr. Hedrick.

(August 30, 1939.)

In order to straighten out the record and make it perfectly clear where the prices shown in Exhibit No. 122 for materials purchased prior to June 1, 1931, were obtained, I wish to explain that they were taken from the books of the company. As to the materials which have been purchased or are to be purchased after June 1, 1939, where prices are shown for them, I secured these prices from the exhibits submitted by Mr. Strong, Mr. W. H. Davidson, Mr. Powers, Mr. Bulla, Mr. Campbell, Mr. Bussard, Mr. Dickinson and myself.

On pages 13, 15 and 54 of this exhibit there are certain items where the words "Not Salvageable" as on page 13, and "No Salvage" as on pages 15, 53 and 54 appear. There are other items of property of both defendants which are not shown at all in this exhibit and which are not salvageable, according to information from other witnesses who will follow me on the witness stand and testify concerning those items. In the light of this information and of my own experience, it is my judgment that the items not listed are not salvageable. I have prepared a list by account number classifications, such as 1002, etc., showing additional non-salvageable property of the two companies. When this list of non-salvageable property goes into the record, it and Exhibit No. 122 and that property concerning which I have already testified as being non-salvageable, will include all of the property now owned by these two companies and all that will be added thereto which will be on hand as of the end of 1954. Of course, in addition to these properties there are the gas leases of Texoma which will automatically expire when there is no further production. We have no fee interest in these leases. They are somewhat like the right-of-way easements, in that when the use ceases the right in the property ceases as I understand it.

(At this point the witness produced certain lists of property entitled "Natural Gas Pipeline Company of America—Non-salvageable Property Not Listed in Exhibit No. 122" and "Texoma Natural Gas Company, Non-salvageable Property Not Listed in Exhibit No. 122." The Examiner thereupon instructed the reporter to set forth in the record the items contained in such lists as follows:

856 Natural Gas Pipeline Company of America

Non-Salvageable Property Not Listed in Exhibit #122

Account Number	Description
1002	Telephone System Right-of-way Easements.
	Various Land Easements at Stations for Drainage, etc.
1005	Road Markers and Stiles.
	Steel Frame and Corrugated Iron Gate and Header Boxes.
	Concrete Foundations Meter and Regulator Stations(150 Yards).
	Blocking on Main Line Headers, etc. (Concrete 300 Yards).
	Ottawa and Red Oak Warehouse Foundations (235 Yards).

Account Number	Description
	Insulation on Meter Runs—Ottawa, Illinois.
	Insulation on Regulator Runs—Joliet, Illinois.
	Gaskets, Bolts.
	Scattered Pipe Racks.
	Jetty Protection on Rivers.
	Drain Tile Used on Farms as Replacement.
	All 24-inch Main Line Couplings Including Welding Coupling Sleeves.
	All Pipe and Casing at Railroad Crossings.
	Linewalker Bridges Scattered along Line.
1006	Engine and Building Foundations, Floors and Reinforcing Steel.
	Pipe Rack Foundations.
	Blow-off Pits (Concrete).
	Cooling Towers and Cooling Tower Basins (Concrete) and Guy Wires.
	Concrete Septic Tanks.
	Sidewalks and Lighting Fixture Foundations.
	Manifold Blocking (Concrete).
	Fences, Gates and Cattle Guards.
	Roads and Curbs.
857	Evaporation Ponds.
	Landscaping and Shrubbery.
	Recreational Facilities.
	Insulation on Steam Lines.
	Signs, Steel Stairways and Grating.
	Water Wells and Original Casing (All Excepting Mechanical Equipment).
	Miscellaneous Plumbing Fixtures in the Stations.
	Grating in Floors.
	Lighting Fixtures, Conduit and Globes.
	Annealing Furnaces.
	Sewer Lines.
	Storage Batteries.
	Clothes Line Poles and Wire at Cottages.
	Small Oil Measuring Tanks.
1010	Signs, Walks and Roadway—Red Oak Warehouse.
	Lockers—Red Oak Warehouse.
	Fencing—Various Meter and Regulator Sites.
	Retaining Wall (15.2 Yards Concrete)—Davenport Line.

Account Number	Description
	Curbs, Sidewalks, Roads, Sewerage System Signs—Joliet Meter Station.
	Water System and Landscaping—Joliet Meter Station.
	Curb, Walks, Landscaping Sign—Joliet Regulator Station.
	Pipe Racks, Roads, Signs, Lockers—Ottawa Warehouse Site.

Texoma Natural Gas Company

Non-Salvageable Property Not Listed in Exhibit #122

Account Number — Description

1002 Telephone System Right-of-Way Easements.

1004 24″, 18″ & 16″ Pipe, Valves & Fittings and 24″ Couplings.

858 Concrete Anchors on 24″ Pipe.

Cattle Guard, Gates.

Various Types of Drips and Headers.

28″ Highway and Railroad Crossing Casing.

Approximately 200 Yards of Concrete in Building Foundations.

1005 All Main Line Couplings, Including Welding Sleeves over Couplings.

All Main Line Meter Headers.

All 28″ Casing Pipe Railroad and Highway Crossings.

Concrete Anchors on Main Line.

Pipe Racks.

1006 Engine and Building Foundations, Floors and Reinforcing Steel.

Pipe Rack Foundations.

Cooling Towers and Cooling Tower Basins (Concrete) and Guy Wires.

Concrete Septic Tanks.

Sidewalks and Lighting Fixture Foundations.

Manifold Blocking (Concrete).

Fences, Gates and Cattle Guards.

Roads and Curbs.

Account Number	Description
	Landscaping and Shrubbery.
	Recreational Facilities.
	Insulation on Steam Lines.
	Signs, Steel Stairways and Grating.
	Miscellaneous Plumbing Fixtures in the Station.
	Grating in Floors.
	Lighting Fixtures, Conduit and Globes.
	Annealing Furnace.
	Sewer Lines.
	Storage Batteries.
	Clothes Line Poles and Wire at Cottages.
	Small Oil Measuring Tanks.
859	Gasoline Service Equipment.
1007	Concrete Blow-off Pit.
	Building Foundation and Floors.
	2 Air-Cooled Settings for 500 H.P. Water Tube Boilers.
	200' Reinforced Concrete Chimney.
	Concrete Walks and Curbs.
	Evaporation Pond and Pits.
	Miscellaneous Plumbing Equipment.
	Miscellaneous Shelving and Cabinets.
	Steel Grating and Steps.
	Concrete Foundation of Material Storage Platform.
	Concrete Foundation of Pipe Rack.
	Concrete Septic Tank.
	Absorber and other Tank and Tower Foundations.
	Foundations on Chlorine Rack.
	Ice Making Equipment.
	Salt Storage Tanks.
	Insulation of Piping and Various Equipment.
	Lighting Fixtures, Conduit, Globes.
1010	Curbs, Roads, Sidewalks.
	Cabinets, Clothes Lines, Shelving.
	Cattle Guards and Pipe Rack Foundations.
	Foundation for Storage Platform.
	Corrugated Iron Tool House and Garage and Wood Frame Water Well House, Kingsmill.
	Concrete Septic Tanks.
	Water Wells.)

860 *Cross-Examination by Mr. Booth.*

The amounts shown under the caption "Original Cost" on page 22 of Exhibit 122 represent the cost which the company paid for that equipment when it was purchased. The cost of the motor itself is the amount stated. I went to the books and got the figures shown in this exhibit, that is, I had my organization do so, and in that connection I instructed them to obtain the book cost figures for the material which is to be salvaged. The freight is not included in the items shown in this exhibit. Only the bare cost of the items as shown on the books is shown throughout the exhibit. I would like to make one explanation in this connection. Some of the buildings, the main buildings for instance, were purchased erected. Now in that case, freight and labor of erecting were included in the purchase price and reflected in the original cost shown by the books.

The amounts shown under the caption "Original Cost" on page 27 relating to tanks represent only the cost of the equipment, as to all those small tanks. There is a question in my mind as to the elevated storage tanks. I believe that those tanks were purchased erected, but that is immaterial since those tanks are not affected by the figures shown under the column "Original Cost", as they are among the items to be salvaged on a weight basis. I am speaking here of the nine 100,000-gallon tanks, weighing 212.66 tons.

Cross-Examination by Mr. Slaff.

Whenever freight was paid by the company it is not included in the original cost figures, and no other overhead and no interest during construction or expenses of that type are included in such figures, only bare original cost; only the amounts received by the seller from the defendants are reflected. (Objection and motion to strike by counsel for Illinois Commerce Commission overruled and denied.)

861 HERMAN P. TAUBMAN, a witness for the defendants, testified as follows:

Direct Examination by Mr. Morgan.

(August 30, 1939.)

My name is Herman P. Taubman. I live at Dallas, Texas, where I have lived since the early part of 1938. Prior to that time I lived for eighteen years in Tulsa, Oklahoma.

Before going to Tulsa I was employed by a junk and salvage company in Joplin, Missouri, for four years from 1916 to 1920. This company was the Joplin Iron and Metal Company. It was engaged in buying mining machinery and breaking it up, that is, any part of it that could not be resold. We also engaged in the resale of second-hand mining equipment. They were considered the largest dealers in their line in the Southwest. They bought and broke up large crushers and compressors and the engines that supplied the power for the plants. These plants were mining plants that extracted zinc and lead from the ore, or rather from the boulders brought up from the ground. These boulders were crushed up into what we call tailings or gravel for the separation of minerals. They employed heavy machinery in these operations.

When I went to Tulsa I entered the oil and gas supply business, mainly in connection with the pipelines, buying and selling of pipelines and abandoned leases, oil and gas wells that were exhausted, and putting the material on the market for sale as salvage. I went to Tulsa in 1920. I started with a strictly second-hand business in pipe and machinery, but later I specialized in pipe alone, and machinery was a side line. For a period of three years we had given no specialty to either pipe or machinery, depending on whatever came our way. At the end of three years we changed our policy and specialized in pipe because we felt that machinery, no matter where it was located, in all instances had to be brought into the plant at great expense. It had to be overhauled, tested, and sold with a guarantee of performance. We had a great deal of it come back on us because parts which would not be reconditioned would give out afterwards. In other words, making good on the items we sold cost us too much, and we finally had to quit dealing in such machinery.

Thereafter we handled it only on the basis that when the pipeline or lease was offered us for sale and we could buy it and figure the machinery and equipment on a junk basis, so that we could break it up and ship to the nearest market, we took it. Otherwise we refrained from purchasing some of it if we had to sell it as usable items.

My business continued strictly second-hand until the
early part of 1926. Thereafter we found that the market
for second-hand pipe was getting more difficult, due to the
newer types of pipe and the greater capacities of the steel
mills, which made the sale of second-hand pipe material
and its turn-over difficult. We had to add new pipe
862 in order to remain in business. In 1926 our business
was divided between second-hand and new material
about half and half. The second-hand business kept going down until the three years at the height of the depression when of course there was very little business, if any, and at that time the second-hand business was practically the same as the new. In normal times, after the depression lifted somewhat and business improved, in 1936, when I sold my business to Bethlehem Steel Corporation, 85% of my business was in new material and about 15% second-hand.

I operated the business about one year for the Bethlehem Supply Corporation, a subsidiary of Bethlehem Steel Corporation. There was a reason for this decreasing percentage of second-hand business down through the year 1937. The constant increasing cost of labor and the improvement of new material rendered second-hand pipe impractical because of the ratio of saving in the price we had to charge for second-hand pipe, that is worked over and shipped later for a specific purpose, in relation to new pipe. The prices were so close that the buyers did not consider the second-hand pipe. We get a greater number of buyers for the smaller sizes of pipe, such as 12 inches in diameter and under, than for the larger sizes.

I am familiar with the type of pipe as to dimensions and specifications used in the construction of the pipeline of defendants. I bid on a great deal of it, although I did not get the sale of it. I had the specifications to bid on and made bids in an effort to sell these companies pipe at the time they were constructing their line. Included in my pipe business, of course, were pipe fittings, such as gate valves, fittings, and accessories that go with pipelines.

Since I withdrew from the pipe business at Tulsa the first of 1938, I have been in the oil business. I have had oil interests for about eight years, of which I did not have personal charge. On leaving the supply company I took charge of my oil company, known as the Buffalo Oil Company, which is engaged in drilling wells for oil and gas.

I am conversant with oil field conditions down in the Southwest in the States of Oklahoma and Texas. I know the types of pipe that are being utilized, and I know the demand for pipe of different dimensions and qualities, as well as some of the machinery that is employed by pipeline companies. I spent over a million dollars for purchases of this nature of material in the last three years. From the beginning of 1921 I have kept a record of the pipe and machinery and related material which I handled. The volume amounted to more than $36,000,000. I have bought thousands of miles of pipeline in the ground and taken it up and put it in condition to sell as used pipe. This was not at one time, of course, but in the aggregate of years that I was in the business. The cost of taking pipe out of the ground and incurring all the expenses incident to getting that pipe loaded on the cars varies as to locations, as to depths, and as to weather conditions in working outside. It ran from $15 to $18 a ton.

These costs include a number of items. First it is necessary to get permission from the land owners to enter their property, and in most instances they make you pay considerable damages because they figure that when you get the line out of there, that is the last chance they will have to get anything from it. We find we have to pay a considerable amount more than was paid in the original 863 taking of the right-of-way from the owner. We find the farmers in a receptive mood to find damages for turned up crops, dead cows, and everything, and we have to pay them these damages even before they let us come in with our property.

Then we have to remove the pipe from the ground. Some smaller pipe we ditch by hand, by shovels, but in the larger sizes we have to use heavy machinery, such as tractors, ditchers, and cranes to lift the pipe on heavy trucks. We first have to ditch it, to uncover it, to get to the pipe. Then we have a crowd of men with shovels following to get to the pipe itself to get it free to be lifted. We then lift it up with a crane. If it is small pipe, we put men in there and let them shoulder it out. Even up to 6-inch pipe we handle it by hand, but when it gets above that we have to have cranes.

The equipment we use depends on the size of the pipe and the weight of the load we have to lift. We cut it with acetylene torches usually. This is an expensive operation. We have to have skilled men for the job, and the ingredients of carbon and all other requirements that go with the mixture in the acetylene, and the equipment itself is quite expensive, running into quite a cost. After we get the pipe on the ground we have to cut it in lengths to transport over highways in approximately 40-foot lengths and get it away from the ditch. Then we have to refill the ditch made in recovering the pipe. If the pipe is a large size, we naturally create an empty space there where the pipe is taken away, and if the land is flat it is necessary to fill it up and restore the ground in a usable condition to the farmer, whatever that condition happens to be. The specifications in the right-of-way grants require that the pipe be buried enough below the ground to make it safe.

Referring to the pipeline of the defendants, the places that I have looked at, even as late as two weeks ago, aside from knowing the specifications at the time the pipe was laid, I noted that the pipe is buried an average of five feet—some places may be four and some six, but the general average I would judge to be five feet in depth to the top of the pipe. I was really curious, and at the time I noticed the depth I inquired of the management why they went so deep, and they explained it was a high pressure line and they had to bury it deep to have the safety factor of the weight of the soil to hold it down.

In order to get the dirt off the pipe and get it out of the ground, it would be necessary to have regular ditching machines such as were used in putting the pipe down in the first place. They can come within an inch or so of the top of the pipe without hurting the machinery. Later it is necessary to follow with men and shovels to dig at least one-third of the clearance down the sides of the pipe so we can have it free enough and loose enough to lift it out of the ditch. In other words, it is a pick and shovel operation to get the dirt immediately off the top of the pipe and one-third down the sides.

When the pipe is lifted out of the ground by heavy machinery, as I have stated, it having occupied a cylindrical position there 24 inches in diameter, there will not be enough dirt there to fill the ditch back to its level at the time the salvaging was started. There is no dirt, I would say, in the majority of the territory without making a ditch by bringing it in from the sides. If we get the dirt along the pipeline immediately near the pipeline and fill the trench, we create a ditch condition. It is necessary, therefore, in order to satisfy the farmer
864 to haul in dirt to level the place where the line was taken up, or it would be necessary to leave a ditch even if you take dirt off the sides and try to level it up. In most instances we allow for the ground to settle, due to rains and washouts, so that we would not have to come back and repair the right-of-way, because we are always subject to damages for going in and breaking up the land. We build a ridge above the trench so as to allow for the ground to settle to a level.

If the pipeline happens to be on a farm under cultivation, the farmer definitely will not let you take the top soil off his cultivated field to fill up this ditch. It is necessary to bring the dirt from the outside, and the dirt left on the top of the field must be as near as possible the same type of dirt he has there. In other words, he will not let you bring in any rock and gravel and road building material to fill in with because that would ruin his land. He wants to go on cultivating after the pipeline is removed and requires some soil that will conform as near as possible to the soil on the rest of his land. If the land is not restored to approximately its original condition, it means more damages than the damages alone of going in there with your machinery in the first place. You never hear the end of it unless he is satisfied. I have had lawsuits to pay for months after we lifted the pipeline. In one case the farmer even accepted the backfill when we left. He said, "It looks all right to me." Some months later we found he had a cow that got hurt, that broke its neck. He said the rains came that he did not expect and washed it out. Unless you leave the right-of-way in a safe condition, you are responsible for any damages that may result therefrom.

When we have got the pipeline on the ground cut up into 40-foot lengths, we have to lift it up from where it is and take it to the nearest railroad point for shipping. If it is coated pipe, a pipe that is coated with bitumastic covering, we have got to take it off. Bitumastic covering is a pipeline coating for its protection. If you are going to sell it for pipe, you have to clean it off so the man who is buying it would know what he is getting. He would not buy it like a cat in a sack. He would want to know the condition of the pipe before he bought it, and you would have to take this covering off. You would have to get special machinery because this type of coating is a sort of enamel. It cannot be handled by hand. There is machinery in existence for that purpose. It cannot be removed with sandpaper like varnish or paint off of furniture or off of wood, unless you wanted to be there for the rest of your life. If you want to take it off economically, you have to use machinery for it. That is an expensive operation. It is big pipe, weighing 83 pounds per foot, and a 40-foot length would make it over a ton, and you have to have a crane or machinery erected at each loading point, or you have to have an army of men carrying that pipe, and in either instance it is an expensive operation.

For the removal of this enamel the pipe must be moved to a location flat and dry, and this is usually at the railroad. In my judgment there is not enough ground in the country where the pipeline could be taken that would accommodate that much pipe. It runs into too much stack space alongside the railroad. Unless you have an immediate outlet where you could move it out of the way, I doubt that there is any one point on the entire line that you could get enough space to stack this pipe and work it over and lay it away for later shipment.

865 In order to get it to the railroad for cleaning it has to be trucked with heavy trucks. It cannot be trucked as ordinary material, such as the smaller items concerning which Mr. Smith and Mr. Davidson were testifying here yesterday. It is necessary to have heavy pipe trailer trucks to handle this type of pipe. That type of truck usually has what we call a winch, or else you have to use a lot of labor, unless you have a crane. You can hardly use a crane in the loading because the crane would have to be on the other side of the ditch, you know, and it would just

be impossible. It would be necessary to use a lot of manpower and skids to roll it up on. This loading and trucking would cost between $3.50 and $5 a ton, depending on the distance.

After it has been taken to the railroad site where the cleaning machinery is located, there is other cost involved in getting it on the railroad car ready for shipping. The cost depends on what you are going to ship it for. Before you can ship it, if it is to be used after cleaning it off, it would be necessary that it be again coated with what you call an iron paint protector. Otherwise the pipe would become rusted and would not be merchantable. That is necessary if you are going to dispose of it as used pipe. In addition to that, the ends must be beveled for welding, because in cutting it at the ditch it is practically impossible to make an accurate cut so both ends will meet again when you are relaying it, and therefore you have to go over it again and trim the ends suitable for rewelding, what we call beveling for rewelding.

Pipe that has been bent in going over hills and across valleys and around curves and things of that kind it would be definitely impossible to straighten out and make a merchantable job of it without its costing more than making new pipe. That pipe could not be cleaned off with the some machinery with which straight pipe is cleaned off. You can only accommodate straight pipe traveling over rollers, pipe that fits the machine. It must be straight or it would not go through the rollers. This bent pipe would not be fit to use if you cleaned it by some other method.

After getting this 24-inch pipe out of the ditch and paying the farmer his damages and meeting his requirements as to refill and so forth, and after trucking it to the railroad and cleaning this pipe of its enamel, such of it as is straight, and after rebeveling it and preparing it for welding again, the pipe is then ready to be loaded on the railroad car. Since it is exceptionally heavy and is built for a specific purpose, my experiences have been that we have never bought or sold any amount of it worth mentioning of this size of pipe in such weights as that, or, in fact, very little in any weight of that size, because it is an unusual size for oil and gas use. I have had very little experience in handling 24-inch pipe in my business down there. I purchased about a mile of it from the A. O. Smith Corporation in Milwaukee, Wisconsin. They had it left over from an order that they filled and had it in stock for three or four years, having no calls for it. They had to have space when they went into the manufacture of casing, and they asked me if I would buy it with other sizes of large diameter pipe. I bought, as I recall, close to 1,000 tons in all, of which the 24-inch was about 200 tons, or a mile in aggregate length. Well I held it there. I moved it from where they had it and paid for the moving in order to get it out of the way. They had sold it at a low figure because they wanted to get rid of it, and the understanding was that I would move it. So I moved it to the lower end of their plant, and finally, after a year nearly, they got tired of looking at it and called on me to remove it.

866 I shipped it to Houston. It happened that I had more space to spare there at that time. I held it there nearly a year and had to clean it again before it was merchantable. Finally I sold it to the Humble Oil and Refining Company for a gasoline plant where they wanted some low pressure pipe. The specifications I think were 22 inches, but I gave them 24 inches at the same price at the low weight figure in order to move it. In other words, there was a job where they could have used 22-inch specification work, but the larger size in this particular instance did not interfere, and they were getting heavier pipe for the same money as light pipe. It took me two years to get rid of a mile of pipe which I bought new at a second-hand price because the manufacturer wanted to get rid of it. I don't suppose I would live long enough to get rid of 900 miles of pipe of this character.

Taking into account this cost of removing the pipe and getting it to the railroad, which I have stated would be from $15 to $18 a ton—and in my judgment it will cost that to get it there, I am basing that on the cost of small sizes, with less difficulty, with less equipment used. I am not raising the figure. It could be done with a safety factor in this size of pipe. My reason for saying that is because the heavy weight involved in the pipe would be offset by the greater tonnage taken up in a day's work with the same crew that would take up small sizes, and therefore I am not using a higher figure, which should be allowed based on the extremely large size of the pipe, the extremely heavy weight in handling.

In my eighteen years in the pipe business I would say that for the first ten years I do not recollect having a single call for 24-inch pipe, and for later years, when the greater number of gasoline plants began to be built with what we call a low intake pressure, we got occasionally calls for 20-inch and some 22-inch and once in a great while 24-inch for extremely light weight pipe. There are manufacturers who make that pipe. That is not the same type of pipe that went into defendants' pipelines. They do not require the same specifications for this low pressure use out at the fields for the gathering of gas to a natural gasoline plant that are required by these pipelines in transporting gas under high pressure. As I recall, it is 50 pounds of pressure going into the line, and what we call a stovepipe weight would be sufficient, and that is what they asked for.

I do not remember ever having had a call for used pipe of the specifications of the pipe used by these pipelines. There is a market for 16-inch and smaller light weight pipe used in the construction of gasoline plants, but there would be no market for this heavy 24-inch and 22-inch pipe. In my judgment second-hand pipe would not be used, even if there was a line of this type of pipe contemplated being built elsewhere. In fact, I have never had an inquiry for a permanent high pressure line where they would take second-hand pipe. This is for the reason that the life of the pipe, based upon metallurgical figures, would not justify the expenditure of constructing the line at this great expense, having in mind that the pipe would not last during the same life that new pipe would. There is a lot of expense involved in the laying of a pipeline besides the purchase price of pipe. A pipeline would only be constructed by people of financial means, and under no circumstances would an engineer specify or even accept at any price a line of this type after twenty years' use, regardless of the looks of it.

867 The only market disposition that could be made of the steel in these pipes would be a market for such use as road crossings and use for such gasoline plants as might be built where they could use light weight pipe. In such competition, even if there was a fair market for this heavy pipe, taking it out and preparing it for use and shipping it to the point it might be used at, in some instances would be local shipment, but assuming it was carloads, the freight from the point where most of this line is located is almost as high a rate as it would be from the steel mills, and in some instances a greater freight rate, because the ordinary railroad points do not have what we call a common point freight rate for pipe and equipment such as to compete with the steel mill must be set up. Therefore, it would cost

you more to send this pipe to where it might be used than new pipe from the mill that is made to the specifications, which would be just as acceptable for other purposes as this heavy weight pipe. In fact, it would be more suitable because in constructing lines in the field which are usually short they do not equip themselves with the type of equipment that would be required in a line of this type. Naturally, since it is extremely heavy pipe, it would not be as suitable for that purpose because they would have extra expense in laying it.

In other words, my judgment is that from an economic standpoint, it would be utterly impossible to condition and market this pipe within a reasonable length of time.

We have overlooked one factor, and that is the tax. The minute we take the pipe out of the ground and bring it to the railroad station we find the tax assessors counting the joints of pipe and sending us a bill for it. I have had an instance where I took out a line and brought it to the railroad point in Oklahoma in Pawnee County. We came in early in February to move the pipe and there was a sheriff's notice: "Do not touch this until you pay." I think it was three hundred and some odd dollars for tax. So our counsel went over there, and they told him that anything that was in that county since January 1st, if it was unloaded, would be taxed. He said, "You pay me for a whole year or I will not let you take the pipe." We had to pay before we could move the pipe. In taxing the pipe he values it alongside the railroad and not in the ground.

In addition to the slowness of its moving and the tax, there is the safety standpoint of children getting on this pipe and getting hurt. All that would cost more than you could get out of it. The only practical solution from an economical standpoint would be to take this pipe up and ship it to the Chicago junk market and sell it to the steel mills for melting back into steel. In order to do that this bitumastic covering would have to be removed since it contains a chemical which would be injurious in the melting of steel, and no steel mill to my knowledge will accept it as scrap steel for remelting until that is removed.

Then you would have to pay the freight rate to Chicago. You get it into the yards in 40-foot lengths in pipe of these dimensions. It would then have to be moved into some yard which is equipped to get this pipe into specification melting sizes for steel scrap. This unit is called cupola size. This refers to the cupola in which the steel is remelted, and they

have to cut it into slabs 18 inches wide and 5 feet long to accommodate open hearth furnaces. No steel mill would take it in 40-foot lengths. It would have to go to a dealer's yard, wherever you could find one that is equipped for it, in Chicago or other markets. Naturally, the closer to
868 the shipping point, the more you would reduce the freight. In my days we were forced to use acetylene torches to cut this pipe into these small cupola sizes. I understand now they could build a machine if there was much tonnage involved, whereby they could flatten it in one operation and then cut it with the machine, thereby reducing it to $4 a ton. Cutting it by torch would cost about $7 a ton. The prices quoted in the publications and shown in this Exhibit 122 are the mill prices quoted in the Chicago Journal of Commerce and the Iron Age that we used to go by. There were three or four such publications. That is the market at which the steel mill would be interested in buying this pipe or these chunks of pipe for melting purposes. The record shows that at the present time the price would be about $11.38 a ton. Instead of making money salvaging this pipe and putting it in shape to sell to the steel mill, you would lose about $13 a ton on it.

The cost of bringing it to the railroad would amount to at least $15, the cost of cleaning it to $2, and assuming the place that you break it up will be near the steel mill, the freight, I understand it, would be on the average of $4.40 a ton. This would bring the cost of getting it to Chicago up to $21.40. The cost of cutting it into cupola lengths would be another $4 a ton, bringing the total cost up to $25.40. This would show a loss of $14.02 a ton. As a practical proposition, it is impossible to recover that pipe economically. My judgment would be, if your right-of-way terms would permit it, to leave it in the ground. That is the only salvation without going through a tremendous loss.

As to river crossings, our practice has always been to leave the steel there. The costs were always greater than the material was ever worth after recovering it. I never heard of any one's salvaging a river crossing. Those that we did do we never told anybody about them. By river crossing I mean the river line, the pipeline across rivers and streams. The line headers would be obsolete and there would be no market for them as used equipment. They would not be worth anything to take down for the money they would bring as scrap. The gate valves were specially made for this purpose, and there is no market whatever for any other use. If you have to leave the pipe in the ground, you would leave those in the ground because they would not bring the price for junk that it would cost you to take them out.

In Exhibit 122 all types of gathering line pipe and fittings, including valves and other fittings that go with the pipe, outside of the 24-inch line are valued at $20 a ton. I gave Mr. Davidson that figure. It is based on purchases which have been made for about ten years of similar grades of material which were in rough condition coming out of the ground. It is not possible to clean up, recondition, and resell for further use all of the equipment of this kind that comes out of the ground when a pipeline is salvaged. None of it is suitable for immediate reuse without work cleaning up, testing and replacement. In the case of gate valves, you would have to bring them into a machine shop, take them apart, replace the parts that are worn, reseat the rings, and later test it again for whatever use you are going to put it to. In doing so the percentage of at least one-third is usually discarded as not being suitable for working over. Not until you perform considerable work and incur considerable expense can you determine whether it is suitable or not. We go through with the work and expense of taking it up and hauling it to the train, and shipping it to the central places before we find that out in many instances.

The same observation applies to the pipe. It isn't
869 suitable to be used immediately without being taken
into a central point, cleaned up, checked and tested, and the ends rebeveled for welding, and whatever percentage isn't suitable for reuse has to be discarded as junk.

Bent pipe of 12 inches or less in size can be straightened if the body is sound and in usable condition, but this straightening involves a cost, depending on the size of the pipe and the amount of bends or kinks to be taken out. There is regular machinery, similar to the cleaning machine, only it operates with a hydraulic press, which is used in the straightening process. It is a hydraulic system, whichever way it operates, whether by hand or motor, and the pipe is put in the straightener, and there is a half round shoe that comes down on the pipe in the crooked places to straighten it. Light weight pipe, 12 inches down, can be straightened cold. Heavy weight pipe has to be heated either with building a fire from wood, or a torch has to be applied before you can straighten it. In other words, the strength of the pipe is so great that if you force it with hydraulic jacks without softening the metal, it would throw the pipe out of roundness and render it worthless. In order to maintain its roundness you have got to soften the metal, make it flexible, so that it will straighten out.

It is seldom that you are able to recondition and sell more than 60% of the pipe that comes out of the ground. That doesn't mean that all of that is what you would call 100% good, suitable pipe for the same purpose. It would do for a lighter use purpose than it was originally intended for.

There is a corresponding loss by unfitness for further use in other types of these fittings besides the pipe itself and the valves that I have mentioned. There are many reasons for this. For example, most of them are made out of cast iron, and they will be chipped off and defaced in appearance, in addition to the worn parts, and there is a great deal of obsolescence. A certain pipe is made for a specific purpose and would not be suitable for many other purposes. For gas line use I would say 95% of the pipe used is welded together. Taking welded pipe and cutting it into 40-foot lengths in the manner I have stated here in order to be able to handle it, there is loss in the cutting process and in the reconditioning or beveling of the end where the cut is. That is true even if the pipe came out sound from the standpoint of its condition. The weld originally made to lay the line seldom is cut right in the weld. You always cut a distance from it, leaving on one end of the pipe that part which has been previously welded, and in order to make it merchantable and suitable for reuse, that part has to be cut off and beveled for use again, and there is a loss of about 5 percent of the metal.

This taking up of pipe and pipe fittings of the various kinds that are listed in this exhibit and reconditioning them for sale as used pipe and fittings is a specialized business. There are quite a number of people in the business, but they all have to have equipment and central points to bring the material to and work it over.

In an instance like the Phillips Petroleum Company, or any other company which is continuing to operate in the field, they will take up lines and sort them out and do the same work as the dealers do. They will then pick out what
they can use and bring it to such points as it may be
870 suitable for, and they do not sell that unless it is a
tremendous amount more than they need. The same

people, however, do sell, and I brought many millions dollars worth from major units which do use the same kind of material in their operations, either the operations for which the material was originally intended or any other branch of the industry, but by reason of the freight factor and the handling, they will at times sell. I happened to buy a gasoline plant and the lines from Phillips in Roswell, New Mexico. They at the same time were doing work in Kansas. It would have been entirely prohibitive from a cost standpoint for them to take this particular plant and move it over to Kansas, so they bought new material and some second-hand material I had to sell there. They sold me the New Mexico stuff as it stood. They turned it over to me, and I took it out of the ground, cleared the location and shipped it where I had a market for it.

In other words, some of the oil companies which have this type of equipment which they can move within limits from one place to another build up organizations for the purpose of doing the same thing that the dealer in second-hand material of this kind has to do. They have a man in charge of that particular department that uses the same machinery we do and goes through all of that. Of late, if I am permitted to state, I have investigated personally among the oil companies and dealers and find that they are discarding this practice by reason of the fact that it is unprofitable to maintain any central point for shipping material to, and handling and labor and freight are eating up the worth of the material compared with what they can buy new material for as and when they need it.

Even those companies like Phillips Petroleum Company, which have built up organizations and have acquired equipment necessary to recondition pipe and pipe fittings of this character do not recondition the material but sell it to a dealer who is equipped to do that. This dealer must know its condition before he sells it. I would say that in a case where the Natural Gas Pipeline Company and the Texoma went out of business after the gas gave out, they would definitely have to sell it to some one who is in the business, because economically it would not be possible for them to organize such type of organization to do this work and carry on the sales for the length of time that would be involved to get rid of it. I am talking about these gathering lines and pipe fittings that go with the gathering lines, which are listed here in the exhibit, the small pipe and small pipe fittings of the character listed here, on which I have placed a $20 valuation. This valuation covers this type of material after it is taken up and put on a car and I had a chance to see what I am getting. I would not pay that kind of price for the material in the ground and take it out. The fact of the matter is, based on today's conditions in the market, I wouldn't take it as a gift in the ground where it is now.

I heard Mr. Davidson testify that in applying the arithmetic which is used in making up Exhibit 122 he had applied a freight factor of $4.40 a ton from all points up and down the line except Joliet, which is near Chicago, and Fritch, which is down in Texas, and in those two instances he used a freight cost of $1.06 and $7.20 respectively, and that he had used a hauling charge of $3, and that the balance of the cost involved in the reclaim was to cover what he termed "demolition." I supplied those figures to
871 Mr. Davidson for this exhibit, based on my experience
of demolishing engines and pumps and tanks and scrubbers, and material of that type, perhaps not as big as those, particularly the big compressors that are described here, but for a similar nature of work. By demolition I mean breaking them up into parts that can be handled as junk and sold as junk at the full market price. We use three levels of demolition: $7 in the case of what he termed melting steel; $5 for these large units and other units composed of what he termed fixed scrap; and $2 for some of the small castings which can be demolished with a sledge hammer without the use of heavy equipment. I supplied those figures.

In order to demolish a 100,000-gallon or 200,000-gallon water tank set up on stilts and cut it into cupola sized pieces, we generally have a group of men around there to keep every one out of the way, and then we apply the acetylene torches to the props or legs that hold up the tank. We manage to knock it down to the ground and then apply the torch in cutting it up. We have to cut it with a welding torch which burns its way through the steel. Steel products cannot be broken up with dynamite or a sledge hammer. We have to use a torch on them. If you start shooting a steel plate you will get killed. You might, in light weight steel, make a hole in it, but the idea of dynamite breaking is not only to break an immediate spot, but it is the amount of cracking it does to the whole structure. It will not crack steel. The acetylene torch is the accepted way of cutting down these large steel units into cupola sized pieces so that they can be sold as scrap.

You have to use skilled men who know how to operate torches. My experience is that this process involves a cost of from $7 to $10 a ton, depending on the size of what you are breaking up and cutting up and the thickness of the metal you are working on. The same type of torch is used as that used putting it together by an acetylene weld, only you use the tip of the torch for welding and the other part is used for cutting. The same ingredients are used, and practically the same type of training for the men is required in either operation. These torches require skilled men who know how to operate them.

When we come to one of these big compressor units we find that the shaft is steel, the piston is steel, and probably the lettering around it, and some of the supports. The remainder is casting. The castings are usually so heavy, that is, the majority of them are so heavy, that you can't use a sledge hammer on them, and to get anywhere with it you will have to apply dynamite. The steel shafts and other steel parts you will have to use the torch on. That same performance applies to that type of salvage as it does to the tanks and the scrubbers. We find that the cheapest method and the quickest method to demolish big cast iron engines or crushers or pumps, or whatever they happen to be, when they are too heavy for sledge hammer work, is by the application of powder, just the same as you use dynamite in dynamiting rock or anything else. That is not the safest way, but it can be done, and that is the way we have been doing it. It requires skilled men for the purpose, who know how to handle powder and who use judgment as to loading, so that it won't fly in every direction. I tried it myself and had several narrow escapes until I learned how.

In order to apply dynamite to castings you find a flat spot on the metal so it won't roll off, something that you have a hold on, and you apply the amount of sticks of dynamite you think it will take to do the job, and fix it with a fuse and cap, making the fuse long enough to give you a chance to run away from it. Then you pack mud or wet ground, preferably a mixture of something that will hold, on the top. It doesn't have to be a big load, and if you taper it with something on the top it has a tendency to shoot downward, whereas if you place the shot right on top of the metal without anything on it, it will fly in all directions, and there is no telling where it will land.

Direct Examination Resumed by Mr. Morgan.

For an engine of the size of one of those involved here, you have to make quite a number of shots, because it is a large engine, and you don't expect that to blow up all at once unless you use a ton of dynamite, and then you wouldn't find anybody around there. Quite often we make shots and they don't take effect, and we have to do it over, or they don't break through, and we have to do it over.

Due to the heavy parts there is so much weight in it, we have found in our experience that it would run from $5 to $7 a ton, based considerably on how far you have to transport your men and if you have to board your men. If you have facilities locally, it reduces your cost. Where you have to bring them all in and take them back and feed them, that naturally brings up the cost. In this case, where your lines are located, in my examination recently, I didn't find a place where you would have for the men to do the work. You would have to bring them from somewhere and take them back.

Occasionally you find the type of men who are trained in this sort of thing and who are skilled in handling dynamite and these acetylene torches, and equipment of that kind, in the localities where these compressor stations up and down the pipeline are situated. But most of them you have to organize and bring in and give them a regular set-up to go on the job. It doesn't necessarily require that all of the men you use be skilled. You probably use on a job like this maybe 30 or 40 men, and you wouldn't need over a half dozen trained men. The rest of them can be ordinary laborers to do the work.

The small castings, water pumps, and things of that kind can be broken up with a sledge hammer, and each man can break from two to three tons a day, and maybe four. It depends on the place he works in and how accessible he is to the work. A man could swing a hammer all day long and break, as I say, from two to four tons. I figure to pay a man like that out in our part of the country about $4 a day as a common laborer. But you have insurance to carry,

and you have to feed the men and bring them in, and so if he averages three tons a day he costs you $6 at least, and thereby I arrive at the figure of $2 per ton. That is in line with my experience in junking that kind of machinery. Those other figures of $5 and $7 are in line with my experience also. In all these figures I tried to use the lowest figures in our experience, because there is to be considered that this will be a big job, and you can organize crews to go on these jobs that would reduce your costs to some extent, compared with your costs if you have just got to pick up a man here and there; for quite often you don't
873 get the right kind of men to do the work. In my judgment these are the minimum costs, and if any additional tax, such as Social Security and any other tax, may be added to the labor cost, that, of course, would raise these figures.

In the course of my experience going out and buying pipelines and pipeline fittings and other equipment, in which I dealt for a number of years, as I have stated, I have run into wooden cottages such as you see in the compressor station sites of these pipelines. In every instance there are from one to ten houses. In the nature of the business you have to provide permanent families with a place to live at the work. I didn't make a specialty in dealing with this type of equipment, but there was always that type of material, or I called it part of the salvage problem which we found in every deal when we could buy a "clean-up." I mean by that that we had to buy the whole place as it stood, including houses, offices, and garages. Such cottages have always been furnished and always will be as long as the companies have to provide permanent quarters for their men.

In our work, of course, we have had quite a number of leases or plants that we demolished in a district where other plants in other business enterprises were going on. In other words, it wasn't a district where everybody was moving, but was a going district like the Panhandle is today. We found occasional buyers, like a farmer who wanted a better house, or maybe there would be a small town nearby, and if the houses were in shape, they would buy them and move them over to the town, doing considerable repairs to the house. There never was a ready market for them. It has always been one of the things we didn't give a great deal of value to when we were figuring on the plant. We have sold them all the way from $25 up to $100, depending on the condition of the house and the location and the outlet we had for them. Sometimes we found it cheaper, rather than to leave a nuisance and be subject to damage suits, to put gasoline on it and burn it down, and in that way we would be better off. In most instances we found that the plant was located on leased ground, and the lease reverted back to the original landowner, and we used to make a deal, on my clean-up jobs, with the landowner for cleaning up certain parts of the work, and we would hire him to do that in order to get along with him. We would figure a house in for a little amount, plus whatever additional cash we had to give him, to clean up the location acceptable to him from the standpoint of the restoration of the ground.

I gave each of the houses, including 4-room cottages, 5-room cottages, duplex cottages, bunk houses, 5-room boarding houses, and office buildings a listing of $100. This is the most that I would figure any one would get for them, having as many of those houses. I gave them this value only because they are well built houses, and I am assuming that they will keep them up in good shape to the last minute. As far as the market in the Panhandle is concerned, as I know it, having a branch there for eleven years, frankly I don't know what to do with them, no matter what kind of structure they are. Sometimes a little community starts when the plant is built, and when the plant is moved, the whole thing moves because there is nothing else for them to live on. In that particular country, which has been the dust bowl that we know it to be, whole communities are isolated and the houses are boarded up and left standing there. I don't know what they will do with them. It is a shame. I was ashamed to figure a house as good as these at any figure less than $100.

874 Most of the people who live in that country live from employment in the plants built down there. They earn their living from the operation of the oil and gas companies and other industries which are dependent on these companies, such as gasoline plants, refineries, carbon black plants, machine shops, and other things that have to do directly with the oil and gas business. When the plant is gone, in a case where the company continues to function in business, they pick out some employees and move them to new locations, and those that they have no use for they turn loose, and they drift in every direction. They don't have a chance for livelihood where they are.

Cross-Examination by Mr. Slaff.

I have never testified in any other case on matters similar to those to which I have testified here.

875 E. M. SOLOW, a witness for the defendants, testified as follows:

Direct Examination by Mr. Morgan.

(August 30, 1939)

My name is E. M. Solow. I live in Dallas, Texas, where I have lived between six and seven years. For two or three years prior to that I divided my time between Pampa, Texas, and Tulsa, Oklahoma. Pampa is in the Panhandle of Texas, in Gray County. It is the county seat of that county. It is within what is commonly known as the Panhandle Oil and Gas Field.

I am Vice-President of the Western Supply Company, an organization engaged in the purchase and sale of oil field equipment, both new and second-hand. I have been associated with that company for the past ten years. For five years prior to that I owned a business of my own engaged in second-hand trading of oil field equipment, under the name of Solow Pipe and Supply Company.

The Western Supply Company has a store at Pampa. In connection with that store we have a machine shop and a shop where valves are reground and refaced and reconditioned so that they can be resold. We also have at that point a pipe shop where used pipe is brought in and reconditioned for sale.

At Greggton, in the East Texas field, we have a store and also maintain a pipe shop. At Wichita Falls, in North Texas, we have a supply store where we maintain a full line of casing, line pipe, and supplies. At Tulsa we have a large machine shop, rather completely equipped, where we can manufacture various oil field specialties, repair and recondition pipe, and things of that kind. These are all the places of business we maintain at the present time.

During the period when I lived part time at Pampa and part time at Tulsa I was engaged exclusively in the second-hand material business. To put the thing briefly, we trade in any kind of second-hand oil field equipment where we feel we have a chance of making a dollar. That means we will take oil field leases that have been abandoned, pull the equipment out of those, and salvage it. We take up pipelines and salvage the lines. We will buy warehouse stocks of valves and fittings and other equipment of that kind and divide them up among our stores. If they are used material, we will send them to our shops and recondition them. We are engaged really in a general used material oil field trade.

Oftentimes we have had to acquire residences or wood frame cottages provided for employees when we buy leases on which these structures are located, and we just get rid of them as best we can. We buy whatever they have if we think there is a chance to make any money on it. Oftentimes what these oil companies want to do when they sell a property is to clean the thing up completely. They want you to take possession and charge of it and clean up everything on it that is to be cleaned up, and turn the property back to the landowner in a condition suitable to him. That is the usual practice.

876 When an oil or gas well is drilled there remains in it certain casing, consisting of steel pipe screwed together in joints to comprise a wall for the well. If the well is drilled by the rotary method, which is one of the two general methods of drilling wells, there usually is a small amount of surface pipe, 100 to 300 feet, cemented from top to bottom in the top of the well, and then there is a final string which shuts off all formations above the gas or oil which is being produced from that well.

Wells drilled by the cable tool method, on the other hand, often start with larger strings of casings, and as salt water or other obstructions are encountered as that well is drilled, additional strings of casing are set from time to time. A cable tool well may have in it four or five strings of casing. When it is completed only the bottom string shuts off the last water or other formation which would interfere with the production of oil or gas from the well.

The two principal elements entering into the cost of the well, which this record shows ranges from $17,000 to $22,000 in the Texas Panhandle, depending on whether it is drilled in the Gray-Carson or Moore County areas, are the cost of making the hole and the cost of equipping the hole. When you drill a well you employ usually a drilling contractor who, for so much a vertical foot, does certain things. He sets the pipe, cements the pipe, drills the hole, and hands over the well in complete condition with the formation drilled under the instruction of the company's supervision. That usually represents about 70% of the cost of drilling gas wells in the Panhandle. The remainder of the cost is the cost of the material, principally the casing, which is placed in these wells. In the case of gas wells it is almost exclusively casing, and on top of these gas wells is placed a Christmas tree containing two or three gate valves and nipples.

When a gas well has served its purpose and ceases to produce gas in quantities justifying the owner's operating it, that 70% which the owner paid to the contractor is gone. There is nothing there but a hole which has to be filled up and plugged in accordance with the rules and regulations of the Railroad Commission of Texas, if the well happens to be in Texas.

When the final string of casing is set in a rotary drilled hole, it is cemented in place. The casing as first placed is merely hung in the well which has been made by the drilling contractor, and there is no seat, but in order to retain that casing in place and prevent leakage around the casing, it is cemented. This fills up behind the casing up to an approximate depth of, say, 1,000 feet, and is an additional wall to the casing up to that point. When you pull pipe out of a well you can't pull the cemented portion of the pipe.

The man who goes in there to pull this pipe moves his hydraulic jacks on to that pipe and takes tension, or stretches and measures the pipe. If the pipe is loose, say to the top of the cement, it will stretch eight or ten inches. If it is tied up where it can't be pulled one or two joints down, there will be practically no stretch. If he can only get four or five hundred feet, he will only have one and a half or two inches of stretch.

877 In the Panhandle there is a formation known commonly as salt. It is a formation that goes clear through the Panhandle from one end to the other. In Gray, Hutchinson, and Carson Counties you will encounter that at depths of 1200 to 1500 feet, depending on your well location. In Moore County, which is farther west, it will be found 100 or 150 feet deeper than in adjacent counties. That salt formation, when water leaks down into it, evidently ties that pipe up like cement, because it is practically impossible to get pipe out below that salt, and that salt is above the bottom of the cemented portion of the string.

In considering the salvage from these wells you have to look to this salt. I would say that the maximum amount of pipe you could expect to recover from one of these wells, taking the Texoma wells as a whole, is 1200 feet, but you don't always get the maximum amount of pipe. In many cases you get much less.

When I was in Amarillo last week a friend of mine, Don Harrington of the firm of Hagy, Harrington and Marsh, told me that they had recently drilled a gas well south of White Deer. It was such a small well they decided to pull the casing out, but they didn't get a single joint, when it had been in the well only a few days. In our own salvage operations we have had similar experiences.

So it is an entirely uncertain thing as to how much pipe you can really get, but for the purposes of this study I have estimated that we will recover 75% of the pipe above the salt, and frankly, I think that is a very generous amount to estimate. That is about 800 feet of pipe per well.

Ordinarily when you have pipe to pull from a well, you will employ contractors who are engaged in that business and who have the special equipment that is necessary, consisting principally of heavy hydraulic equipment to pull this pipe. Usually these contractors gamble in pulling pipe by taking a job on shares, but I have talked to every contractor in the Panhandle or have had our representatives up there talking to these men who are in the pulling business, and they confirm my judgment that no contractor would, or would have a right to, risk pulling these rotary drilled holes on shares, because there is only one string of pipe in them, and the amount of recovery expected is so little that it would practically cost them all or more than they could get out of that salvaged pipe to move in and do the job.

When the Texoma drilled these wells at each location there was a slush pit, which was built by the contractor, where he mixed his mud. When a well is plugged you have to fill that well with a mud-laden fluid sufficiently heavy to suit the requirements of the Railroad Commission. Usually this mud is taken from the old slush pit at the side of the abandoned well, but in this case there is no slush pit there. Texoma cleared that ground off as level as the top of this table. I drove around to I don't know how many of these wells, maybe fifty of them, all over the field, and I didn't see one evidence of a slush pit at any of those locations. They cleared them off after the wells were drilled. The contractors used them in making the well, but they cleared them off, I presume to avoid damage to cattle on the ranches in the Panhandle where these wells are located.

878 Now a contractor will have to haul mud and water and fuel oil to these locations. These contractors want various prices for doing this work. They range from $32 to $50 per 8-hour tour. After they find out how much tension they have on the pipe, they have to shoot off the pipe above the point where they estimate it will come, that is where it will start pulling out of the well.

In order to shoot off a piece of pipe 800 feet under the ground they have to drop dynamite in the hole, and sometimes it won't work and they will have to come up another 100 feet and shoot again. We have shot wells from a depth of 3500 feet to the top without the pipe coming loose and pulling. In other words, there is no question at all but what the actual cost to the pulling contractor for pulling the pipe out of these rotary wells will be $500, $600, or $700 per well.

Now in valuing the salvage of these wells in this report I gave Mr. Davidson this $100 figure. I allowed $100 for salvage for those rotary gas wells. I think it is an overstatement, and I put it in there because I believe it was a case where there were so many wells that there was a possibility that you might work out a little better trade with a pulling contractor and might get a small amount of salvage out of these wells.

There is one other factor I ought to describe, and that is the value of this pipe that is recovered from the wells. These wells are equipped, with one or two exceptions, with 8⅝ inch casing. This casing is either lapweld, electric weld, or seamless. Some of it is 28 pounds and some of it 32 pounds. I averaged the present new prices of all that material, and it figures about $1.55 per foot for the average value at this time of a joint of casing in one of these rotary wells. A second-hand dealer doing business and buying second-hand pipe would not pay at this time 77 cents, which is half the new price of 8-inch casing, but I have given that much credit for the pipe.

Now to haul that pipe from these locations, which are an average distance from the railroad of six or seven miles, and to ship this pipe from the Panhandle, because the oil and gas field will be abandoned when this system is abandoned, to a Texas common point, which is the cheapest place to which pipe can be shipped, will cost, reduced in terms of footage, 16 cents a foot. So that the value of this pipe to the Texoma for salvage would be 16 cents less than the 50% price I have indicated, or 61 cents a foot, and the value of 800 feet of this pipe would be approximately $489. If it is going to cost $500 or more to pull and plug the well and supervise the plugging of it, and furnish the cement for the plugging, the dynamite for shooting, and everything else that has to be done, you can see that there is no real salvage to these wells.

There is a difference in the salvage situation of those wells drilled and completed by the rotary method and those which are drilled and completed by the old method of using cable tools. These cable tool wells have all the way from two to four strings of casing in them. I took the first 15 of these cable tool wells listed on the material reports of the Texoma and found that in these 15 wells there were
879 the following pipe: 973 feet of 20-inch pipe; 4,509 feet
of 15½-inch pipe; 6,956 feet of 12½-inch pipe; 16,529 feet of 10-inch pipe; 19,325 feet of 8¼-inch pipe; and 7,471 feet of 6⅝-inch pipe. This pipe is not cemented in the wells as the pipe I described in the rotary wells was, and you can recover a percentage of the surface pipe. I have been buying wells in the Panhandle for ten or twelve years or longer. We have drilled a number of wells out there. We have had experience pulling this pipe, and before I wrote these figures down I made two trips out there. I discussed it with the members of our organization and with our man in the Panhandle that does all the preliminary dealings in pulling wells and things of that kind, and I believe the figures that I am going to give you now for recovery are exactly in line with conditions as they will be found.

I estimate that we will recover 30% of the 20-inch and 15½-inch casing; 50% of the 12½-inch and 10-inch casing;—this is the pipe where the salt will be behind one of those strings—60% of the 8¼-inch and 6⅝-inch casing. The reason, of course, you will recover more of the latter strings is that they are protected to the depth to which the outside strings are set.

Wells of this kind are the kind of wells that pulling contractors will contract to pull and salvage for 50% of the salvage. It is usually a good thing to deal with them on that basis. They naturally want to get all the salvage they can and will make every effort to get every foot possible of it out because their profit and the success of their work depends on their ability to get a good measure of pipe recovery.

Using these figures of recovery which I have given you, we will recover 292 feet of 20-inch pipe; 1,353 feet of 15½-inch pipe; 3,478 feet of 12½-inch pipe; 8,264 feet of 10-inch pipe; 11,595 feet of 8¼-inch pipe; 4,483 feet of 6⅝-inch pipe.

This pipe will have to be handled similarly to the pipe pulled from the rotary holes. It will have to be hauled from these locations, transported to a dealer's yard at a Texas common point. In addition to that, this pipe will have to be repaired. Cable tool wells are drilled with the tools hanging down on a wire line or cable, and the tools flop around in the hole, and oftentimes they line-cut, that is, the side of the line whips a groove in the pipe. There is some cut pipe in nearly every cable tool hole, and that has to be discarded. Further than that, a good deal of this pipe in these cable tool holes will have to be repaired in machine shops. Defective threads will have to be replaced with good threads. Swelled or damaged collars will have to be taken off and replaced with new collars. We have estimated the cost of shopping and throwing out junk pipe at $5 per ton. I think that is very reasonable. In actual practice the allowance for that is usually substantially more than I have given you.

In addition to that there will be a 2% loss in shopping pipe. In other words, when you cut off a thread to put a new one on, when you cut off a collar to put a new one on, when you have a joint of pipe that has been shot off and there is a shot hole in it, and you cut 6 or 8 feet off that so as to cut a new thread, this is all lost in handling that pipe, and the 2% that we have given to that is, I believe, far less than the loss you will actually find in practice and experience.

880 Taking all these factors into consideration, we next have to find out what this pipe is worth. I have allowed as the price of this pipe the maximum amount that we would pay today for this pipe if offered for sale at one of our stores where we are actively selling that size pipe. In connection with the large pipe, I want to say that from month to month, as fewer cable tool wells are drilled, the use for large casing is diminishing, and in some of our stores where we have 20-inch and 15½-inch casing in stock, we haven't sold 100 feet of either size of pipe in the last 18 months. So, while I am giving the top value which we would pay, I am frank to say that if we had to buy this pipe today, I don't think we would offer the price I have indicated for it because we wouldn't know what to do with it.

Those prices are as follows: the 20-inch, $3 per foot; the 15½-inch, $2 per foot; the 12½-inch, $1.50 per foot; the 10-inch, $1.10 per foot; the 8¼-inch, $.77 per foot; the 6⅝-inch, $.50 per foot.

I will also make the statement that within the last 90 days I believe we bought pipe of each category, small quantities of it, at less than the price I have placed on it in this salvage study.

When you deduct the 2% for pipe loss in shopping, the hauling of this pipe to the railroad, and the freight, and the $5 per ton for reconditioning that I have outlined, from the value of Texoma's one-half of this pipe at a common point in Texas, which value is $13,529, and since it covers fifteen wells, the net salvage per well for Texoma is $603. Now that is the average price on these fifteen wells. I think it is a very fair average of all of the cable tool wells of the Texoma in the Panhandle.

There is a progressively declining demand for used oil field casing. Fifteen years ago the majority of wells drilled in the oil country were drilled by the cable tool method, and in drilling wells by that method they would use three or four strings of large casing to shut off upper stratas of water as the well was being drilled. These strings were not particularly long. It was not particularly dangerous to run used pipe in these strings because they hadn't yet reached the oil or gas bearing formations. Usually companies that drilled wells used and reused various strings of surface pipe, and would buy new strings of pipe for the final string which they left in the hole as they pulled the others out. Sometimes they couldn't pull the others out and from time to time would have to replace their surface strings of pipe, so there was a demand for considerable pipe in every well that was drilled.

Under the rotary method you set a small amount of surface pipe to shut off the surface quicksand or water, or whatever is at the surface of the hole you are drilling; then you wind up with one string of pipe at the bottom of the well, protecting the oil or gas which you had discovered below this string of pipe.

The average cost of drilling a well in the Panhandle is $20,000. On the Gulf Coast of Texas it may range from $45,000 to $50,000. In some cases wells down there cost $150,000 or $200,000 to drill and complete, wells that range in depth from 8,000 to 12,000 feet. You can't conceive of an operator risking the investment in that hole by trying to

get a small saving by using for his one string of pipe
881 which is in that well used material. So you just have to find your customer for used casing among small outfits that aren't financially very strong and have to make every saving they can and who are willing to take the chance in completing a well in setting a string of used pipe in it.

Another thing, as drilling goes on in the Mid-Continent field, wells get progressively deeper. Twenty years ago the average well was drilled, I suppose, to a depth of 2500 feet; fifteen years ago to 3000 feet; today the average well is probably 1,000 or 1,200 feet below that. As deeper wells are drilled, you require better materials. You require materials with greater factors of safety, that will stand more tension and are just better made all the way around, and naturally when you pull out the material from old wells, you are just going to have a hard time to find a proper place to put it in current operations. Even today, if all this 8-inch pipe were pulled from the Panhandle, it would be a very difficult matter to go over all the oil country to every field that is being drilled and find a place where you could dump that pipe to be resold as casing. I don't think you could do it.

Leaving the wells and starting out towards the Fritch station we immediately run into what we call the gathering lines, or the lines which transmit this gas from the well head to the main gathering line, which in turn takes it to the initial compressor station. I have had experience in handling that type of equipment, gathering line pipe of the dimensions of that used by Texoma. We are constantly selling gasoline plants, which are being built all over the country, light weight pipe which they use for gathering lines, vacuum lines, residue lines, and so forth—pipe of the size and similar weight to that employed by the Texoma Company. A little different situation obtains with reference to this type of equipment than that of the gas well equipment. There is a limited market for used valves, for used fittings, and for used pipe. Before any responsible organization, however, will sell that kind of equipment to the trade, they naturally want to put it in first class condition.

I helped prepare this salvage estimate on those lines, and I placed a value of $20 per ton upon all of the pipe, 12-inch and under, and all the valves and fittings in the gas pipeline of the Texoma system. That means that we would take up approximately 11,000 tons of scattered pipelines running in size from 4 inches to 12 inches, that we would pick up out of the compressor stations and out of the lines some 6800 tons of assorted fittings of every kind, nature, and description.

Now that is a great quantity of fittings. I don't believe that all of the used material dealers in Oklahoma and Texas together will sell that many used fittings in a 2 or 3 or possibly a 5-year period. They might, because some dealer might get a large plant and find an occasional market for it, but these fittings will have to be sent to a machine shop and checked over. The valves especially should be reground and refaced and retested to such pressure as the supply companies selling them would be willing to guarantee to the buyer. The lines would have to be taken up, probably cleaned of the enamel that coats them, rebeveled for welding, and probably in some cases checked as to
882 test pressures they will stand, pretty closely. We have allowed a figure in these compilations of $15 per ton for doing this work. I believe that figure is very reasonable.

Let's take a concrete case to show what I mean. The 4-inch pipe weighs 7.63 pounds, approximately 8 pounds, per foot. If you take that pipe up out of the line and haul it to the railroad for an average distance of 7 miles, we estimate it will cost $15 per ton to do that job. Let's assume that $3 is the charge of hauling it to the railroad, which is a very reasonable charge for that length of haul. That leaves $12. With that $12 we have to ditch the line; that is, dig a ditch, and it is buried to an average depth, according to company records of 34 inches. We have to take the pipe out of the line, cut it into rough sections about 40 feet in length, and reditch the line. The pipe weighs about 8 pounds, slightly less, per foot, so we are getting less than 5 cents per foot for that operation, and it would be a hard thing to find a contractor to really perform that operation, or to do it yourself, for that 5 cents.

Similarly, you can take all sizes through the system. Therefore, I believe this $15 estimate, if anything, is on the low side.

The price we have estimated for this pipe at the depot is $20 per ton. New line pipe of this character sells at the mills today, and I am buying it for my company almost every week, at least some quantities of it, from the National Tube Company, or the Republic Steel Company, or some other manufacturer, at prices ranging from $45 to $50 per ton, and when you buy it in large quantities, as Texoma did when this was ordered, you buy it at prices approximately 10% less than the regular price. Therefore you can see that by the time this $20 a ton pipe is shipped to a point where it will be reconditioned, beveled, cleaned up, and offered for sale, that competing with new pipe it is going to be hard for the supplier who has ventured to buy the pipe and taken the risk of investing his money in it to make any money out of the venture. But I will say there is a possibility of a small salvage value in the pipe and in the fittings, and that is why we have given them these prices on these estimates.

I have seen some of Texoma's properties. I have been through the gasoline plant and the Fritch compressor station. I visited dozens of the wells in the field at different times, and last week while I was in the Panhandle I particularly went back to two or three of these wells to check up on the equipment around them and to be sure that I knew what I was talking about when I discussed them. I have been to the Gray station. I guess that is the Natural Gas Pipeline's station. I have been to the Joliet meter and regulator station. I have driven down to Geneseo on the main line in Illinois. I have driven to the Fox River crossing, I believe it was called, and have driven to the Mississippi River at the crossing of the pipeline near Muscatine, Iowa, and have examined the river crossing in the Panhandle on the Canadian River. I did not examine that last crossing particularly, but I have seen it a number of times when I have been in the Panhandle.

I took note of what they refer to in their property records as the steel frame buildings that are located at Fritch and these other compressor stations. I looked at those buildings carefully at the different places where I visited. Assuming the same type of buildings will be found at those other stations which I have not visited, I find that there is some salvage value to these steel frame buildings. Eliminating the foundations entirely, which have no salvage 883
value, you have the structural steel framework, the galvanized iron sides, the roofing, and the windows and doors of these buildings. These main compressor buildings are very large buildings. They are 68 feet wide, and the one at Fritch is, I believe, 244 or 245 feet long. The others range from 168 feet to a length 28 feet greater than that. Some of them were extended, as I understand it, in length.

These buildings are pretty high. I cannot conceive or find any ordinary use for these buildings somewhere else of the size they are now built. The buildings are too large. No lot would be just large enough to fit them. No industry would be just the right size to utilize them. The principal value of those buildings is the steel that is in them, the doors and windows that are in them, and stuff of that kind, and those buildings could be bought by a dealer who deals in buildings and refabricating them, using most of the material in smaller sized buildings.

Now as to these smaller buildings, two of them are too large for use generally, but most of them are what we call ordinary oil size buildings, the kind of building that can be used in building a new gasoline plant and for a dozen other purposes in the oil felds. Of course, they would have to be dismantled. If the buildings I looked at were fabricated any place, I believe they could be dismantled with somewhat more ease and facility, but the others would be more difficult. However, they all could be dismantled and shipped away to some other location where they could be utilized. That is why I gave 10% valuation to the smaller buildings and 5% to the larger buildings, and we based that valuation on the original cost of those buildings without taking into consideration the cost of the foundations. That represents my estimate, in round numbers, of what these pipelines will be able to salvage for those buildings.

I do not believe those roofs can be satisfactorily salvaged. I would just forget them. They are just waste like the foundation.

Occasionally you can find dealers in the larger cities who are engaged in the business of acquiring buildings of that kind. I do not know of a single dealer who is exclusively in that business in the Southwest, but a number of dealers down there will buy buildings if they can buy them cheap enough to make a dollar. Most used material dealers will venture into anything they feel they have a chance to make a profit out of if they know enough about it. There is a demand in the oil fields and perhaps in other places for that type of steel frame buildings. I believe that any one building a gasoline plant, or at least a large number of builders of gasoline plants, and others, maybe builders of small refineries or gathering station buildings, the small type of buildings, I believe would be a market for these used buildings of smaller sizes. This is the type of building that is ordinarily used in the oil fields for various oil operations. If the size does not fit one customer, it will probably fit the next one.

The reason for the difference in the attitude of the oil companies toward this kind of equipment and that toward casing that goes into the well and the pipe that goes into its pipeline, and things of that kind, is that when you drill a well the pipe or string of casing is going into the well and protect your investment. If, for instance, the string of pipe is lost, that probably is the end of the well. It is a
very expensive matter to repair such an error. For
884 example, since I have come here to Washington I have
learned that we were drilling a well ourselves, in which I had an interest, in the Camp Munger Allen oil field in Texas, and we lost a string of 26-pound casing in that well. The drilling contractor that was completing that well dropped his tools in the hole and broke the string of pipe in two in the hole. Just the pressure of the tools going down through the hole burst the pipe, and he had to set inside of that a string of 5-inch casing, a special size, which we had to order from Houston and rush it up to the well, and I believe it is now being cemented in the well. In other words, dropping the tools just accidentally caused $4,000 or $5,000 worth of damage in that one spot.

So you see a person has to be careful of what kind of material he uses in these wells. But a building is something that can be seen. It is on the top of the ground. If a truss, or anything else on it, goes wrong, it can be replaced by another. In the pipeline, where you put gas in the line under tremendous pressure, a break is a very serious matter. It costs a lot of money. It would cost more to repair than all the saving you could make by the possible use of a used valve or used fitting. You cannot take the same risk in dealing with casing, engines, or equipment such as we have been discussing here, as you can in the case of a steel frame building.

I have been through some of those cottages, duplex cottages, bunk houses, boarding houses, and office buildings. Those cottages have been figured in Exhibit 122 at $100 per cottage. When I first came to Chicago and went over the whole inventory with Mr. Davidson, I told him a house like that could always be sold to somebody or other, and I thought a valuation of $100 would be fair, because in fooling around with different properties and handling a lot of houses like that we usually get that much out of them. After going back to Fritch and looking the thing over I realized that when these projects are abandoned there will be a great migration away from the Panhandle. The dust storms up there have been very severe. It is in what they call the dust bowl of the Panhandle and Oklahoma, and people are not living there unless they have to, unless they are working for companies engaged in business there, except a few ranchers. The population of Hutchinson County, where Fritch is, I believe was 13 before oil was discovered, and I have been told that there was not a lawyer or a doctor in the whole county—just a couple of ranch houses. Certainly when these oil fields are abandoned, while the Panhandle will not revert to such a condition, I suppose it will be a pretty barren place, and just at the present time where these houses sit, who will want to buy them? I do not believe they are going to have much value, but I did suggest that value, and Mr. Davidson set it up in the record.

When I visited the Geneseo station, I noticed several of the towns were pretty empty. There were houses boarded up on the street, even large brick buildings boarded up, not being used. If that is an indication of the quality of the activity around there, I do not believe the houses will bring very much. Some of these cottages will probably be wanted by the farmers and by people who will want to move them to little towns. They are too large to move over the road very far, probably too large to pass over a bridge or something of that kind, but some of them will have some salvage value. From the portion of the set-up
I have been, this value of $100 per house is high, but
885 probably is somewhere in line, taking the other stations
which I have not seen into account.

I heard Mr. Taubman testify about this main line and this main gathering pipe, which is 24-inch dimension pipe, and these 18-inch, 16-inch, 12-inch, and 10-inch river lines, 6-run, 2-run, 3-run, and 5-run headers, and 24-inch and other dimensions of flanged gate valves which are used on this large diameter pipe and which are down below the ground with that pipe. We have bought a good many pipelines. We have bought them in a good many places, such as Wyoming, Colorado, and all the states of the Mid-Continent, but we never bought a 24-inch pipeline. None have been offered, and if there had been one offered, I do not believe we would have bought it. Oftentimes in effecting a salvage deal you just cannot afford to buy it because there is no value there.

The function of the dealer in used material is to find materials which can be reconditioned and used in the economic system and be sold advantageously. This 24-inch line is absolutely worthless. There would be no market for it if it was salvaged, and if it had to be junked, the cost of shipping it to the junk market would greatly exceed any possible revenue that could be had for it. I heard Mr. Taubman's statement that in his judgment it would take $15 a ton to remove it from the ditch and to go through all the steps which I heard him discuss and get it to the railroad. I am in accord with his estimate except that I seriously doubt that it could be done for that sum of money. That is the minimum.

In a break-down of figures on which his estimate was based and which he went over there was, for example, a charge for ditching that line of 10 cents per foot. That line is buried to an average depth, I believe, of 59 inches to where the top of the line is, and it would have to be uncovered one-third below that. I do not believe you could go up and down the line and ditch it for 10 cents a foot. I suggest that figure as low. The river crossings and headers used in connection with them could not possibly be salvaged. The cost of salvaging would be more than it is worth. In most cases you could not salvage it even if you wanted to. You do not know where the lines have shifted in the beds of the streams. It would be like looking for a needle in a haystack to find those lines across these river beds. It just could not be done, and there is no question in my mind about that.

As to the water well equipment, such as motors and pumps, set out on Page 22 and some other pages of this exhibit, we have handled a good many motors in our experience in our purchase of other second-hand material. With reference to these Layne Western pumps, we have never bought or sold any of those pumps. I only know from my observation that it is very good equipment, equipment of that nature.

There is a salvage value of 10% of the original cost of those motors set up in the exhibit, and the salvage value on the following page of 10% on the original cost of motors acquired after June 1, 1939, is set up. I believe that is a proper value and reasonable and in line with the used material market. Certainly that is the most that we could offer for that class of material if it were offered to us.

With reference to the pumps, I guess I was the one who suggested to Mr. Davidson this 10% valuation. I
886 probably did not think enough about the use of those
pumps and the conditions under which they were used when I suggested it. There is a possibility that some of them could be sold, but when Mr. Smith and I went out to the Panhandle and I talked to him he told me very emphatically that those pumps had no value and that we should not have suggested any value for them. I think I would have to acknowledge that it was an error on my part in placing a value on them. I am convinced that they are junk. It would not pay to take them out of the wells and put them on top of the ground and junk them. They should be left where they are in the wells.

Listed in this Exhibit 122 is a large variety of property listed under the caption of "Tools." The lists appear on pages 43 to 47 and pages 87, 88, and 89. As to this type of equipment, every time you buy used material the object of the seller is to get you to take as much miscellaneous material of this kind off the hands of the seller as possible. We have had to take quite a lot of similar material, although probably not identical. The salvage value as set up in this report is 10% of the original cost. Frankly, all of this material could not be sold by any dealer anywhere. There are some items that a dealer would keep forever and not find any way to dispose of or anybody that wanted them. A lot of it is special equipment ordered particularly for this system. Some of the items you would get a little more for because they are more commonly used than others. I still think 10% of the original cost of this material is a large and fair valuation to place upon it for salvage.

There is another miscellaneous grouping of equipment under the title "Miscellaneous Equipment—Account 1006-J," appearing on pages 32, 33, 67, 68, 78, and 79. I am familiar with most of that equipment. Naturally, in any list of that kind there are going to be some special items that nobody is familiar with who did not order them. However, I believe what I said about the tools is also true of this material in its entirety, except this: If you can conceive of a second-hand dealer having all this material in his stock, you cannot conceive of the buyer of most of this type of equipment going to any second-hand dealer to get this stuff, those specialized tools. If the dealer was in Houston, the use for them might be somewhere else in the country. It is small stuff. It would be hard to transport it, and even though there is 10% valuation placed on it, as to a great deal of it whoever gets it will never be able to dispose of it.

There are a number of different types of tanks appearing on page 27 and all through here. To save time I will classify them into tanks of what we call 450 gallons and down, or small tanks, and those 150,000 and 200,000 gallon elevated tanks built on the Fritch station and other stations. Tanks that are 15 or 20 years old will be in pretty bad shape. I do not believe there is much resale or salvage value to them. Just the other day I bought for our company three wells in Talco, Texas, and in connection with those wells we salvaged some tanks, two 500 barrel tanks, a 1,000 barrel tank, and one smaller tank. Now those tanks were only in use at Talco for about a year and a half, and yet when we examined them the bottoms were rotted out, and we sold them in place to a dealer in used tanks for about 5 or 6 per cent of what they originally cost. We were glad to get rid of them. Now we are dealing in tanks 15 or 20 years old, so I think the 5 per cent valuation set up here is very reasonable. I want to call attention to the 887 fact that a good deal of the cost of a tank is the cost of putting it up on the location where it is. The steel or material is not the only substantial item in the value of the average tank. A good deal of the value of it is building it, erecting it, and so forth.

These large 100,000 and 200,000-gallon tanks are elevated tanks, and they just have to be cut up. After they are cut up it will be a very difficult matter to rebuild them again. I do not believe it would be worth while contemplating that. I would sell those for scrap. Even a large tank, such as a 55,000-barrel tank, has a great deal of steel in it, and it only has a salvage value in the oil industry of five or six hundred dollars, and there have been hundreds of them sold over the past ten years at prices within that range. ~~The small tanks are riveted also~~, but they can be hauled on trucks and carried away. They would not have to be cut up and re-riveted.

As to the laboratory equipment appearing in Account 1014 on pages 40 and 90, I noticed that there has been a salvage value of 20% given to that. This laboratory equipment includes a number of special items, and good items, that have been purchased for the system. I believe they will keep this laboratory up in full notch order to the last minute, so they should have a higher salvage value than other classifications. Our organization in the last two years has equipped two or three refinery laboratories complete. In equipping such a laboratory we will issue purchase orders to 25 or 30 different manufacturers of laboratory equipment, and assemble this equipment, and sell it, and I believe you could sell this equipment, or most of it, although again some items might be hard to dispose of or perhaps might never be disposed of.

I believe the 20% figure is reasonable and proper as to the engines listed in Account No. 1024 on pages 92 and 93. There is one of them installed now, and Mr. Smith and I when at Fritch drove out there and looked at that engine. It is a combination engine and compressor cylinder used to increase the pressure from the gas wells to assist in boosting the gas into the line. I believe they contemplate, as the well pressures go down, installing these at different wells for the same purpose.

All through the country a 40 horsepower vertical gas engine is used for pumping oil wells, in connection with the power plants which pump oil wells, and are generally that size, so I believe those engines, if they are salvaged, could possibly be used throughout the oil country. We will always buy 40 horsepower engines. Usually these engines are three to five years old. Sometimes they are ten years old. They are seldom older than that. We pay prices ranging from $200 to $250 or $300 for these engines, depending on the condition of them, the manufacturer, the location of them, and how much it will cost to fix them up to resell them. So I believe the price of $200, or 10%, which we have placed on these engines, which is a little over $200, is a reasonable price and is in line with the salvage value of this type of equipment. Inasmuch as this is a new thing, none of these engines have ever been salvaged before. I believe this is the first one that was ever made.

Referring to the warehouse stocks, such as are listed on page 94 through page 102, consisting of engine parts, pipes, and fittings, casing, couplings, gate valves, and similar material, this is the type of equipment that I ordinarily deal in. That is, a good deal of it is. In contemplating
888 the salvage of this system we included in our calculations of pipe less than 12 inches in size the valves and fittings of this pipe and such valves and fittings as were

in these warehouse stocks. The only different factor is the cost of reclaiming. There will be no cost of reclaiming when it is in the warehouse stocks. It just has to be loaded with the other material into cars. That is true with reference to the Worthington engine parts. Since there is no market for these engines and they will have to be junked, naturally those parts for such engines would similarly have no value and should be sent up to the scrap heap.

As to the material other than engine parts, we have given the same value to that material that we have given to the reclaimed equipment of the same character, which is $20 a ton. All the material in the warehouse stock is not new and will not be new. They take new material out and bring material in from other uses when they are through with it, and a lot of that material in the warehouse stocks is second-hand material or material they had taken and cleaned up and put in the warehouse with a view of using it again if the occasion requires.

I have had experience in dealing with the type of equipment referred to in Exhibit 122 as cleaning tools. Our concern at one time made, and still has the facilities to manufacture, a complete line of cable tools, which these are. If we had a sufficient market we would manufacture these tools today. We still make certain cable tool specialties, such as Crotto wire line clamps, the Hardenberg underreamers, and other tools. The market for tools of this kind has been gradually disappearing over the last ten years. I guess in our own stocks we have between $200,000 and $300,000 worth of new tools that we would be happy to dispose of at 10% of their original sales price, or possibly less. However, in certain parts of the oil country, such as the Panhandle, there is still a small demand and a small use for cleaning out tools, and they are bought and sold.

After the wells are drilled, usually with the rotary method, if you want to go back in them, you employ a drilling contractor with a drilling machine or a spudder to go in there and clean out the wells, because it is too expensive to go into these holes with heavy rotary equipment. In the Wichita Falls area after we drill the holes out with rotaries, we drill them with spudders, so there is a small value to these tools. Remember this, however, that it is expensive to mishandle and to have trouble with tools. Tools that are 15 or 20 years old would be a very serious matter to use, and a prudent contractor would hesitate very much to consider putting them into a well. Of course, there are certain minor improvements in the building and construction of this equipment. I think the 10% valuation which I myself placed on these tools is pretty liberal.

I have had experience in trying to dispose of material of this kind which has been accumulated on a rather large scale. At Pampa alone we have had months where we sold as much as $250,000 to $300,000 worth of used equipment. We have made sizeable used material deals. Several years ago we bought all the lapweld casing and line pipe that the Midwest Refining Company had in Colorado, Utah, and Wyoming. While I was up in that country Mr. Wilson the vice president of the Texas Company, got hold of me and asked me to inspect all their drilling equipment, 889 which they wanted to sell, as they were going out of the drilling business themselves and turning their work over to contractors. Their superintendent, Mr. Leo Daley, and I made a trip through Colorado and Wyoming to every one of their properties, the Florence, Isle Dome, and other points, and I looked at a group of tools which had an inventory value of almost $800,000. After I figured the freight on these tools back to the Mid-Continent field I had to inform the Texas Company that in my judgment they had no value at all, and I could not use them. I could not recommend anything for them. It is my understanding that they finally sold them to a junk dealer in Casper, Wyoming.

I have had experience in cleaning up plant sites after the salvage of the material such as buildings, engine units, tanks, and other above-foundation property have been removed. Oftentimes we have had to clean up leases when we left them. After I joined the Western Supply Company I bought a number of refineries personally. You remember the Oklahoma Petroleum and Gasoline Company that had a plant at Dual. I junked that plant myself, and we bought gasoline plants and junked them, and we built gasoline plants. We have had a lot of experience generally with that kind of work. Frankly, I think the minimum cost estimates shown in Exhibit 122 of $3600 in the case of all these plant sites, with the exception of Fritch, in which the figure is shown at more than $10,000, are very reasonable for cleaning up and conditioning these sites. I caused the auditors over there to do a lot of work. I asked them how much concrete was put into the foundations and pits in those nine compressor stations and at Fritch. In answer they gave me, without adding it all up, the figure of over 42,000 yards. That just gives you an idea of the immense amount of these foundations, these concrete pillars, these concrete wall pits, and everything of that kind.

Now those plants today are just as clean as a whistle. There is no place in the oil country where any property is any cleaner or better kept than those compressor stations. There is no pin loose in it. There are no loose amounts of dirt or anything of that kind. I believe honestly that if I were offered the opportunity to clean those sites up for what Mr. Davidson has estimated it would cost, I certainly would not undertake to do it. I think the figure is very low.

You can't go off and leave those sites instead of cleaning them up and by that means save $3600. It would be a very dangerous thing for an individual or a corporation or anybody else to abandon a property that has deep pits in it which would be filled with water where people and cattle would drown, with walls sticking up all over among the weeds where people would drive down the country lanes and run into them. There is danger of that and other things that could happen, and anybody who is acquainted with the oil country knows these things could happen when you give the least opportunity for them to occur.

The prevailing custom throughout the oil and gas country is to clean up and level off these plant sites. If we buy a plant from any company, they will put in their contract an obligation for us to clean that off satisfactorily to the customer. You remember I mentioned a few moments ago we bought a few wells a couple of weeks ago at Talco, Texas. These three wells had three derricks sitting over them. Each derrick stands on four concrete posts about 4½ feet high. The city of Talco made us level those posts off, and we had to contract to have that done
890 before we abandoned those walls and pay the contractor so they knew the job would be done. Now anywhere in the oil country, whether you have to or not, you want to do that because you would not want to leave yourself wide open to all kinds of damage suits or lawsuits, even if you were not afraid of them and were protected by insurance. You would not want to leave a nuisance which would cause some innocent person to be injured or hurt in any way.

I spoke earlier about leaving the pumps in the bottom of the water wells. The wells themselves should be filled up and plugged, just like all the other wells in the system, for the same reasons that I have given with reference to pits. We cannot leave holes in the ground.

I have seen the list submitted to the Examiner this morning by Mr. Davidson of property which is not included in Exhibit 122 and which is not covered by his testimony in connection with that exhibit. He has described the property under the caption: "Non-salvageable property not listed in Exhibit 122." That covers such items as the telephone system, right-of-way easements, and various items that are set on those four pages. A great deal of it has to do with concrete work, concrete anchors, pipe racks, engine and building foundations.

When I first went to Chicago Mr. Davidson and I went over the entire property inventories of defendants. It was a tedious task, and it took several days to just go through it, and there are a number of items, principally these items here, that I would say have no possible salvage value of any kind whatsoever. He would jot them off, so I am probably responsible for a good many of these items being left out of the other exhibit. They are just worthless from any point of view whatsoever that I could figure out. Take the item of 28-inch highway and railroad crossing casing, which Mr. Davidson has testified would have to be taken out from under the railroad company's right-of-way easement. If all that pipe was at any one place, it could be loaded out, like this other pipe we have discussed, on a $20 per ton basis. That much could be salvaged out of the cost of getting it out of the ditches, but since it is scattered up and down the system, it would cost more than that to assemble it in carload lots at these various points, so it is just worthless.

As to the cooling towers, the Bentube sections have been salvaged, the pits under the towers are being filled up. What we are talking about now is a wooden structure. That is only good for kindling wood, if it has dried up enough to be used for that. It is just a series of wood slats that have had water running over them for years. We could not attempt to use them on new installation or anything of that kind. In my judgment there is no salvage value in any of the material listed on those pages.

Cross-Examination by Mr. Slaff.

I have never testified in any case on matters similar to those matters on which I am now testifying.

891 Cross-Examination by Mr. Booth:

My study of the salvage value, and the salvage values which I have attributed to material, are based upon such values as they exist in 1939. I have given no consideration at all or made any endeavor to arrive at any conclusions as to conditions which might prevail in 1954, except to that extent that in the used material business you are always handling material that is old. You get material offered to you that is 15 years old, 20 years old, 10 years old, or 25 years old. I mean you are always dealing with equipment of that age, and I believe it is reasonable to assume in dealing with equipment of that age that it is just about like it was 10 years ago, or just about like it will be 10 years from now. I make no effort to predict what the material will be worth 10 years from now. My conclusions are predicated upon conditions which prevail in 1939, and I have made no study or made no estimate of conditions which will prevail in 1954, fifteen years from now, except that in dealing with used material you are always dealing in material that is 15 years old, and it is reasonable to suppose that 15 years ago you were doing that, and if you were doing it then, it is reasonable to suppose that you will continue to do that and that similar conditions will prevail. There are, of course, exceptional conditions which can occur, but I do not attempt to be a prophet. I am not stating now that the conditions with respect to the sale of the properties of these two companies in 1954 will be identical with the conditions which exist in 1939. I am in no position to predict, nor do I endeavor to predict the conditions which will prevail in 1954. All I was asked by Mr. Morgan to do was to determine the salvage value of these properties and this equipment based upon conditions which exist in 1939.

Questions by the Examiner.

The corrugated iron tool house and garage at Kingsmill is not a structural steel building but just a small oil field tool house like a great many on that system. We have one of them of our own, I guess, two miles from there in the

Panhandle, that has absolutely no value whatever. This little water well house is just a tin-covered house over the water well. You would not haul it away for all the material in it.

Redirect Examination by Mr. Morgan.

They have those little tool houses with corrugated iron nailed to wood frame structures. We have them in that immediate vicinity not two miles from there. They are just built of two-by-fours with corrugated iron nailed on them to put tools into. They have no value at all when you build them and certainly are not worth anything when you salvage them.

892 HERMAN P. TAUBMAN, recalled for cross-examination, testified:

Cross-Examination by Mr. Booth.

(August 30, 1939.)

My estimate of the salvage value of the property of these two companies was based entirely upon conditions which prevail in 1939. I did not, and was not asked to, predict the conditions which will prevail in 1954. I would not call it unreasonable, if I were asked to predict the conditions which might prevail in 1954 effecting the salvage value of this property, because you have got always to figure back based on a certain age. I do not profess to know what will happen in the future. I do not know the business conditions which will prevail in 1954, which is obviously one of the factors and an important factor which would have to be considered in arriving at the salvage value of this property.

All I was asked to do was to determine the salvage value of certain equipment and property of these two companies on the assumption that the property was approximately 20 years old and based on the salvage market value conditions in 1939.

893 (August 31, 1939.)

(EXHIBIT 122 for identification was offered and received in evidence over the objection of counsel for complainant and counsel for the Commission, who were granted exceptions.)

894 F. C. HAMILTON, a witness for the defendants, testified as follows:

Direct Examination by Mr. Morgan.

(August 31, 1939.)

My name is F. C. Hamilton. I live in East Orange, New Jersey. My place of business is at Sixty Wall Tower, New York City. I am a consulting engineer engaged in making valuations of public utilities and natural gas pipelines for various purposes. At the present time I am consulting engineer for Electric Advisers, Incorporated. My time for that corporation is devoted to valuation work although that organization is not devoted to that type of work.

I have been engaged in valuation work since July, 1914. From July, 1914, to April, 1917, I was employed by Harold Almert in the Rookery Building in Chicago. During that period two of the principal valuations on which I worked were the Washington Railway and Electric Company in the District of Columbia and the Commonwealth Edison Company in Chicago.

From April 1, 1917, until October 1, 1935, I was employed as a consulting engineer by Henry L. Doherty and Company, who were employed by the Cities Service Company to supervise operations of the subsidiaries of the Cities Service Company.

From October 1, 1935, to December 31, 1937, I was employed by the Cities Service Company directly, and from January 1, 1938 to date by the Electric Advisers, Incorporated.

The valuations with which I have been connected were of natural gas pipelines, utility properties and oil properties for the purpose of purchase or sale, and valuations of natural gas pipeline and utility properties for the purpose of establishing rate bases before courts and public utility commissions and some city councils. There were valuations for the purpose of presentation before state commissions and later the Securities and Exchange Commission in connection with the issuance of securities. There were valuations for insurance purposes and for tax purposes. There were valuations for presentation to bond houses and insurance companies having to do with the sale of securities.

At all times during my employment above outlined I have been at liberty and have received employment from companies other than Cities Service and its subsidiary companies. Electric Advisers, Incorporated, is owned by the subsidiary companies of Cities Service and is a purely service at cost organization, so far as those companies are concerned.

Some of the companies for whom I have prepared valuations or rendered valuation services outside of my own organization are Columbus Gas and Fuel Company in Columbus, Ohio, The Iroquois Natural Gas Company at Buffalo, the Calgary Gas Company at Calgary, Canada, the Federal Gas and Fuel Company at Columbus, Ohio, the United Fuel Gas Company at Charleston, West Virginia, the Pennsylvania Gas Company at Erie, Pennsylvania, the Jamaica Water Company at New York, the receiver 895 for the Kansas Natural Gas Company under Judge Booth at the time that company was in receivership, and many others.

I have appeared before commissions, municipal councils, and courts in connection with these valuations in about 22 states, namely: Connecticut, New York, Pennsylvania, Maryland, North Carolina, Virginia, Texas, Georgia, Alabama, Mississippi, Arkansas, Tennessee, Oklahoma, Kansas, Missouri, Colorado, Wyoming, Washington, Minnesota, Illinois, Ohio, Michigan, District of Columbia, and the provinces of Alberta and Ontario, Canada. The amount involved in these various valuations was considerably in excess of two billion dollars in the aggregate.

During that period there were purchased through negotiations which I have conducted 37 properties on which I fixed valuations, totaling $165,000,000. During that same period I valued properties which were not purchased, because of failure to meet on prices, in the amount of $95,000,000. I have made valuations for the purpose of conducting negotiations for the sale of 23 utility properties with a total value of approximately $60,000,000. During the same period I conducted successful negotiations for the purchase of 29 oil properties with a total value of $53,000,000, and conducted negotiations in connection with other oil properties which were not purchased to the number of 34, with the total value of $106,000,000

Those were negotiations for purchase and sale. In those transactions I had the responsibility of arriving at the value for the interest I represented, and those I represented relied on my judgment a great portion of the time as to whether or not they would purchase or sell the property so far as its valuation was concerned. They have relied upon my judgment a great portion of the time except that in the 1927 and 1928 boom I advocated the sale of some properties, and they disagreed with me.

A very large portion in total number of dollars falls under the classification for the establishment of rate bases of various properties, and another considerable portion under the classification of establishing a value for the issuance of securities and/or the sale of those securities.

I have had a considerable organization throughout the whole period, varying in number of men from 15 to a high of about 75. As I recall it, there are about 55 men in the organization now. Some of them have been with me for as much as 22 years, and the average of the nine top men is in excess of 15 years. The force is almost entirely made up of graduate engineers from the leading colleges, who have had experience in natural gas pipelines or on utility properties prior to coming with me. I consider that this organization and force which I utilized in these studies is composed of men competent to perform the duties to which they are assigned. I have been completely cold-blooded in weeding out people who were inaccurate, unwilling to devote their entire energy to the work, and who seemed to me to lack the mental ability.

I have been going back with valuations to the same commissions over and over again, many times for the same clients, and that is something that cannot be done with a force that is either careless or inaccurate in this work.

896 For use in the valuation of a property such as that of a natural gas pipeline I have prepared myself with factual data concerning what is involved in the construction of a property of that kind. For years it has been my practice on new pipeline construction jobs, whether they were being conducted by contractors or by the Cities Service Company or by the forces of other companies, to put men on those jobs to follow the construction from the beginning to the completion of the work. They have kept the time of the men and gangs by the units of work which those men or gangs were doing. By that I mean a gang for trenching, a gang for backfill, and so on. Those hours were so kept that they would, at the labor rates then prevailing, balance out with the payroll that was being kept on the job.

I wanted that for the purpose of establishing the man hours that were necessary to do a specific piece of work, so that, with those man hours and with that gang set-up I could, at a later date, apply a changed labor schedule that might then be in force and arrive at what would be the cost of reconstructing that pipeline at a period when prices had changed. I incurred the expense of doing this work and I never was recompensed for that work at all, except in the sense that on later jobs I had available for my use accurate information, and my recompense came in the fact that it secured me employment because of the accuracy of the data. That was an expense and a means which I incurred and adopted as a preparation for the work that I am holding myself out to do.

As an incident to learning the number of man hours required to install a given unit there was kept the original cost of the equipment, the type of the equipment, and the gasoline and oil consumption where they used gasoline and oil, and the maintenance cost.

I made and kept a record of this character on the work on Natural Gas Pipeline Company of America and Texoma Natural Gas Company. At the time this line was constructed it was the largest line constructed as a single unit up to that time, and I wanted to and did get time studies on that line in great detail. I have used those time studies and the other information which I got in the same connection in the work concerning which I am about to testify.

In applying these man-hour costs, unit costs of that character, I have taken into account such changes as I have found in the character of the machinery employed or appliances employed—in other words, the technological changes that have occurred in connection with the construction of properties of this kind—because we are familiar with the changes that have been made in the equipment. I have made it my business to keep up with the changes that have been made. I am familiar with the relative man hours that are required and have given effect to those changes where they occur as the result of any technological improvements or advances.

I have been keeping this man-hour and similar type of study and records since about the year 1925. I have kept it up to the present time and am engaged in making out at the present minute on 40 miles of 8-inch line being laid southwest from Hutchinson, Kansas, to a gas field there. I have kept up that practice of sending men out to these construction jobs and getting studies of this character and have observed the records of them from 1925 to the present date.

897 I have been asked to make a valuation of the properties of the defendant. I was engaged to perform that service in February, 1938, and the work started about the first of March and continued to the 20th of August that year. In fixing the valuation I took a date certain as of January 1, 1938. There were employed on that work at that time 1894-1/2 man days.

That is not all the work we have done in that connection. Again in April, 1939, I was requested to bring that valuation down to date by the additions and betterments, that had been made in the meantime, the removal of such small items as had been retired, and bringing the valuation up to a date certain as of June 1, 1939. On this work there were 725 man days employed.

I was asked to value all of the physical properties with the exception of leases. In other words, I took the wells and well equipment on the leases but did not attempt to establish a value for the leases themselves. I took all other physical property, pipelines, compressor stations, buildings, and so on, and did establish first the cost of reproduction of those physical units without including anything except the costs of the inert property at the time of completion before it had been seasoned and before it had business attached to it.

I had access to the books and records of the companies but did not attempt to establish the original cost of the property, but I did use those books and records as checks on the inventory as to quantities. We were not told by the management of these companies at the time we were asked to place values on these properties, with the exception of leases, as to the methods we would pursue in arriving at the values. Our task was to arrive at the value by such means as we, with the training and experience that we had, saw fit to use.

I started first with the cost of reproduction of the physical property, including those items of interest, taxes, and other necessary costs during construction that are sometimes called overhead, but which are just as necessary as the labor of the man who digs the ditch. I then, on completion of this, deducted from that cost of reproduction the observed depreciation which was prepared by P. McDonald Biddison. I took the figures for existing depreciation on the present properties and applied them to the cost of reproduction and by that means arrived at my conception of present value. That is the method of arriving at present value that I have always employed in connection with the valuation work which I have done throughout all these years.

In addition to ascertaining the cost of reproducing the inert physical properties, including the overhead charges of various kinds which I have mentioned, I, at the request of these companies, have also undertaken to develop the going concern value of the property as separate and distinct from physical property itself. In that connection I have worked out the necessary working capital that must be employed in a business of the character and magnitude of these pipelines. All of those are included in the studies which we are prepared to present to the Examiner.

898 When we were employed to undertake this study back in February, 1938, I assigned Mr. H. L. Eastman, Mr. J. L. Willard, and Mr. Frank Stoddart to supervise the gathering of the information and the putting together of this information under my direction. These men were all experienced and had been with me for many years. With that group went a large number of other men who worked under the direction of these three in the preparation of that valuation.

There were employed 21 men in the period from March to August, inclusive, in 1938, and 12 men in the period from May to August, inclusive, in 1939. These men have devoted a total of 2618 man days to this work.

To Mr. Eastman I assigned the establishing of the labor rates in the various sections as of a particular time and the establishing of the value of rights-of-way and of land, and the determination of the working capital and the overheads, such as interest, insurance, taxes during construction, etc.

To Mr. Willard was assigned the supervision of the inventory of the physical property other than the well equipment on the leases and other than the measuring stations. The inventory on those last items was assigned to Mr. Stoddart. There was assigned to Mr. Willard the build-up of the unit costs from the time studies and from the labor rates which would be supplied to him by Mr. Eastman. Other details they adjusted among themselves and assigned the necessary men to work out the details. The group that worked on this last job had an average of 11 years in my employ, and all of them had experience prior to coming with me.

As I have always done my work it goes into very great detail. I have prepared a detailed inventory of all of the existing physical properties of these pipelines with the exception of the gas leases. I have not only broken that down into units, but, for the purpose of pricing the units, have broken them up by districts many times because of the variation in freight rates, the variation in labor costs, and items of that kind.

There are so many different items, so many different sources of manufacture, so many delivery points, that a freight rate study is a very detailed proposition, and we have applied the present freight rates which, by the way, were changed from the rates in existence at the time of the 1938 valuation. I mean by that that in the interim freight rates have been raised 10%, as the papers refer to it. Of course, no individual rate was raised exactly 10%. The average raise was 10%, and we had to get the new specific freight rate that did apply in order to attach it to the particular item and to the particular delivery point to which this item had to be delivered.

The labor costs similarly had to be gone into in great detail because of a large variation. For instance, in the rates for common labor in the States of Texas and Oklahoma and the rate for the same common labor in the district around Chicago there is a large variation. In other words, there is a variation there of probably 80 or 90% that the rates in Chicago for the same item are above the rates in Texas.

899 We had to vary our prices by states, for instance, because of the difference in the taxes that apply to payrolls or the labor item, one state as against another, and because of the difference between, or the absence of, use and sales taxes for materials. Those are just samples of the detail to which it is necessary to go in order to get an accurate determination of what it would now cost to reproduce this property in its present location.

I have assembled the detail of these inventories and set out the cost of reproducing each unit of the physical property in the form of a volume or compilation to be offered as an exhibit in this case. I have kept up with the preparation of that exhibit and examined it and know what is in it. I have spent a lot of time on it myself.

(At this point the witness was handed two volumes numbered I and II respectively, each captioned "Valuation Natural Gas Pipeline Company of America, Texoma Natural

Gas Company, F. C. Hamilton, Consulting Engineer, New York, New York," and at the request of counsel for the defendants the Examiner directed that these volumes be marked for identification as Exhibit No. 125, Volume I and Volume II.)

These are the compilations which we have prepared as exhibits to be offered in this case.

Mr. Slaff: Then at this time I should like to object, Mr. Examiner, and to be heard on the objection to the introduction of any evidence dealing with the reproduction cost of the properties of the defendants-respondents on the ground that that evidence is irrelevant, immaterial, and incompetent in this proceeding, and on the ground that that evidence of reproduction cost has no bearing on the determination of the proper base for rate-making purposes in this case.

This is a proceeding under the Natural Gas Act, and I want to call the Examiner's attention specifically to Section 6 (a) of that Act which provides, in part, that "the Commission may investigate and ascertain the actual legitimate cost of the property of every natural gas company, the depreciation therein, and, when found necessary for rate-making purposes, other facts which bear on the determination of such cost or depreciation and the fair value of such property."

Now your Honor will observe that this is a legislative expression of a fundamental departure from previous rate-making concepts as they have existed in some quarters. In the first place, there is no statement in this section, or elsewhere in the act, that among the "other facts" to be investigated and ascertained which bear on the determination of "the fair value of such property" is the reproduction cost of such property. Now it is not an immutable constitutional concept that a determination of reproduction cost is a prerequisite to the determination of the fair value for rate-making purposes of utility property and the fixing of utility rates. I am fully aware, your Honor, of Smyth *vs.* Ames and the other decisions of the Supreme Court on utility matters, but it is quite clear to me, as the Supreme Court itself indicated in the term just past and in the preceding term in such cases as Graves *vs.* O'Keefe and Erie *vs.* Tompkins, that fundamental concepts of constitutional protection of property rights must be adjusted in the light of the economic experience of the nation.

Now I do not mean to imply at this time, or at any other time, that constitutional rights are to be subject to rapidly shifting vagaries and year-by-year changes, but I do mean that the Supreme Court itself has declared that when the progress of our complex economy has rendered obsolete or unworkable doctrines which had until that time been more or less accepted it was not in violation of but rather in keeping with the spirit of constitutional government that such doctrines be replaced by those which fit the needs of the modern age.

Now Congress recognized this in the passage of the Natural Gas Act and pointedly omitted to charge the Federal Power Commission with the duty of investigating and ascertaining the "reproduction cost" or the "replacement cost" of the property of natural gas companies, while specifically authorizing it to ascertain the actual legitimate cost of such property. Nor can it be successfully argued that this commission is charged with the duty of ascertaining reproduction cost under the doctrine of Smyth *vs.* Ames—ergo there was no need for congressional mandate—ergo the congressional omission is meaningless. That such argument falls of its own weight is at once obvious from the fact that, under Smyth *vs.* Ames, ascertainment of "actual legitimate cost" of the property,—there referred to as "the original cost of construction",—is also an element in the determination of fair value. Hence if Congress had intended to follow that case implicitly there would have been no necessity, either, for the explicit direction by Congress to the Commission to ascertain actual legitimate cost. The explicit inclusion of the one and the explicit exclusion of the other shows clearly that Congress recognized the inherent invalidity of reproduction cost determination as an aid to the process of fair rate-making. It is clear, therefore, that Congress, cognizant of the fact that the experience of years had shown that determination of reproduction cost had been perverted from an aid to an impediment in the determination of the rate base, clearly ruled that factor out of consideration by this Commission.

The Federal Power Commission is instructed by Congress to ascertain the "actual legitimate cost of the property of every natural gas company and its depreciation". There is no blanket instruction, no blanket direction similar to this one to go into "other facts" bearing on the fair value of such property. It is only in certain limited cases, to-wit, "when found necessary for rate-making purposes" that the Commission is instructed to determine "other facts" bearing on the determination of fair value.

Now there has been no showing whatever that in this case it is necessary for rate-making purposes that this Commission ascertain such other facts as the reproduction cost of the defendants'-Respondents' properties for rate-making purposes. Nor can there properly be such a showing.

I think, speaking generally, it can be ascertained confidently that the insistence by utility companies upon the introduction of evidence dealing with reproduction cost and that major weight be attached to reproduction cost as against any other element of value in the determination of the rate base has consistently impeded the regulatory processes in the past. This Commission itself has said, "It has been the considered judgment of the great majority of the regulatory commissions that the use of reproduction cost is not a proper factor in the determination of a valuation." And further, "The general opinion of regulatory authorities who have passed upon the question of the proper valuation base is overwhelmingly in favor of the prudent investment as opposed to the reproduction cost method."

The opinion of Commission counsel in this respect is expressed in the concurring opinion written by Mr. Justice Frankfurter for himself and Mr. Justice Black in the case of Driscoll *vs.* Edison in the term just passed that "the force of reason, confirmed by events, has gradually been rendering that formula (of Smyth *vs.* Ames) moribund by revealing it to be useless as a guide for adjudication. Experience has made it overwhelmingly clear that Smith *vs.* Ames and the uses to which it has been put represented an attempt to erect temporary facts into legal absolutes. The determination of utility rates—what may fairly be exacted from the public and what is adequate to increase enterprise—does not present questions of an essentially legal matter in the sense that legal education and lawyer's learning afford peculiar competence for their adjustment. These are matters for the application of whatever knowledge economics and finance may bring to the practicalities of business enterprise."

Congress, in the Natural Gas Act, has clearly indicated its intention to have the Federal Power Commission depart from that moribund formula of Smyth against Ames. In the light of that circumstance, there is no justification whatever for the introduction of reproduction cost evidence in this case.

Let me add, too, that Commission counsel is in wholehearted agreement with the fundamental principle of utility regulation which Mr. Justice Black very trenchantly expressed in his opinion in the McCart case, McCart against Indianapolis Water Company, 302 U. S., when he said:

"I do not believe that the constitutionality of action by a soverign state of this Union (or, I might add parenthetically, as in this case, 'the Union itself') is dependent upon the market fluctuations of cast iron pipe."

How particularly apt is that statement in the light of the very facts of this case where one of the major portions of the companies' investment is in just that very thing.

Moreover, Mr. Examiner, even if there were no such explicit expression of legislative intention as designated in the Natural Gas Act, and even if it were not for the fact that reproduction cost estimates have no sound place at all in the determination of a base for rate-making purposes, this case would fall squarely within the special type of situation covered in the Clark's Ferry Bridge Company case in 291 U. S., where Chief Justice Hughes wrote the opinion for a unanimous court. And in that case the court said:

"Appellant attacks the finding of fair value upon the ground that it was based solely on the original cost of the bridge property and that the amount paid by the appellant for the bridge was less than its fair value at that time and less than its fair value in 1930. It is not open to question that the reasonable cost of the bridge is good evidence of its value at the time of construction. And we have said 'such actual cost will continue fairly well to measure the amounts to be attributed to the physical elements of the property so long as there is no change in the level of applicable prices.' "

Now note particularly two things: first, that the Commission in the Clark's Ferry Bridge case took as the value of the utility the cost of its construction some seven years before the date at which the Commission fixed a fair value; and second, that the evidence introduced by the defendants-respondents in this very case establishes on its face that there is no change in the level of applicable prices, and that consequently the value of the properties in this case must be measured by, and only by, the actual legitimate cost of those properties, less depreciation.

Let me call your Honor's attention to Exhibit No. 67, which was introduced on behalf of the defendants-respondents by the Witness Palyi. Now, if your Honor will examine the indices on that exhibit you will note three that are particular pertinent to this discussion. First, is the companies' wage index. The Witness Palyi testified that this index was constructed by him as follows:

"From 1931 on we used the companies' own wage index, for which I had figures from the middle of 1931 until and into 1938. That index is a weighted, composite index of two indices, one for skilled labor used by the company and one for unskilled labor. Out of the two, by weighting in accordance with the annual expenditures in each category, skilled and unskilled, I constructed this one index number, which appears as the companies' wage index."

Now if your Honor will observe that exhibit and the witness' testimony, those wage expenditures were supposed to represent actual wages paid by the company to employees, and your Honor will observe that the company's wage index is at the latest date shown on Exhibit 67 lower than in 1931 at the completion of the construction of the company's property.

So, too, the second applicable index, the general price level index shown on that Exhibit 67, is lower at the beginning of 1939 than the average for the same general price level index during the period of construction of the properties of this company.

I call your Honor's attention to the fact that the Witness Palyi testified as follows:

"That is a very important aspect of the comparison; that the data for the history of the company covers only a short period. But I still say my impression of this price study is that there is a fair correspondence in the general trend in prices of commodities used by the company and in the general trend of what is called the general price levels in the country. This is, of course, theoretically obvious.

"If you spend money on these different types of commodities ranging from office supplies to storage batteries, from red lead to lumber, pipe, fittings, building materials, you cover so many things, as I mentioned yesterday, that, a priori, it would be most astonishing if your index number of prices fluctuated—would be very different in trend from the general index number, which would need an explanation if major differences for any length of time would occur; but that the trend is about the same, as a matter of fact, ought to be a priori, more or less obvious."

I stated a moment ago that the general price level index on Exhibit 67 is shown to be lower at the beginning of 1939 than the average for that index for the period of construction of the defendants-respondents' properties. Carrying that price trend down to the latest available date—a fact of which your Honor can now take judicial notice when it is, as now, called to your attention in open hearing—carrying that price trend down to the latest available date, we find that it is even still lower than shown on Exhibit 67. Projected down to the beginning of June, 1939, the general price level index would show, on Exhibit No. 67, as a figure of approximately 118 for the month of May, 1939. This compares with the figure of 126 shown for the end of the year 1938, and with the average figure of approximately 136 for the period shown as the companies' period of construction in 1930 and 1931.

We now come to the third of the companies' indices which has significance in this discussion, to wit, the "Index of Prices for Commodities Used by Natural Gas Pipeline Company of America", which also appears on Exhibit 67.

Even had there been no explicit statement to that effect in the record, we would be justified in assuming that these commodities were representative of the trend of prices generally of all commodities used by the companies. Now that index, as of the latest date shown on Exhibit 67, namely approximately the middle of 1938, is just approximately where it was during the period of construction of the companies' properties and has begun a downward swing. And if we accept at its face value the statement of the companies' witness Palyi that "there is a fair correspondence in the general trend of prices of commodities used by the company and in the general trend of what is called the general price levels in the country", then, of necessity, the index of prices for commodities used by the company must be even lower today than is shown at the latest date on Exhibit 67.

Now, I take it, Mr. Examiner, that it is not this Commission's intention to penalize investors by the fact that prices at the time the Commission fixes rates may be lower than they were at the time of original construction; although as I have pointed out a moment ago, there has been a drop in the general price level of approximately 13 percent from the time of the construction of the companies' properties to the present, I do not feel that the investors in this project should be penalized on this account. They are, as I view all the equities involved, and the constitutional requirements which are to be considered, here entitled to a fair return on the actual, legitimate cost, less depreciation, of the property now used and useful in the service of the public. Nor is it this Commission's intention, I take it, to penalize consumers when the converse of the facts which obtain in this case with respect to changes in price levels, is true.

And particularly, Mr. Examiner, when there has been little change in the applicable price levels and that change, if anything, has been to a point lower than the levels at the time of construction, I insist that the statement quoted from the Clark's Ferry Bridge case is applicable and that there is no necessity whatever that this Commission receive evidence of reproduction costs. For this hearing, and this Commission to engage in the incompetent mumbo jumbo, as it has been well called, of a reproduction cost estimate, would serve no purpose but to waste the time of everyone involved in this hearing and to delay the determination of the fairness of the rates of the defendants-respondents.

It seems to me, Mr. Examiner, that it is about time that this Gordian knot that has tied up the regulatory process for so long should finally be cut, and particularly is this true in the light of the fact that Congress has clearly expressed its intention that this be done in the regulation of natural gas companies.

Mr. Justice Stone aptly observed, in the concurring opinion in the St. Joseph Stockyards case, in 298 U. S., that, "the doctrine of stare decises, however appropriate and even necessary at times, has only a limited application in the field of constitutional law."

In the light of all these circumstances, Mr. Examiner, I must therefore object to the introduction in this proceeding of any evidence dealing with the matter of reproduction costs of the properties of the defendants-respondents, and I urge upon you that the rate base of the defendants-respondents be determined solely upon the basis of the actual legitimate cost of the properties, less depreciation, that is to say of those properties which are now used and useful in the service of the public, so that reasonable justice and speedy justice in the matter of rates may be done in this case on behalf of investors, consumers, and the public at large.

Mr. Booth: If the Examiner please, I would like to add a word or two before Judge Morgan answers the excellent argument that was made by counsel for the Federal Power Commission. I join in the objection for the reasons advanced by Mr. Slaff. I believe that this is an unusual proceeding. It is not like an ordinary rate case because, as Mr. Slaff has pointed out, there is a special statutory provision which I want to read again because it is brief:

"The Commission may investigate and ascertain the actual legitimate cost of the property of every natural gas company, the depreciation therein and, when found necessary for rate-making purposes, other facts which bear on the determination of such cost or depreciation and the fair value of such property."

It is obvious that that provision applies specifically to this proceeding. It seems to me that there must be a determination or at least a showing before evidence as to reproduction cost is introduced, that it is necessary in this proceeding that consideration be given to reproduction cost, and no evidence of that character has been offered. There has been no evidence that in the determination of the fair value of this property, it is necessary that the Commission give consideration to or find the reproduction cost of the companies' properties.

And furthermore, under the facts in this case and the exhibit, copy of which has just been handed to us and has been marked, it seems to me quite clear that no consideration is necessary or can reasonably be given to reproduction cost and value of property.

I raised the point earlier that the testimony which this Witness Hamilton had been giving was apparently of a misleading character because he apparently had made a reproduction cost study of the companies' property and he was calling it, and counsel for the company was calling it, the value of the property of the company.

Now, in the first place that is clearly contrary to the provisions of Section 6 (a); it is contrary to all the decisions of the court that say that in the determination of the value of the property of utility companies, generally speaking, consideration shall be given to original cost and if necessary to reproduction cost, or to both, under the individual facts in this case.

However, if you look at this exhibit you will note that on page 1 there is a reproduction cost new in the amount of $57,000,000, present value $54,000,000—the property is found to be at least in 95 percent condition. And that is the value of the companies' property.

Here is a property which, on the basis of the evidence submitted by the company has already operated for approximately 40 percent of its entire life, and yet, the company seeks to present evidence that in the determination of the rates to the consumers that the property shall be taken at 95 percent of its cost new, and that that is the sole element that shall be considered in the determination of the value of the property of the company.

Now it seems to be quite clear in my judgment that reproduction cost new under the facts in this case is not a necessary or a reasonable element because this is not an electric property, the company has presented evidence that the life of this property is going to expire in 12 more years, 10 more years. It must be clear that the reproduction cost new would be, upon the basis of the appraisal which the company is about to present, as high as the reproduction cost new which they have now submitted, if prices continue to maintain their present level between now and 1954, and their theory apparently, is that even though the property would have only a few more years of operation, that reproduction cost new, less observed depreciation, be taken as the sole element in the determination of value of the property of the company, and that, it seems to me, is highly unjustified.

Mr. Slaff also referred to the general experience of regulatory commissions which have been commented upon by the Federal Power Commission with reference to the use of reproduction cost. I agree with his viewpoint that the experience of utility commissions generally is that reproduction cost is an impediment and a very serious impediment to the prompt and fair determination of utility rates.

He referred to a number of court decisions. I would like to add one or two. There is a very recent decision of the Supreme Court of Wisconsin in the long litigated Wisconsin telephone rate case, which was handed down only within the last 30 or 40 days by the Supreme Court of Wisconsin, where the Supreme Court of Wisconsin criticised very severely the Wisconsin Commission for determining the rates of the Wisconsin Telephone Company on the basis of reproduction cost.

The trend of judicial decisions, the trend of Commission decisions, is very clearly away from the giving of consideration to reproduction cost in determining the fair value of the property. It seems clear, therefore, that the motion of counsel for the Federal Power Commission, in which we join, should be granted, that there should be no evidence as to reproduction cost submitted in this case, and the Commission under the specific provisions of Section 6-A should determine the value of the property on the basis of the actual legitimate cost, less depreciation, unless it is definitely shown that it is necessary that consideration be given to reproduction cost.

Mr. Morgan: May we take our recess at this time?

Examiner Simpson: Yes, we will have a five-minute recess.

(Thereupon a short recess was taken.)

Examiner Simpson: The hearing will resume.

Mr. Morgan: Mr. Examiner, I have been, as we all have, devoting myself to the study of the facts of this case for the past several months, and I am not prepared to go into a discussion of the authorities in the organized and learned manner in which counsel for the Power Commission has done, and in using those adjectives, I don't want to be understood as utilizing sarcasm or derision, because I think it is a very apt and a very splendid discussion of the subject from the point of view of that school of thought which has been advocating for some years a change in the law, a change as yet not effected, however.

Section 6-A of Natural Gas Act, as already stated, does mention that "the Commission may investigate and ascertain"—they don't have to but they "may investigate and ascertain the actual legitimate cost of the property of every natural gas company, the depreciation therein and, when found necessary for rate-making purposes, other facts which bear on the determination of such cost or depreciation and the fair value of such property."

They are not necessarily talking about rate-making purposes in the first part of that section at all. Now they get down to talk about rate-making purposes "and for rate-making purposes other facts", showing clearly that the Congress recognized that under the law as it was then being declared and had been declared since Smyth against Ames, that it was necessary to ascertain other facts in order to arrive at the fair value of the property which term they used here significantly, because that is what Smyth against Ames says, that it is the fair value of the property and not the original cost of it that must be given account in the matter of rate making.

Now there may have been Members of Congress who belonged to that school of thought which apparently Mr. Slaff and Mr. Booth subscribe to. By knowing something of the practical working of those things, I have some suspicion that somebody of that school of thought had something to do with the wording of Section 6. But the Congress, in enacting Section 6-A recognized that under certain circumstances it might be necessary to talk about other factors, and apparently one of the occasions when it might become necessary was when the Commission was investigating facts for rate-making purposes. There may have been Members of Congress who entertained the hope that the Supreme Court might, during the operation of this act, change the holding in Smyth against Ames and in the uniform line of majority opinions from that decision right on down to the present time, that it is necessary, in arriving at fair market value which the Supreme Court has uniformly held must be the rate base, to consider not only original cost but reproduction cost. They may have wanted to put the Federal Power Commission in a position so that if the Supreme Court held at any time during the operation of this act, that it was not necessary to consider anything but original cost, they might be in a position to do it. But unfortunately, from the standpoint of that school of thought, the Supreme Court has spoken again in the very case in which Justice Frankfurter wrote his dissenting opinion, and in that same dissent, Justice Frankfurter put this construction upon the majority opinion. He says that this court has reaffirmed the doctrine of Smyth against Ames, and that is the law, and I can't change it. This examiner can't change it. Mr. Slaff and Mr. Booth can't change it and nobody short of the Supreme Court of the United States can change it. I couldn't come here in the discharge of my responsibility to my clients and fail to present here evidence of reproduction costs which the courts have held, right down the line, must be considered in arriving at what the fair value of the property which the Congress itself calls the rate base in effect in Section No. 6-A is. And I can no more discharge my responsibility without bringing in here one of the necessary elements than I could if I didn't bring any evidence here at all.

Now Mr. Booth has taken pains to say that we are relying solely on reproduction costs. How does he know we are?

Mr. Booth: Your exhibit says valuation, and that is the reproduction cost appraisal.

Mr. Morgan: That is evidence of the value according to the testimony of the witnesses who are coming here to testify concerning these two volumes. But we haven't said we are relying solely upon it. As a matter of fact we are not. Yes—that is one of the things we are relying on. We say that the rate base is the fair value of the property, and we are bringing here evidence at this time of reproduction cost as evidence of the fair value of the property. Well, we will have other exhibits in which we will show the original cost and we are going to offer that ourselves as evidence of the present fair value of that property. This is just a part of our case, this is not all of it, and until we have rested, Mr. Booth is not at liberty, as I view it, to come here and say what we are relying on because we can't put all of this case in and state all of our positions at any one time.

Our position simply is this, that the rate base according to the doctrine of Smyth against Ames, which is still the law of the land, dealing with the constitutional rights of people, is the fair value of the property, and that the doctrine of the Supreme Court as announced in that case, and by the majority of the Court every time the matter has come up, is that in arriving at the fair value of the property, original cost must be considered and reproduction cost, less existing depreciation, must be considered.

We are trying to meet our responsibility under the law as it exists today because we can't change it, and we think that this would certainly be a record that would have to come back to the Commission if it went out of here without this evidence in it, and we are here prepared to present it and insist on the right to present it.

900 **H. L. EASTMAN**, a witness for the defendants, testified:

(August 31, 1939)

Direct Examination by Mr. Morgan.

My name is H. L. Eastman. I live in Maplewood, New Jersey. My place of business is at Sixty Wall Tower, New York City. I am associated with F. C. Hamilton, who preceded me on the witness stand. I have been employed by or associated with him, with the exception of a period of three years, since January, 1919.

I was graduated from the College of Engineering of the University of Colorado in 1917 with a degree of Bachelor of Science in electrical engineering. Immediately following my graduation I was employed by the Great Western Sugar Company, Scottsbluff, Nebraska, as a construction and later as an operating engineer. My employment with this company was terminated by the war when I entered the army.

While awaiting call to the army I took graduate work at the College of Engineering, University of Colorado, and completed the scholastic requirements for a Bachelor of Science degree in mechanical engineering. I spent the larger part of 1918 in the army.

Following my discharge from the army I was employed by F. C. Hamilton of New York City, who was then consulting engineer for Henry L. Doherty and Company. This was in January, 1919. In general I was engaged in the type of work already outlined by Mr. Hamilton in his testimony.

Upon my first employment with him I was assigned as a valuation engineer on valuations that were then under way. The largest property on the valuation of which I was employed during that two-year period, 1919 and 1920, was the property of the Toledo Edison Company in Toledo, Ohio. I was also employed on the valuation of the Durham Public Service Company of Durham, North Carolina and on a valuation which was being made for the receiver of the Kansas Natural Gas Company, involving property of that company and the Marnet Mining Company, a large natural gas system in Kansas, Oklahoma, and Missouri. I was also employed on valuations of the Wichita Natural Gas Company, the Quapaw Gas Company, the Webb City-

Carterville Gas Company, Carthage Gas Company, City Light and Traction Company, St. Joseph Railway Light, Heat, and Power Company, and some other smaller natural gas properties.

On January 1, 1921, I was employed by a group of natural gas properties which now comprise the Cities Service Gas Company of Bartlesville, Oklahoma, and I was employed by that group of properties as a valuation and rate engineer and on other general engineering problems. I remained with that group of companies until May, 1924, when I was again employed by Mr. Hamilton.

During that period of over three years I personally made detailed valuations of all of the natural gas properties operated from the Bartlesville office. I made studies of
901 rates for natural gas and assisted in various rate cases,
of which there were quite a number during this period, wherein the rates charged by these companies for natural gas were increased and the companies put on a profitable basis.

From May, 1924, to June, 1925, while in the employ of Mr. Hamilton, I resided in Kansas City, Missouri, and spent that year on general valuation and rate matters of natural gas properties and electric properties in that general vicinity.

In June, 1925, I moved to New Jersey, and since that date have been continuously associated with Mr. Hamilton. Until October 1 of 1935 we were consulting engineers for Henry L. Doherty and Company, fiscal agents for Cities Service Company. From October 1, 1935, until December 31, 1937, we were employed as consulting engineers for the Cities Service Company, and since January 1, 1938, have been associated with the Electric Advisers, Incorporated, a mutual service company. By mutual service company I refer to the type of mutual service company defined in the Public Utility Holding Company Act. I believe we are registered under Section 13 of that act.

Since 1925 I have been in active charge, through Mr. Hamilton, of an organization comprised of probably a minimum of 15 to a maximum of 75 men, who have been for the most part engaged in making valuations and rate analyses for public utility, natural gas, and in some cases petroleum properties. I have been associated with Mr. Hamilton in all of the valuation work done during the period on properties of which the total value will aggregate two billion dollars. Most of these properties were subsidiary companies of the Cities Service Company, and a large proportion were valued because of pending rate cases, for the purpose of security issues, or new financing.

We have also made numerous valuations of public utility, natural gas, and petroleum properties whose purchase was contemplated by the Cities Service Company or one of its subsidiaries. During this period from 1925 to date we have presented valuations before courts and commissions and other regulatory authorities in many different states, and I have personally appeared and testified before public utility commissions in the States of Oklahoma, Missouri, Texas, Kansas, Ohio, Michigan, Connecticut, and New York, and before the Interstate Commerce Commission and the Federal Power Commission. In addition I have participated in conferences over valuation and rate proceedings with public utility commissions in Colorado, Wyoming, Arkansas, Louisiana, Pennsylvania, New Mexico, Tennessee, North Carolina, and with the Securities and Exchange Commission.

Among the major properties which we have valued during this period from 1925 to date are the Toledo Edison Company, a major portion of the Ohio Public Service Company, the East Tennessee Light and Power Company, the Tennessee Eastern Electric Company, a large portion of the Public Service Company of Colorado, the Durham Public Service Company, the Empire District Electric Company, the St. Joseph Railway Light, Heat and Power Company, the City Light and Traction Company, the Knoxville Gas Company, the Spokane Gas and Fuel Company, the Republic Light, Heat and Power Company, the Dominion Natural Gas Company, Limited, the Southern Ontario Gas
Company, the Cities Service Gas Company, the Kan-
902 sas City Gas Company, the Ozark Utilities Company,
the Empire Pipeline Company, and many other properties whose purchase was contemplated and which we were requested to value.

In the Summer of 1930 I was sent to Western Canada to report on a contemplated natural gas pipeline project which had for its purpose the bringing of natural gas from the Turner Valley field in Alberta to the City of Winnepeg, Manitoba. In the Winter of 1930 and 1931 I was in charge of a survey of markets which contemplated the future marketing of natural gas, which it was hoped would be developed in large quantities in the Oriskany sand area of north central Pennsylvania and southwestern New York.

In the Fall of 1931 I made a complete detailed valuation of the Cities Service Gas Company for presentation to the Kansas Public Utilities Commission as a justification for the wholesale rates charged by this company. After presentation of this valuation and the other pertinent data this case was appealed to the United States District Court and eventually to the United States Supreme Court and was remanded back to the Commission for further findings. As a consequence we again made a detailed valuation of the Cities Service Gas Company in the Fall of 1934, and this was presented to the Kansas Commission during 1935. This case was later settled and disposed of by the Kansas Commission.

Since 1931 I have spent the greater portion of my time on the valuation of natural gas properties for presentation in rate cases before courts and commissions in the states of Kansas, Missouri, New York, Illinois, and in Washington, D. C..

I know about the record that Mr. Hamilton stated his organization had assembled and kept, and which he terms "time studies." I have quite a little to do with that study. We started this work as far back as 1925, and I have been quite familiar with each one of the studies that we have made since that time. The men actually engaged in the field in collecting and correlating the data were working directly under my supervision, and I familiar at all times with what they were doing. I have spent quite a good deal of time accompanying them in their work and endeavoring to see that the data which they collected was in the proper form and also to familiarize myself with construction methods.

We wanted this information for basic data and information which would be useful in making the valuation of similar property in the future. At the time the properties of defendants were being constructed we realized that here was the best opportunity that we had had up to that time to secure basic information of this sort on a large natural gas pipeline project, and we undertook to make time studies and collect data on representative sections of that line. We have had this data available and have used it in connection with the valuation studies that have been made by Mr. Hamilton and his organization, including myself, and which is now being presented to the Examiner.

I was among those first assigned by Mr. Hamilton to this particular study. After our arrival in Chicago, from which point the greater portion of our work was conducted, and the assembling of our men to carry on this work, the first step was the preparation of an inventory of the property.

Fortunately for us in this work, these companies were 903 constructed originally in almost their present form. That is, there have been very few additions to the property which we covered since the original construction. At the time of construction these companies kept a very adequate and detailed record of construction equipment and expenditures. They prepared a very excellent system of maps, and we made use of all this information which they had in their files in preparing the inventory of the property. When it came to the pipelines, we made use of their detailed pipeline maps, which showed the chainage notes, the pipes, and details of all special installations. Their other office records contained detailed plans, drawings, specifications dealing with the material, and we assembled all this data which we needed from their files and carefully analyzed them.

Then we sent field parties out to take inventory to the property in the field and to check the quantities of material which we had obtained from their regular records against the quantities as actually existed. We sent men to the Panhandle gas field who made inventories of the top fittings of the wells, casing, and checked the records of those wells. We sent men to the various compressor stations where they checked the quantities which they determined from the records of the company against the actual material at those stations. We sent men to the various compressor stations and structures along the line, and they made inventory of the cottages, dwellings, and other buildings, and we obtained lists of the construction tools which the company had, and the laboratory equipment, and other small items of that nature.

This data was assembled then and brought back to the office in Chicago and summarized and reduced to workable form. Quotations were then secured and unit prices evolved which would reflect the conditions as they existed on June 1, 1939. This inventory of which I spoke was a complete field inventory, where such type of inventory was necessary. On other portions of the property, where we knew of our own knowledge that they had an accurate inventory from regularly maintained records, it was more of a spot check. We, of course, could not see all of the joints of pipe that were in that pipeline, but we could see the engines and the buildings and those other things that are dealt with here as units. We actually inventoried the office equipment and furniture, mechanical equipment such as comptometers and adding machines, and all those things. We made a detailed list of all the physical property which went into these pipelines and which, when put together, constitute this pipeline system, with the exception of the gas leaseholds, which we did not include or value.

I was familiar with and supervised all of the work that was done. Personally I devoted a great deal of time to the appraisal of the real estate or land, the right-of-way, and to the calculation of certain costs which are detailed in the valuation and which we commonly refer to as general overhead. Also I made the calculations which were the basic data we used for working capital.

I did the field work which was necessary for the determination of the present schedule or levels of labor costs, and upon the completion of that work the various wage rates or wage levels which we have adopted and used
904 in this valuation were determined in conference with my associates.

For the most part the unit costs applied to the various units entering into the system were handled under Mr. Willard's direction. I kept up with it and kept advised as to how it was being done. I know what the results were from the exhibit which I helped prepare. I might state that in work of this kind it is absolutely impossible to delegate certain work to any one particular man. Most all of the work that is done is done by one or more men in collaboration. Calculations made by one man are checked by another, so that in a job of this kind probably three or four or five men are almost entirely familiar with everything that has gone into the finished report.

We determined what procedure would be necessary if this property were to be reproduced today, that is, the general method of construction. It was at once obvious that a pipeline system such as this would be constructed by general contractors. Companies of this character do not have a construction organization, and they never have a construction organization in the sense that they could construct and build themselves this entire property. So we undertook to determine from contractors who are engaged in building this particular kind of property the wage levels that prevailed as of June 1, 1939, and the wages they would have to pay were this property being constructed at that time. I personally visited the principal pipeline contractors and obtained from them the wage levels which they were paying at that time, which was June 1, 1939, in the territories traversed by this pipeline system, and of course these wage levels vary greatly throughout the territory covered by this system. They pay considerably more wages in some places up and down this pipeline than they do in other places. They pay more for hours of work. This pipeline traverses six states, and in the states of Texas, Oklahoma, Kansas, and Nebraska, and a portion of Iowa it could be constructed at the present time, I mean as of June 1, 1939, very largely with non-union labor. In the State of Illinois and in a considerable portion of the State of Iowa, however, union labor would have to be employed.

I do not mean that for all of the work, in most instances, non-union labor could be employed up to the central portion of Iowa and then union labor would have to be employed for all of the work east of that point, up to Joliet. The work of constructing the pipeline itself could be so done. The work of constructing the compressor stations, however, being of a different type and requiring a different type of skilled workman, is highly unionized, and all of the labor at compressor stations would be union labor, including that employed in the construction of housing facilities and other buildings. The work of constructing the pipeline across the State of Illinois would be solid union labor as would also be true of a portion of Iowa. This applies even to the common labor employed in the handling of ditching and things of that sort. That coincides with the experience of contractors building lines in this area this summer.

In addition to the wage scales that I have obtained from the contractors—and I might say that the scales I obtained from the different contractors did not vary a great deal, they were very close together—we obtained union rates from union headquarters at various points along the line and at cities closest to the various compressor stations, and we have used those rates as wage levels in the calculations which we have made.

905 At the time this line was constructed we made the studies of the construction of major portions of the line, and at that time we obtained from the contractors the wages which they were paying and all of that information. That was for a specific job of constructing a

pipe line. As to what we have done now, however, we have seen a wide range of contractors and did not limit ourselves to the same contractors who constructed the pipe line in 1930 and 1931, although some of the contractors that we have interviewed this summer were the identical contractors which constructed portions of the system when it was originally constructed. There is not a wide range of contractors who do this particular kind of work. There are probably not to exceed 7 in the country equipped to do pipe line work of this kind. In investigating the present level of wages as June 1, 1939, I consulted with five contractors. Four of these five had done some of the work in connection with the construction of this particular pipeline system. There are only two other major contractors who are prepared to do this character of work. I did not consult with these other two because one of them is located in California and the other one in Texas, and I did not have time available to see them.

Among the contractors I consulted in this investigation were: Williams Brothers Construction Company of Tulsa, Oklahoma; Sheehan Brothers Construction Company of Tulsa; Kelly-Dempsey Construction Company of Tulsa; Smith Brothers Construction Company of Kansas City, Missouri; and Truman-Smith Construction Company of Eldorado, Kansas. Of these five the Kelly-Dempsey Company did not handle any work in connection with the original construction of defendants' pipeline.

At the time that this pipeline system was constructed the prevailing common labor rate, for example, was 40 cents an hour over the entire pipeline system. Forty cents per hour was paid in all of the states as the basic common labor rate. There was some common labor in Illinois that was paid 50 cents per hour. At the present time the prevailing wage level for common labor in the states where union labor would not be employed, that is in Texas, Oklahoma, Kansas, and Nebraska, is 50 cents an hour, and in Illinois it will average 80 cents an hour, as contrasted with the scales originally paid. The scales for skilled labor have advanced not quite in proportion with common labor rates, but they have advanced substantially, particularly in the Illinois section.

Our time studies and the data we have collected since 1925 disclose that weather conditions have a great deal to do with both the time that is required to construct the line and the cost of constructing the line. I know of my

own knowledge, and I also know by authority of the weather bureau that weather conditions were exceptionally good during the period when these pipelines were under construction. That portion of the line across the State of Iowa was mostly laid in the winter time, and that winter was the most open winter that had occurred in many years, and much more open that has occurred since in the State of Iowa, both as to temperature and as to rainfall and snowfall. The weather conditions, as reflected in any computations which we have made, have been reflected through the use of these time studies, and, of course, a time study made of construction where adverse weather conditions prevailed, and unusual weather conditions prevailed, would not result in data which we would be warranted in using as a basis of computation in future years. In other words, if, during the time of construction of this particular pipeline, adverse weather conditions had prevailed, the data which we obtained should not be interpreted to apply to average weather conditions. So we wanted to satisfy ourselves that the data which we obtained during the construction of that line was obtained during a period at least of average weather conditions. If this pipeline were about to be reproduced and other weather conditions prevailed than prevailed during the time when it was constructed, the figures we have would, I believe, be too
906 low from the standpoint of the cost of construction.

I do not believe that they might also be too high. I am not a weather expert and I have not attempted to forecast any weather conditions. (Motion by Commission Counsel to strike the witness' testimony that the figures would be too low.) I do not know how many days of interruption that they had during the construction period. I know the temperature and rainfall conditions during the period of construction which are the things which mostly influence the time and cost. It is conceivable that if the line were constructed at some other time since 1931 the time would be longer or shorter, more expensive or less expensive. In compiling our unit cost and basing it as we have upon these time studies, we have naturally assumed the same weather conditions as existed at the time the studies were made and at the time the line was constructed, which were extremely favorable weather conditions. I mean by that I used the same time of construction period, the same number of days, and so forth, as that actually occupied by the construction of the line at the time it was built. I assumed the same identical weather conditions which prevailed in 1930 and 1931, and they were extremely favorable.

In making up these time studies, or rather applying these time studies to the work which we have had in hand in connection with this assignment, I gave effect to such changes in methods of construction and the introduction of such new technological improvements as have come along since 1930 and 1931 and adjusted the labor to meet those changed conditions. We assumed in all cases that the most modern construction methods would be used.

I pass now to another phase of the work which I did personally, namely, the valuation of the lands owned by these companies. The valuation of land is a specialized subject. I was not familith with the value of the lands through the areas traversed by this pipeline system, and for that reason we employed the services of qualified land appraisers in the various areas in which this company owns land in fee. These appraisers were given a description of the land, a plat showing its areas, and were asked to appraise the land as of the date of the valuation and to furnish us certificates of appraisal, and those local realtors or appraisers were paid for their services.

I explained to them at the time I asked for these appraisals that we were not talking about land purchase for agricultural purposes but were concerned only with the small tracts, the size of those owned by these companies, for special purposes such as these lands have been utilized for since being acquired by these companies. I have not personally purchased that type of land. That is, I have not personally executed the purchase, but I have been familiar with purchases of the nature mentioned, and have seen the dates and records of purchases of land of this nature in numerous instances. By way of example I have seen the recorded costs of each purchaser of land owned and purchased by the Natural Gas Pipeline Company of America and the Texoma Company. In some cases I have also seen the recorded cost of the adjacent property used for agricultural purposes, such as ranches or other property. However, I would not say that I have seen such recorded costs in the majority of cases. (Objection for Commission counsel to the witness' qualification.) In general, my ability to testify on this subject arises only in that I have seen that information disclosed from the records of companies which I have examined, and through the connection which I have had with operating companies, and knowledge of the purchases which have been made during that period of time. In a great many cases I have gained the knowledge in connection with studies calling for that information in the valuation of properties other than that of Natural Gas Pipeline Company of America and Texoma Natural Gas Company. I have accumulated this information over a period of about 20 years. For a period of 3½ years I was directly connected with an operating company at Bartlesville, Oklahoma as an employee particularly charged with making valuations and studies for rates, and other general engineering matters. Although I did not make the actual purchases of lands for that company I have knowledge of practically every such purchase in that period of time. Those transactions pertained to land adjacent to a transmission pipe line. (Objection of Commission counsel overruled.) In the majority of cases a pipeline company, a gas transmission company, or an oil pipeline company, is forced to pay a higher price in the acquisition of land than is the prevailing price of the acquisition of land for purely agricultural purposes, and there is a very good reason for that.

In the operation of a natural gas pipeline system or oil pipeline system the flow of the product handled depends upon the establishment of the pressure differentials at various points along the system. Those points are confined to a small area for the various compressor stations, and these stations must be constructed within certain small geographical areas. The site on which they are located must also afford a protection against damages from floods and weather disasters and must be located with the advantage of a permanent water supply. This narrows the available land down to quite a small area, so that it is necessary to make the purchase in this particular area, regardless of what price the company is eventually forced to pay for it. It is my observation that they almost always have to pay well for it.

907 There is another fact which must be considered there, and that is that these companies did not have the right of eminent domain in the State of Nebraska or in the State of Illinois, and it was impossible for them to condemn land for the purpose of stations. I do not believe they had that right in Iowa at the time they constructed the line, but I understood that they have it now although they have not exercised it. The farmer who owns a 160-acre farm or a farm of a greater or less size, or a rancher who

may own a substantial tract of land which he uses in connection with the grazing of stock, may or may not be willing to sell 30 or 40 or 60 or even 80 acres, as in the case of the Fritch station, off his farm or off his ranch for the conduct of an operation such as that of these pipelines on these station sites. (Objection by Commission counsel overruled.) I can think of two or three reasons why a farmer would not be willing to sell 20 or 30 acres off his farm for a station site for a pipeline company at the value of that land for agricultural or ranching purposes. The first is that his whole economic scale of farming is predicated on dividing the farm into pieces, devoting 15 acres to his cow pasture, another 15 acres to the cultivation of wheat, and that fits into his balanced scheme of farming. Now if the pipeline company or anybody else attempts to buy his cow pasture, he is naturally going to charge more per acre for the cow pasture than he would for the farm as a whole because it would split up his whole scheme of operations. It would leave him less land than he has been utilizing in the making of a living. Such a situation is similar to what is commonly known as severance damages.

The second reason is that the construction of any natural gas pipeline system presents a certain hazard to persons living in the immediate vicinity, and if I were a farmer I would not want a natural gas pipeline company compressor station on one corner of my farm.

I made use of the figures I obtained from these various boards and realtors who made the appraisals and who have advised me of their judgment as to what would have to be paid for lands to be used for the purposes of these pipelines. They are the figures that we have used in setting out the reproduction cost of these lands in fee and they are incorporated directly into our report. In total these reproduction costs are below the actual costs of the lands. I think that one or two parcels may have been valued in excess of their cost, but in total they are below the actual cost to the companies. As to ascertaining the present day cost of the rights-of-way for the pipeline and the telephone system, and any other rights-of-way that we found to be owned and used in their operation, we first made a careful inventory of the actual right-of-way contracts owned by the companies. We consulted the cost records of the companies and determined the cost incurred for the purpose of these rights-of-way, together with the cost of acquisition, that being the cost of the man who went out and made the purchases and the cost of abstracting the agreements and recording the instruments, the traveling expenses, legal expenditures, and items of that nature.

The cost of acquiring pipeline right-of-way has steadily increased ever since the first pipeline was constructed. It has no depression at all. Every additional pipeline that is constructed any place in the country makes it more difficult for the next pipeline to secure rights-of-way on anything like a comparable cost, and for that reason we employed the services of an experienced right-of-way man, a man who had actually purchased a great deal of this right-of-way owned by these companies and who had actually been engaged in that type of work since that time. We sent him out over the pipeline system to interview farmers, land
owners, farmer organizations, realtors, banks, and to
908 report to us the cost of acquiring similar contracts for
right-of-way at the present time.

He covered the entire length of the line and all the rights-of-way from Joliet clear to the Texas Panhandle. He reported his findings and determinations to us, and we have used these determinations and incorporated them in our report.

As to the costs of securing or making the actual purchases, we determined the relative wage scale paid to right-of-way agents at the time the line was constructed and at the present time and have increased those costs in that proportion.

A right-of-way is just an easement as I understand it, and the land occupied by the right-of-way reverts to the farmer ordinarily, as soon as it is no longer used for the purpose for which it is granted. The pipeline company does not buy the land itself but merely the right to cross it and lay, maintain, and operate a pipeline in the land.

In addition to the mere easement and the other costs involved in the acquiring of a right-of-way, a very substantial portion of the total cost is represented by payments for the damage to the crops during the construction of the line.

I have seen right-of-way contracts covering the acquisition of rights-of-way extending back as far as 1886, or 1881, and I have seen rights-of-way contracts in that same immediate vicinity acquired in 1936, 1937, and 1938. In one particular area that I have in mind I have seen an executed right-of-way contract providing for 5 cents per rod for the right-of-way, and I know at the present time that company would be exceedingly fortunate if they could purchase a similar right-of-way for $5 a rod. This remarkable change in the cost of obtaining rights-of-way is due principally to visiting between the farmers. When a pipeline system sets out to secure rights-of-way, in order to obtain it in the most economical manner they will send a large force of agents out to make these purchases. The first purchase that the first agent makes from John Jones, in the next half hour has been told to Bill Smith, who owns the adjoining farm, and frequently the price at which the first man sold is exaggerated, and so the news spreads. The fact is, it soon becomes common knowledge that a pipeline is about to be laid in the territory, and the farmer will remember that two years ago he got $2 a rod from some other company, or somebody else got $2.50 from some other company. Thus the price goes up year after year.

For this reason to acquire rights-of-way we send out large forces in order to try to close it up quickly, but they do not always succeed in closing it up with everybody. There is always some fellow who is harder to deal with than another fellow. Here again, in the states of Nebraska and Illinois these companies do not have the right of eminent domain, and it is impossible for them to condemn land for right-of-way purposes. That means eventually they must meet the price demanded by the landowner. There is frequently dissatisfaction among the neighbors when one neighbor receives more than the general run of his neighbors receives.

909 Of course the construction company or the company building the pipeline has the option of taking the line around some other way and keeping off of the land of the man who is hard to deal with, but that usually costs more than it does to pay the landowner his price. When he is paid a higher price, it is more difficult to deal with his neighbors when you come back to them for another right-of-way. That is the way it works out in practice. At the time this line was constructed a general expedition was conducted for the landowners, and they were taken down over sections of the line already completed to show them that the construction of the pipeline across the farm was not going to utterly destroy the whole farm. That was necessary before any arrangement of anything approaching a reasonable price could be made.

The term "overheads" is used to include certain elements of cost, always entering into the construction of any projects, that are of a general nature and are difficult to allocate to specific items of property. The general overheads which we have included in our report consist of engineering and superintendence, organization and law expenditures during construction, taxes during construction, administration during construction, preliminary operations, and interest during construction.

By "preliminary operations" is meant the expense of tuning up the system and placing it in a position to operate, together with the necessary costs of carrying such portions of the investment as must be purchased at the start throughout the construction period, and in this latter category I was thinking particularly of the leaseholds—gas leaseholds—owned by the company that must be obtained in advance of the drilling of wells and must be kept alive throughout the construction period by the payment of rentals to the landowner.

We do not assign to each unit, to each pump, engine, compressor unit, building on the compressor site, or any other unit of inert physical property which has gone into the construction of the pipeline, its proper proportion of the engineering expense, legal expense, interest and taxes, and various other things above mentioned, because it would involve a tremendous amount of detailed work and would accomplish nothing in the long run. The method we have pursued washes out with the same result and results in the same amount.

If you will refer to page 39 of Exhibit 125, the method of calculation of these overhead costs is indicated on this page for the property of Natural Gas Pipeline Company of America. "Engineering and superintendence" we have calculated at 4% of the reproduction cost of the property requiring engineering work in connection with its construction. There are certain items of property owned by this company which require no engineering in their construction or purchase. These are such items as tools and laboratory equipment, furniture and fixtures, automobiles and trucks, so we have eliminated them from consideration in calculating the engineering and superintendence. We have calculated the organization and law expenditures during the construction at .3 of 1% of the applicable accounts; taxes during construction at .4 of 1%; administration during construction at 1.5%; preliminary operations at .6 of 1%; and interest during construction at 6⅔%. This is set out in detail to show just what figures those percentages apply to on page 39. The organization and law expenditures apply to all construction accounts but not to certain other overheads which we have calculated.

910 The item of engineering and superintendence, which is the first item enumerated on page 39, is put in at 4% of the total of all costs except the costs involved in Accounts 1013, 1014, 1015, and 1016. I determined that such costs would amount to 4% of the costs to which that percentage was applied in the following manner: In the first place, engineering and supervision in the construction of a project like this can usually be obtained from engineering organizations which specialize in this sort of work. There charges for complete engineering and supervisory service in a project of this kind would probably cost in excess of 5%. It is usual to make contracts of that kind. That percentage, in the case of a property such as this, I believe, would be somewhat reduced because of the project's magnitude. In other words, that service on a small project might run as high as 10%. On a larger project, when it is related to a percentage, the percentage would be reduced, and I believe if this company should contract for complete engineering and supervisory service for the construction of the system on the basis of 4%, they would make a very good deal.

In addition to that, this project was built originally almost in the same form in which it now exists. The additions since the time of original construction have not been extensive, consisting for the most part of additional compressors in the compressor stations.

The company kept a very careful record of all expenditures for engineering and supervision during the construction period, and we made extensive analyses of these expenditures, resolving them into their different component parts, and we have used that as a basis for our computation. In certain instances, where we felt that those expenditures would be increased or decreased at the present time, we have adjusted them accordingly.

We have thought it necessary to make adjustments where labor was involved primarily. In other words, we made a comparison between labor rates, or wages for technical labor, at the time the line was constructed and at the present time, and for the unskilled labor that has entered into these costs. We also made a comparison of traveling expenses, which are a considerable portion of these costs. We came to the conclusion that traveling expenses at this time are approximately the same as at the time the line was constructed. We then added all these costs, adjusted or otherwise, together and found that they would approximate the figure of 4%, and we rounded it out to an even 4%.

As a matter of fact, I know that there were services performed during the construction of this line which were never charged to these companies or never paid for by these companies. Those services were rendered by organizations participating in the construction of the line that owned a portion of the line, and they simply donated these services to the defendants. We have not attempted to carry these costs incurred by the participants into the cost of reproduction in detail. Insofar as that type of service would be rendered in reproductions of the property as of today they do not appear in the engineering and superintendence overhead except as they may be reflected in the difference between the actual amount recalculated and the rounding out to the four per cent. It is very slight amount.

The 4% figure, applied to the property of both defendants, which required engineering, amounts to $1,958,000. My calculation of the actual engineering necessary for the construction of this project and predicated to a very large extent on their actual costs amounts to $1,900,000, a difference of only about $60,000. This would be 3.98%, or something like that, instead of 4%.

911 In arriving at the next item, organization and law expenditures during construction, which is .3% of subtotal 3, we worked out the cost of organizing these two corporations and licensing them to do business in the states where they are licensed. The organization costs include the expense of incorporating both corporations in the State of Delaware, where they are incorporated. There are certain fees in connection with that incorporation which must be paid. The organization costs include the licensing of the Texoma Company to do business as a foreign corporation in the State of Texas and in the State of Oklahoma, and the licensing of the Natural Gas Pipeline Company to conduct business as a foreign corporation in the states of Oklahoma, Kansas, Nebraska, and Iowa. They include also license tax payable to the State of Iowa for permit and the attorneys' fees for organizing the two corporations, the cost of engraving and signing the stock certificates, and the revenue stamps on the original stock issue, all of which totals approximately $31,000.

The law expenditures include the cost of the companies' regularly constituted legal department during the construction period, together with the cost of obtaining certificates of convenience and necessity in the State of Kansas, the expense incident to securing a pipeline permit in the State of Iowa, the legal expense necessary in securing the permits across navigable streams, and that which would be necessary, I believe, at this time in obtaining a certificate of convenience and necessity from the Federal Power Commission, which total, as we have calculated them, approximately $155,000. This amount added to the $31,000 of organization expense would make a total of $186,000, which we have rounded out to .3 of one percent, resulting in the inclusion in this amount of $154,000, or some $35,000 below our actual calculations.

We made no allowance in this calculation for legal services in connection with examining titles to the property owned by the company or anything of that sort, other than what would be normally done as a routine matter by the regular legal department of the company. I made the assumption that the company would have a legal department during its construction period, just as it did when the construction was actually carried on. I made no assumption as to the expense of examining the titles to the leases, because we haven't included the gas leaseholds in any way in this valuation. There is a considerable cost for examining all titles in connection with right-of-way contracts which are included in the report as a part of the cost of the right-of-way.

The next item appearing on page 39, for which I am primarily responsible, is that of taxes during construction, and I have placed it at .4% of subtotal 3. In arriving at that figure we have made the assumption that if this property were to be reproduced at this time it would require approximately the same construction period as it did when it was actually constructed. I have used the same assumption in all of these overhead charges. During the construction period the taxes which the company would have to pay should be included as a part of the cost of the project, and there are four general classes of taxes which these companies would have to pay. The first is the ad valorem tax, the second the franchise taxes, the third, special taxes such as the pipeline inspection permit in the State of Iowa, and the fourth, Federal capital stock tax.

912 In calculating the amount of ad valorem taxes we made the necessary assumption that assessment rates

and tax rates would be the same as those which prevailed on June 1, 1939, and depending upon the assessment dates in the various states would depend the period over which the companies would be taxed during the construction period. The assessment dates are not all the same in all states. For example, in the State of Illinois the assessment date is April 1, and so during the first year of the construction period, when no property was constructed in Illinois, there would be no tax to pay in the State of Illinois. In the second year of the construction period the tax in Illinois would be assessed only on such property as was installed or completed by April 1.

In connection with the gas wells drilled in the State of Texas, we considered that if this property were to be reproduced, a drilling program would be inaugurated which would drill the present wells owned by the company during the period when the pipeline system and the compressor stations were being constructed, so that at the completion of the pipeline and compressor stations, the wells would be drilled and the company would be ready to start off furnishing gas service. In other words, we reproduced the whole property as of the period of the actual construction of the original pipeline.

We reproduced the whole property from a date beginning the same month of the year as the original line was commenced to a date corresponding to the same month in the following year at which the line was completed. We calculated the ad valorem taxes which would be necessary to pay during this construction period, which approximates a year and a half, at $176,500, and the franchise taxes which it would be forced to pay during this construction period at $17,800. The special tax in Iowa for the pipeline inspection permit we calculated at $3,092, and the Federal capital stock tax we calculated at a minimum amount of $4. The provisions with respect to Federal capital stock have been changed by the last Congress, and at this time it would not be necessary, we believe, to declare a stated value of the capital stock of these companies, which would avoid the payment of excess profits tax, and therefore we believe we could declare only a nominal value during the construction period for the stock of these two corporations.

The total taxes during the construction period we have computed as $199,000, and we have rounded that out to .4 per cent, which, when applied, amounts to $205,376, or within $5,000 of the calculated amount.

The next item is "Administration during construction," listed at 1.5% of subtotal 3. In calculating this item of expense we have been guided primarily by the actual experience of the companies during the period of construction. Administration during construction includes amounts calculated for executive salaries during construction, clerical salaries, office supplies and expense, insurance, rent, telephone and telegraph expense, and items of that nature. We determined from an analysis of the records ~~of the~~ company just what those expenditures were at the time of construction for the two companies and have adjusted those expenses reflecting conditions as of June 1, 1939. We have calculated these expenditures ~~to be~~ approximately $774,000, and applying the percentage of 1.5 it results in the figure which we have included in our report of $770,000 for the two companies.

913 I might say here that in the calculation of all these overheads we have considered the two companies as one and have made the calculation for the combined companies and then divided it between the two companies on the basis of the physical properties of one as compared with the other. The figures which we have given are comparable to the sum of the figures shown on page 39 for the Natural Gas Pipeline Company and similar calculations are shown for the Texoma Company on page 65.

The next item of an overhead nature we have included under the caption "Preliminary Operations," calculated at the rate of .6 per cent. In calculating this amount we again were guided by the actual experience of the company. We determined that from the time the physical property was completed over the various portions of the system until gas was first run through the line there was a total expenditure of $142,000. Now this expenditure was occasioned primarily by what we call tuning up the system, turning the engines over and making sure that they operated satisfactorily, filling in small gullies along the pipeline system, and in general cleaning up and tuning up the whole system and putting it in shape for operations. During that period there was a slight credit for gas sold, which we have deducted, or applied it as a credit against this expense. There is also included in this allowance for preliminary operations the expense of rentals on the gas leases during the construction period. The leases would have to be assembled, and were assembled, prior to the drilling of any wells, and we have predicated that expense on the premise that the company owned and carried the exact amount of acreage which they had on June 1, 1939. We analyzed the lease contracts and determined that the average rental per acre which would have to be paid during the construction period was 55 cents an acre. This would have to be paid over a period of two years. We applied as a credit to that rental the royalty from gas used in drilling the wells, which amounts to approximately $12,000, making a total or net charge for the lease rentals during the construction period of $155,000. This added to the expense of tuning up the system makes a total of $297,000, which we have rounded out to .6 per cent, in the amount of $308,000.

The other item remaining is "Interest During Construction." In determining the amount to be calculated for interest during construction we have again assumed that in the reproduction or reconstruction of this pipeline system the same period of time would be required as was required in the original construction. That is a period of approximately 16 months. So we went to the actual construction expenditures of the companies during the construction period and found that during the first month of construction there was 1.58% of the total expenditure made. During the second month there was 5.71%; the third month, 14.32%; and so on throughout the various months of the construction period. On this basis we believed it was reasonable to assume that in the reconstruction of the system the money would be spent at the same rate, and so we took the total of the reproduction cost of those items requiring interest during construction, which happens to be the subtotal that is indicated on the page at which you are looking as subtotal 4. That subtotal for the two companies amounts to $52,781,710, and applying the ratio in which the money was spent, or the rate of monthly expenditures of funds, to this amount we determined that in the first month of construction there would be a total expenditure
914 of $833,951; in the second month the expenditure
would be $3,013,836; in the third month, $7,558,341; and so on during the construction period. The expenditures during the fourth month were $6,286,302; the fifth month, $3,589,156; the sixth month, $4,797,857; the seventh month, $5,183,164; the eighth month, $3,837,230; the ninth month, $3,610,269; the tenth month, $4,380,882; the eleventh month, $3,684,163; the twelfth month, $2,047,930; the thirteenth month, $1,382,881; the fourteenth month, $717,831; the fif-

teenth month, $791,726; the sixteenth month, $496,148; the seventeenth month, $337,803, and the eighteenth month, $232,240.

In making this calculation we found that gas was actually being delivered after the sixteenth month, and the expenditures in the seventeenth and eighteenth months were largely carry-overs, representing the lag between construction and final payments when entered on the books. So the expense in the first month would draw, or should have interest calculated on it for a period of 16 months; the expenditures the second month for a period of 15 months, and applying an interest rate of 8% per annum results in a percentage of 10.67% of the expenditure during the first month. This percentage of expenditure when multiplied by the portion of the funds expended during the first month results in an amount for interest during construction on that first month of $88,983.

The calculation was then extended for each of the succeeding months and resulted in a total amount of $3,533,059, which is an overall percentage of 6.69%. We rounded that figure out to 6⅔%, which resulted in an amount of $3,520,540, as compared with $3,533,059, as actually calculated. In rounding it out we reduced it from 6.69% to 6.66⅔%.

I used the rate of 8% per annum after discussion of the matter with Mr. Hamilton and after consideration of the rate which these companies had paid as interest for funds during the construction period, coupled with the fact that interest during construction is merely a portion of the return on funds invested during the construction period and on which the investor is deprived of any earning unless it is added to the rate base. I believe that the amount of 8% per annum is a reasonable figure. In other words, through the calculation of interest during construction we have simply made provision for the money which was invested in this enterprise to yield compensation during that period of construction at the rate of 8%. The money was idle during the construction period so far as affording any return to the investors was concerned. The company actually paid 8% for the money that it used in the construction of this pipeline. This interest was paid to the participants furnishing the funds, who later became the security holders of the company.

By "Working Capital" is meant funds which an operating company has tied up in the conduct of its business and which are currently kept on hand. The operating com-

pany would be deprived of any return on these funds unless they are included as a part of the rate base. It is usual, therefore, to include the amounts tied up in working capital as a part of the rate base. We arrived at the proper amount to be set aside as working capital for these companies from the actual experience of the companies as of June 1, 1939. Defendants employ working capital in five different ways. First they have funds currently
915 invested to meet current operating expenses over that portion of time between which the services are first rendered and payment is received for those services. I went through the payments received from the sale of natural gas for a period of two and one-half years and found that there was an elapsed time of an average of 49.22 days between the beginning of service and the time when the check was received in payment for that service in the office of the company. That means that these companies have to provide cash for operating expenses and have that cash currently tied up in the conduct of the business for a period of 49.22 days.

I then determined which operating expenses required cash to be invested currently, excluding those expenses which were not paid until sometime after they were incurred, such as Federal income taxes and items of that nature. I also excluded the item of regulatory expense because that is a non-recurring expense, and while it takes working capital at this time, it will not require any working capital after this case or similar cases are disposed of.

I excluded also from consideration the purchased gas, because the gas which the company purchases is not paid for until after cash is received from the customers to whom the gas is sold. We found that applying the factor of 49.22 days divided by 365 for the entire year, and taking the operating expenses over a period of years, that they had currently invested to meet operating expenses as working capital $348,000.

They also had cash invested in the way of minimum deposits in banks to maintain these banking connections. No bank will handle the volume of checks which these companies issue in the course of a month without requiring a minimum deposit to be left on hand in that bank, and I determined from the cash balance of the company that that minimum approximated $150,000.

The third portion of this working capital is the cash currently invested in prepayments or expenses paid in advance of actual charge. These prepayments are for the most part prepaid premiums on insurance policies, and I found that they had on the average $69,000 currently tied up in such prepayments.

The fourth item is that of materials and supplies which the company currently keeps on hand for making repairs, minor extensions, and things of that character. They might be termed warehouse stocks. I determined that the average amount which they had in warehouse stocks amounted to $379,000.

The last item is the gas which is currently in the lines and which is there at all times and must be either purchased or produced originally. The company is never able to sell it until it finally ceases business, and that item for gas in the lines is carried on the companies' balance sheets at $27,900.

The total of these five items amounts to $974,638, which I have rounded out to $975,000 as the necessary amount to be allowed as working capital. From my experience in valuation work I find that this is a relatively low working as compared with that employed by other pipeline companies.

916 I have a break-down of the part of this expense which has been allocated to Texoma Natural Gas Company on page 65 of the same exhibit. The total figure which I gave of $975,000 applies to both companies, and it has been distributed between the two companies in the ratio of their physical property. These break-downs are found on pages 39 and 65. The combined figures are shown on page 1, which is a summary of the total figures found for both companies.

In general the structural overheads have been depreciated in the same ratio that the physical property has been depreciated. We find it proper to depreciate such charges as engineering services, legal services, administrative services, interest, taxes, and these other items of overhead because they are primarily labor charges, and we believe they should be depreciated the same as the other labor entering into the construction of the pipeline, and for the further reason that if this company is to be amortized, so to speak, over its useful life, provision must be made for the amortization of these amounts. In other words, these charges are merely a part of the cost of the physical property and have to be depreciated along with the other costs of the physical property when you apply the depreciation to that cost and if they are related to certain units of property that should be retired along with the retirement of those units. We have not depreciated the overhead item of organization and law expenditures because this is a corporate expenditure and does not have to do with the physical property and would remain as long as the company was in existence in its corporate form. Since working capital is not an item of fixed capital, it is a current asset, it is not one of the costs of reproducing and is therefore not depreciated.

On page 1 I have set out in this exhibit the reproduction costs of the items which I have discussed and for which I have stated I was responsible in the making up of this exhibit. On this page are shown also the final figures representing the reproduction cost new of the two properties and the present value of the two properties. The lands in fee and rights-of-way are shown in lines 1 and 2 under the caption numbers 1000 and 1002, respectively. Those numbers correspond to the fixed capital account numbers used by the company. Toward the bottom of the list no account numbers appear. That is due to the circumstance that the company has no account number for engineering and items of that kind and distributes those items currently over the items of property to which they apply.

Based on my experience and on the work I have done in assembling the figures which have been set opposite those items lands in fee, rights-of-way, engineering and superintendence, and the other items following it in the list as shown on page 1, it is my judgment that those figures represent the reasonable amounts that would be involved for those items in the reproduction or reconstruction of the property.

Questions by the Examiner.

I did not personally select the appraisers but I arranged for the selection of them in the various districts. In answer to your question as to whether I know if they were qualified, I can only answer by stating that they were employed with the understanding that they were qualified and competent.

The appraisers who furnished me the figures for the lands in fee and rights-of-way were employed directly by the superintendents at the various stations of the com-
917 pany, who were each instructed to employ the most
competent men that could be obtained. Ordinarily we

would ask for appraisals of similar property to be made by the appraisal committee of the local real estate board; but in this territory where these lands are located there are no real estate boards. These men were regular or professional appraisers. I did not talk with the appraisers directly, but I corresponded with them. I took their certificates and worked from the latter. It was a paper job in that sense. I just added up the total of their certificates to arrive at my total figure. I have in my possession all of these certificates received from these appraisers. They are available. If it had been possible for us to obtain the services of one appraiser who we felt was expert enough to value the company lands and rights-of-way from Chicago to the Texas Panhandle, we would have done so. We actually employed in the neighborhood of fifteen.

I have here a certificate of one of them, Robert Ricks, an appraiser of Amarillo. I do not have here the qualifications of each one of these appraisers, but I do have the qualifications of Mr. Ricks. Some of these appraisers probably didn't furnish their qualifications. A part of this territory is pretty far out in the sticks. I do not believe the company has in its files any statements as to the qualifications of these other fourteen. (Objection by Commission Counsel to qualification of witness overruled.)

Direct Examination Resumed by Mr. Morgan.

The mechanical work of applying the amounts deducted for depreciation as reflected in this exhibit was done by our force. The amounts of depreciation deducted were determined and furnished us by Mr. P. McDonald Biddison, who was retained by the defendants to make a study of existing depreciation and report on that subject. He furnished us the amounts in dollars.

The first three pages of this Exhibit 125 are a letter of transmittal explanatory in general of the work we did. These pages are followed by a photo map indicating the system of these two companies. This map is followed by a table of contents. Page 1 of the exhibit is the final summary indicating the property of both companies. It shows the reproduction cost new and the present value after the application of depreciation figures furnished us by Mr. Biddison. The total of the two columns is shown at the toot of each respectively.

Page 2 is a similar summary of the property of the Natural Gas Pipeline Company of America only, and page 3 is a similar summary of the Texoma Natural Gas Company only. In other words, page 1 is a summation of pages 2 and 3.

Beginning with page 4 is what we term the detailed summary of the property of Natural Gas Pipeline Company of America and is arranged by accounts corresponding to the fixed capital accounts maintained by the company on its books. These detailed summary sheets show the reproduction cost new of each major item of property or group of items, the depreciation deducted, which was determined by Mr. Biddison and furnished to us, and the present value, which is merely the depreciation subtracted from the reproduction cost new. This detailed summary extends from page 4 to and inclusive of page 38 for the property of Natural Gas Pipeline Company of America. Page 39 is a further summary showing the manner in which the various overheads have been applied and calculated as far as the Natural Gas Pipeline Company of America is concerned.

918 Beginning on page 40 and extending to and including page 64 is a similar detailed summary covering the property of the Texoma Natural Gas Company, in which the determinations of depreciation made by Mr. Biddison are shown and deducted from the reproduction cost new in arriving at the present value. Page 65 is an additional summary similar in form to that shown on page 39 and covering the property of the Texoma Natural Gas Company, showing the manner in which the various overheads have been calculated and applied.

The detailed portion of the valuation begins on page 66, and all of the ensuing pages of the report indicate the details of property, together with the unit cost and reproduction cost new of the particular item.

On page 1 I call attention to the fact that under the caption "Present Value" the total is $54,410,492. That figure in my opinion and in my judgment represents a reasonable reproduction cost new of the physical elements entering into this pipeline system, viewed as inert elements or component parts and not as parts of the whole, less the applied depreciation worked out and furnished to me by Mr. Biddison. I point out again that these figures do not include the item of gas leases.

Cross-Examination by Mr. Booth.

With respect to the items of general overhead which I have prepared, I intended to state the principal considerations which entered into my judgment in arriving at the amounts I estimated for each of the items of general overhead. So far as I can recall at this time I have not omitted any principal factor which I considered in arriving at those items in my testimony this afternoon.

Cross-Examination by Mr. Slaff.

I will furnish a list of cases in which I have testified in the last ten years on valuation proceedings and rate cases.

Redirect Examination by Mr. Morgan.

Referring to Mr. Booth's questions, I have the working papers and notes that were used by me in assembling the figures for these items of overhead concerning which I have testified. I have the details of all calculations which I made. I am willing for Mr. Booth or his experts, or Mr. Slaff or his experts, to examine these working papers and ascertain just how I arrived at those figures. They will be available at any time they wish to do that.

Questions by the Examiner.

I had one man go along the entire pipeline and have interviews with farmers, farm organizations, and so forth, with regard to the cost of acquisition of rights-of-way as of June 1, 1939. I cannot tell you the exact number of days that agent was out, but he was out a considerable time. The number of days he was engaged in this work can be ascertained very easily in Chicago. He was out a considerable time in 1938 and again in 1939. I will have that data available at the time of cross examination.

919 In estimating the cost of acquisition wherein we considered wage scales and so forth, we used the same system of acquisition of rights-of-way as was actually used by the company. I contemplated the same method of acquiring rights-of-way. I attempted to use the same number of man hours, assuming that the difficulties that would

be encountered would be the same as those which were encountered.

This item of crop damages is a lump sum determined once and for all, with the exception that in subsequent years when repairs are necessary and the crops are destroyed, the farmer is reimbursed for all damage of that kind. That is charged as current operating expenses. It happens quite frequently that crops are damaged because of repairs made after the line is in operation. I did not use any figure in this cost of acquisition of rights-of-way to represent increase in the difficulty of acquiring rights-of-way today.

(September 1, 1939)

Redirect Examination Resumed by Mr. Morgan.

In my examination yesterday I was asked concerning the number of contractors with whom I checked labor costs up and down this pipeline and the number who were engaged in the building of the pipeline. I gave the names of five contracting firms whom I had consulted on this point and stated that there were four of these contractors who had a part in this pipeline construction. I was mistaken. I should have said there were three. The other one which I thought at the time I testified did take part in this construction work, but which it turned out did not participate, was Truman Smith Construction Company. They are a large pipeline construction organization and have been doing work in that immediate vicinity at this time. They have been so engaged for several years. I believe they made a bid on a part of the construction of this line, but I am not certain on that point.

Questions by the Examiner.

I am certain the appraisers who appraised this property actually viewed it. I didn't accompany the appraisers, and I have only correspondence from them, but that correspondence would lead me to believe that in every case they did view the property.

Redirect Examination Resumed by Mr. Morgan.

As I stated during my testimony yesterday, I was for a period of approximately three and one-half years directly connected with an operating natural gas organization. That organization now comprises the Cities Service Gas Company of Bartlesville, Oklahoma, and my work with that organization was of such a nature that I was familiar with almost all of the activities of that organization. I was familiar with several tracts of land which were purchased by that company during that period of time, knew their costs and the location of the land and the purpose for which it was used. Since that time I have also been quite familiar with the operations of that same company and have made two complete detailed appraisals of all their property, including their lands in fee.

Questions by the Examiner.

I have noted in my experience in that connection that we
were not able to purchase land for our pipeline pur-
920 poses at the prevailing agricultural prices. This is
true in a great majority of cases. It is true with respect to the Cities Service Gas Company at Bartlesville. That is a transmission company and not a distributing company. It is one of the pipelines which transmits gas out of the Texas Panhandle.

My statement concerning the difficulty of obtaining land from farmers or ranchers experienced by the defendants at the time they were getting the land for the construction of their pipeline, including station sites, was based on correspondence which I have seen in the files of the company. I saw this correspondence during the last year or year and a half. It consists of letters in the files that were written as of the time the pipeline was being constructed and dealing directly with the then going on negotiations for the acquisitions of the land. I have also had this information confirmed in my conferences with offices of the company who know or should have known of the difficulties, because they were associated with the company at the time.

921 J. L. WILLARD, a witness for the defendants testified:

(September 1, 1939)

Direct Examination by Mr. Morgan.

My name is J. L. Willard. I reside at Summit, New Jersey, a suburb of New York City. My place of business is at 60 Wall Tower, New York. I am at present and have been for the past 14 years associated with F. C. Hamilton.

I went through the public schools in the city of Denver, and later attended the University of Colorado, finishing there with a Bachelor of Science degree in civil engineering in 1922. During odd times while in the university, I was employed by the Phelps-Dodge Corporation in their coal camps in Dawson, New Mexico. In that work I was with the mining engineering department, and was engaged in survey work of an underground and surface type, and also in making estimates of coal recovered and expected recoveries.

Following my graduation I was employed by the Empire Gas & Fuel Company at Bartlesville, Oklahoma, and was connected with the civil engineering department. I was employed by this company from the summer of 1922 to the fall of 1925, during which period I covered the entire territory of all their gas pipe lines, oil pipelines, oil production and refining properties. By all their territory I mean the territory in the Mid-Continent field.

At the beginning of my employ I was placed in charge of survey parties for the location of pipelines, both oil and gas, tank farms, oil pumping stations, gravity oil gathering systems, location of oil and gas wells, and was also connected with the follow-up construction of gas and oil pipe lines. During the construction of these pipe lines I did considerable checking of materials that went into the project, and after the completion of the project, quite often I had charge of a party making a complete field inventory and check of all of the materials that went into the project. Later in this employment I was engaged in making estimates of the cost of the pipelines, including lines from the Oklahoma district to Denver, Colorado, and also to St. Louis, Missouri. I was engaged in making cost estimates of various accessory equipment to gas compressor stations.

These estimates of cost of constructing these pipelines included all of the costs involved in the construction of the pipeline and the necessary appurtenances used in connection with its operation. That, in a general way, is practically the same as the work of making the valuation of a pipeline after the project is completed. It is necessary to obtain quotations on all materials that go into the project, and estimate labor performances from knowledge of previous pipeline construction.

In the fall of 1925 I was employed with the Cities Service Company, and associated with F. C. Hamilton in the valuation and rate department. I have been engaged in that work from then until the present time.

922 After a preliminary experience of two or three years, I was on the road almost constantly from 1925 until 1936 in charge of appraisals on gas properties located at Denver, Colorado, two valuation jobs in Bartlesville, Oklahoma on the Cities Service Gas Company, a job on the Kansas City Gas Company located at Kansas City, Missouri, the gas properties of the City Light and Traction Company at Sedalia, Missouri, the East Tennessee Light & Power Company at Bristol, Tennessee, the Danbury Gas & Electric Company at Danbury, Connecticut, and was called in, in a consulting capacity, on work on the Republic Light, Heat & Power Company in Buffalo, New York, and the Arkansas-Louisiana Gas Company at Shreveport, Louisiana.

In addition to these valuations on gas properties, I have been engaged in valuations on electric, street railway, water, ice and cold storage projects. The major of these properties include those located at Cleveland, Ohio, the property of Ohio Public Service Company, which covers a large portion of the central and eastern part of the state of Ohio, the Toledo Edison Company located at Toledo, Ohio, the entire electric property of the Public Service Company of Colorado at Denver, Colorado, properties of the Empire District Electric Company, the Lawrence County Water, Light and Cold Storage Company, the Toledo & Indiana Railway, the Lake Shore Power Company, and numerous other properties.

I have made estimates the appraised value of which ran in the neighborhood of from $800,000,000 to $900,000,000. The portion of that of which I have had direct charge—sometimes individually and sometimes in association with other men of our department like Mr. Eastman and Mr. Stoddart, and always under the direction of Mr. Hamilton

—I would say of that total I have been in direct charge of approximately $600,000,000.

I have made appearances before utility commissions, courts, and other tribunals in connection with these valuations matters with which I have worked. I participated in hearings of the Cities Service Gas Company before the Public Service Commission of Kansas in 1931 and 1932, not as a direct witness but as an accessory to the witness. I also appeared in the same capacity at a later hearing on that same property in 1934. I was connected with two hearings before the Public Service Commission of Missouri on the properties of the Empire District Electric Company and the St. Joe Railway, Light, Heat & Power Company. I was present at a hearing before the Interstate Commerce Commission recently held on the properties of the Empire Pipeline Company, an oil transmission company of the Cities Service Oil Company. I testified before a district court in the city of Fort Collins in a condemnation suit brought by that city against the Public Service Company of Colorado.

In 1936 I was sent into the New York office to take charge of the valuation crews who had jobs going on in various sections of the country at odd times. I have visited and consulted on these jobs in many locations. My work has involved the making of reports for attorneys in their work to obtain new securities before the Securities and Exchange Commission, and also before the Ohio Public Service Commission. That was valuation work. I have also been engaged in the establishment of rates for both gas and electric service in various sections of the country.

923 I have had to do with the valuation studies compiled under the direction of Mr. Hamilton on the properties of defendants. In conjunction with Mr. Eastman and Mr. Stoddart, under the supervision of Mr. Hamilton, I was engaged for a period of five and a half months in 1938 in obtaining a complete physical inventory, together with a pricing of that inventory on the properties of the two defendants, and again in 1939 for a period of three to three and a half months I was engaged in that same work in bringing the previous 1938 data down to date.

I was in Chicago, with the exception of a few days, during the entire period of both of these valuations in 1938 and 1939, and had under my supervision a group of men varying from ten to twenty.

It was my duty to organize the personnel that was brought into Chicago to compile this data. In conference with Mr. Eastman I decided that certain men would take charge of certain phases of the work, some going into the field to make a complete physical inventory of all the visible property in the field. After all of the records in the office and the data taken from maps of the pipeline, maps of all compressor stations, meter and regulator stations, had been thoroughly examined, these men were sent into the field to make additional inventory of all of the property in the field and check that inventory with the data that was obtained in the office, and to make any adjustments that were found necessary due to any small changes that might have been made in construction work around buildings or on other small maintenance jobs that had not been properly reflected on the maps from which we obtained the data in the Chicago office.

We made a complete inventory of all of the accessible or visible physical property of these two pipelines. During the field check we had men inventorying, after visiting all of the gas wells in the Panhandle Field, all of the physical property in connection with the top fittings of the wells, fences, signs, meter and regulator runs, together with the meters and regulators, the buildings housing the equipment, and from there traveled to the Fritch compressor station and tabulated all of the equipment in connection with the compressor station, the gasoline plant and the dehydration plant, all of the cottages, warehouses and other items of a physical nature at that location. Our men visited all of the intake meter runs on the various gathering lines. They visited the river crossings where the gates on the headers could be observed, and then traveled from Fritch northward, covering all of the stations in the states of Oklahoma, Kansas, Nebraska, Iowa, and Illinois. I don't want to convey the impression that one party covered all this territory. We had several parties in the field, some working south on the line from the north end and others working north from the south end.

These parties were composed of members of our organization who were employees of long standing. All of those men have been familiar with gas transmission and gathering properties over a period from a minimum of six to approximately fifteen or twenty years.

Naturally we did not dig up and have an inventory made of the number of joints of pipe and the valves and other fittings that are buried with the pipelines. However, 924 men associated with Mr. Hamilton have taken time studies on that line, a very substantial portion of the line, and these men actually saw the pipe going into the ground. We have pictures of it in our office as a part of these time studies, so that we are definitely informed that the pipe is there. In addition to that we had men making time studies of compressor stations where they observed the actual trenching of all of the underground pipe in connection with the stations, and saw the pipe as it was laid in these trenches.

We made a thorough check of the maps of the company and these maps, I must say, are very well kept up and very well made in the beginning. I feel that as a result of these checks of all these maps and of the field checks we made to verify the fact that all items of property shown on the maps actually existed, that the compilation of our inventory is a true and accurate record of all of the physical properties of these two companies with the exception of course of the gas leases. We left the gas leases out because we were advised that the gas leases would be handled by someone else, and were requested to pay no attention to their value. Our instructions were to confine our valuations to the properties other than gas leases owned by these two companies.

In my opinion this Exhibit 125, composed of two volumes, which was identified here and from which Mr. Eastman testified concerning some of the details, is a true and accurate inventory and listing of the property of these two companies as we were able to obtain. In my judgment it encompasses all of their properties except the leases.

This inventory naturally comprised volumes and volumes of data, and it was our task to summarize and tabulate that data in a form, necessary for pricing purposes, to fit the classification of accounts now in use by the companies. It was also necessary to tabulate the data in a form so that we would know what equipment came from the various manufacturers and the quantities of that equipment. The entire inventory was separated, in the case of the pipeline, by States, each State comprising a summation of all of the physical items in connection with the pipeline in that State.

The pipeline inventory was divided into States mainly for the purpose of pricing to reflect an accurate price for pipe in the several States. There are many factors that change the value or the reproduction cost of the pipe, and of the materials, such as difference in freight rates, taxes that are applicable to material in certain States, difference in hauling rates, in labor rates, in insurance rates, such as workmen's compensation, public liability and other insurance that is applicable to labor. By so dividing the pipeline inventory we were able to reflect in each State the proper price for each foot of pipe and for all of the individual accessories of the pipeline.

In the case of compressor stations, that inventory naturally was taken for each station. However, if we deemed it a saving you might say that we could have grouped all of these compressor stations into one lot for pricing. But after investigation it was discovered that there would be no saving in this type of summary in the work that we had to do, as we would have had to average the prices 925 in the various locations and apply that average to all of the material which would result in a distorted price for any one particular item at any one station. So we priced all of the items at each of the ten compressor stations individually. This involved the work of compiling unit costs at ten different compressor stations for a large number of items in the stations that had the same manufacturer's quotations. In the case of pipelines, we priced separately for each of the six States, the pipe that was part of the system in each State.

While this tabulation was in progress, other men were engaged in the work of investigating all the original commitments of the constructing company, collecting over-all purchase vouchers or a large number of the purchase vouchers from the original completion date of the project up to the present time, in order to inform ourselves as to the kind of material or the description of the material that was in the property, and in order to familiarize ourselves with the manufacturer who actually furnished the equipment. After that investigation had been made, we tabulated this property by manufacturers who furnished the equipment or material, and prepared quotation letters for prices as of the valuation date on all of the equipment and materials involved in the system.

We sent these letters to the manufacturers in the various sections of the country. I would judge that we forwarded quotation letters to the extent of 250 to 300, and some of these letters varied from single pages up to quotations involving as many as ten or twenty pages, all containing different items of equipment that an individual manufacturer furnished. In these letters we asked the manufacturers or dealers to quote prices on the material that had gone into this pipeline. In asking for their quotations we asked them to furnish the net price that was available to this company under the consideration of the purchase of the quantity of items that were involved in the entire system, and reflecting all cash discounts and chain discounts that the company would obtain in the purchase of the large quantities that would be necessary in this construction. We received replies to these letters requesting quotations. All but one or two to whom requests for quotations were sent out answered, and those one or two in all probability were answered by other concerns who had since taken over the manufacturing concern that had gone out of business. We received back substantially every quotation that was requested.

I do not mean that we ourselves stated the price which was quoted. I mean that we received back our form on which we had listed the property with as complete a description as possible, and on which we asked them to quote us prices on the basis that I have already mentioned, first as of January 1, 1938 and then as of June 1, 1939. I mean by this that we requested these quotations at two different times in the course of our work for these companies. That was the only way possible to get current quotations on the various items of material and equipment. As we were required to bring our previous work down to date it was necessary, of course, to get quotations as of June 1, 1939 for the work as presented in Exhibit 125. In addition to the prices we got also the weights of all the equipment and materials. We needed the weights in order to calculate freight, hauling costs, and other similar things that involved the weight of the particular items.

926 Next we had to make up forms for the building up of unit costs for each and every item that appears in Exhibit 125. I would judge that there are in the neighborhood of from 12 to 20 thousand unit costs that we made up in the compilation of those volumes. Take the general item of pipeline material as an example. Our unit on pipe has always been the foot. Pipe prices are substantially always quoted by the foot or by the hundred feet, and it is a recognized unit in the industry. It also gives a clearer picture in the report as to the actual quantities that are involved in the system, the magnitude of the system. We added to

the cost of the pipe, the necessary freight, taxes that were applicable, hauling, and labor of installation.

In connection with our quotation letters we obtained the shipping point of all of the material, and an indication as to whether or not the quoted price was an f. o. b. point of shipment or f. o. b. destination price. We knew the destination of all of the material and we formulated a tabulation to obtain freight rates. These freight rates were obtained from established traffic bureaus. I believe our tabulation of freight rates involved in the neighborhood of 1500 tariffs for both carload and less than carload rates.

In the State of Oklahoma, as an example, it was necessary for us to obtain tariffs, both carload and less than carload, for all items of equipment in the Perryton compressor station. The physical property that comprised that station was purchased from locations as far east as the eastern seaboard and as far west as the western seaboard. We obtained the tariffs from the various sections of the country to the destination at, I say, Perryton, Texas, because the town of Perrton, Texas, is the closest town to that station, although it is located in the State of Oklahoma. It was also necessary for us to obtain tariffs on pipe for every destination where pipe was actually shipped to the company during the original construction of the line. In the State of Oklahoma this did not involve many locations, because the pipeline travels through what is known as the Oklahoma Panhandle and does not cover a substantial part of the State. But in that State, as well as every other state, we obtained tariffs, both carload and less than carload, on every point of shipment that was actually used during the original construction of the line. We went through the same detailed computations in arriving at the freight costs involved in the material which would have to be shipped to Texas, to Kansas, to Nebraska, to Iowa, and to Illinois. We have given effect to the differences in these freight costs in arriving at our unit costs. We have applied, with the same degree of detail, these costs to each of the 15 or 20 thousand units which are set out in this inventory.

In figuring these unit costs we used the labor rates that Mr. Eastman had secured, and applied them to our man-hour performance for each and every unit of installation that was compiled. When we received these quotations we very carefully scrutinized all of them, compared them with the data that we had available from purchase vouchers, reviewed them in the light of our own personal knowledge of

equipment extending through a period of some fifteen or twenty years and put them through every test that we knew to assure ourselves of their accuracy. In some cases it was necessary for us to further correspond with manufacturers in an attempt to justify in our own minds that the full information we had requested had been reflected in the
927 quotations. As a result of a few of these additional
letters that had to be written, we obtained lower quotations on certain items of equipment. We justified in our minds before the use of any prices, the fact that that price was the correct price as of the particular date for which it was quoted. We gave careful consideration to all of these prices almost to an equal extent. As to the pipe prices, due to the fact that there was a tremendous quantity and a very large value involved, we were particularly careful in observing the quotations that were given us in the case of pipe. We recognized that due to the tremendous quantities involved in this system, and due to the condition of the market at the particular time, the prices of pipe called for a special investigation, and Mr. Hamilton conducted this investigation and will testify as to his findings. We used the figures given us by Mr. Hamilton as the cost that this company would have to pay if this project were to be constructed at this time. We received quotations from pipe and all other manufacturers, quoting prices as of January 1, 1938 and as of June 1, 1939. These letters, of course, were sent out at entirely different times. We knew the conditions of the market all the way through and we knew the quantities involved when we sent out these requests for quotations, and we made a study of prices available both before and after the quotations were received. We went through all purchase vouchers of the company for the years 1938 and 1939 and made the study in that form. Then, after the quotations were received, we thoroughly went over them, but decided that Mr. Hamilton should make a special investigation of pipe prices. Mr. Hamilton will explain just what he did and whether or not the prices he gave me were higher or lower than those set out in the quotations. I may say, however, that the prices we used were below the quotations in general. There may have been some exceptions. By that I mean that in general the ultimate net result was to use a lower gross pipe figure over the whole pipe consideration.

The taxes entering into the cost of this material are not the same character and type of taxes that Mr. Eastman was discussing when he was going over the overheads and mentioned and discussed the items of taxes during construction. These are entirely different taxes, known as sales and use taxes on material and equipment. These taxes are paid at the time of the purchase or at the time of the use, as the case may be, of the material. There is no duplication whatever of the taxes which we have figured into these unit cost computations and those taxes that were under discussion by Mr. Eastman in his treatment of the subject of overhead costs.

The term "stringing cost" as applied to the construction of a pipeline is that cost involved in the unloading of the line from the cars of the railroad siding, hauling it out to the right-of-way, and stringing or distributing it along the right-of-way. Our costs for that item were determined from the actual man-hours used during the original construction of the line, taken from our pipeline time studies, with labor rates as of the present time applying to the man-hours, and the prices of equipment used in the hauling of the material. In the case of compressor stations we corresponded with hauling contractors who were actually engaged in the hauling of this material from the railroad siding to the compressor stations during the original construction, and were familiar with the quantities involved, the type of material involved, and the various terrain at the several locations where the material had to be hauled. We used quotations from these hauling contractors in the case of compressor station material and equipment.

928 This is not the type of hauling that we could go out and employ the local truck owners to perform. In the case of pipe we have joints that are 40 feet long and call for special equipment, and in the case of compressor stations equipment you have iron frames of these gas compressors that are so heavy that it calls for very special equipment in the hauling and handling of that material. The hauling of this type of heavy equipment and material is a specialized line of work, but there are hauling contractors equipped to do that work in the particular districts.

Taking into account all of these items after we had grouped or separated the different types of equipment by states, and by stations as I have testified, we applied the cost of the material at the factory, the freight, the hauling, the construction, the insurance, the sales and use taxes, and incidental costs going with labor such as compensation insurance and that type of cost as we found those charges and costs to exist in the several states or at the several stations. Charges like insurance, workman's compensation and public liability insurance, like the other elements of cost, vary substantially in the several states. We added all of those items to which I have just referred into a unit cost which appears in Exhibit 125 as the unit cost of the particular item. In some cases there are many unit costs that were added together for pricing in Exhibit 125 for the reason that we found it necessary to condense a large number of small items that go to make up one particular unit. If we had gone into all the detail we would have doubled the size of that exhibit. However, I have all of the details of all of the items, and these details are available and we will make them available for the counsel and the engineers of the two commissions who are involved in this hearing.

In conjunction with Mr. Eastman and Mr. Stoddart, I had supervision of the compilation of this entire Exhibit 125. In general I had to do with all phases of all of the items listed on page 1. Our work is of such a nature that we must collaborate with one another at all times. The entire two volumes have been compiled in a form suggested by Mr. Hamilton and obtained through consultation or collaboration with my associates in this work, and the various details, of course, were passed on to men under my supervision. I took personal responsibility for presenting all of the general subdivisions listed on page 1 of this exhibit except those items listed as lands in fee, rights of way, gas wells, and those items of overhead beginning with engineering and superintendents, and so on, down to and including working capital. Mr. Eastman took responsibility especially for the figures in line 1, Account No. 1000, "Lands in Fee", Account No. 1002, "Rights of Way", and those overhead items and working capital down at the end of the list. Mr. Stoddart is especially responsible for the item listed under the caption "Gas Wells" and he will testify concerning that item. He was directed especially to devote attention to the matter of reproducing gas wells, or computing the cost of reproducing those wells. He also collaborated with us on other items.

By way of general explanation I would like to say that this exhibit consists of three parts. The first three pages are the grand summary of the individual companies and the sum of the two companies; Pages 4 to 64 are what we called a detailed summary and consist of a recapitulation or a condensation of the detail which appears beginning on page 66 and continuing on through to the final page of the second volume. 929 There are several reasons for this condensation or recapitulation. First, it enables an individual to run through each and every item and find the total reproduction cost of the various items in each account in each State in total, and will afford a general over-all picture of the entire property. In addition to that the summary is made up in this form for the convenience of an application of depreciation. I mean the depreciation worked out by Mr. Biddison concerning which Mr. Eastman and Mr. Hamilton testified. Under this column of "Depreciation Deducted" the figures were obtained from Mr. Biddison, and the only work that was involved, as far as my direction was concerned, was just the mathematical subtraction of his figure to obtain our present value column on these detailed summary sheets. The figures for which I have assumed responsibility, are those under the caption "Reproduction Cost New."

For convenience in following this report there has been an index placed just preceding sheet one, and the details of ~~Account~~ 1005, which is main lines, and which contain the figures on page 8, are shown on pages 109 to 132. On page 109 we find the beginning of the details of the main line in the State of Oklahoma, and continuing on to page 110 and 111, being totaled on page 111, to $1,292,094, which is the figure that appears on page 8. On page 109 we began with the listing of the detailed items included in the main line account in the State of Oklahoma. First we list the steel pipe and a description of that pipe as electric weld, plain end, 40-foot joints, 24-inch pipe with a weight of 86.908 pounds per foot. The detail indicates that in the State of Oklahoma there were 194,578 feet of pipe priced at a unit cost of 3.6463 dollars per foot. This same indication of the detail proceeds on through the right of way grading, the trenching both earth and rock, and back filling of all of the earth and rock; the welding of the line, the dresser couplings that are part of the line, the footage of enamel paint, the painting of the couplings, and on page 110 we list the two river crossings that are located in the State of Oklahoma, namely, the Beaver and Willow Creek river crossings. These two items show no amount for a unit cost because in the buildup of the price of a river crossing there are so many individual items involved, every river crossing being different from any other river crossing, the complete detail of all of the items of physical property in connection with each river crossing would take up several pages.

All of the unit costs going into the total of $215,843, shown as the first total figure on page 110, are included in our working papers with a unit cost for each and every item that is a part of the river crossing. However, in this description we do give a general over-all description of what the crossing consists of, the size of the lines, the kind and length of the joints, the weight of the pipe per foot, and the actual footage of each different sized line in the crossing.

We then go on to highway and railroad crossings which to some extent are similar to river crossings, the detail of the unit costs consisting of many unit costs which are added together in our working papers. The main line gate valves that are a part of the line in the State of Oklahoma, the blow-off valves, valve boxes, the drips and drains that are located along the line, the fittings such as "T's" and nipples in bridges that are necessary in river crossings for the purpose of line walkers, and the other accessories such as sleeve houses and pipe racks, all have their individual
cost listed and their quantities listed, and by the multi-
930 plication of the two we would get total figures which,
added together, give us the total for the main line
account in the State of Oklahoma of $1,292,094.

Questions by the Examiner.

Along the line of a pipeline they invariably have sleeves for the maintenance of a line. The sleeve house is a small house that houses a sleeve that may at some time during the operation of the line be necessary to place over the pipe to take care of any particular emergency that might come up. You might say, in a sense, it is a small storage house for the sleeves that are located on the line. They locate the sleeves on the line just as the railroads do spare rails.

On page 109, where we have the trenching and back filling, 24-inch, the figure stated is the average for the entire State of Oklahoma. It very truly reflects the cost in the State of Oklahoma. It is based on the actual present construction.

The highway crossings of 28-inch are not culverts. At all or practically all highway crossings the specifications of the state, county, or other subdivision that might have charge of the highways require the pipeline companies to install casing over their regular pipe with vents coming out of the casing. That is why the pipe is a 28-inch. It circumscribes the 24-inch pipe, and at each end is welded through a coupling to the 24-inch line, and vent pipes come off of that casing from each side of the highway or railroad crossing. It is just to take care of anything that might happen to the pipe under the highway or railroad. If leaks should spring in the pipe underneath the highway the gas, instead of coming up through the ground into the highway where it might be set on fire by an automobile, is vented off to the side.

Direct Examination by Mr. Morgan Resumed.

This first line, 194,578 feet, is the quantity of footage of 24-inch pipe line that is found in the State of Oklahoma. We used the description electric weld plain end 40-foot joints of 24-inch pipeline, weight 86 and a fraction pounds per foot in the State of Oklahoma instead of describing the seamless pipe because that is the kind of pipe that is in the State of Oklahoma. In each state we have used the same kind of pipe that was actually used in the construction of this pipeline at each location where we have reproduced the cost.

The figure, 3.6463 dollars, represents the per foot cost of that pipeline. That amount reflects the cost per foot of that particular kind and size pipe, and includes not only the cost of the pipe at the mill but also the freight to the state, the use tax levied by the State of Oklahoma, which is applicable to all interstate purchases, and it includes the hauling, stringing, laying and lowering of the line into the trench. Having built up all these items into one total, we multiplied the number of feet by the total cost per foot and arrived at this first total of $709,490. I am referring to the first unit cost on page 109. The unit cost is 3.6463 dollars per foot for the kind of pipe that was used in that state. That price is obtained from an f. o. b. mill quotation of 2.6551 dollars per foot for the pipe.

To that I have added freight in the amount of .6605 931 dollars per foot. That freight has been obtained by actually calculating the deliveries of the pipe in the entire State of Oklahoma to the many destinations of the State of Oklahoma and dividing the total number of dollars of freight so obtained by the total footage of pipe in the state. It may not reflect any particular freight rate to any particular point in the State of Oklahoma. To that has been added the cost of a shop priming coat on the pipe. All this pipe, when purchased, was given a coat of shop primer to protect it against rust enroute to its destination. This amount has been quoted to us by the manufacturer at .0225 dollars per foot. I then added a state use tax which is applicable in the State of Oklahoma not only to the material cost but to the freight necessary to get the material to its destination. This tax amounts to 2 per cent of the foregoing items, or .0668 dollars per foot. I then added the cost of unloading and stringing the pipe at .0938 dollars per foot, and the cost of laying and lowering the pipe at .1476 dollars per foot. All of these items total up to 3.6463 dollars per foot which is found as a unit cost on page 109.

The items included for unloading and stringing and those included for laying and lowering are obtained by application of the present-day labor rates existing in the State of Oklahoma to the time study man-hours which were developed from time studies taken on this pipeline, and include an allowance for all contractors' equipment that was used in connection with the stringing and laying and lowering of the pipe.

We developed the unit prices of a cubic yard of grading, or earth and rock moved in trenching, and the other different units that appear on this page, and the succeeding two pages, by the same detailed steps, insofar as those steps were applicable to those units, that we took in the case of a foot of pipe. Some of these unit costs, for instance the grading cost listed here, include no material other than the using of contractors' equipment. That is a labor performance with the machines and other equipment necessary to grade the tops of hills and the rights of way in general for the purpose of enabling the ditching machine to travel more uniformly along the right of way and to eliminate as far as possible the bends in the pipe.

Speaking of bends I would like to indicate that in this cost of laying and lowering there is an amount included for the necessary over-end and sag bends that must be made in the pipeline when it is going over a rolling country or through draws or ditches. We allowed for the same bends of one type or another that we find from the records were made in the pipe that was actually laid there by defendants. We applied the use of our time study all the way through, and the man-hours for making bends were reflected in the time study together with the equipment that was used. We knew where to provide for a bend because the bends run along the system with the draws, the rolling country, and we have applied in the case of Oklahoma the man-hour study which applies to that particular section of the country. That study shows the work of that particular character. We did not count the bends in our inventory as they are properly reflected as a part of our time study man-hour performance. The performance of this bending is one of the things that was done by the men whose man-hours were computed in our time studies.

932 I have the detailed breakdown of each of these other items appearing as the unit cost in the third column shown on pages 109, 110, and 111 among our working papers which are and will be available to counsel and the engineers of the two commissions. These include also the details behind those two total costs on river crossings which are not indicated as a unit cost on page 110. All these working papers will be available to the engineers and counsel of the commissions at any time they desire. However, if it is not at the immediate time, I would like to have some notice as they comprise two or three immense boxes that would have to be put together and shipped. We have many jobs going on in various sections of the country and we would like to avail ourselves, at those jobs, of all of the information that we have that might assist in furthering any present or future work. These details can be shipped here (Washington) or made available at any location at any time we are notified.

We will go next to one of these compressor stations. As indicated by the index, the detailed summary covers pages 4 to 65, and that part covering the Texoma Natural Gas Company of which the Fritch compressor station is a part is on pages 40 to 64. The Fritch compressor station in the detailed summary begins on page 55, and the summary of the details continues over to page 56, listing all of the items in the Fritch compressor station and totaling the entire reproduction cost new to $2,258,071. All the classifications are not listed individually. For instance, you will find "Machine shop equipment" on page 56. Now that caption includes all of the machine shop equipment consisting of lathes, drill presses, hack saws, and such other items of machine shop equipment. The list includes everything located at the Fritch Compressor Station which is properly chargeable to Account 1006 "Compressor Stations". There are other items at the Fritch station which are located in other accounts. The detail of the compressor station account for Texoma Natural Gas Company is on pages 758 to 795, which would be in Volume 2. On page 758 in Volume 2 we find the listed details of the auxiliary building in the Fritch compressor station, which is carried over to page 759. All the units on which we computed their cost on a unit basis are set forth in those pages beginning on page 758 and ending on page 795. I would like to add at this point the fact that in the listing of this detail in the valuation we have carried it all by the classification of accounts used by the company, recognizing that various classifications are in use by different companies. Due to the possibility of a new classification being necessary, we have attempted to list all of this detail in a form that could be readily converted to almost any classification of accounts. You will notice in the Fritch compressor station we have indicated each and every item of a structural nature, like buildings, in alphabetical arrangement first and then followed with items of equipment in an alphabetical arrangement.

We have worked out the number of units, whether stated in terms of weight, or dimension, or length, or quantity, whatever the manner of stating may be, and the unit costs of each of these units in this compressor station in the same detail and by the same method that we have worked out the details concerning the unit cost of pipe in Oklahoma. We used the different crews necessary for installation of the different items and applying taxes where they are applicable, and such labor rates as are applicable in the State of Texas. We do not use the same factors, of course, but we use the same method of applying such
933 factors as are applicable to each unit cost and break the unit costs down into the same character of detail which we mentioned when we were talking about the per foot cost of pipe, or the other unit costs in the State of Oklahoma in connection with the pipeline.

We went through the same procedure in each of the other compressor stations, at all of the meter and regular stations, at all warehouses and other locations along the line that had equipment belonging to the company, that was apart from the compressor station. Items like meter stations and regulator stations, meter lines and regulator lines, are distributed through the exhibit at the locations or in the states where they actually occur in the system. These main line meter stations are the meter stations on the main line only and have nothing whatsoever to do with branch or lateral lines. In the State of Illinois we have a main line meter and regulator station that is a sales meter as it is the termination of the line where the final sale is made. In the State of Iowa we have other meter and regulator stations that are a part of lateral or branch lines from the main line. These appear on another account. These items do not occur on the main line which is the reason they are not listed in this account.

Going now, for the purpose of illustration, to the State of Illinois main line, I call attention to an item of $5,633,212. The detail of this amount, which is indicated on page 8 for main line in the State of Illinois, commences at page 125 and extends through to page 130, where the total of all of the detail on pages 125 to 130, inclusive, is tabulated. The pipe with which we deal at this point is exactly the same kind of pipe with which we were dealing in the State of Oklahoma except that this pipe has a bell on the end of it. This is just a sort of flare on the end of the pipe increasing the diameter, and was used for the purpose of facilitating welding and keeping the interior diameter of the pipe the same by use of a ring inside of the weld. We priced for the State of Illinois single bell end pipe instead of pricing it as of the same quality as that used in Oklahoma because that is the kind of pipe that was used by defendants in the State of Illinois. We are reproducing the cost of the same kind of pipe that is in the pipeline in Illinois and in all other states and other compressor station locations. It appears that in the State of Illinois the unit cost of pipe is 3.5734 dollars per foot as against 3.6463 dollars in the State of Oklahoma. There are elements involved in this buildup of the cost of 3.5734 dollars per foot that go to increase and decrease the cost. For example, this pipe that is known as single bell end pipe costs more per foot, or per ton, than the plain end pipe, so that the price of the pipe f. o. b. mill is higher than the pipe that was listed for the State of Oklahoma. The freight rate in the State of Illinois is lower than it is in the State of Oklahoma due to its being much closer to the mill. There is no sales or use tax applicable in the State of Illinois for this type of material. Other items that go to vary this price are differences in labor costs, differences in the actual labor performance due to the different terrain, the different type of soil, and the factors encountered in laying and lowering and stringing the pipe. In other words, there are differences in the man-hours required to perform the work and differences in the labor rates applied to those man-hours. In each instance we gave effect to the actual cost of reproduction as we found the facts to be in the particular state where we are reproducing the pipe.

934 Each line of our summary beginning on page 8 and continuing through page 64, with the exception of page 39, is supported by detail in other portions of the exhibit which are readily found by account numbers and by the index shown on the page preceding page 1 in exactly the same manner as is the detail found in those items which I have discussed here by way of illustration.

The amounts set out for each account number indicated on page 1 are, in my judgment, a reasonable and accurate listing of the reproduction cost of the property included in the several accounts, based on prices as of June 1, 1939, and prevailing in the locations where the property is situated. I am now referring to these accounts 1004 to 1024, inclusive. The figures I was referring to were those set out in the column "Reproduction Cost New". In the second column on page 1, under the caption "Present Value", are set out the figures resulting from the subtraction of the depreciation figures furnished us by Mr. Biddison from those reproduction costs to which I was referring in the last two or three questions.

Cross-Examination by Mr. Booth.

I had nothing to do at all with the determination of the existing depreciation which was made by Mr. Biddison. The only work I had to do with the depreciation as listed in this report was the mathematical work of subtracting Mr. Biddison's depreciation from our reproduction cost new. That is true of the other members of our organization. They had nothing to do with the determination of the existing depreciation.

Cross-Examination by Mr. Slaff.

I will prepare a list of the cases in which I previously testified, with the dates on which I testified.

935 **FRANK W. STODDART, a witness for the defendants, testified:**

(September 1, 1939)

Direct Examination by Mr. Morgan.

My name is Frank W. Stoddart. I can't say definitely where I live because I am part of the traveling organization of Mr. Hamilton, and am usually on the road. My office, when I am at the office, is that of Mr. Hamilton in New York.

In 1925 I graduated from the College of Engineering at Iowa State College and received a bachelor of science degree in mechanical engineering. Immediately upon graduation in July of 1925 I was employed by the Cities Service Company and went to Denver, where I entered the employment of the Public Service Company of Colorado as a junior engineer in their training school. That was a training school designed by the Cities Service organization to train employees for future positions in their organization. I remained in the employment of Public Service Company of Colorado for approximately one and one-half years.

On the completion of my work there in December of 1926 I was assigned to a regular job with the Doherty organization. During the training period in Denver I was assigned to a special job in the fall of 1925 in the city of Fort Collins, Colorado, where I worked for the Colorado-Wyoming Gas Company. I was employed in the first place to do certain design work on a natural gas line which they contemplated laying from the Wellington Dome, near Fort Collins, to the cities of Fort Collins and Cheyenne, Wyoming. While there, I made all of the maps from the surveys of that line, designed various items going into the line such as gate fittings, drips, meter settings, buildings, and so forth, drew all of the plans for this, drew up bills of material for this work, and after work was commenced on the construction of the line was retained by that company as a welding inspector on the portion of the line running into Fort Collins.

My next assignment was at Joplin, Missouri in the employ of Empire District Electric Company with which I remained for a period from December, 1926 until about March, 1929. I was employed as a power sales engineer in the lead and zinc mining district of southwestern Missouri, southeastern Kansas and northeastern Oklahoma.

In March, 1929 I was transferred to the New York office of Henry L. Doherty & Company, where I was employed in the rate and valuation department under F. C. Hamilton, with whom I have been associated ever since that date in rate and valuation work.

I am a member of the American Gas Association and at times I have represented Mr. H. D. Hancock, who is president of Gas Advisers, Incorporated, on rate committee work for that organization. Gas Advisers, Incorporated, is a mutual service company, similar to Electric Advisers, Incorporated.

936 Ever since my employment with Mr. Hamilton I have been engaged more or less in valuation work. I have prepared numerous valuations, in some cases working alone and in others with assistants. This work has been on oil marketing properties, which the company contemplated buying, and on natural gas pipeline systems. In 1931 and 1934 I assisted in the work of preparing a valuation of the Cities Service Gas Company. During quite a portion of that time I actually had supervision over crews in the field making inventories and crews in the office pricing that inventory and preparing it for presentation. I worked also on the property of Republic Light, Heat and Power Company, and Northwestern New York Gas Company, preparing a valuation of those properties for presentation to the Public Service Commission of New York. More recently I had active charge of work on the valuation of the Empire Pipeline Company, which is an oil pipeline having property in Kansas and Oklahoma and in the East Texas field, for presentation last year before the Interstate Commerce Commission.

In connection with valuation work, I have done some special work in the nature of pipe tests on pipe samples taken from pipelines in the Mid-Continental area. In other words, that testing was made for the determination of corrosion in pipelines and my work consisted not only of inspecting the pipe in the bell holes, but also of testing coupons, taken from sections of that line that had been removed, in the laboratories of the University of Kansas, and I have also made numerous burst tests on pipe in the shops of the Cities Service Gas Company. These were hydraulic burst tests.

I have never appeared as a witness in any proceeding before. I have had to do with the preparation of the valuation studies that are being presented here on the properties of defendants. I have been actively engaged in this work both in 1938 and in 1939, which is embodied in Exhibit 125.

I was not in Chicago during the entire time that the organization has been working on these studies because it so happened that the hearings before the Interstate Commerce Commission were being conducted during that time and I was here in Washington quite a bit of that time. I did spend the major portion of the time in Chicago last year and I was in Chicago during the entire time we spent on this work this year. I was assigned for special attention to the specific job of determining the reproduction cost new of the gas wells owned by Texoma Natural Gas Company.

On June 1, 1939 that company actually owned the physical property in 159 wells in the Panhandle field. I took or caused to be taken under my direction an inventory of all the physical equipment used in connection with each of those 159 wells. I sent men into the field to make an inventory of all the top fittings, that is the portion above the ground that could be seen, which I personally checked in the field. I have been in that field and have personally checked those notes, and I also personally made and directed the inventory in the office at Chicago from the records of the company of all that material, and of other equipment that goes into the hole that cannot be seen in the field. It is impossible, of course, to see anything below the surface of the ground in a gas well.

937 These wells are not all alike in the sense that they have exactly the same number of strings in the casing and the same length of casing strings. Each well is a problem of its own. In other words, the depth of the wells will vary, depending upon the depth of the sand, the sizes and lengths of the strings in the casing of the well, etc. So each one had to be figured out as an individual. We cannot look at a well and tell how deep it is.

We ascertain the facts concerning those features of the wells necessary for our information in the cost of reproducing them, which are not visible above ground such as the quantity of casing, the quantity of cement used, the depth of the well, and other things that may be hidden or invisible about a gas well, from the records of the company. The company keeps a very accurate record of what goes in. They keep what is known as a well log, which describes the depth of the hole and the amount of material and kinds of material that went into that hole, and these records were available to me at the Chicago office. The facts utilized in calculating these reproduction costs as to those items which are not determinable from the surface were taken from the records of the company, including the well logs kept by the company. The strings of casing that I have assigned to each well are the actual strings of casing which are in those wells at the present time. If a well has three strings of casing I reproduced it with three strings of casing. If two or one, I reproduced it as having the exact number of strings that it actually has. The casing of all of Texoma's wells is cemented, and I ascertained from the records of the company the number of sacks of cement that was used in cementing the casing in the well and ascertained the cost of placing that cement at the bottom of the casing. I ascertained also the cost of the cement delivered at the well and the cost of putting it into the well. I drilled these wells to the exact depth to which they were actually drilled. In other words, we reproduced these wells exactly as we found them on June 1, 1939.

According to the index in the front of the exhibit, these wells will be found in the detailed summary in volume 1 of Texoma Natural Gas Company on pages 41 to 54, inclusive of the detailed summary. The first column in the detailed summary entitled "Reproduction Cost New" represents what I have calculated in the details as the reproduction cost new for each and every well owned by Texoma Natural Gas Company. They are listed by wells, and the amount of money found opposite each well is the reproduction cost new of that particular well. The amounts cannot be uniform due to the variation in the depth and size, the amount of casing in the well, etc. The first well listed is the L. A. Aebersold well, which may be found on page 568 of volume 2 of the exhibit. The first item on that page is headed "Casing". This is seamless casing, 8¼ inches in diameter and 32 pounds per foot. The quantity of this casing in the well is 2,487 feet, which I have priced at 1.8026 dollars per foot, making a total of $4,483. I arrived at the amount by multiplying the quantity by the unit cost. I took 2,487 feet as the quantity of casing because that is the amount of casing that I found from the

records to be in that well. I arrived at the unit cost of 1.8026 dollars in the following manner. That cost first contains a price of 1.4678 dollars per foot f.o.b. Lorraine, Ohio, for the casing material. That price was secured
from the manufacturer of the casing as we sent him a
938 letter requesting quotations on that type of casing and
this is the price quoted. That is an f.o.b. price from which we have subtracted 2%, the cash discount applicable to all casing. This reduces the price to 1.4384 dollars per foot. To this amount I have added freight from the mill to Texas in the amount of .2784 dollars per foot, which gives us a delivered cost of 1.7168 dollars per foot at the warehouse in Texas. All material going into the well passes through a warehouse, and the cost last stated is the cost to the warehouse. These companies generally buy quite a large quantity of material anticipating a certain number of wells to be drilled in the future, and put that material in the warehouse rather than on the lease, so it can be looked after and will not be stolen. To the cost in the warehouse I have added a warehouse charge amounting to .0858 dollars per foot, which, added to the delivered cost price, brings the total cost to 1.8026 dollars per foot, the unit cost I find on page 568 of this exhibit. That warehouse charge was worked on a percentage basis, based on all material going through the warehouse. That is partly a labor cost of tallying and handling charges, and of course there are certain fixed costs of the building for house material that have to be considered in that cost. In computing the reproduction cost of the item "Casing Clamp" I found from the records of the company that there was one set of casing clamps on this well. This is due to the fact that there is only one string of casing in the well so only one clamp was needed. I have priced this one set of 8¼ inch casing clamps at $15.27. I arrived at this price in the same manner that I arrived at the price of the casing in applying those factors that were applicable to it. In this item, and in many others in the exhibit, the totals are stated in terms of even dollars. I do not give effect to the 27¢ in the cost of the casing clamp, but treat that cost as $15. If the cents are less than the half, I throw them out, and if more than a half dollar I give it the dollar above. They will average out in the long run by totalling dollars. That is the uniform plan of organization in this exhibit. I arrived, of course, at the number of casing shoes and the number of lots of top fittings in the same manner that we

have done in all the others, that is, we used the actual number found in the particular well under consideration.

We come now to the item "Contract: Drilling—rotary tools—2,685 feet" at a unit cost of $3.25. The log of the well shows that when this well was drilled the contractor actually drilled it to a depth of 2,685 feet and was paid on that basis. All contracts for drilling are made on a per foot basis. We arrived at $3.25 per foot after sending out to several drilling contractors in that area requests for quotations on drilling, and that is the quotation we received from them for drilling in that particular area. I checked that with the contract price per foot which the company was paying currently as of June 1, 1939. The company is now engaged in drilling some wells and I found that the prices I have used here are identical with the drilling rates now being paid by the company. The contractor's contract calls for the drilling of a well to a specified depth and when that depth is reached his contract is completed and he is paid on the basis of the number of feet he has drilled. However, if after the drilling is completed certain cleaning out of the hole is necessary around the well which requires the contractor's time, he is paid for that additional time on a day basis. As a matter of fact, in the drilling of a gas well, it is often necessary for the contractor to be retained there with his tools until the well can actually be put on production after he has completed his work. I find occurrences like that in the records of the company. The amount I have used here I found by analyzing the drilling costs of a number of wells that have been drilled within the past six months or a year. They are not uniformly retained for one day. There is a
939 variation according to the records of the company. I found in certain cases that no day work was required of the contractor, and in other cases I found as many as five or six days required of the contractor. In order to reproduce this I could not tell what the hazards would be after drilling each and every well, so I have used an average figure which represents the average amount that the company would have to pay the contractor for extras. This one day is the average per diem payment which the company has paid on its wells as a whole, according to the records. I have used an average of one day for each well instead of undertaking to set out in each instance just the number of days that the contractor was held on each particular well. I did this because in reproducing these wells

it would be impossible for us to determine what hazards they would run into on each and every well. We do know those hazards exist, and in the past the company has paid this average amount for extra work. The $90 figure is the amount actually paid to the contractor as a part of his contract price for doing this work. This $90 covers 24 hours' work with his rig equipment and tools. That is contractual rate per day just like the drilling and the work that goes with the drilling is contracted on a per foot basis.

Questions by the Examiner.

I have applied that one day uniformly, but I think there are some wells where I have applied more than one day. I think there are some wells where I have applied more than one day. For instance, there are one or two wells in here that have been acidized, and I think one or two wells that were shot, and of course after acidizing or shooting a well, there is a certain amount of cleaning up to do, which the company contracts to the contractor, and whenever that exists I have determined how much extra day work is necessary for cleaning out the hole. For instance, the R. S. Coon well on page 598 shows nine days. In the second line below "Day Work" you will find an item of "Shooting Well." I determined from the records of the company that in shooting the well there would be an additional 8 days necessary for cleaning out the well after shooting it, in addition to the other cleaning out which would be covered by the one day. This 8-day special item of Day Work is very close to the actual time required as reflected by the records of the company. I did not arrive at it exactly in that way, however. When I asked the contractor for a quotation on shooting the well I also asked him in that letter to tell me how many days would be necessary to clean out after he had completed his work. This cleaning out would have to be done by the contractor and not by the shooter. I took this 8 days from his letter stating that so many days would be required to clean out the well after the shooting. I do not mean that the man who shoots the well would clean it out. There are two operations. One contractor would shoot the well and then the contractor who drilled the well originally, who is an entirely different contractor, would clean out the hole.

Direct Examination Resumed by Mr. Morgan.

If the shooting was done at the completion of the well, the original contractor would be kept there until the well could be shot and then he would go in and clean it out. This is a charge for keeping his equipment on the job and cleaning the well out after the shooting has been done. This 8 days is the time that we were advised by the man who did the shooting would be required for the contractor to clean out the well and condition it after he had administered his shot.

940 The reason I did not use the actual figures in this instance is due to the circumstance that some of the wells of Texoma were purchased at the time the company was organized and they do not have complete records, although we did receive from the companies that sold them the wells the log showing the depth of the wells, the amount of casing in the well, etc. We could not determine all the costs from those old records. In other words, I have tried to predicate my costs on wells being drilled currently. I applied this day work to all the wells, using an average figure. I averaged some of the wells which had not been cleaned out with some wells which had taken six or seven days to clean out and found that the average was one day for all wells. In other words, I was trying to arrive at an average cost that I could apply to some older wells that I had no records on.

These older wells on which we had no records as to such costs were wells that were drilled prior to being acquired by Texoma. We had no difficulty in finding records for the wells drilled by Texoma. I applied this one day of extra work in some cases to the wells Texoma itself had drilled because I took an average for all wells and in the long run it would average out.

"Cementing" I have included in the amount of $350 for each well. This is the actual amount paid by the company at the present time for cementing wells. In other words, a cementing job requires 125 sacks of cement which is put in the hole by the contractor, and the cost of putting it in the hole is the contract labor, so that is a uniform amount. I base that amount on what the company was paying currently as of June 1, 1939. The company is currently paying $350 for the material and labor of placing the cement in the well.

The next item, "Rig Expense", amounts to $1,099. This rig expense includes two or three items mainly. It includes first, the cost of erecting the rig which is done by the contractor. The company actually furnishes the rig for drilling the well, but it does not attempt to erect it itself. It contracts the erecting of that rig. It is a steel rig and has to be put together on the site, so the company contracts for the erecting and dismantling of the rig. That is a fixed amount which I have determined from the records of the company amounting to $750, and to this amount for drilling a well with rotary tools I have added an amount of $349, which I have determined is the expense to the company for the rig which they own and furnish to the contractors. In other words, there is a certain amount of depreciation on that rig, certain fixed charges that have to be charged into each well, and this amount I have found to be $349. I have determined the amount and put it in here because it is properly chargeable to each well. I don't know just how they handle it, but I have determined the amount of expense that they are put to for drilling wells. It is not reflected in the job order for drilling the well.

In that connection I took into account the number of wells that would have to be drilled, and the period during which they would have to be drilled, in order to reproduce this property as a whole during the period of construction that we have used here in this study. I have assumed that all of these wells would have to be drilled in approximately one and one-half years, which was the construction period for the building of the entire system.

941 I determined that if all these wells were to be drilled in this one and one-half year period, they would have to have eleven rigs drilling at one time—continuously drilling throughout the period in order to drill all the wells in the specified time. I have just allocated to each one of the wells its proper proportion of the cost which would have to be incurred in connection with providing these rigs. These rigs are a very essential part of the process of getting these wells drilled.

You will find under "Contract—drilling" on page 570 that this well was drilled with cable tools whereas the wells on pages 568 and 569 were drilled with rotary tools. The fact that this was drilled with cable tools required additional expense in certain materials furnished by the company. In addition to the derrick unit they also furnished a bull wheel unit, a band wheel and walking beam unit, machinery supports, and so forth. There is additional investment involved in wells drilled by cable tools. Thus the cost corresponding to $750 and the $349, totaling $1,099 set out in the analysis shown on pages 568 and 569 must be changed to $1,272 in the case of the wells shown on page 570, in order to meet the actual cost of this cable tool type of rigging. This is the amount arrived at by allocating to each well its proportion of the total additional cost of drilling the number of wells that were actually drilled by cable tools. Those items shown on page 570, amounting to $351, $199 and so on down through the remainder of the column, are not dependent upon the depth of the well or the amount of casing in the well, but are miscellaneous expenses incurred in the drilling of the well and are generally uniform expenses for each well whether drilled by a rotary or by cable tools. I arrived at those figures by analyzing the actual costs of drilling the number of wells during the last 12 months, and have arrived at certain average costs for these items. In analyzing these records of the company I was able to break down into the component parts all of these items, and I found that they varied slightly from well to well, but in order to apply these present-day miscellaneous costs to the older wells, I had to take averages for all of these items, and these are averages which represent actual present-day miscellaneous costs for drilling wells. All these costs are actually incurred and paid and the company's record so reflect. I found that the total cost of reproducing the well referred to on page 568 is $17,008. By referring back to page 41 of the detailed summary under the column headed "Reproduction Cost New" we find that amount to be the first item in that column. On page 41 there is the figure $850 immediately to the right of the $17,008. That figure is in the column headed "Depreciation Deducted" and is the amount of money which was determined by Mr. Biddison and represents his figure for depreciation to be deducted from the reproduction cost new of this well. This leaves a net, after the subtraction of the depreciation from the reproduction cost new of $16,158.

These varying amounts set opposite the wells listed, beginning on page 41 and extending through to the middle of page 54, were arrived at in exactly the same manner as were the amounts $17,008 and $16,158 to which I have referred.

For the purpose of further illustrating the way we arrived at those figures, turn to page 569. We have some five

different kinds of casing listed in that well as against only
one string of casing, all of the same kind, in the well set
out on page 568. I have shown here the exact amount
942 of casing which the books of the company show to be
in that well. In other words, I find that even in the
case of rotary drilled wells, there is more casing in some
wells than in others. In the case of cable tool wells there
is sometimes more casing than in the rotary well. In each
instance we reproduced the exact amount of casing that
is found in the particular well.

From my study of the total number of wells, the way those wells were drilled and completed, the way they have been equipped, and the condition in which I have found them equipped as of June 1, 1939, and in the light of my investigation and that of our organization as to the material prices, labor costs, and other elements which we have figured in the unit costs applied to the material in those wells, it is my judgment that the figures set out in detail from page 568 to the middle of 726 represent the reasonable and actual cost of reproducing those wells if they were to be drilled beginning as of June 1, 1939.

These costs are carried back into our detailed summary beginning on page 41 and continuing through succeeding pages, in the column headed "Reproduction Cost New," and these figures set out in the third column under the caption "Present Value" represent in my judgment the reasonable cost of reproducing these wells new as of the time we have just mentioned, less the depreciation as determined by Mr. Biddison. The figures shown in the third column under the caption "Present Value" on page 41 and succeeding pages to the middle of page 54, represent the amount left after deducting the existing depreciation as determined by Mr. Biddison from the reasonable cost of reproducing those wells as of June 1, 1939. This represents the present value calculated by deducting the depreciation as determined by Mr. Biddison from our reproduction cost new.

These depreciation figures are not my figures. I merely recorded them on the sheet, subtracted them from the reproduction cost new, and arrived at the figure in the third column. I think the subtraction is correct.

Questions by the Examiner.

Under the terms of the drilling contracts I read, they provide for a fixed sum per foot, with a provision for an additional sum if the driller runs into difficulties. The additional sum is an amount for the time necessary for him to work on cleaning up the job. If it takes ~~him~~ 1 day, it is so much money, and if it takes him 2 days, it is so much money. It is all stated in the contract at so much money per 8-hour shift.

Direct Examination Resumed by Mr. Morgan.

I have all the work sheets showing the details used in the preparation of the figures submitted in Exhibit 125. These work sheets and supporting data will be available to counsel and engineers of the two commissions.

943 I can't say whether the provision for paying the contractor for extra work is part of the contract for drilling the well, but it is paid on a per day basis. The trouble which usually causes the detention of the contractor after the actual drilling is completed is usually due to something that gets into the drilled part of the well such as the caving in or bridging of the formation after the well has been drilled, and the footage obligation completed.

Cross-Examination by Mr. Slaff.

The reason that in some places we use $4 per foot as the unit cost for drilling while in others we use $3.25 per foot is due to the fact that the drilling rates vary from county to county. Drilling contractors have established prices for various parts of the field, due partly to the fact that water is hard to find in some places and there they charge more per foot, and so on. It is an actual contract price and is the amount that is actually paid by the company in various parts of the field. Texoma is actually paying $4 per foot right now for the drilling of some of their wells. In Moore County the wells are drilled deeper than in Gray County, and the depth of the well tends to slow up the rate of the drilling under some circumstances. It takes longer to drill out the last part of a deep well, and they charge more for it. There are three unit costs per foot used in the exhibit —$3.25, $3.50 and $4. In Hutchinson County we find that it is $3.50.

Questions by the Examiner.

We furnished the contractor with information showing the depth of the well and the amount of casing in the well, and told him in which county the well was to be drilled, and he quoted his bid price on the basis of that information. He would bid the same way on a well if we were actually going to drill it today, on the basis of that limited amount of information. He is very familiar with the field, and by knowing in which county the well is to be drilled, he is familiar with the depth of the sand; he is actually drilling wells there today; and can readily make a bid on drilling a well in that area.

944 F. C. HAMILTON, recalled by defendants, testified:

(September 1, 1939.)

Direct Examination by Mr. Morgan.

When my organization was arriving at the cost of various materials and equipment which would be required to reproduce this pipeline, I personally took the responsibility of determining the proper cost to be applied to the pipe that would be required. I did this for the simple reason that I have had an opportunity to familiarize myself with purchases of pipe for a great many years. Beginning back in 1918, I made an original cost study of the Republic Light, Heat & Power Company property as it is now constituted in and around Buffalo, New York. That property contained some of the earliest gas lines that were laid. In our New York office we have some paper weights that were made from the lead pipe that led to a flare in Fredonia, New York, at the time of Mr. Lafayette's celebration. Some of that pipe we have in the museum in New York, and there also came out of that district some wooden pipe made by boring holes through logs which were longitudinally fastened together with what we guess to have been Civil War army blankets covered with tar and joined on each end to the wood with steel straps. That particular line was laid by the Bloomfield and Rochester Natural Gas Company. It was laid in 1870. I cannot recall the name of that old company that laid the lead pipe because, of course, we were not familiar with it. In that original cost study, of course, we found a large portion of cast iron pipe with two types of joints, oakum and tar or yarn and lead joints. Later we found, as time went on, more wrought iron pipe. Then there was developed finally the steel pipe in the form of lapweld pipe. We have available in our office those records up to 1918 from that original study as to what those various types of pipe cost. I am eliminating the lead and wood pipe, of course.

That original cost study was presented to the New York State Commission, to the Bureau of Capitalization, for the purpose of the authorization of the securities on the consolidation of several companies which are now represented by the Republic Light, Heat & Power Company.

About two years ago we were requested to bring up to date from 1918 the cost of the property which had been constructed there since that time, and reclassify all of it under the new classification of accounts put out by the New York Public Service Commission. Yesterday, at Albany, two of my men presented the entries for approval on that work, so we have the history of that company from the beginning, back in 1868, on down to date.

At the present time, in anticipation of the order of the Federal Power Commission putting in the new classification of accounts for natural gas pipelines, I have had men working for a period of nine months on the Cities Service Gas Company's records and the records of the predecessor companies that now constitute the Cities Service Gas Company. The tentative classification of accounts has been put out and has not been made final, as far as I know, for natural gas pipelines, but is expected to be made effective as of January 1 of next year. That work on the Cities Service Gas Company's records has developed costs of
pipe beginning in 1904, which was when their first line
945 was laid by the Kansas Natural Gas Company. That
has all been available to me. That first line laid by the Kansas Natural Gas Company was 16-inch plain and lapweld, 20-foot length pipe weighing 43.168 pounds per foot. The price of that pipe f.o.b. Pittsburgh at that time was $58.20. I just cite that to show where some of the information that I have been able to acquire comes from.

In addition to that, I have been engaged in the valuation of large gas pipeline and gas distribution companies for many years, and on the occasion of each valuation I have had to secure quotations for pipe. Naturally, I checked those quotations each time against purchases of pipe which have been made by the company in periods prior to our determination of the cost of reproduction.

During a long period, from 1925, I was on the executive committee of Henry L. Doherty & Company, to whom was submitted the operating budgets of the subsidiaries of Cities Service for each year. Those operating budgets included their construction programs and necessarily included their estimates of cost of construction. Because of my department's work and familiarity with prices, questions as to the adequacy of the estimate of such items of construction as pipelines were submitted to me. From about 1924, I have had a man in my office who has done very little else except keep a continuous index of prices of the various items that enter into the construction of natural gas pipelines and of electric and artificial gas utilities. I, of course, made available to him for his assistance all of the information which was gathered in the way of quotations, and by checks on costs that had been paid by operating companies where we were making valuations. Also, I have had to do, in a responsible way, with the approval of construction projects on which, of course, estimates of the cost of construction based on quotations had been submitted.

Because of the fact that so much of the cost of defendants was dependent upon the price of the pipe itself, roughly some $14,000,000, I felt that it was necessary, in collaboration with Mr. Eastman and Mr. Willard, to spend considerable time on the accurate determination of what should be the proper cost of pipe. That could easily be determined if the amount were small, because you would pay what is shown by the current standard discount sheet plus an extra 10 per cent discount for quantities, but when you run into such enormous quantities as are shown in this valuation of one particular size, for instance of the 24-inch—there is in this system about 214,000 tons,—when the quotations came in, the quotations on the 24-inch showed that they had given all of the discounts in their quotation that appeared on the standard discount sheet, and that they had taken off 10, 10 and 5 per cent, approximately, in addition to the regular discount sheets that you might expect with reasonable orders. When it came to the smaller quantities in the other sizes, they had not quoted nearly so desirable a price. They had quoted more in line with the prices that would be expected to be given for the quantities of those particular sizes that were shown in our requests. In our

requests for quotations we had asked for a quotation on the quantity that was shown in the inventory. For instance, they quoted prices on the 16 and 12-inch pipe as if those were the only pipe purchases involved. This was also true of most of the smaller sizes of pipe. They had not done that on the 16-inch because there was a very considerable portion of that, but on most of the smaller sizes that is what they had done. I felt, and I still feel, that a purchasing agent who has in his hands an order for such a large quantity of one size could hammer the pipe manufacturers into giving him the same quantity discounts
946 on those quantities of smaller pipe, notwithstanding
there were not sufficient quantities of that smaller pipe to justify such a discount.

Those quotations on the large size pipe were $62.35 a ton f. o. b. Gary for electric weld and $60 a ton f. o. b. Lorraine for the seamless 24-inch pipe. By interpolation we found what seemed to be the additional deductions that they had given over prices that were available to the public and to pipelines in general, and then we applied the same additional discounts to all of the rest of the pipe on the system.

They had done one more thing in this situation on these bids. The standard discount sheets apply to lap weld pipe. There is, and there has been for many years, a fixed addition per ton, after the standard discount of $2 for electric weld and $3 a ton for seamless. In these quotations they omitted those additions from the standard discount sheets and then still applied the discounts which I have listed. That is generally what we did and as a result that has lowered the cost of the 24-inch pipe in this system below what the company paid for it when they did have this tremendous order in their hands by about $1,725,000. The 24-inch pipe, in other words, is in here, so far as the pipe itself is concerned, at $1,725,000 below what the company actually paid for it. I was familiar with this company generally at its inception. I knew about the preliminary work that was done on this, and I do know that we all felt when they made their original purchases of such a large quantity that they had reached what then was an all-time low for the purchase price.

Question by the Examiner.

The manufacturers' discounts were all based on lapweld pipe. The base price is always $200 a ton. That does not change. They issue changed discounts that apply to different sizes, and always apply the discounts to lapweld pipe. We will say that the discount for a particular size is 60 per cent, then your price would be $80 a ton for lapweld. If you want to order electric weld instead of that then the price would become $82, and if you order seamless the price will become $83. In other words, those additions are not subject to the discounts; they are added after the discounts are taken off. But in this particular situation they apparently not only gave the additional discounts to the companies but left off the additions for seamless and electric weld that had hitherto been put in.

Direct Examination by Mr. Morgan Resumed.

The net result, covering all of the pipe, as between the prices quoted and the prices we used here is a very considerable reduction below the original cost. I computed it only on the 24-inch pipe, because I had that tonnage available, but in the prices per ton the reduction on the other sizes below the quotations which we received, and below the prices that were paid originally, ran all the way from $2.30 per ton to as high as $30.40 a ton, according to the particular size and the particular purchase. As to the comparison between the prices quoted in response to our letters and the prices we used in Exhibit 125, the prices on the 24-inch are identically what they quoted us because they were quoting on that large quantity. The prices on all other sizes were less than they quoted us. I have examined that exhibit and I have been in contact with the work both this year and last year so that I am thoroughly familiar with what is in that volume. It was prepared under my direction.

947 Taking into account my experience in valuation work, my knowledge of the costs involved of the materials utilized in the construction of this pipeline, and the other costs incident to the assembling of its physical parts into a pipeline system, and in the light of the investigations that have been made concerning time hours, labor costs, and all of the other elements that have been mentioned here by me and other witnesses, it is my judgment that the amounts stated in this exhibit and summarized on page 1 of this exhibit, constitute in their aggregate the reasonable amount that would be required to reconstruct or reproduce this pipeline, if constructed as of June 1, 1939. (Objection by Commission counsel.) In my judgment it represents the

lowest price at which the property could be reconstructed at that date, with a reasonable construction period allowed. That construction period I have assumed to be the same period that was covered by the construction of the pipeline in the beginning. That study includes all of the physical properties of the two pipeline companies with the exception of the leaseholds.

Assuming the existing depreciation to be as stated in the figures furnished to me and my organization by Mr. Biddison, the figures in the second column set out on page 1 under the caption "Present Value" represent the lowest cost at which these pipeline properties could be reproduced after deducting Mr. Biddison's figures for depreciation. I have already stated that the figures set out in this exhibit have to do with the reproduction cost new less existing depreciation furnished by Mr. Biddison of the inert physical property. By the term "inert physical property" I mean that it was a collection of the material and equipment into a pipeline, so far as the physical property alone was concerned, and that it included no cost for seasoning the line, preliminary operations after the completion, and no cost for attaching business and making it an operating organization or building up a force to operate.

By "preliminary operations after the completion" I mean such operations as are necessary in the process of seasoning and tuning the plant up after it has been completed. There are always incidental costs involved in these early operations.

In addition to the value of the inert physical property, as I have defined that term, there is, as to this particular system, a going concern value.

By "going concern value" I mean a value to be assigned to the property over and above the cost of its physical property because of the fact that it has made the necessary expenditures and sacrifices to get a business attached, and that it has this business attached and has built up the income and is a going concern. Those costs, of course, come after the construction of the pipeline and are something that create an item of value. In other words, this pipeline without customers and without business is something entirely different from this pipeline that does have customers attached and is doing business, with its organization seasoned, familiar with their jobs, and with the resulting low operating costs that you get from that kind of organization.

At the request of defendants I have undertaken to analyze and determine from the records of the companies what the costs and the sacrifices of building the load and making this business a going business or going concern have amounted to in terms of dollars.

948 First I had, as did some of my older men, a quite intimate knowledge of the original cost of this property and the things that had to be done to get its business established. I considered it as an integrated project because the two defendants are interdependent.

In the first place, these costs for attaching business on this property are lower than could be secured by any pipeline with which I am familiar. The reason for it is this: It is a single pipeline from a single field to a market that has a potential use of many times the capacity of the pipeline, so that the cost of securing a sufficient load to fill the pipeline would be less than would be the cost of securing a load for a pipeline that was built to supply all of the ultimate needs of the whole district.

One of the reasons for this lower cost is this: In any town where the sales of gas are quite universal in all homes for cooking, water heating and house heating as they are in towns in Kansas, Missouri and Oklahoma, the average investment of the average domestic customer in equipment, by actual inventories which I have made, runs to roughly $135 per customer. When I say that I am giving you the average of the numbers of poorer homes and the smaller number of large homes. It is an average for domestic customers based on inventories of all of the equipment in all of the houses in town, and applies to domestic customers only.

When we run a pipeline to a town which has not had natural gas we start out endeavoring to sell gas to supplant other services which those customers have had, maybe coal, maybe oil, in some cases wood. Assuming that our gas rate is comparative, we still are up against the reluctance of the customer to throw away his investment in whatever equipment he now has and which he has bought for the purpose of utilizing the fuel which he did use prior to natural gas. In Chicago, because they were not building a pipeline of the size to supply all of the customers with all of their needs, they could get customers who were less reluctant. In other words, their time of attaching load would be less than it would have been were they building a pipeline to get all of the load that is there available.

I have made a study of what those items of developing and attaching business would cost in the case of this pipeline. I might add again that it was not built for the ultimate load, but it comes as near being a 100 per cent load factor as any pipeline with which I am familiar. You could not secure such a desirable load factor, if you were trying to supply all of the needs for heat of all of the customers in Chicago, or of any other town that I know of.

The business of any natural gas system fluctuates from month to month because of climatic variations which affect the sales to the domestic customers, and because of the variations of the seasonal needs of the industry. We have adopted, for the basis of these computations, the sales in the year 1936 of $14,537,985, for the year 1937 of $15,546,451, and for the year 1938 of $14,456,899, and have averaged those, arriving at an average figure of $14,847,112. Those are the only three full years during which the pipeline has operated since it was fully loaded. So I have used as a basis the average of those three years. Now during that period the capacity of the pipeline was increased by the installation of additional compressor station capacity. The nominally rated capacity prior to that
949 increase was 175 million cubic feet a day. Today it is 210 million cubic feet a day. Both figures have been exceeded on particular days due to packing of the lines. I have therefore taken 175 over 210 as a fraction, and reduced by that ratio the $14,847,112 which constituted the average revenue of three years, with the result that I got $12,372,593 as the amount of sales that would have represented the ultimate capacity of this system prior to the increase in its capacity. In other words, if the line had been loaded from the beginning and had a capacity of 175 million, the revenue which could have been expected on the same load factor that has obtained during these three years would have amounted instead of $14,847,112 to the sum of $12,372,593.

Using this $12,372,593 as a basis of the revenue representing the full load capacity as it existed prior to 1936, I have made a tabulation to indicate the average non-productive capacity in each of the preceding years. In the year 1932 the revenue was $5,854,567, which represented 47.3 per cent of the productive capacity. In 1933 the revenue was $6,254,177, which represented 50.5 per cent of the productive capacity. In 1934, the gross revenue was $9,485,366, or 76.7 per cent of the productive capacity. In the year 1935 the revenue was $12,036,535, or 97.3 per cent of the productive capacity. In those various years, subtracting the per cent of load that they have from the load which they could expect, and which they did get, we have in 1932 non-productive capacity of 52.7 per cent, in 1933 of 49.5 per cent, in 1934 of 23.3 per cent, and in 1935 of 2.7 per cent.

It must be appreciated that in the construction of a pipeline system such as this it is economical to build a pipeline for the ultimate capacity for which it is designed at the time you first install it. I might give you this example, that in the first year of operation they had nearly 50 per cent of their ultimate capacity in the line. You cannot have piece-meal construction in the pipeline, because it would have taken an 18-inch line to have carried 50 per cent of the capacity of a 24-inch line, and the 18-inch line for rights of way, and many other items, would have cost the same as the 24-inch line. The pipe and labor costs of installation and trenching would constitute far more than 50 per cent of the cost of the same items for the 24-inch line, so that the economy lies in installing the 24-inch line. You cannot make a piece-meal construction of pipeline capacity with economy.

The participants in this project received mortgage bonds bearing an interest rate of 6 per cent for the majority portion of the funds which they advanced for construction purposes. They knew, as a matter of course, when they advanced these funds that a certain number of years would be necessary before the project could acquire a business that would allow the payment of their interest, or the payment of dividends on stock. Anybody familiar with pipeline operation knows that. They also knew that it would be necessary to spend a very large sum of money on sales promotion work, both directly and in the way of contributions to distribution systems for the promotion work of those systems, if they were rapidly to build up the load. The earnings of the system from 1932 to 1935, inclusive, were not sufficient to meet the bond interest, and the companies were forced to borrow to meet ordinary cash requirements. No dividends were paid. I have taken the interest expense which represents the interest on the bonds together with the interest on the Gulf note which was given for the acquisition of some of the property that is now owned by the
company. These interest payments for 1932 were
950 $3,666,350. For 1933 they were $3,625,079, in 1934 they
were $3,598,329, and in 1935 they were $3,474,732. To

the interest for each of these years I have applied the percentage that was indicated by the non-productive capacity computed from the revenues, with the result that 52.7 per cent of the 1932 interest expense amounted to $1,932,166; 49.5 per cent of the 1933 expense amounted to $1,794,414; 23.3 per cent of the 1934 expense amounted to $838,411; and 2.7 per cent of the 1935 expense amounted to $93,818. The total of these four items is $4,658,809, and represents the rental on money which was invested in idle capacity during the period of the acquisition of the business that they now enjoy.

Bonds, of course, would not have been salable at the inception of this property, and I felt that in applying the interest rate of six per cent that was paid for all of this money I have applied a rate less than would be required to raise money for a new project similar to this. I have taken those ad valorem taxes that apply to the property itself, not including income taxes and items of that kind, and have applied them in exactly the same way. The taxes paid in 1932 were $301,766; in 1933 they were $301,629; in 1934 they were $270,558, and in 1935 they were $289,193. Applying these same percentages that I used in the previous calculations, I have determined the amount of taxes paid through that period on property that was non-productive. These percentages result in $159,031 for 1932, $149,306 for 1933, $63,040 for 1934, and $7,808 for 1935, a total of $379,185.

A determination of the amount of depreciation existing in this system as of June 1, 1939, has been made by Mr. Biddison. He determined the depreciation existing on that date on the system as amounting to $2,866,758. For the purpose of this computation we have made the assumption that this depreciation occurred at a uniform rate throughout the 8-year period since construction. On this basis the annual amount of depreciation would be $358,345. By that I mean the depreciation that has occurred, which has not been replaced by maintenance or otherwise. Applying to this amount the ratio of the increase in capacity of the system due to installation of additional compressors I reduced that by taking 175/210 of it, arriving at a result of $298,621.

Taking for 1932, 52.7 per cent of this, for 1933, 49.5 per cent of it, for 1934, 23.3 per cent of it, and for 1935, 2.7 per cent of it, I arrived at the depreciation represented in the system today attributable as having occurred on the non-productive capacity during those four years, and it amounts to $382,832.

Certain expenses on a natural gas pipeline are fixed and do not vary in proportion to the quantity of gas handled. In other words, certain officers' salaries do not go up and down with the gas handled, and neither do taxes and other items. Certain other expenses do vary almost directly in proportion to the quantity of gas handled, and naturally during the development period these expenses are much lower than in subsequent years when the full capacity of the line is being utilized. Without making detailed analyses, we have considered that the general and administrative expenses, pipeline expenses and telephone expenses are fixed and that a certain portion of these expenses are properly attributable to the system's non-productive capacity.

I have, therefore, taken those fixed operating
951 expenses which were in 1932, $1,127,807; in 1933, $881,430; in 1934, $810,684, and in 1935, $882,028. Applying these same percentages for non-productive capacity to these amounts I have a total for the four years of $1,243,366. By pipeline expense I mean that pipeline expense as contained in the Commission's Provisional System of Accounts as opposed to compressor station expense.

Prior to any construction, in fact beginning in July, 1939, various market surveys were conducted by participants in the project, and these surveys were available to the companies at the time the actual construction of the project was begun. No part of the expenditures for these surveys is included in the tabulation of direct expenditures made for the purpose of attaching business.

During the years since the completion of the project the companies have made the following direct expenditures for the sole purpose of attaching the business which they now have. In the year 1932 they spent $86,105; in the year 1933, $219,149; in the year 1934, $889,060, and in 1935, $373,058, or a total of $1,567,372 for building the business up to full load. I will add here, for the purpose of comparison, the expenditures by the same department in 1936, 1937 and 1938, which amount to $16,371, $16,115 and $17,788, respectively. In other words, the expenses were cut down to a very minimum as soon as the load was acquired.

Included in the total of these expenditures which I have listed were contributions to the Chicago District Pipeline Company amounting to $187,131 in the year 1933 and $705,-

065 in the year 1934, which were made for the sole purpose of developing the domestic and house-heating business of those utilities serving the Chicago territory. In 1933 $749, in 1934 $160,243, and in 1935 $353,783, or a total for the three years of $514,755 was contributed to utilities operating outside the Chicago area for the purpose of developing their business.

It must be borne in mind that while these expenditures were being made by the pipeline company there were other large expenditures being made by the distributing companies for the purpose of attaching business, with the result that the other expenditures tended to help attach the business to the pipeline, but included here are only the expenses of the pipeline company itself.

I have summarized these items as follows: Rental on the money invested in the non-productive capacity, $4,658,809; taxes paid on non-productive capacity, $379,185; depreciation on non-productive capacity, $382,832; fixed operating expenses due to non-productive capacity, $1,243,366; direct expenditures for attaching business, $1,567,372, or a total of $8,231,564. These costs that I have shown do not include all of the costs of attaching business, and such costs as are here included are low because of the very favorable situation of this pipeline as compared with a pipeline designed and built to supply all of the heating needs of a particular town. There has been omitted from these calculations any costs incident to the seasoning of the plant, which costs always follow the beginning of service on any system of this nature, and neither has there been included at any place any costs for the assembling and training of the operating personnel.

Based on these actual out-of-pocket costs incurred in order to provide, because it was economical to do so,
952 facilities for the handling of gas in advance of obtaining the load of gas to be handled, and taking into account my knowledge of the history of this company and of the progress it has made and the volume of its business, the properties of these companies possess, in addition to the value of the inert or bare physical properties, a value of at least $8,500,000 in the nature of going concern value.

Cross-Examination by Mr. Slaff.

In referring to pipeline expense I was referring to the company's own accounts which it considers pipeline expense and which was taken from their books. It would not include pipeline maintenance expense.

Cross-Examination by Mr. Booth.

I was directed by the defendants in this case to prepare a reproduction cost appraisal of the property of defendants, that is the physical property of the defendants, exclusive of leases, and to prepare this appraisal based on the prices prevailing on June 1, 1939. I was directed by the defendants to deduct from this reproduction cost new the amount of existing depreciation which had been determined by Mr. Biddison. I do not sponsor in any way the amount of existing depreciation determined by Mr. Biddison. I have no connection with it other than to be responsible for the mathematics of deducting it from the cost of reproduction. In addition to that I, myself, prepared this study to which I have just testified, as to the going concern value of the property. That is all I was directed to do upon behalf of the company in presenting this case. I also prepared an appraisal based on 1938 prices but was not asked to present it in this particular case. All there is here is the 1939 appraisal.

Further Cross-Examination by Mr. Slaff.

I have a list of the cases in which I have testified but unfortunately the only dates I have are the dates that I was on the case from the beginning to the end. I cannot give you the dates at which I testified and will not be able to do that until I get to the New York office. I will have somebody get that up for me and get the exact dates.

Further Cross-Examination by Mr. Booth.

While I did not undertake to value the leases, as I have already stated, Mr. Eastman, in connection with his study of preliminary operations of the company, included the delay rentals paid on the leaseholds during the period of construction. That is the only way in which these leases enter into our study. We did, of course, include the wells, as explained by Mr. Stoddart.

953 (Document entitled "Texoma Natural Gas Company, Gas Well Details, Well Groups Nos. 1 to 12, Inclusive," marked Exhibit No. 118 for identification.

Document entitled "Errata Sheets for Exhibit No. 122," marked Exhibit No. 124 for identification.

Document entitled "Rate Reductions Effected by the Introduction of Natural Gas in the Communities Served by Natural Gas Pipeline Company of America," marked Exhibit No. 126 for identification.

EXHIBITS NOS. 118, 124 and 126 offered in evidence. EXHIBIT NO. 118 received in evidence without objection.)

954 P. McDONALD BIDDISON, recalled by defendants, testified:

Direct Examination by Mr. Hedrick.

(September 5, 1939)

At the time I testified in this case before, which was at Chicago, on August 3, 1939, I went into my educational qualifications and experience over the time I have been engaged in business since leaving school. I will add to that statement the experience I have had in making estimates concerning the existing depreciation in the various properties ordinarily owned by natural gas pipeline companies.

During the war and shortly after the close of the World War I had occasion to acquire pipe for construction purposes for gasoline plants in the State of West Virginia, and during that period I bought a considerable amount of used pipe because new pipe was almost unobtainable. I inspected a great deal of this class of material at that time to determine the purposes for which it was usable. Prior to that time, during my connection with the Ohio Fuel Supply Company and its associated companies, I had numerous occasions to examine oil well and gas well casings, to determine its suitability for re-use. About 1913 or 1914 I was required to examine and pass upon the condition for re-use of a considerable amount of natural gas lines which had been acquired, or were being acquired by the Ohio Fuel Supply Company in the south central Ohio gas field areas. I was required to determine how much of this pipe was suitable for re-use and for what purposes it could be re-used, and what portions of it would have to be junked. About

1923 I made inspections of natural gas pipelines and distribution lines in the vicinity of Camden and Eldorado, Arkansas, and Monroe and Bastrop, Louisiana, for the purpose of fixing the price upon properties for purchase by my then employers. In 1923 I made purchases of a large amount of used oil line and gas line pipe for the purpose of relaying in Louisiana. This material was acquired in Indiana and Illinois in sizes from 4-inch up to and including 12-inch. On this pipe I determined the purposes for which it was suitable to be used, directed the amount of rejections, and the amount of repair work on it, and put it in condition for use.

In 1936 I made the determination of the suitability for re-use of about 70 miles of 12-inch pipe lifted by the Lone Star Gas Company, determined the rejections, the repairs necessary to put the usable pipe in condition for re-use, and in that connection I made a rather detailed determination of the distribution of pitting on that pipe. Each joint of that 70 miles of pipe was inspected from end to end by men under my directions for the determination of the amount of pitting and the distribution of pitting.

In 1928, and again in 1936, I think it was, I made an inspection of the distribution properties at Fort Worth, Texas, of the Fort Worth branch plant of the Lone Star Gas Company, for determination of the condition of that property in a valuation. I have made similar determinations on the condition of pipe in distribution of plants for Galveston, Waco, El Paso, Wichita Falls, Sherman, Denton and Greenville, all in the State of Texas, and for a group of 33 smaller towns in Texas of the Community Natural Gas Company, and for a group of 26 smaller towns in Oklahoma for the Community Natural Gas Company.

955 In 1931 I made a determination of the condition of the transmission lines and compressor stations of the Cities Service Gas Company in connection with a valuation.

In 1932 I made a determination of the condition of the production and transmission lines and the general property of the Lone Star Gas Company located in Texas and Oklahoma in connection with a valuation. Again in 1933 I made a similar determination. I made a determination of condition of the production and transmission lines and general property of the Oklahoma Natural Gas Company in the State of Oklahoma in 1937.

I made a determination of the condition of the oil pipelines of the Empire Pipeline Company in 1937, in connection with a valuation made by others for presentation before the Interstate Commerce Commission.

I made a determination of the condition of the production and transmission lines and general property of the Arkansas-Louisiana Gas Company located in Louisiana, Texas and Arkansas in 1935 in connection with a valuation in which I was participating.

I made an inspection of the transmission lines of the Southern Natural Gas Corporation in the State of Louisiana in 1933, in connection with some taxation suits that were pending.

I made an inspection for the determination of the condition of the property of the Albuquerque Natural Gas Company in the State of New Mexico in 1935, in connection with a valuation as of the same period, for presentation in a case involving the application of the New Mexico statutes in regard to making common carriers of natural gas lines.

In 1936, I made an inspection to determine the condition of certain oil gathering pipelines in the East Texas oil field in connection with the valuation used for the consolidation of properties.

I made an inspection of the distribution and transmission lines of the Sapulpa Gas Company properties in and near Sapulpa, Oklahoma, in connection with the valuation which I was preparing. I have made inspections of the distribution properties of the Arkansas-Louisiana Gas Company for the determination of their condition in connection with valuations in Texarkana, Eldorado, Conway, Pope, and some other minor communities on that system, all in the State of Arkansas.

Those inspections to which I have referred cover property of the same general character as the property of defendants.

The published bulletin to which I referred in my testimony of August 3, concerning gasoline plants, was written by George A. Burrell and George C. Overhold, both at that time associated with the Bureau of Mines, and myself as co-author. It was a U. S. Bureau of Mines bulletin and was No. 120 and entitled "The Extraction of Gasoline from Natural Gas by Absorption Processes". This same bulletin was presented substantially as a joint paper by the same authors before the Natural Gas Association of America at Pittsburgh, about the spring of 1917.

956 I was requested by the defendants here to make an inspection of their properties to determine their physi-

cal condition. I made two inspections: One in March, 1938 and one in May, 1939. I have prepared a report of my findings in the form of an exhibit for presentation in this case.

(At this point counsel handed to the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company—Valuation of Property—Deduction for Depreciation as of June 1, 1939, Witness P. McDonald Biddison". At the direction of the Examiner, the document was marked Exhibit No. 127 for identification.)

These findings are set forth in Exhibit 127 for identification. In general the contents of this exhibit are, first, a letter of transmittal and explanation, and following that on page 1 is a title page, on page 2 an index, beginning on page 4 is a tabulation of the condition of the respective items of property, the reproduction cost new of those classifications as determined by Mr. F. C. Hamilton in Exhibit No. 125, the amount of depreciation to be deducted from the reproduction costs new by virtue of the condition in which the property is found, and a column of present value figures which represent the remaining amounts after deduction from reproduction costs new of the amount of depreciation.

On pages 4 to 38 are included the property accounts and values as described for Natural Gas Pipeline Company of America. On pages 40 to 64, inclusive, are shown the values as described for the property classifications of Texoma Natural Gas Company. There is a relationship, so far as page numbering is concerned, between Exhibit No. 127 and Exhibit No. 125. For example, it will be found on page 4 of this Exhibit No. 127 that the items shown are the identical items shown on page 4 of Exhibit No. 125. That example illustrates generally the relationship between the arrangement in the two exhibits. That is true down to and including page 64 of Exhibit No. 127. The detailed data in Exhibit 125, pages 66 and following, provide the underlying details for weighing out the observations which I made and applying the percent condition factors. Having applied those percent condition factors to those details in pages 66 and following of Exhibit No. 125, I have produced the condition figures shown in summary form in Exhibit No. 127.

I do not mean that I applied the percent condition to all the details of the units shown on pages 66 and following in Exhibit 125, but I did apply it to such details as it was necessary to use, and the detail in Exhibit 125, pages 66 and following through to the end, are the details of the same property shown in my Exhibit No. 127.

In 1938 I began by an inspection of the equipment in the Chicago office; then went to Amarillo and made an inspection first of the equipment of Texoma Natural Gas Company in the field, the gathering system, wells, well measuring stations, and of the Fritch gasoline plant and compressor station, and followed that through on the transmission line of Texoma Natural Gas Company up to its connection with the property of Natural Gas Pipeline Company of America.

The inspection began in the Chicago office on March
957 24 and was completed at Joliet on April 4, 1938. In the 1939 inspection I started at the Amarillo end of the line on May 16, and went across the system in the same fashion, completing the inspection in the Chicago office on May 29. During the 1938 inspection, I was accompanied throughout the trip by Mr. Mark Burlingame, one of the engineers for defendants. In each division we were also accompanied by the division superintendent or the division foreman, or both. In the 1939 inspection, I was accompanied throughout the trip by Mr. Mark Burlingame, and by Mr. Johaningsmeyer, an engineer for the Federal Power Commission. We were also accompanied in the districts by the respective district superintendent or foreman, or both.

Referring to Exhibit No. 127, and in particular to pages 4 to 6, covering Account No. 1000 "Lands in fee", and pages 7 and 8, covering Account No. 1002, "Rights of Way", it will be noted that no depreciation is shown. That is due to the circumstance that these accounts cover fee lands and rights-of-way, respectively and that character of property is not depreciable.

Before starting out on each of the two inspection trips to which I have referred, I instructed the management to cause holes to be dug at approximately 5-mile intervals over the entire pipeline system allocated on the gathering system as between the various sizes generally in proportion to the mileage of the sizes. These holes were opened and were so dug that there would be six feet of pipe exposed, four feet of the exposed pipe was scraped clean of all protective coating. The bitumastic enamel was removed and the wrapper was removed so that four feet of exposed pipe could be inspected. Two feet of protective coating was allowed to remain in place so that an examination of the condition of the coating itself could be made. The holes were so dug that clearance was allowed on both sides, and underneath the pipe, so that the pipe could be examined clear around in circumference, and so that the protective coating could be examined for two feet at the end of the bare four-foot section of pipe. For the 1938 inspection there were 42 holes on the gathering system of Texoma, 15 on Texoma's main line and 168 on the pipeline of Natural Gas Pipeline Company, a total of 225 holes.

In the 1939 inspection, on my instructions holes of identical size and character were opened, except that the holes were spaced at approximately 10-mile intervals and staggered with respect to the holes dug for the 1938 inspection.

(At this point counsel handed the reporter a map entitled "Natural Gas Pipeline Company of America, Texoma Natural Gas Company Bell Holes Dug For Inspection of Pipe—Total System". At the direction of the Examiner, the document was marked Exhibit No. 128 for identification.)

In the 1939 inspection, there were 15 holes dug on Texoma's gathering system, 7 on Texoma's main line, and 83 on the lines of the Natural Gas Pipeline Company of America.

Exhibit No. 128 is a map showing the location of the inspections made of pipelines for the inspections both in 1938 and 1939. At the lefthand end of this map and divided off by vertical lines from the main portion of the map, is an enlarged map section showing the pipelines of Texoma Natural Gas Company. At a point in the southwest portion and near the southwest corner of Hutchinson County may be noted the name "Fritch". This is at a junction of a red horizontal and a red vertical line, and that junction point is at the location of the Fritch Compressor Station and Fritch Gasoline Plant. From that point there ex-
958 tends to the right a red line nearly horizontal running
out into Gray County. I am referring to the heavy red line and not to the smaller, lighter red line. This line represents the gathering system bringing gas from Gray and Carson Counties into the Fritch Gasoline and Fritch Compressor Stations. Running to the left of this same central point and extending out into Moore County is another heavy red line connected up to lighter red lines, which represents the gathering system of Texoma Natural Gas Company, bringing gas from Moore County. In other words, there are two separate gathering systems, one going to Moore County and one going to Gray and Carson Coun-

ties. The smaller red lines are branch lines off of the larger gathering trunk lines, and the smallest ones are connected to wells which are represented by stars.

The numbers in the orange circles represent numbers assigned to inspections made on this gathering system in the 1938 inspection. From the orange circles the blue lines leading down to the red lines lead to the locations on the pipelines at which the respective inspections were made. The green triangles and the lines leading from them up to the red lines indicate the location of inspections on this system made in the 1939 inspections. I may also add an explanation on this section of the map, that from the Fritch Compressor Station and Gasoline Plant running to the northeast there is shown a heavy red line with a multiple crossing of the Canadian River. This is the main transmission line of Texoma Natural Gas Company. And the red line in the right-hand section of the map from Fritch in a generally northeasterly direction to the Nebraska-Iowa line is the main pipeline of Texoma Natural Gas Company and Natural Gas Pipeline Company of America. I might point out that at the point where this pipeline crosses the Missouri River the map has been bent; that is, the line was changed so as to get this map all on one narrow strip, and that the true direction of the line east of the Missouri River would be properly delineated on this map if the map were cut in two at the Missouri River and two sides of the Missouri River brought into conjunction, to show the right angle at which the line turns at the Missouri River Crossing.

I will now take as an example of what I did when I made those inspections in 1938 and 1939, one of the green triangles leading up to either the main gathering lines or the smaller gathering lines of Texoma Natural Gas Company. We will take No. 5X which represents an inspection made in 1939. This inspection was on a 24-inch Gray County gathering line, on what is called the Gray County main line in the gathering system. The line was welded. The coating on this particular section was asphaltic. The amount of covering over the pipe—this is not the depth of the trench but the distance from the normal ground level to the top of the pipe—was 60 inches. The inspection was made at station 1170 plus 74. This station to which I refer is the survey station and is the company's field designation for a particular point in the survey. It is the engineering record of distances along the line. The location was 50 feet north of drip number C-24 W in Section 38, Block 4, I & G N Survey, Carson County, Texas. The soil was loam with caliche streaks. The coating was good, but light surface rust and light etching on top of the pipe could be seen.

By "light etching" I mean the effect of corrosion which could just barely be detected by looking at it, appearing as though it might be etching with the application of acid, or something of that sort, a very light surface attack. There were no pits and I assigned to the pipe the condition of 99 percent, and to the protective coating a condition of 70 percent.

959 We will take 25X. That point is on the line of Natural Gas Pipeline Company of America. The line is 24 inches, is a combination welded and coupled line. The protective coating was bitumastic enamel. The cover over the line was 67 inches. The location was at mile 31, station 5,088 plus 17. "Mile 31" means that it is the 31st consecutive section of land through which the line has passed. It does not mean necessarily the 31st mile. The survey station shows that it is not that. This location is in Section 23, Township 4, North, Range 22, East, Beaver County, Oklahoma. The soil was clay to caliche sand. The coating was poor from flux and soil indented with small rust stains. Light etching on pipe and very small pits. I measured the depth of these pits and found that in the first one-foot section the pit depth was 10 mills. A mill is 10/1000 of an inch. There were 4 feet of bare pipe exposed. This 4 feet was divided into four one-foot sections. Where pits were found, the procedure was to measure the pits on each of those one-foot sections and the depth of the deepest pit was recorded for the particular one-foot section. In measuring the depth of these pits I used a Moorlane pit depth gauge, an instrument designed particularly for measuring the depth of pits in pipe.

I have given a great deal of study to the relationship of the depth of pits and extent of pitting to the condition and usability of pipe. The value of pipe is affected, of course by the depth of pits and by the relation of those depths to wall thickness. It is also affected by the diameter of those pits, and by the relationship of that diameter to the circumference of the pipe. It is also affected by the distribution and frequency of pitting and by the character of the pitting, or the size of the eroded areas, if any. I know of no way to relate all those factors to produce a mathematical expression by which you may determine the condition of pipe. It is a matter of judgment in making the detailed examination as to what the condition of the pipe is. In my case, the condition of the pipe was based upon my many years' experience in that kind of work. Without that experience in such work my opinion would not be worth anything on the value of pipe that has been in service.

From my observations in the State of Oklahoma on the property of Natural Gas Pipeline Company of America I determined a condition for the pipe which applies to the fittings and the installation of 98 percent, for the protective coating 62½ per cent, for the river crossings and line walkers bridges 90 percent, and for sleeve houses and pipe racks 95 percent. Those conditions, applied to the reproduction cost new values determined by Mr. Hamilton, produce a present value figure of $1,215,481, which is 94.07 percent of the reproduction cost new figure of $1,292,094.

(Objection by counsel for the two Commissions to the qualifications of the witness to testify as to present value overruled.)

On pages 8 and 54 of Exhibit 127, in Account No. 1005, "Main Lines," for the two companies, I divided the line into States: Texas, Oklahoma, Kansas, Nebraska, and so forth. That was done because I thought a more balanced weighing out of the observations could be obtained by taking the states as units for grouping the observations and applying the results to the reproduction costs figures, than by simply averaging out the figures and applying them to the property as a whole. It was convenient to do that because the valuation itself had the property grouped by states.

960 In determining the condition percent of the main lines, I took into consideration the findings made from the examination of the pipeline at the various points shown on Exhibit 128. Going back to my examination of the hole at No. 25 X, shown on Exhibit 128, I may add that I found the pits on the four one-foot sections to arrange in depth as follows: Ten mills, ten mills, six mills and ten mills. I assigned to the pipe a condition of 97 percent and to the protecting coating a condition of 30 percent.

In my examination of the pipeline of both of these companies in 1938 and 1939, I made observations as to the depth of cover over the top of the pipe in each of the states. On the Texoma Natural Gas Company property, the average cover determined from my observations is as follows: On the 24-inch main line, 52 inches; on the 24-inch gathering line, 51 inches; on the 16-inch gathering line, 60 inches; on the 10-inch gathering line, 44 inches; on the 8-inch gathering line, 34 inches; on the 6-inch gathering line, 27 inches; on the 4-inch gathering line, 30 inches. On the 24-inch main line of Natural Gas Pipeline Company of America, I found the average cover in the State of Oklahoma, 56 inches; in Kansas, 56 inches; in Nebraska, 57 inches; in Iowa, 62 inches; and in Illinois, 63 inches. The over-all average is 59.6 inches. On lines other than 24-inch, such as lateral and river approach lines of sizes other than 24-inch main lines, I found the cover in the State of Nebraska to be 57 inches; in Iowa, 44 inches; and in Illinois, 47 inches.

The meter station mentioned on page 8 of Exhibit 27, under Kansas, is the tie-over connection between the systems of Natural Gas Pipeline Company of America and Panhandle Eastern Pipeline Company. Most of the equipment at that station is above ground and visible, and can be readily seen. I looked it over and made notations as to its condition. The property actually showed no deterioration except the quality of the paint materials on there. The allowance there is to take care of deterioration that would not be visible. Shown on page 8 are a meter station and a regulator station in Illinois. The condition of these stations is shown at 97 percent. Those are the stations at Joliet, Illinois. I examined those two plants in detail and made notations on location as to the condition of the property at those plants.

As shown on page 8, I found the average condition of the main lines of Natural Gas Pipeline Company to be 95.66 percent. In the second column, the reproduction cost new, as determined by Mr. Hamilton, was $26,558,660. Applying my percentage of depreciation, the deduction was $1,152,908, leaving a reproduction cost new, less depreciation, designated under the column "Present Value," of $25,405,752. The same explanation is true as to Account No. 1005 of Texoma shown on page 54 of the same exhibit. The items were arrived at in the same fashion.

The meter station, designated under the word "Oklahoma" on page 54, is the State line measuring station at the point where the gas delivered by Texoma Natural Gas Company to Natural Gas Pipeline Company of America is measured.

Turning to pages 9 to 23, inclusive, which show Account No. 1006, "Compressor Stations of Natural Gas Pipeline

Company of America" and to pages 55 and 56, which 961 show Account No. 1006, "Compressor Station of Texoma Natural Gas Company," I made an examination and inspection of all these compressor stations. In general, I first went into the office of each individual compressor stations. I noted the condition of the office furniture and equipment, made notations on specific items. I would then proceed to the auxiliary building, the building which houses the electric power generating equipment and the water pumping equipment, and the machine shop, the electric lighting equipment, storage battery equipment.

Station No. 2, sometimes referred to as the Perryton Compressor Station and sometimes as the Gray Compressor Station, is the second station on the system, Fritch being No. 1. The facts as to this station are set out beginning on page 9. The first line under Compressor Station No. 2 is Auxiliary Building, on which I found the condition percent to be 92.98. That percent condition is the composite result of the application of the observed condition to the reproduction cost estimate of various components of the building. As a result of my inspection of this building, I have assigned to the superstructure a condition of 95 percent; to the foundations, a condition of 95 percent; to the floors a condition of 90 percent; to the curbs a condition of 95 percent; to the stairways a condition of 95 percent; to the down-spouts and gutters, a condition of 95 percent; to sumps, a condition of 95 percent; to pipe trenches, a condition of 95 percent; to lighting, to heating, and to plumbing, a condition of 90 percent; to partitions, a condition of 95 percent. Applying those conditions to the reproduction cost figures for the specific items mentioned, I obtained a present value of $11,281, which is 92.98 percent of the reproduction cost new of $12,144. This is the same thing as a deduction for depreciation of $853.

Cross-Examination Interposed by Mr. Slaff.

I didn't assign percentages to every individual item making up the equipment classification under the terms of lighting or heating. I assigned to lighting separately a condition of 90 percent. I grouped the heating and applied to the heating group 90 percent. I grouped the plumbing, and applied to the plumbing a condition of 90 percent. I grouped the partitions and applied to them a condition of 95 percent. There are some instances, in the case of large structures, where I made specific notations further breaking down information as to superstructures, but generally the example I have given applies to the major structures. Now for small structures I did not weigh out the values in that fashion, but assigned to the individual structure an over-all condition based upon the observations. (Objections by counsel for the two Commissions to the designation of "reproduction cost new less depreciation" as "present value" overruled.)

Direct Examination Resumed by Mr. Hedrick.

Column 1 in Exhibit 127 is my work. Column 2 in this exhibit is as shown, the reproduction cost new to which Mr. Hamilton and his associates have testified in this case in connection with the presentation of Exhibit No. 125. The amount of the depreciation deducted as shown in the third column is my determination, and that determination is made by applying to reproduction cost new values, of which Mr. Hamilton's Exhibit 125, the condition which I determined by my investigations. The application of those conditions to the reproduction cost new figures produced the figures in the right-hand or fourth column under the
heading "Present Value." Throughout the entire ex-
962 hibit, the last three columns are the same as are shown
on pages bearing the same numbers in Exhibit 125,
with the exception of the title pages and the index pages. (Motion by counsel for the two Commissioners to strike testimony with respect to present value denied.)

After I made my examination of the auxiliary building referred to on page 9, my general procedure was to proceed from the auxiliary building to the main building. The main building is the largest structure at these stations, and it houses the gas engine driven compressors, that constitute the main equipment of the plants. At this building I have inspected the condition of the superstructure, the engines and their attached compressors, and the condition of the floors, the lighting systems, of the ventilating systems, if there were such; and made notations as to the condition of the various items of equipment in that structure. Then I would generally proceed to look over the cooling tower and the yard piping of the station, and generally from there to the warehouse. Most of these stations have located on the premises a warehouse for the use of the pipeline operations and maintenance crews. I would then inspect that structure and the equipment that was housed in it. Then I would generally proceed to inspect the condition of the dwelling houses, the cottages, the boarding house, and so forth, and would during the course of my examination make an inspection of the sidewalks and roads and fences and the shrubbery and lawns. I went through that general procedure at each station of the Natural Gas Pipeline Company of America and at the Fritch Station of Texoma Natural Gas Company.

At the compressor stations I made separate notations as to the individual structures and separate notations as to the condition of each of the major items of equipment. There were some minor items of equipment, of course, at each plant, on which I did not make individual notations. Little things like that in the final analysis have practically no effect upon the determination of values.

The percent condition shown in column 1 on pages 9 to 23, for Natural Gas Pipeline Company of America, and 55 and 56, for Texoma Natural Gas Company, represents my judgment of the condition percent of those various items listed. I would like to explain with reference to that volumn of conditions that the items of condition which are even percents are in general individual observations of the particular item, while those which are fractional percentages are the result of weighing out a number of observations against the reproduction cost new figures given in detail in Mr. Hamilton's Exhibit No. 125. That is not always the case, but that is the general rule as to the conditions. Where I had a composite figure such as for the main building on page 9, of 94.83 percent, and in other places where it shows odd percentage, I arrived at that composite percent in the same general manner as I testified in connection with the auxiliary building, which is shown in the first line on that page. In general, the ones where it shows an even percent are separate items where there was no composite involved. That applies all the way through Exhibit 127.

Passing to page 24, which shows Account No. 1008, the telephone system of the defendant Pipeline Company and on page 60, which shows the same account, representing the telephone system of Texoma, the term "pole lines" means the outdoor line equipment consisting of poles, guy wires, anchors, cross-arms, braces, brackets, insulators, wires, tie wires, in general the telephone lines running cross country,

as distinguished from the ringing and connecting equip-
963 ment and phones at specific locations such as compres-
sor stations and warehouses. Equipment of the kind last mentioned is designated by the term "stations" as distinguished from "pole lines."

At each one of the stations, compressor stations, and at each one of the warehouses where the equipment was located, I saw the equipment and I made notations as to its general condition. In going over the pipelines of the two companies, I had opportunity at very frequent intervals to see the pole lines, because those pole lines in general are fairly close to the pipelines. On the property of the Texoma Natural Gas Company in the Amarillo field, the telephone lines in general are along the pipe-line right-of-way, but on the system of the Natural Gas Pipeline Company of America, the telephone lines are in general along the roadways, and they may be seen and inspected in driving from one of these test hole locations to another at numerous places. So that I had an opportunity to observe the condition of telephone line equipment just about as frequently as I observed the condition of pipelines.

Mr. Johningsmeyer was generally, but not always, in a separate car during these inspections, and whether the pole line was identified to him throughout the distance there, I could not say. I know it was in some instances, but in how many I don't know.

Cross-Examination Interposed by Mr. Slaff.

In some instances, I stopped and made individual notations of individual poles and in other instances I just looked at them as I drove along. My working papers will not disclose what I did in any specific instance. They will merely disclose that I made an observation. They will show an observed condition as applied to pole lines for each location at which I made an observation. They will not show whether that observation was one which I made in transit or one which I made standing still. My work sheets will show that this observation at or near a certain pipeline survey station number, or between certain pipeline survey station numbers was made. It will show only that at some point between those two locations I inspected the telephone lines. It will not give the pole number. It will include a percent condition for the location at which I saw the pole line. My working papers will not include the percentage condition for the entire pole line between the two locations indicated on them. I saw the pole line at a specific point and the extent of that specific point may have been a couple of poles or it may have been a mile or two if I rode along. My records will not disclose. They will show that I observed that line and made a notation as to its condition. If I drove from bell hole No. 125 to hole 126 and saw the telephone line in between there, I would make a notation as to the condition of that line as I saw it between those two pipeline inspection locations. That is an over-all percentage for that two miles, or five miles, or whatever it may be. In a number of cases my observations were made as I drove along without stopping.

Direct Examination Resumed by Mr. Hedrick.

I also stopped at a great number of telephone poles and made detailed inspection of them. Whenever I saw anything of some unusual character, I stopped and made an inspection. I examined the butts of poles in a number of cases minutely to see what shape the creosoting was in and how much protection still remained.

Cross-Examination Interposed by Mr. Slaff:

964 I put down my observation as to the over-all condition which I judged that line to be in, but I did not make specific notations in my work sheets to the effect that I had stopped at a specific pole and observed conditions of the pole, of the creosoting, of the butts, the cross-arms and other specific notations.

Direct Examination Resumed by Mr. Hedrick.

In addition to actual viewing or inspecting the property myself, I took into consideration other matters in arriving at the percent condition. At each station I made an examination of the operating, maintenance and repair records. These records disclose the micrometer measurements of the various engine parts made to the annual overhaul periods and disclosed repairs made to various portions of the equipment. I examined those records and took those records into consideration in fixing the condition of the equipment at the compressor stations.

Turning to pages 25 to 29, inclusive, and page 61 of Exhibit 127, which refer to Account No. 1009 "Meters and Regulators", I visited each of the stations listed and inspected the equipment in service at those stations. As to the reserve equipment, I have not seen all of those items, but the equipment itself I have seen, and the condition assigned to the equipment in reserve is based upon the condition in which I found the equipment in service. The term "in reserve", as used here, means exchange equipment held for the purpose of changing the equipment when repairs and adjustments are required. I find almost invariably the condition percent of the meters and regulators in service is more than that in reserve, because for the equipment in reserve I have allowed for the known fact that some of it is in reserve for repair and adjustment. Consequently, those that are not in service on account of repair and adjustment, the percent condition would be lower than those in service.

Cross-Examination Interposed by Mr. Slaff.

Where the percentages are the same for equipment in service as in reserve, that merely means that I did not make the extra allowancs on that particular equipment. It simply means that I did not make an additional allowance on that equipment of adjustment. It is not necessarily true that all this equipment is out for adjustment and repair. That is true in some cases. In most cases I make such an allowance simply to allow for the possibility or necessity of repairs and adjustment on equipment that was out of service. Where I did not make the allowance it was simply because the equipment was out.

Direct Examination Resumed by Mr. Hedrick.

As I have stated, I saw all of the equipment that was in service. On that I have allowed 95 percent and the percentages which are shown in the first column. Where the equipment was in reserve on account of repairs, I generally made an allowance for the fact that it was in reserve because repairs and adjustments were in process or contemplated or probably necessary. I have not made a determination with respect to each of those items of reserve equipment, as to whether repairs were then necessary or not, but I have in general made an allowance for equipment in reserve because, in general, the equipment in reserve is out for the reason that once in a while this equipment has got to be repaired and adjusted, and some of this equipment which is in reserve is in the process of repair and adjustment.

965 I have been at the location of the structures shown for Account 1010 and shown at pages 30 to 34 and 62 and 63 of my Exhibit 127. I made notations as to the condition in which I found those structures. Many of them are meter and regulator station buildings. Some as on page 32 at the top are for other purposes. This Red Oak warehouse is a group of structures, one housing materials and equipment for the pipeline forces for repair and maintenance and the other housing equipment for the compressor station repair and maintenance work. I inspected those structures and assigned to each structure a condition based upon those observations. With respect to the structures in Account 1010 for Texoma shown on page 62 and continuing on page 63, the first item is "Meter Stations, Amarillo Field". I inspected a large number of such meter stations, both in 1938 and 1939, and determined their average condition was 95 percent. The other structures shown, the Dumas and Kingsmill warehouses, and the meter station on the main line in Oklahoma, I inspected and made notations at the site as to the condition of the items shown, except that there may be some minor items on which I did not make notations at the location.

Cross-Examination Interposed by Mr. Slaff.

With respect to meter stations of Texoma shown on page 62 as being in 95 percent condition, I examined many of the meter stations in the field and arrived at a 95 percent condition and applied that to all the meter stations in the account. My work sheets show percentages for each individual meter station that I examined. I went out and looked at the first meter station which would be shown on page 862 of Exhibit 125 and having examined it I put down a certain percent for the condition of that meter station, if I saw that particular station. Then I went to the next one and looked at it and put down another percentage, whatever it was, for that one, and so on as to all those stations that I examined.

I added up the percentages and then used the over-all figure of 95 as a round figure to represent the condition of all meter station structures in the Amarillo field. The figure that I actually came to, instead of the figure I used, was 95.2 percent. I applied 95 percent to the figure of $27,090 and arrived at the present value figure of $25,736, as shown on page 62 of Exhibit No. 127. That results in a figure of $1,354 for depreciation to be deducted, and that figure of $1,354 for depreciation to be deducted is the figure for that item of property which I furnished to Mr. Hamilton for his use. The 95.2 percent condition to which I referred a moment ago is a numerical average of my observations on meter station structures which I observed. We will assume that for the first meter station which I examined, I arrived at 90 percent condition, for the next one 97 percent, the next one 93 percent, the next one 92 percent and so on. When I was all through I added up all those percentages and divided the total by the number of meter stations I had examined.

Direct Examination Resumed by Mr. Hedrick.

The 95 percent is the average for all that I examined, I then took that average percentage and applied it to the reproduction cost new of the total. If I had applied the percentage that I found for each of the items in question to the cost of each item as determined by Mr. Hamilton and got a present value figure for each and then added all such figures together it would be exactly the same if each structure cost the same amount. I am not exactly certain that each structure did cost the same amount. This is true since from Exhibit 125, pages 862, 863 and 864, it is apparent that with some minor exceptions all these structures cost the same amount. They were so nearly
966 alike that the cost should be the same except in a few instances where the building might vary slightly from standard.

Turning now to pages 35 and 36, which show Account No. 1011, "Branch Lines to Distributors"; we will take the first one there in Barton County, a lateral, where the condition percent is 95. That refers to a branch pipeline through which deliveries are made to consumers of gas off of the main pipeline system. The percent condition which I have assigned to lateral lines is, in general, based upon the condition found by examination of the main line itself. In the State of Kansas, as may be noted on page 8 of Exhibit 127, I found that the main line was in 95.72 percent condition. I therefore assigned to the lateral line listed as the Barton County lateral a condition of 95 percent. That Glasco lateral, also in Kansas, was constructed, as I recall it, at a considerably later date than the main line itself. That is my present recollection of that. Considering the condition of the lines, that is of the main line found in this area, I have assigned to the Glasco lateral a condition of 97 percent. It is my judgment that the figure of 95 that I used for the Barton County lateral is justified from my knowledge of the conditions existing on the main line. And it is my judgment that the percent condition of the Barton County lateral is not less than 95 percent. I saw the equipment in Barton County, which constitutes the second item. It consists of some direct meters. There is no deterioration visible from an exterior inspection, except as to the condition of paint on that equipment. I have made an allowance, however, for wear and tear that would not be disclosed upon exterior inspection.

I made the same type of examination of the regulator station, shown under the caption "Glasco", as being in 95 percent condition, as I made of the meter and regulator station in Barton County. That is true as to all of the meter and regulator stations shown on pages 35 and 36.

At the various locations where the tools of Natural Gas Pipeline Company and Texoma, as listed at pages 37 and 63, under Account No. 1013, in Exhibit 127, are kept, at the compressor stations, pipeline warehouses and field warehouses, I have inspected tools and equipment. This consists of the equipment used by the pipeline and compressor station crews for maintenance and repair work. Included in this classification are portable electric lighting units, welding equipment, excavating equipment, and in general the full line of equipment required for pipeline or compressor repair and maintenance. I arrived at the percent condition of these tools and appliances from a price listing of this equipment compiled by Mr. Hamilton's organization. To a price listing of this equipment, I have applied my observations as to the condition of the equipment and have arrived, by that process, at the weighted values of condition in percent as shown on pages 37 and 63 for these classifications.

Cross-Examination Interposed by Mr. Slaff.

I had a listing of these tools and equipment. For the major items, I had specific observations as to their condition. This equipment was priced by Mr. Hamilton's organization at its reproduction cost new. I applied specific observations to those specific items of major equipment. The small hand tools I lumped together.

967 *Direct Examination Resumed by Mr. Hedrick.*

Included within the classification of tools and appliances in this particular item are wrenches, tongs, excavating equipment, welding equipment, and water pumps.

Cross-Examination Interposed by Mr. Slaff.

To the small tools I applied the percentage independently, based upon the general observation as to the condition of small tools. For the major items of equipment I applied specific observations. Those are all weighted out, and from the weighting out I arrived at the overall condition of each group. I applied the same procedure to each one of those three groups of tools. I have, as the result, a different percent condition for each of the three groups.

On page 542 of Exhibit No. 125 are listed tools and appliances in the State of Kansas at three locations. Bloom compressor station, Glasco compressor station, and Heizer compressor station. Of the amount at the Bloom compressor station of $6,483, $2,418 represents equipment, acquired in 1938 and 1939, consisting largely of caterpillar tractors, water pumps, portable electric lighting plants, and similar equipment. To that equipment I have applied an over-all figure of 97 percent, resulting in a deduction of $73 from reproduction cost new. To the balance of the reproduction cost new of that equipment I have applied 75 percent against $4,065, resulting in a deduction for depreciation of $1,016. This is a total deduction for depreciation against that equipment of $1,089. Now to develop the 75 percent figure, I will have to get back further into other detail sheets. For Glasco station in similar fashion, of the total amount shown on page 542 of Exhibit 125 of $7,042, $2,967 was recently acquired equipment, to which I have assigned a condition of 97 per cent, resulting a deduction of $89. To the balance of $4,075 I applied a condition of 80 percent, resulting in a deduction of $815. For Heizer station, of the total amount shown on page 542 of Exhibit 125, of $13,053, $6,615 was recently acquired equipment, to which I have assigned a condition of 97 percent, resulting in a deduction for depreciation of $198. The balance of the equipment in the amount of $6,438 reproduction cost new has been assigned a condition of 70 percent, resulting in a deduction of $1,931. The total of those deductions for depreciation of tools and appliances in Account 1013 in the State of Kansas is $4,122.

Direct Examination Resumed by Mr. Hedrick.

Referring to pages 37 and 63, showing Account 1014, "General Laboratory Equipment of Natural Gas Pipeline Company of America, and Texoma Natural Gas Company", this equipment includes equipment at the Joliet, Illinois meter station and regular station used for the testing of natural gas and for testing and calibration of measuring instruments. It consists of thermometers, gauges, calorimeters, chemical balances, specific gravity apparatus, gas analysis apparatus, and, in general, equipment of that nature.

I inspected the equipment at location and made specific notes as to the condition of the major items and have weighed those observations out against the prices to Mr.
Hamilton's figures of reproduction cost. I did this
968 generally in the same way as I did in the case of other
miscellaneous equipment concerning which I testified. I arrived at the figure of 93 percent as a result of that weighting out.

It was a mathematical process of multiplying values by observed conditions. This 93 percent results from the application, for example, to the "apparatus for determination of deviation from Boyle's law" of a figure of observed condition. I applied that condition to the value of the equipment, as fixed by Mr. Hamilton in his sheet for reproduction cost.

Taking other items of equipment in the same fashion, I applied to the values shown in the reproduction cost estimate the figures of condition which I observed, and added both columns, reproduction cost figures and the resultant figures derived by the application of the percent figures, and the ratio of those two sums produces the weighted condition, which in this case would be 93 plus or minus. I have rounded it out at 93 percent. (Motion to strike witness' answer by counsel for Illinois Commerce Commission denied.)

The general laboratory equipment of Texoma, shown at page 63, Account 1014, is of the same character in part as the equipment in the laboratory at Joliet. In addition it contains equipment for the testing of petroleum products. This latter equipment is locted at the gasoline plant at Fritch. I arrived at the percent condition of 90 shown on page 63 just as I arrived at the percent condition of equipment shown on page 37.

Account No. 1015, "Automotive and Transportation Equipment," includes automobiles, trucks, tractors, and trailers. The percent condition assigned to this equipment was arrived at from a consideration of the mileage which the various pieces of equipment had recorded up to June 1, 1939. I gave consideration to the fact that cars used by Texoma were largely used in the Panhandle field, where roads were poor, or non-existent, and where the effect of mileage upon the condition of that class of equipment is greater than is the same amount of mileage upon cars used further north on this system where roads are better. There is not nearly so much dust on the north end of the line as on the the south end. The dust condition tapers down to almost nothing as you proceed northward. I took that factor into consideration in arriving at the percent condition of this equipment. In arriving at the percent condition of automobiles, I estimated that an automobile in the field system of Texoma which had traveled 25,000 miles to be depreciated approximately one-third. An automobile with the same mileage on the system of Natural Gas Pipeline Company of America, I estimated had depreciated approximately 25 percent. The company records were available to me so that I could determine the mileage on this transportation and automobile equipment. I have seen trucks that had more than 50,000 miles on them, and I think I have some observations on cars that have exceeded that.

Cross-Examination Interposed by Mr. Slaff.

969 If I had a car which showed exactly 25,000 miles of mileage I would give it a percent condition of 66.66. In applying the conditions I took into consideration the mileage on the basis I have explained but have used them all as event percentages without fractions. If it was 12,500 miles, I used half of 33⅓ percent or 16⅔ percent. The basis upon which I arrived at the relationship between mileage and percent condition was that in general the cars on the Texoma system can be exchanged on the basis of a full life rating of 75,000 miles, and on the Natural Gas Pipeline Company of America system they can be exchanged on the basis of a full life of 100,000 miles. That is, if they had about 50,000 miles they can be turned in at approximately 50 percent of cost.

Direct Examination Resumed by Mr. Hedricks

Account No. 1016 for Natural Gas Pipeline Company consists of the office furniture and fixtures, calculating machines, typewriters, and so forth, at the compressor stations and at the warehouses on the pipeline sysiem. In the State of Illinois, the same class of equipment is found at the Joliet meter and regulator station and in the Chicago office. I arrived at the percent condition of that office equipment, furniture and fixtures, by weighing my observations against the reproduction cost new of Mr. Hamilton in the same manner I have described for other equipment where different classes of equipment were carried under the same Account number. The resultant figures have been rounded off to even percentages. In the case of Texoma that equipment shown of page 64 consists of the furniture and fixtures at the Fritch gasoline plant, Fritch compressor station, the Dumas warehouse, Kingsmill warehouse, and at the operating office of the company in Amarillo. I inspected the equipment in each one of these locations, in each office, and upon my first inspection when I did not have available any inventory. I listed the equipment as I inspected it. Upon the second inspection, I had that listing available and went over it again. Now I have seen, I think, every bit of this equipment; except a few minor and unimportant items that I may have overlooked in going through the various offices.

I did not see all of the wells of Texoma Natural Gas Company. I really do not know how many I saw. I made specific notations as to 41 but I saw a great many other wells on which I did not make specific notations. There were probably 25 of these additional wells. I actually saw all of the wells on which I made notations. The company records as to all of these wells were made available to me. These records show the equipment in the well, its age and the work that has been done upon it. So far as an examination of these wells is concerned, very little deterioration is disclosed. Of course, in an examination of the well from the surface, only the top fittings are visible. If a well is in very bad shape that can sometimes be detected by leakage showing up at the surface. Nothing of that sort was visible in connection with any wells which I saw. I have determined the amount to be deducted for depreciation for these wells on the basis of age of wells.

To wells drilled in 1938 and 1939 I have assigned a condition of 100 percent. To wells drilled in 1936 and 1937 I have assigned the condition of 98 percent. To wells in 1934 and 1935, I have assigned the condition of 96 percent. To wells drilled in the years 1930 to 1933, inclusive, I have assigned the condition of 95 percent. To wells drilled prior to 1930, I have assigned the condition of 92½ percent, 970 with the exception of a few very old wells drilled about 1926 and 1927, to which I have assigned a somewhat lower percent condition, and with the exception of a group of wells in Gray and Carson Counties connected to lines other than those of Texoma Natural Gas Company to which I have assigned the condition of 50 percent. This latter assignment is based upon information which has been made available to me as to the condition of those wells below ground. There are four of those wells: G. H. Saunders, Nos. 6, 10, 12, and 13, which fall under this 50 percent classification. There are others, the M. A. Shaw well, and another is the McLarty-Lester "B" well No. 3. Based on my experience and the information which I obtained concerning these wells, it is my judgment that the percent condition of each of these wells is as is set out on pages 41 to 54 of my exhibit.

Account No. 1007, beginning on page 57, shows the equipment in the gasoline plant at Fritch. I have made two inspections of this gasoline plant, the equipment of which is listed in Exhibit 127 under Account 1007. Upon each of these inspections I have noted the condition of the various items of equipment and have applied those observations against the cost of reproduction new provided by Mr. Hamilton. In the case of major structures, such as, for example, the boiler house on page 57, the figure of percent condition of 94.31 is a weighted figure, arrived at by multiplying my observations to component parts of this structure to arrive at the overall condition. The majority, however, of the figures in this column of condition percent under this classification are direct observations of the overall condition of the items to which they are applied. I have applied separate observations as to conditions to the following divisions of the reproduction cost estimate of Mr. Hamilton for this structure: The superstructure, the foundations, the floors, the stairways, down-spouts and gutters, lighting, plumbing, partitions, ventilators. Those divisions of that building will be found in Exhibit 125 on pages 797 and 798.

Account 1012 shows a list of the drilling and clean-out tools of Texoma. I saw some of this equipment at the Dumas warehouse and some at Kingsmill warehouse. I saw some of it in use upon a well. My observation of this equipment indicates that it had lost about 30 percent of its value, so I assigned to it a condition of 70 percent overall. I did not go into any specific detail as to individual items of tools. I simply assigned an overall condition to this group of equipment.

At page 64, Account No. 1024, appears a list of the booster station equipment of Texoma. That is the small 40 horsepower unit about which other witnesses have testified. It was practically new and just broken in on June 1, 1939, and I assigned to it and the miscellaneous equipment, piping, and the building at that station, a 100 percent condition.

From my experience in the natural gas business, and in conducting investigations to determine the condition of natural gas properties about which I have testified, and from my inspection of these properties and from the original records and information with which I have been supplied, it is my judgment that the percent condition for each of the items listed in Exhibit 127 is as set out opposite each one of these items. And it is my judgment that the depreciation which should be deducted from reproduction cost new, is

the amount set out opposite each one of those items
971 and shown in the third column in Exhibit No. 127. I
furnished the figures shown in the third column of Exhibit 127 to Mr. F. C. Hamilton and men working under him for the preparation of Exhibit 125, and they have used those figures in the last two-named exhibits.

Cross-Examination Interposed by Mr. Slaff.

I have checked each figure in Exhibit 125, on each one of the pages in which my figures, developed and shown in Exhibit 127, are used. The figures under the column "Depreciation Deducted" in Exhibit 127 were furnished to Mr. Hamilton and his organization and were used by them in their Exhibit 125. I have verified that they so used them by checking them myself or having my organization check them.

Direct Examination Resumed by Mr. Hedrick.

I may say that with respect to lands and rights-of-way, there being no deductions, I furnished them the zero figures which Mr. Hamilton used for that zero deduction.

My examination showed that the program of maintenance and operation of this natuarl gas system had kept it in a better state of preservation, in a better of state of maintenance, than any other system with which I ever had any experience. The facilities for accomplishing this have been so carefully thought out and provided for in advance, and the standards have been set so high, that the results are very unusual in comparison with what you find even in the best of other pipeline systems of which I have knowledge, and I am familiar with most of the major gas pipeline systems of this country.

(At this point Exhibit No. 128, the map showing the location of the holes at which the pipeline was inspected, was offered in evidence and received without objection.)

I have checked that exhibit against the actual facts. It was prepared at my direction, has been approved, and it bears my signature in the lower right hand corner of the map.

Cross-Examination by Mr. Booth.

My work has had to do with determining the amount which should be deducted from the reproduction cost new on account of the existing depreciation which I found in the property, shown in my Exhibit 127. This exhibit does not embrace all of the property of these two companies. It does not show the leaseholds and it does not show the undistributed or general construction costs. I made a study of what purported to be the original cost of the companies' property. I made no investigation of their records however to determine the original cost. I had nothing to do with the preparation of Exhibit 125 other than to submit to Mr. Hamilton and his associates the amounts which I determined to represent the existing depreciation, as I have already testified. I had nothing whatever to do with the determination of the reproduction cost new of these companies' properties.

972 Mr. Hamilton and his associates had nothing to do with the preparation of Exhibit 127 other than to supply me with the figures of reproduction cost from his Exhibit 125, with the exception that some of Mr. Hamilton's employees did perform some of the mechanical operations of multiplication, addition and division for me. (Motion to strike witness' testimony and portions of Exhibit 127 by counsel for the two Commissions denied.)

EXHIBIT NO. 127 was offered and received in evidence over objections of counsel for each of the two Commissions, to whom the Examiner granted exceptions. (Objection to Exhibit 125 by counsel for the two Commissions overruled.)

SEPTEMBER 6, 1939

(Exhibit No. 126 for indentification, withdrawn by counsel for defendants.

EXHIBIT NO. 124 for indentification, received in evidence without objection.

EXHIBIT NO. 125 for identification, except the two items captioned "Lands in Fee" and "Rights of Way," offered and received in evidence over objections of counsel for each of the two Commissions, to whom the Examiner granted exceptions. The ruling as to the two above-mentioned items of the exhibit was reserved pending further testimony.)

P.V. 167 46925 S.C.

VOLUME III.

TRANSCRIPT OF RECORD

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1941

No. 265

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, PETITIONERS

vs.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY

No. 268

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, PETITIONERS

vs.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT

Petitions for certiorari filed July 12, 1941, July 14, 1941

Certiorari granted October 13, 1941

IN THE

United States Circuit Court of Appeals
For the Seventh Circuit

No. 7454

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND TEXOMA NATURAL GAS COMPANY,
Petitioners,

vs.

FEDERAL POWER COMMISSION AND ILLINOIS
COMMERCE COMMISSION,
Respondents.

Petition for Review of Interim Order of the Federal
Power Commission.

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973 FLOYD C. BROWN, recalled by defendants, testified as follows:

Direct Examination by Mr. Morgan.

(September 6, 1939.)

I am Vice President and General Manager of defendants and have testified heretofore in this case. In the month of May, 1930, I was made Vice President and General Manager of Continental Construction Corporation, predecessor of defendants and was placed in general charge of the construction of the pipeline. I continued in that position through the construction period and have held the same position throughout the period of defendants' operations.

The first major problem confronting me, before any of the design, engineering, or even the office work could be undertaken, was the necessity of assembling an organization. The office staff had to be supplemented by construction engineers and field forces to supervise the construction work. In going about the assembling of the organization, I was offered the privilege by the participating companies of going into their engineering and operating forces and selecting therefrom, either on a temporary or permanent basis, such of their men as I felt would be qualified to undertake positions of responsibility with the new company.

I did not have an intimate knowledge and acquaintanceship of the men, their training or their experience, who were associated with the other participating companies that I had of the men with whom I had been associated in the Empire and Cities Service Companies, so I naturally turned to the latter group of people with whom I had been associated, for the selection of executives, sub-executives and other men who were to occupy positions of responsibility with this new company. I had been with the Empire Companies for approximately 13 years and had what I feel was an important part in the building of that organization during that period of time. A number of the important men in that organization were brought to that company through my efforts; and I had had considerable to do with the training and development of those men, having that intimate knowledge of their technical training and their experience and knowing the degree of responsibility that could be placed upon them. I had the advantage of being able to hand-pick men who were capable of undertaking, with a minimum of supervision, important responsibilities to be imposed by this new project.

You have asked me a question which, as I understand it, divides itself into two parts, first, as to how I went about selecting men, and, second, the purpose I had in mind in selecting and building up the organization. In response to the latter question, I would say that of course it was of primary importance that we select the men who had the greatest experience and training, qualifying them to undertake the responsibilities in connection with the design and selection of material, testing the material and assembling of material for the construction and inspection of the line. We were employing new engineering principles so we had to draw upon that talent which would give us the greatest degree of security in the selection of men, having in mind the objectives toward which we were aiming. We also had in mind in the selection of these men, the need for picking men who were not only qualified to undertake the engineering and construction responsibilities, but also men who would be fitted by training, experience and temperament to undertake or take over the operating responsibilities when the line was finished.

974 We knew from experience of other lines that the men who construct the line, who are familiar with every valve fitting, every foot of pipe, and with the peculiarities encountered in construction, are the men who are best qualified to operate these facilities when the construction work is completed. So, we had an eye looking toward the selection of men qualified not only as construction engineers but as operators, in order that we might pass through that transition state from construction, completion of construction, to the operation of tuning up the line and putting it into operating service.

There is difficulty involved in the selection from the whole engineering profession of the right men to do the particular jobs in connection with the construction and operation of a pipeline system such as this. It is hard to explain without going into minute detail why any good construction engineer might not be thoroughly capable without prior experience of building a satisfactory pipeline. That, however is not true. Good engineers are not difficult to find and it is not difficult to employ good engineers. It is hard however to find good construction engineers experienced in the technique of properly designing and laying pipelines; and that difficulty increases as the diameter of the pipeline increases, and as you commence to inject new and untried theories into the design of a transmission facility such as we undertook in this pipeline.

In assembling our organization, we tried to take into account all those elements and factors and to meet the needs of our company by the selection of the right man and assigning him to the proper position.

The plan we followed worked out surprisingly well. As we neared completion of the construction work in the fall of 1931, we started dividing the responsibility of our supervisory and executive staff in both the field and the office. The change-over did not come about over night. It wasn't anything that took place suddenly or that was not contemplated. We had very definitely in mind how the operating organization should shape up; and we started transferring the responsibility of the men gradually from construction to operation as we neared completion of the line and progressively we started moving gas through the line; first for a purging, and then for a testing of the line itself. As the gas moved progressively up the line, we had it available for testing the engines and tuning them up, putting them on performance tests so that these men who had done the assembling of the machinery and who were familiar with every nut and bolt that went into the assembly were the men then who were best qualified to undertake the tests and finally take over the operations.

They passed through that period there of tuning up not only the machinery but the line itself, taking care of leaks, settling of the backfill and rocking the river crossings. Gas finally was moved into Chicago for a sort of tuning up on a temporary basis of the Chicago District Pipeline Company's equipment. In the beginning, we only put one station in operation until we could start building up the load putting on more stations and engines, so that these men had an opportunity gradually to work from construction over into operation. Now it was about the middle of 1932 before we had fully completed all construction; but we arbitrarily set as the date for terminating the construction as a matter of accounting, the calendar date of January 1, 1932 and fixed that date as marking the termination of construction and the starting of operations, although many of the
975 men and a good part of the organization continued to give decreasing percentages of their time to construction and increasing percentages of their time to operation

until the construction was finally completed. We did not have to go on the outside to bring in operating men to man the organization. We passed from the construction organization into an operating organization with all the knowledge and familiarity that the organization had acquired during the construction period, just as we had planned to do.

I do not mean to convey the impression that I myself selected every man for the construction organization. Obviously, that would not be good organization as I view it and I doubt that my knowledge of the type of men best qualified for many of the routine field jobs would be as good as that of some other men who had more intimate contact in The Empire organization with men of that type.

So what I attempted to do was to concern myself primarily with the selection of the executives, the sub-executives and the staff who were to be engaged in supervisory work. I did not however cease to have an interest in these other men, but having satisfied myself with the selection of the staff men, I then attempted to outline to them what I felt to be my responsibility and the company's objectives and policies and tried to instill in them a sense of responsibility that I expected to repose in them. That is, I wanted them in turn to accept the responsibility of selecting the men who were to work under them to whom they expected to assign other responsibilities and that was progressively carried clear on through the organization.

As an example, I think with possibly one or two exceptions, I did not personally select the superintendents for the compressor stations. I did know every man selected, however, knew of his training, of his qualifications and experience and I had a judgment as to whether that man would be qualified or not; but in the selection of those men, as far as possible, I leaned towards the recommendations of the compressor station superintendent in Chicago who was to have charge of those men and tried to delegate as far as possible, or make him feel that responsibility as far as possible by letting him select his own men. There were disagreements and there were differences of opinion, but in very few instances was it necessary for me to veto the recommendations of that man.

Now the same thing applied to the pipeline division, telephone division and the production department. Having selected the head of each one of our operating departments, field and office, I then tried to delegate to the man selected the responsibility of picking his key men. You can see therefore that I did not mean to convey the impression that I had selected the 500 men who form our operating company.

As a matter of fact, the work of building this organization was done primarily by me, then by the members of my staff, and then in turn by the members of their respective staffs clear on down through the organization, so that the time of a number of us was devoted to the selection of the organization. At this point, I want to say in order that the record may reflect the fact, that the key men, the staff men in the organization, were as much responsible for the success attained by these companies as any success I might be claiming here for the picking of this organization of which I think so highly.

976 As an example of the way we work, since we last met in Chicago, one of our station superintendents, the superintendent of number 3, died very suddenly. That immediately called for the replacement of that superintendent, either by a man immediately under him at the station or the transfer of a man within the company from wherever we felt that we might have that qualified man available. If he is not within the company, we have got to go on the outside. It is seldom that we ever—and I do not recall a single instance where we ever have—go on the outside to pick a man for an important position, as important a position as a station superintendent. Those men are trained from within the organization.

When this superintendent died, we immediately considered the list of men which we have and which we are constantly considering, the men who are available for promotion into other positions. Mr. Kesinger, Mr. G. M. Davidson, Mr. Walt Davidson, and I reviewed the list. They first conferred and decided upon their recommendation as to who was to fill that vacancy. That man was considered and agreed upon. We then considered who would fill the vacancy created by the promotion of that man. Well, progressively, before we got through, the result was that about 5 men were advanced within the company. We try to build and train for advancement our own men, not only because we feel that it has certain incentive value, so that these men may know that they are in line for promotion but these men have been definitely viewed for a period of months or even years and are considered to be second or third string men in line for promotion to positions of responsibility. In the meantime, we have seen to it that they are acquainted with the responsibilities which they are to assume when that date of promotion comes. While it is not easy to overcome the loss of a man of that capacity, we nevertheless are trying to follow an organization procedure which will enable us to build and take care of emergencies such as that when they arise.

In a system of this character involving the dangers and the technical difficulties that are involved in the operation of a business like that of this pipeline system, all positions are responsible positions. The degree of responsibility may be relative, and we may be inclined in our routine discussions, to speak of our supervisory staff as being the men of responsibility in our company. It is true we like at least to feel that we occupy some position of responsibility in the company. Yet, we are not unconscious or unmindful of the responsible position played by practically every man in the company, whether he is charge of 10 men or whether he is responsible for only his own efforts.

Take a pipeline welder, engaged in work typical of the work we are now doing, where we are welding sleeves over these rubber couplings. These men are welding a heavy plate of steel, a drop forging, to the pipeline while the pipeline is in operation. This pipeline carries pressures up to 710 pounds per square inch, with a daily flowing capacity of 210,000,000 cubic feet per day, and is continued in operation while this welder is raising the wall of the pipe to a fusing heat to weld the sleeve to the pipeline. That is not work that we can entrust to an ordinary welder or that the average welder can do without the most careful training, observation and experience as a welder's helper. When we are raising a pipeline under 710 pounds pressure to a fusing heat to weld a sleeve to it and keep the pipeline in operation, we are playing with something that is more dangerous than dynamite. 977 Yet, that is an every day operation that we are performing. It is also performed frequently where leaks occur. Not only is this a part of our operation in this construction program of welding sleeves through flood valleys to try and reinforce the line, but that is typical of the type of man that I say occupies a responsible position with this company. It requires not only training but it requires experience—experience that is not attained on the average pipeline— This organization has to have men thoroughly acquainted with the hazards of operating at these pressures. The improper closing of valves, closing them in the wrong order of sequence, when we are working on shut-outs, and so forth could cause the explosion of the line or an explosion in the station, endangering the property of the defendants and the lives of many people.

These men can not be picked up from the outside. We can get good gas men, yes; but we can't get men who have received the training and experience that this organization has had from the date the pipeline was started, through the some 9 years of its operation. These men are not just ordinary men. When we have a shut-out or an emergency arises as a result of a break in the pipeline and air gets into the pipeline, extreme care must be exercised to see that the air is excluded and that the line is thoroughly purged of air before it is placed back in operation. If this air is allowed to become locked up in the pipeline with the gas when the repair is made, we then carry an explosive mixture which may let go in one of the compressor stations or in the home of one of the consumers. We are dealing with a dangerous commodity and we are dealing with pressures and facilities here which do not occur in the ordinary natural gas pipeline transmission system.

I have already spoken briefly of the way in which we attempt to keep in mind promotion of our men and the training of these men through progressive steps. We try to ascertain or determine from the traits shown by a man and his apitude for the type of work whether he is best suited for the office or for field duty, whether he seems to have more apitude and a greater possibility with the pipeline department or whether he is of that mechanical type that would prove more efficient around the compressor station. Having ear-marked these men, we try to put them in a line of training progression, so that they are fitted for these positions when vacancies occur and we like to think of them as second and third-string men. They might even be serving as assistants, or they may not bear any title but are under the scrutiny and close observation of our supervisory staff. It is not infrequent that we will get together with our field and office supervisory staff and talk over the qualifications of these men, how they are coming along and whether they are ready for promotion when vacancies occur.

There are two channels through which we get men into the organization in the first place. I do not mean to convey the impression that every man we have is a technically trained man and yet I doubt that there is an organization along the natural gas transmission system which so thoroughly stresses the importance of employing technically trained men and insisting upon technically trained men occupying supervisory positions as have these companies. I am intimately acquainted with the top executives of practically every natural gas pipeline company operating in the United States today. I have supplied to those companies a good many men from my organization when I was with the Empire Companies. Some of my men were attracted to some of those companies since that time through larger salaries or promotions which I could not give them in my own organization. I know 978 the field men and the office men in those other companies. It is not hearsay. In addition to that, I have had occasion many times to talk with the top executives in these other companies as to the type of men that they are employing, the type of men that they are training, their training methods, where they secure their new material, and have been frequently requested to explain to them how we go about securing our graduate engineers and training them for these positions of responsibility. Our men have attracted attention throughout these other organizations because of the methods we have employed. They are not employing those same types of training methods. These exchanges are not purely casual. Quite often they become a matter of a roundtable conference at our Natural Gas Conferences each year. We have two of those. There is a general session to the fall and one in the spring. The spring conference is confined to natural gas activities; the fall conference to both natural and artificial gas. We make a systematic effort to find out what the other companies are doing in the matter of training their own personnel in order that we may take advantage of whatever improvements they make. (Objection of Commission's Counsel to entire line of questioning overruled.)

We select our new material as far as possible from the engineering graduates of schools bearing good engineering reputations and these men are brought into the company. We take in a new group each year. It may be only a few men, it may be a larger number, depending upon our needs. These men are selected carefully and brought in each year, but I think it is not necessary to go into detail for as I recall this question of training junior engineers has been discussed in the past. They are placed in a training course with the company and this course extends for a period of two years. After having had a foundation of engineering and two years of schooling in the intricacies of the companies' operations in field and office, they are then in a position to take positions of responsibility and to progressively work up through to supervisory positions as vacancies occur.

We have in our organization occupying staff positions men who have been through this type of training known as the junior engineering course. If for any reason we were to lose our organization and were confronted with assembling another organization to take over the operation of this plant in the period of 30, or 60, or 90 days, we would have to shut down the pipeline. I do not think that there is any reasonable probability of the company losing either 500 men or 50 of its most important men today and being required to replace them in 30 days. (Motion to strike the witness' testimony by counsel for the two Commissions denied.) We could not possibly man this pipeline with new men whether they be routine laborers or operators or executives in 90 days and put it in operation again. We could carry some gas and we could start limping along in operation; but we are dealing with high pressures, with mechanical facilities extending over 900 miles here. The very lack of knowledge of the facilities themselves would prevent inexperienced natural gas operators from putting this system into effective operation in 90 days. It would demoralize the whole organization. It would not take months but years to really qualify these men to become efficient in the handling of the company's facilities and its properties. Our men have grown up with this company and much of their value is attributable to their experience and knowledge that they have acquired in the operation of this company's properties. These field men know every foot of the pipeline. They know the treacherous and dangerous conditions, where they are and where they have to be watched for, the areas where, after a heavy rain, the maintenance staff immediately has to go out and patrol the line to take care of wash-outs and backfill the line where the cover has been washed off. The areas through

Iowa are particularly bad in this respect. We have other areas that we know are subject to flood and where 979 other types of danger make it necessary for the men, through their experience gained over years, to get out onto these properties and to get out quickly. These men have acquired that knowledge in the past 9 years. They know the farmers, the farmers' phone numbers and they know in the event of an emergency they can get in touch with the farmers and muster forces of an additional 100 or 200 men that we can not keep on our payroll to take care of the emergency when it arises. They know the public supervisors and have established contacts which enable them to obtain the road equipment, the trucks and so forth, and that is available to us only through knowledge and experience gained over this period of years. A new staff could not come in and take over the property and do all these things.

The same thing is true in the office. Our office staff knows the companies' history, contracts, their negotiating problems and litigation. It would be impossible to move in a staff of men who could come in and take over the books and affairs of the company who are not experienced with the history of the company. So part of the value of our men has been gained through long years of experience and knowledge acquired through those years of the companies' affairs. (Objection by Commission counsel to Examiner's ruling as to time within which to complete corrections to transcript, and objection by counsel for Illinois Commerce Commission to the number and character of corrections submitted by Company counsel.) I do not think that I would want to undertake the responsibility of assembling an organization of the character of our present organization and report to the owners of the company that it could be accomplished without a cost of ~~$200,000 or $300,000~~. It would mean a substantial reduction in the operating capacity and the efficiency with which the facilities could be handled. The facilities would be manned with men inexperienced in the companies' properties and it would mean the elimination of operation with experienced men and pursuing a cut and try process of drawing a man here and there until the right men had been found. Now this is always expensive. The turn-over of any organization is expensive and there is always the danger of serious accident and damage. I would say it would cost a very substantial sum of mony. (Objection by Commission Counsel overruled.)

At this point, counsel handed to the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company—Personal Data." At the Examiner's direction, the document was marked Exhibit 129 for identification.)

I have before me a copy of Exhibit 129 for identification. That document contains a skeletonized personnel record of a number of the top executives and the supervisory staff of these two companies. Let us take page 1 and analyze it very briefly. We set out in line 1 the name of the man, the position he occupies, his age, education, that is the field in which he was educated, the time which he has been with the company, the experience in the present line or with this character of work. The facts dealing with experience are broken into three parts, showing the position, the employer, and time of employment. It also shows the different positions he occupied at subsequent dates; the term "employer" covers all of the companies down to and including his present employment and the length of time with each employer is set out in the last column. It will be noted that with few exceptions, the men composing our organization are below the age of 50 years, although they have had the experience set out in this exhibit. In my judgment, there is an advantage of a substantial character in having an organization manned with young men who are conversant with their duties. These men with their technical training and years of experience and who have not acquired
980 in the majority of cases an age of 50 years have many years of usefulness before they reach a retirement age, so that the company will continue to enjoy the advantage of their mature judgment, experience, and long association with the company.

This list does not show all of the men who can be classified as executives and staff men. It is extremely difficult in the preparation of a list of this character to know just where to stop. We reach a point where we are trying to terminate the list and the next man below is just as important as the last man included and yet we have to stop somewhere, otherwise, we would list almost the entire personnel of the organization. I did not realize until I was looking over the list last evening that the name of our chief accountant, Roy Miller, who is to appear as a witness this week had been left out. Yet he is equally as important in this organization as any man on the list. Some of these men are the same men who have testified as witnesses in this case and others will appear as witnesses. (Objections by counsel for the two commissions overruled.)

In my judgment, the fact that we have an organization selected, trained and assigned as to its members to the particular positions which they occupy clear through the entire organization gives an added value to the properties of these companies over what they would have if we merely had the physical properties and had no such trained organization but had the task of training the organization before us.

Cross-Examination by Mr. Booth.

I have been in direct charge of the operations of these companies practically from their formation. I have been responsible for the operation of these organizations. The companies have a president. He sits as the Chairman of the Board of Directors but as to the operating problems, the day to day operating problems of the companies, I decide them. I do not think I could say offhand what policies he personally decides. Matters that are not decided by the organization in Chicago are usually passed upon by the board of directors rather than by the president acting alone. The president of the companies does not draw a salary from either of the companaies. Ordinarily in any organization it is not the president of the organization who decides its principal day-by-day important operating problems. I have testified that I have a good deal of experience and know the operations of other natural gas pipeline companies, and that I was acquainted with the officials of those other companies. I have not attempted, in my testimony, to state what the functions of the officers of those other companies might be. The function of the president of a corporation varies a great deal in different companies. In some companies the president, because of the nature of his training and experience, will confine himself to the financial and corporate side of the business. He may have and often does have a vice president and general manager who is an engineer and trained by experience for operations and the president will delegate to him the operating responsibilities. In other instances, the president may be the operating man and he may fortify himself, or supplement himself, with perhaps an attorney or with a man who is acquainted with the corporate, legal and other side of the business. I do not think the duties of the president of these companies have ever been outlined by the board of directors. As I have said, his function to a very large extent is to sit as the chairman of the board of directors, when matters which are of sufficient importance to take to the board of directors are under consideration.

These companies maintain a retirement plan which we recently instituted. I think it was as of September 1, 1938. This grew out of a composite effort engaged in by the secretary of the company, the tax counsel, the chief engineer and the general superintendent. I had something to do with trying to help formulate a policy which would be applicable to the needs of the company. I am not prepared to say why this plan was not put into effect in 1933.
981 Writing of retirement plans was not actively engaged in in 1933. I think that the efforts of the government in trying to provide retirement plans has stimulated the interest of corporations with the result that there has been an epidemic, if I might so term it, of retirement plans and methods by corporations in all lines within the last two or three years. We were fortunate in the writing of our plan in having available the many, many plans of different corporations which had been written within the last two or three years. The interest of our employes was stimulated. There was a clamor, a demand, for this type of protection. It is no different than group insurance. It is a plan which the companies have all felt had certain definite tangible value in helping to maintain a satisfied group of employes.

It is true that the companies up to December 31, 1938 paid approximately $9,000,000 in dividends on their common stock and during that same period they set aside only approximately $30,000 for a retirement plan to take care of its employes. None of the expenditures of the two companies in connection with the training of the employes was charged to capital account. These expenses were charged to operating expenses. These companies laid out no money for the training and experience of their men obtained prior to the time they became employes of the two companies.

(At this point EXHIBIT 129 was offered and received in evidence without objection.)

982 J. A. EMERY, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(September 6, 1939.)

My name is J. A. Emery. I live in Montclair, New Jersey. My place of business is in New York City. I am senior vice president and member of the executive committee of Ford, Bacon & Davis, Incorporated, an engineering firm. This firm was established in 1894 and conducts all classes of engineering.

I received my technical education at the Massachusetts Institute of Technology in civil engineering. For several years after leaving college, I was engaged in engineering design and management of construction principally for electric railways and railroads. I began my connection with Ford, Bacon & Davis, Inc. in 1898.

Our firm is engaged in engineering of all descriptions, including surveys and reports, design, supervision and inspection of construction, management of construction, contracting, financing, valuation, and purchase and sale of properties for both public utilities and industrial concerns. I should have included also the operation of business enterprises including natural gas companies in the operation of which they have engaged rather extensively. They have appraised all kinds of properties, railroads, electric railways, electric light companies, gas properties both artificial and natural, industrial properties, and commercial properties. These valuations have had to do with intangible as well as tangible properties.

The connection of my firm with the natural gas business began to the best of my recollection in 1907 when they made an extensive examination of the natural gas properties owned by the Philadelphia Company which operates in Pittsburg and in the vicinity of Pittsburg. These natural gas properties included production properties in Western Pennsylvania and West Virginia, together with transmission lines. The report was made for a syndicate who were considering the purchase of the company. They afterwards made the purchase.

The firm was employed in about 1910 to make a study of the introduction of natural gas into Baltimore. In 1913, a report was made on the Union Gas Company which was located principally in the southern part of Ohio and is now a part of the Ohio Fuel System. In 1920, the firm began a series of valuations of the East Ohio Natural Gas Company, operating in Cleveland and in Northeastern Ohio; the Peoples Natural Gas Company operating in Western Pennsylvania and West Virginia and Hope Natural Gas Company operating principally in West Virginia.

In 1925 a preliminary survey and later a complete survey were made of the gas project in Alberta Canada to serve Edmonton and the surrounding district. The firm made complete designs for this system, supervised and managed the construction and had charge of its operation for a couple of years thereafter.

In about 1926, the firm engineered and supervised the construction of a line from the Monroe, Louisiana gas field to Baton Rouge. That line was followed by lines to St. Louis, Memphis, Birmingham, and Atlanta. On all of these, the firm made the designs, inspected the
983 construction and in the case of the Interstate Line in Louisiana and of the Southern Natural Gas Company which ran to Birmingham and Atlanta, it conducted the operations for several years.

It also engineered, supervised the construction of and had charge of operations for several years of a line from the Texas Panhandle to Denver, known as the Colorado Interstate Line. It also made a report on the West Texas Gas Company and its affiliated company, the South Plains Gas Company, which take their gas from the Texas Panhandle field. The firm also made a survey and report of the natural gas market in Philadelphia and in northern New Jersey, the latter covered practically the whole northern half of the state which is the territory served by the Public Service Electric & Gas Company.

In connection with the work of my firm and in my capacity of one of the chief executives of that firm I have to do with the operating problems such as load building, and things of that character. In the course of my work over the years, I have had occasion to examine the operating records of natural gas companies, I am familiar and can interpret that kind of record. I have not been intimately familiar with the Panhandle gas field in Texas. The firm has not done a great deal of business in connection with it and I am only generally familiar with it. It is my understanding that it is one of the greatest gas fields that ever was discovered.

I am familiar with the pipeline company known as Natural Gas Pipeline Company of America and its companion company Texoma Natural Gas Company. This system obtains its supply of natural gas altogether from the Texas Panhandle Field and sells it principally in the Chicago district, but to some extent in the State of Illinois, west of Chicago, in Iowa, Nebraska and Kansas.

For the past 18 months, I, with associates, have been engaged on a study of these companies for the purpose of making an estimate of their going concern value and of considering the reasonable rate of return which would attract the capital necessary for their construction. I have studied the record of these companies and their history for the purpose of determining those factors which I deem pertinent to the consideration of their going concern value and rate of return. They have made available to me their books of account and their official records. Through my staff, I have made a detailed examination and inquiry into the facts to which I am about to testify.

From the investigation, I note that this pipeline system did not start out about the first of the year 1932 with a full load of natural gas. That is not unusual. In fact it would be unusual if one should start off with a full load. The company must convince the prospective customers that its service will be reliable. There is always a reluctance on the part of people using one fuel to change to another and the advantages of the change have to be very definitely pointed out to them. That is not a thing that can be accomplished over-night. It takes several years to build up a load. In the case of these companies, it took about 4 years to do that.

I have had occasion at different times to make a great many different studies of industries, population, and so forth, in Chicago and in the Chicago district but I have no very intimate knowledge of the conditions on those parts of the line in Western Illinois and across the states of
Iowa, Nebraska and Kansas, where Natural Gas Pipe-
984 line Company disposes of a part of its gas. My knowl-
edge is not more than general.

I have treated the two companies in my study as one system, they were projected and constructed as one system; and they are under the same management. They are largely owned by the same interests. The pipeline is dependent upon the producing company for its supply of gas to the extent of 75% thereof and the producing company is dependent upon the pipeline for its market. They form one continuous system. While the pipe line takes ¼ of its gas from another company, the Canadian River Gas Company, it is dependent on Texoma in the sense that the Texoma company guarantees the future supply of the pipeline.

I have examined the corporate set-up, the assets, the operating expenses, fixed charges, revenues, and attendant facts connected with the operation of these companies from the beginning of their operations and have had the figures carefully analyzed, so as to be familiar with each of these companies and its operating costs and expenses. Our analysis was for the purpose of determining, first, the going concern value and second, the rate of return to which these companies would be entitled.

When the materials for a property of this kind are assembled and put in place, the property is by no means ready and able to furnish the service for which it was projected. It is necessary to go through a considerable amount of promotion and expense before the property can be brought to a position of standing on its own feet in giving the efficient quality of service that is necessary to justify it financially. This means that an operating organization must be formed, drilled and perfected, that the forms and records necessary for efficient operation must be carefully worked out and tested, the physical property must be what I call "seasoned", that is hidden defects at the close of construction must be corrected and the full volume of business for which the line was built must be attached.

I consider going concern value to be the difference in value between the inert physical property as it would stand at the close of construction or reproduction and the property in full operating momentum with an efficient trained personnel, thoroughly seasoned and with the full complement of business attached. I want to add that I think in considering the going concern value of a property of this kind, the character of the territory in which it is located should be taken into account, that is, whether or not it is thriving and has prospective stability. In other words, I think that a pipeline system equipped to bring natural gas to Chicago and prepared with its organization and other things necessary to bring natural gas to a center of population like Chicago should be worth more than a pipeline built out in the semi-desert area of Arizona, even though it had the same type of physical property, the same investment in the property itself and both were taking gas from the Texas Panhandle field.

It would be extremely uneconomical and impractical to start out with only the facilities necessary to handle the load for which a market is obtained in the beginning of operations and then add to the capacity from time to time as the load is built up over the years. After a pipe is once laid, the size of it can not very well be increased, of course another line can be laid, but if the line is laid only large enough each year to take care of the increase in business each year, you would have a very uneconomical sys-
985 tem. The more economical, as well as the more prac-
tical, thing to do is to provide the facilities at the beginning which are necessary to handle the load which it is expected to acquire over a reasonable period of time. There is expense involved in the building up of the load to the full capacity of a pipeline system like that here under consideration. In the first place, the mechanical cost of attaching the business must be taken care of. By that I mean, the soliciting of customers, the negotiation of contracts, the advertising, and the changing over of appliances, to name some of the items of expense.

Also, there are the fixed charges on that portion of the line so provided and the operating expenses which can not be proportioned to the volume of gas but are proportioned to the size of the physical property. By the latter, I mean the operating expenses which are incurred from the beginning and which continue on regardless of the quantity of the load as distinguished from those which are added as the load goes up and the volume of gas handled is increased. There are certain operating expenses which have to be assumed in full when the operation starts. The fixed charges to which I refer as being constant and which involve an actual outgo of money to the companies in connection with facilities provided before they are required to handle the full load include return on investment or rather, interest on the investment, depreciation, and taxes. and dividends whatever return is called for on the remainder of the investment in excess of the bonds. I do not mean interest that accrues as a matter of bookkeeping because the money is tied up but only the interest that is actually paid out. In figuring up the costs to these pipelines for providing the facilities in advance, in terms of money actually paid out, I have given consideration to interest, depreciation and ad valorem taxes. In the case of these companies, the period of load building extended over a period of about 4 years, that is from the first of 1932 through the year 1935.

In connection with the attaching of customers or persuading prospective customers to purchase gas, it is necessary to set up forces of negotiators, a new business department, and the higher officials of the company must devote a certain amount of their time to such work. There are traveling expenses and supplies but the greatest item is that of contributions for changes in appliances which are necessary to induce customers to change over to natural gas.

I have been furnished with a statement of the actual expenditures during this 4-year period and the commitments made during that 4-year period in connection with their load building. This is in such detail as is reflected in their operating expense accounts. These companies actually paid out in the solicitation of business by years the following amounts:

1932	$ 86,105
1933	219,149
1934	889,060
and 1935	373,477

the latter amount includes $65,471 paid out in 1936 but contracted for in 1934 and 1935. The total is $1,567,791. In my opinion, these amounts aggregating the amount just stated, represent a portion of the expenses to which these companies were put to obtain its going concern value.

The other direct costs that are chargeable to the attaching of business, or the making up of the going concern value, are the fixed charges on that portion of the physical property provided in advance of the full attachment of the business for which they were built. I mean the interest, depreciation, and ad valorem taxes on the property of these companies that made up the project. In arriving at
986 the proportion of this interest, ad valorem taxes, and
depreciation and costs of operation, chargeable to the cost of attaching business in helping to make up the going concern value, I considered that a fair standard for judging the capacity of the property could be obtained from the load carried in the years 1936, 1937, and 1938 when the load had been built up to what I call the capacity of the line.

That capacity, if running full all the time, would have been 210,000,000 cubic feet per day, or 76,650,000,000 cubic feet per year. These companies never actually ran that much gas. They actually ran in the 3-year period I have taken an average of 92.48% of that quantity and I have considered the amount they actually ran to be the standard of full load. It is not possible for a natural gas pipeline company to deliver 100% of its capacity every day of the year as a practical business proposition because of the variations of the demands of the customers. For instance, a househeating load is comparatively large in the winter months and amounts to nothing in the summer months; also there are days of the week when the industries are utilizing more gas than other days and variations of that sort.

I have taken this 92.48%, which was the per cent of the total capacity of the line that it was able to deliver during the three years after it was first loaded, and have used that as the standard. However, the original capacity of the line was not 210,000,000 cubic feet per day but 175,000,000 cubic feet per day, or 63,875,000,000 cubic feet per year. In determining the extent of the excess facilities over those actually in use in each year of the load building period, I have compared the actual volume of gas delivered with the capacity based on the load factor which was found to be practicable in the years 1936, 1937, and 1938. That is, I have taken the capacity of running full in the load building period and have multiplied that by 92.48% to obtain the practical maximum capacity of the line and then I have compared that figure with the actual volume of gas handled in each of the 4 years. In other words, I have used 92.48% of the rated capacity of the line as the basis of comparison and have compared the volumes actually put through the line to that basis.

In 1932, I found a lag of 51.98% which means that practically 52% of the property for that year had been provided in excess of the business attached that year. In 1933, the lag was 56.75, in 1934, 21.42%, and in 1935, 3.63%.

I have ascertained the interest that was actually paid out for money which went to provide those facilities of the system. I got these figures from the records of the company. The interest paid out in 1932 amounted to $3,666,350, in 1933 to $3,625,079, in 1934 to $3,598,329, and in 1935 to $3,474,732; a total for the 4 years of $14,364,490. I have applied to those figures representing the interest actually paid out each year the percentage of lag in attaching business during the same year, with the result that for the year 1932 I took 51.98% of the total interest paid out, which resulted in $1,905,769 paid out on account of facilities provided in advance of the load. By the same process, I found that the interest paid out on account of facilities not yet in use for the year 1933 was $2,057,232, in 1934 $770,762, and in 1935 $126,133, making a total for the 4 years of $4,859,896.

987 I then determined the ad valorem taxes paid out on account of facilities owned by these companies each year during the same 4-year period.

(At this point, counsel handed the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Cost of Attaching Business—Witness J. A. Emery" and asked that it be marked as an exhibit for identification. At the direction of the Examiner, this document was marked Exhibit 130 for identification.)

By ad valorem taxes, I mean taxes generally on the estimated value of the property, that is taxes that the various taxing bodies levy on the property itself as opposed to production taxes, franchise taxes and other taxes of that character. I find that these companies paid out, during the 4-year period of the load building, ad valorem taxes as follows:

in 1932 $301,776
1933 301,629
1934 270,558
and in 1935 289,193, a total for the 4 years of $1,163,156.

I applied the same percentages of lag I had already determined and which I applied to the interest payment for each of the 4 years and in that manner arrived at the amount of taxes which were paid out on facilities provided in advance of the loan. I found the taxes on facilities not yet loaded for the

year 1932 to be $156,863
1933 171,174
1934 57,954
1935 10,498, making a total for the 4 years of $396,489.

I then made the same character of calculation on the depreciation as determined by Mr. Biddison in his recent survey of the property and referred to in his testimony.

I mean the actual viewed depreciation of the physical property as determined by Mr. Biddison. The basic figures were furnished me by Mr. Campbell, the Secretary of the company, who started with Mr. Biddison's figures. I have assumed that the depreciation was uniform from year to year from the beginning of operations until the time of Mr. Biddison's inspection, consequently, I have divided his findings as to depreciation by the number of elapsed years. That amounts to $386,529 for the whole property as he found it for each year.

I applied the same percentages of lag to these depreciation figures as I did in the interest and ad valorem tax figures and obtained as results for the

year 1932 $200,918
1933 219,355
1934 82,795
1935 14,031, making a total of
$517,099.

988 Viewed depreciation is defined as the loss in value of the property, and even if it was not paid out-of-pocket it all constitutes a liability which will have to be paid some day. It is a loss which is incident to the natural deterioration of the property. That loss occurs largely without regard to whether or not it is being used to its full capacity or to only a percentage of its capacity during the earlier years of its history. This is the item of depreciation which, in computing the value of the property and approaching that subject from the standpoint of reproduction cost new, must be deducted from that reproduction cost new in computing the value.

Now this other item of cost of operating facilities provided in advance of attaching business, I computed in the following manner; there are certain operating expenses which must be incurred when operations begin in substantially as great amount as later when the line is loaded. I considered that the proportion of such expenses in accordance with the estimated lag in load is attributable to going concern value. These were operating costs that covered the unused as well as the used portion of the capacity during this period of load building.

I took the production department expenses, other than gas royalties and taxes on gas produced, the mail line expenses, the telephone department expenses, and the general expenses as recorded, other than taxes. I did not include any of the expense of operating the compressor stations although a part of that might reasonably have been taken. My reason for not including any part of the compressor station expense was that there may have been some items which in part should have been omitted and I considered that by omitting entirely the compressor station expense and the gasoline plant expense I was fully making up for such items and arriving at a fair figure. I found that during those 4 years, those items of operating costs that I have taken into account are fairly uniform in amount year after year except in the first year when they were substantially higher. The first year, they amounted to $1,072,759 as compared with $835,903 the next year and comparatively the latter amount for the following years. That higher cost the first year was due to non-recurring expenses which, although I do not have the details, must have been in the nature of perfecting the personnel, preparing the operating forms and procedure, and seasoning of the property.

By "seasoning of the property", I mean consummating the back fills, making provision against wash, as it appears after the line is completed and placed in operation, riprapping, and other measures which have to be taken at the river crossings, and alterations in the compressor machinery, and items of that kind. I did not try to pull out these items attributable to seasoning from that large operating expense of the first year but left them in and applied the percentage of lag to the whole amount. Had I been able to pull out those items which represent seasoning I would, instead of applying the percentages of lag to them, have put them all in as a part of going concern value. So by leaving them in this item the amount of the cost is reduced by the difference between the percentage of lag and 100 per cent. (Motion by Commission Counsel to strike the above testimony denied.) I stated earlier that this difference in the aggregate amount of these charges, which do not vary with the load between the first year 1932 and succeeding years, was made up of non-recurring costs which I have attributed to seasoning. Then I went into the record and took these items one by one and pulled them out, that is all of such charges instead of just the 51.98% attributable to lag would have been properly included as cost of obtaining going concern value.

That is all of the excess of such expenses in 1932 over the corresponding increases in the succeeding years 1933 and 1935. To get an exact figure, I would take the average expenses for the three years as the normal amount, although the differences are not large.

Applying the same percentages of lag to these op-
989 erating costs, I find that the operating expenses incurred on account of facilities provided in advance of attaching business for the

Year 1932 to be $557,620
1933 474,375
1934 165,066
1935 29,757, making a total for the 4 years of $1,226,818.

As appears in line 1 of page 1 of Exhibit 130, the items attributable to the capacity provided in advance of load are interest, taxes, depreciation, and operating costs, amounting to a total of $8,568,093. In that amount is included no interest that was not actually paid out on account of the facilities provided in advance, nor were there included any taxes not actually paid on account of such facilities. I have used the figures representing the actual physical depreciation of the properties not yet in use during the load building period.

As I have already stated, there are other expenses that would have to be incurred in connection with the building up of the load and putting the project on a going basis or putting the wheels to turning in the sense that I have expressed it here.

The organization, as we find it today, has a value must greater than would be that of any crowd of men that could be assembled hurriedly. It has had the benefit of a number of years' familiarity with the property, with the territory, and with the customers. These men know how to work together. This excess of value is reflected in the efficiency of operation. In other words, an efficient organization can operate the properties more cheaply than a less efficient organization. It is not possible to assemble an organization of this kind without substantial expenses and that expense has got to be borne by someone somewhere down the line. I am acquainted with some of the personnel which operates these properties. I have made a point of meeting and sizing up the principal executives, including Mr. Brown himself, and my associates have done the same thing. I have known Mr. Brown, Mr. Kesinger, and other operating heads and executives over the years. I heard Mr. Brown's testimony here today concerning the type of organization that he has. His testimony coforms to my understanding of the type of men who are employed by these companies.

In my opinion, it is an excellent organization which adds a value to the properties of these companies over and above the value which those properties would have without the organization. It has that value because it would cost money to reproduce it. It would cost money to put it where it is. It adds a value to the use of the property because the latter can be operated more cheaply and it certainly would be taken into account in the matter of exchange, purchase and sale by a purchaser who was interested in buying the property. Of course I cannot tell how much.

To make an organization of 600 men work efficiently together, their duties must be carefully defined and understood. That is accomplished by means of instructions which are sometimes worked out piece-meal. Often it is done by instruction books for various departments. I understand that it has been done for this company entirely in piecemeal. To obtain the greatest efficiency of op-
990 peration of the physical property, records of performance have to be maintained very much similar to laboratory records. These records have to be prepared in such a way that they can be understood and that the results can be obtained from them readily so that they can be summarized for the constant inspection of the higher officials. These companies, I find have over 300 forms used in their operations and the very process of designing and perfecting these forms would be expensive and it makes a great difference in operating expenses whether these forms are efficiently designed or not. If the forms are so designed that false motions are made. It means a multiplication of such motions day after day throughout the year.

It is not possible for a business of this magnitude to anticipate and prepare in advance all the books of account, tax records, performance records of the machinery, ad the procedural directions that become necessary as the business is developed and those operating it become acquainted with its details, or a lapse of time and considerable expense are required. Of course if you previously had exactly the same kind of company that was performing as well as you would expect it to perform, where special attention had been given to the subject, you could obtain a satisfactory series of forms at the beginning, but no two companies operate alike and the only way in which the best system of forms and records can be devised is to study it out. (Objection by Commission Counsel.) I have made estimates of this cost but no such estimates as I would feel that I have checked over carefully enough to present. (Objection overruled.) I did not say that I have made estimates in other cases, but I meant that I have made an estimate in this case, but I have not checked it over sufficiently to be satisfied enough with it to present it here. In other cases I have made estimates of a specific value to that element. It would cost a substantial sum of money to reproduce these forms, records and procedural documents. I consider that the location of the company in a thriving, growing territory gives it an element of value, but I have not attempted to estimate how much that would be. But I have always tried to consider a value as a single figure and not that in the case of a property there could be a value for one purpose or another. I am aware that the purpose of determining value in this proceeding is solely for the purpose of rate-making. It is my personal opinion that a company is entitled to an element of value for rate-making purposes only insofar as it has contributed to that condition, which a company often does by fostering the territory, that is, building up industry.

Based on my experience and observations over all these years, I do not think this pipeline system could have overcome the difficulties of loading its pipeline within the period that was required had it been built for a less favorably situated outlet than that of Chicago and those places along the line where it has markets at so small an expense. It could not have been loaded in the same time at the same expenses.

The valuation of the going concern element of a company is a matter of judgment. There is no exact method of calculation. In arriving at your judgment or opinion of such value, it is customary and proper to assemble, weigh, and hold in view all the evidence relating to such value. In this case, I have analyzed the going concern value as I see it, and I have taken such items as I felt could be definitely determined from the records of the company as having been paid out. That gives me the cost of such elements. Now "value" is not cost, but I have chosen to leave out all the other elements of value which I have enumerated and estimated the value of the going concern value of this property as the sum of those figures which I have derived as the cost of certain parts of the going concern elements. This sum aggregates $8,568,093 and in my opinion, the going concern value of this property is not less than that. That is the figure indicated in Exhibit 130, page 1, the item in the lower, extreme right-hand corner. (Motion by Commission Counsel to strike above testimony overruled.)

Based on by experience in the design, construction and operation of pipelines and the problems that are encountered in connection with such operations and with the loading of the pipeline or building up the demand upon it to the point where it can not be loaded any more, it would cost as much if not more to reproduce the elements entering into my judgment just expressed as to the going concern value of these properties. (Motion by Commission Counsel to strike above testimony overruled.)

991 I obtained the figures as to the sales and the operating expenses set out on pages 2 and 3 of Exhibit 130 from Mr. Campbell, the secretary of the company. The analysis shown on page 2 and page 1 are my figures based on the figures furnished to me by Mr. Campbell.

Cross-Examination by Mr. Booth.

The evidence that I have given is that the cost of these particular elements is as stated on that exhibit, based on that cost for certain of the elements, I should estimate the value of all of the elements at not less than that amount. In other words, that is the proper and reasonable amount of going concern value that should be allowed for these companies in this case. The going concern value includes not only those elements set forth in Exhibit 130 but also the elements I have discussed. I made no estimate of either the actual cost of those other elements, the cost to reproduce them, or their value in use. I cannot say without more consideration whether I would still reach the conclusion that the going concern would be $8,568,093 if these other factors not included in Exhibit No. 130 had not existed. As to whether I will say that these other elements form a small or large part of the 8½ million dollars, I do not know what is meant by "large" or "small". In this figure of $8,568,093, the cost of assembling the organization, the accounting procedure and the favorable location had nothing to do with the size of the grand total cost of attaching the business. It includes simply the items contained on page 1 of Exhibit No. 130. I would not reach my conclusion that the Company was entitled to 8½ million dollars independently of these other factors, nor would I if I had not made the study shown on Exhibit No. 130. I spent approximately 18 month off and on in making this study of going concern value.

My study of this going concern value has continued over a period of 18 months off and on, not continuously. I think the time actually spent would represent 5 or 6 months of continuous work, not by myself but by members of my staff. I am familiar to some extent with the operations of other large pipeline companies that have as their source of supply the Panhandle field in Texas.

I am not familiar with any of the details of the Panhandle Eastern Pipeline Company's operations as to the cost of building up its load. My only information about it is that it has taken much longer to load it than it has this line, if it is fully loaded now. Other large pipeline companies which have the Panhandle field as their source of supply are: the Colorado Interstate, the Northern Natural, the Cities Service, the Panhandle Eastern and the Lone Star Gas Company. I have made no study of these lines from the Panhandle field. I did take account of the expense of the Alberta Company where the company began from scratch.

I spent considerable time developing the theory upon which Exhibit 130 is based. I did not discuss it with Mr. Hamilton. Nobody suggested to me the use of these various items which make up Exhibit 130. It is a development of the work we have done on this subject extending through a good many years. That exhibit constitutes a summarization of the work we have done on the subject of going concern value for these companies. In my judgment, that Exhibit 130 and the testimony explaining that exhibit constitutes the principal or major basis for my conclusion that this company is entitled to a going concern value in the amount that I have stated.

Cross-Examination by Mr. Slaff.

I am acquainted with Mr. Hamilton of course. He has testified in this case. I have known him a good many
992 years and know his professional standing, the type of work he does and so forth. In reply to your question, in which you have stated what Mr. Hamilton testified to as a reproduction cost of these properties and the amount resulting from the deduction therefrom of the depreciation as observed by Mr. Biddison, and in which you ask me that if Mr. Hamilton had come in with a reproduction cost new estimate of $75,000,000 instead of $57,000,000 approximately, and a reproduction cost new less depreciation estimate of $70,000,00 instead of approximately $54,000,000, I will say that—if I had no opportunity to go into Mr. Hamilton's figures in detail and were asked to base my judgment on his reputation and on my general knowledge of his methods in respect to such properties as this, if he said that in his opinion the value of the physical property was the figure you named—this addition of mine should be made for going concern value. I think Mr. Hamilton is a competent man to testify for reproduction cost new in this type of proceeding.

Questions by the Examiner.

If a competent witness testified that the reproduction cost estimates would be $75,000,000 and less depreciation would be $70,000,000 and those figures applied to the physical property alone, I would still add $8,500,000. If the figure of reproduction cost should be $10,000,00 less depreciation of $15,000,000, leaving a reproduction cost figure less depreciation of $85,000,000, the grant total cost of attaching business might be different to the amount I have determined in that the depreciation might be different and if those amounts applied to the physical properties alone, I would still testify that the amount of $8,568,093, or a higher amount, should be added as an element of going concern value. It should be added to any authentic valuation of the physical property.

I will furnish counsel with a statement of the cases in which I have testified in the last 10 years.

Redirect Examination by Mr. Morgan.

If the same expense or cost had been paid out for interest, for soliciting customers, for taxes, for operating expenses, not dependent on volume, and the same depreciation had occurred annually as that set out in my Exhibit 130, then my judgment would be, without regard to the value of the physical property, that a going concern value allowance would have to be added to the value of the physical properties, whatever that value was found to be. In stating that I have considered all of these elements as adding to the going concern value and in stating that the going concern value should be at least $8,568,093, I mean that that is not all of the going concern value that I think exists here, but in arriving at that amount, I have confined it to that amount because I can only identify that amount as actual expenditures that occurred in connection with producing this property. My testimony has been that the going concern value is not less than the amount stated and not that it is that exact amount.

993 S. L. MILLER, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(September 6, 1939)

My name is S. LeRoy Miller. I am the chief accountant of Natural Gas Pipeline Company of America and of Texoma Natural Gas Company, under the supervision of Mr. Campbell I supervise the accounting.

I personally prepared those figures which I have heard revealed here by Mr. Em [illegible] and which appear on page 3, of Exhibit 130. I prepared those figures under the direction of Mr. Campbell and took them from the books and records of the company.

(EXHIBIT 130 was offered in evidence and was admitted over the objection of counsel for the Commissions to each of whom the Examiner granted an exception.)

994 R. J. WALLACE, a witness for defendants, testified as follows:

Direct Examination by Mr. Morgan.

(September 7, 1939)

My name is R. J. Wallace. I live in Tulsa, Oklahoma. I am in the oil and gas business and I conduct a brokerage business for the purchase of oil and gas properties.

I have been engaged in the oil and gas business either as a producer or as a broker since 1907. I have been actively engaged in the brokerage business as well as an operator for over 10 years. In 1907 I went to work in the oil fields at Bartlesville, Oklahoma, as a night pumper and roustabout. from 1908 to 1909 I was employed by the Prairie Oil and Gas Company in their civil engineering department on tank construction and pipeline construction. From 1909 to 1911 I attended college in the winter and in the summer worked at surveying and as a tool dresser, and in general oil field work. I secured some oil and gas leases for companies and individuals during that time. In 1912 I was electer registrar of deeds in Washington County, Oklahoma, the county seat being Bartlesville. In 1913 I resigned my position as registrar of deeds to accept the position as assistant superintendent of land and leasehold development of the Quapaw Gas Company and associated companies, which later became the Empire Companies. My work consisted of acquiring and supervising the taking of oil and gas leases by purchase and direct from the land owners in the states of Alabama, Mississippi, Arkansas, Louisiana, Texas, Oklahoma, Kansas, Colorado, and Wyoming. From 1915 until 1919 I was with the gas division of the Empire Companies and was made superintendent of gas pipelines in the Cushing district. In addition, I purchased all gas production properties and acquired gas leases for the gas division. From 1919 to 1920 I was manager of oil and gas operations in Louisiana for the joint account of the Empire Companies, the Barnsdall Oil Company, and H. V. Foster interests. My work consisted in drilling wells, purchasing leases and selling leases to help finance the project. From 1921 to 1924 I was located in Billings, Montana in charge of oil and gas operations for the Barnsdall-Foster Company, a corporation owned by the Barnsdall Oil Company and H. V. Foster interests, operating in the Rocky Mountain States. I leased direct from the fee owners and from the Government under Government permit, and supervised the drilling of wells and the sale of leases and production. In 1924 I sold a half interest in the properties of the Barnsdall-Foster Company to the Mid-West Refining Company, a subsidiary of the Standard Oil of Indiana, by which they took over the management of the properties. In 1925 I resigned from the Barnsdall-Foster Company and organized the Record Petroleum Company, a company in which I owned a substantial interest. In the latter part of that year I sold a half interest in the Record Petroleum Company to the Mid-West Refining Company and surrendered the management to them. I then engaged in the brokerage business and the business of a drilling contractor.

In 1926 and 1927 I secured leases and permits in various fields in Wyoming, Montana and New Mexico for my own account, and later sold these properties during the years
1927 and 1928. In 1928 I moved to Tulsa, Oklahoma
995 to engage more actively in the brokerage business and
in valuation work.

In 1929 I devoted practically the entire year to the consumating of two large transactions and to the investigation of other properties. From 1929 to 1932 I conducted a brokerage business, and also developed a gas property east of Kansas City, Missouri, in connection with which I drilled a number of wells and built a pipeline system. From 1932 to 1935 I conducted a brokerage business in Kansas, Oklahoma and Texas, and sold my gas wells and gathering system east of Kansas City. From 1935 to 1936, in addition to my brokerage business, I served as vice president and general manager of the Signal Oil Company, a producing company operating in Kansas and Oklahoma, in which I represented a bank of Tulsa. This company had become indebted to the bank which made it necessary that they place the management under its direction, and it asked me to act in that capacity.

In 1936, after drilling some additional wells, I sold the producing properties and some of the undeveloped leases for enough to pay the bank's indebtedness and turned the property back to its owners. From 1936 to 1938 I drilled a number of wells in Kansas—oil wells and gas wells—which resulted in the building of a gasoline plant on the properties. In the latter part of 1938 I sold my oil interests and have since been engaged entirely in the brokerage business.

The two or three transactions which occupied the entire year 1929, to which I have referred, involved first the sale of an undivided half interest in approximately 492,000 acres of undeveloped leases scattered through Kansas and Oklahoma, belonging to the Amerada Petroleum Corporation, to the Standard Oil Company of Indiana, and next a sale to the same company of the McMan Oil Company properties. This was a producing company which had both producing and undeveloped properties in Texas, Oklahoma and Kansas. The consideration for the purchase of the half interest of the Amerada Petroleum Company by the Standard of Indiana was $10,000,000. The consideration involved in the sale from McMan to the Standard, which was a stock merger, was approximately $12,000,000. (Objection by Commission Counsel to testimony relating to consideration for purchases overruled.) Both of these transactions involve properties, though not very extensive properties in the Texas Panhandle field. During that same year I was delegated to attempt to sell the Foster Petroleum Company. I took this property up with the Standard of Indiana but we did not consummate the transaction. My contract in this deal set out that the consideration would be somewhere between $10,000,000 and $20,000,000, that is to say that was the range of prices involved in the negotiations.

I think I have had occasion to become acquainted with and acquire knowledge of the market conditions in the Texas Panhandle field. I first became acquainted with that field at the very beginning of operations when I was employed by the Empire Companies, and I remember when the first well was drilled in there, and wells at later times. Under my supervision we acquired acreage, checkerboarded and scattered acreage in that country, in the early development of it, suspecting that there was a large producing area there. I have since acquainted myself, in the course of my business, with transactions that have taken place, and with the values in that field. I know the present boundaries of that field. It is a generally accepted proven area. By
the development that has taken place over these past
996 years it is now accepted as a proven field extending over
portions of Potter, Moore, Hutchinson, Carson, Gray, Wheeler Counties, and I think a small portion of Hartley County. I have kept myself advised concerning the market

conditions prevailing throughout that field over the past several years. The gas leases scattered over the now generally accepted area covered by this field as it is usually outlined on the map, are not of uniform value throughout the field. There are many conditions prevailing in that field and I would not say that they are of uniform value at all. I would say the range of values would be from nothing up. The reason I say that some leases in that field would have no value at all is that there are areas where tracts of land for lease purposes would be absolutely condemned and would have no value. Dry holes have been drilled out over the area that is commonly included in the boundaries of that field as it is mapped by the public authorities and by the people dealing in oil and gas activities in that field.

This field is a very large one—approximately 125 miles long—so we are speaking of a very large area. In the eastern part of the field the land is divided into what I would call small tracts, in the gas area, 160-acre and 320-acre tracts. In the area are Carson, Moore and Potter Counties there are very large tracts of land under one ownership, so the sizes of the leases vary from very small tracts to very large tracts. In Moore and Potter Counties the tracts are large, a great many of them, but there are a few small tracts. In Carson County there are some large tracts and some small tracts.

When I say I have been engaged in the brokerage business I mean that I buy and sell properties or negotiate for the purchase of properties for a particular client. I mean, of course, oil and gas properties and leases.

My business has been to bring the seller and purchaser together on sales transactions involving oil and gas properties. Beyond that I try to study the needs of some of my clients or companies. Because of that knowledge and because I keep up with the different fields, sometimes I have been able to analyze their needs and present to them desired property and make the sale of such property as a broker. I create my own business in that way, receiving my compensation as a commission on the sales price, or a finder's fee or a commission for negotiating the purchase.

The principal factors in valuing the property in the Texas Panhandle field would be first its location as to the generally accepted proven gas area. Another factor would be its location within the proven area, as to the potential producing area—whether it is in a highly productive area, because these areas change rapidly. You find areas probably within the center of the general producing area that, possibly on account of tight porosity, or something, are not within the high producing areas. The field has enough history at this time that we can very intelligently pick out those areas.

997 Another factor would be the conditions and terms of the leases under which the land is held, if it is a large reserve that you are looking over. In the history of almost all leasing, when a field becomes attractive or shows that it is a producing area, or might become a producing area, there is a great rush to secure leases; and almost invariably these leases are written at approximately the same time or within the same year. They are usually written for the same primary term, five years or ten years as the case may be, because when you give a proposition to one land owner it is almost universally the proposition that goes through the field. Therefore, the terms of the leases are very important. To illustrate, the dates of the leases being practically the same time, there would have to be a well drilled within the same period of time on each lease. A lease is really a franchise to produce oil or gas, and you have a right to drill and produce provided you do it within a stipulated time or the primary term of the lease. You do not have title to the oil or gas unless you actually produce it. From that time on you have as long as oil or gas is produced thereafter.

Another factor would be whether on a large reserve the acreage was well blocked. That is necessary for the reason that the offsetting or well spacing can be under the control of the owner or operator of this acreage, and can be done in a more uniform way. The withdrawals particularly of gas can be under the control of the operator and not subjected to close offsetting by others whose market might be entirely different from the operator or owner of the large block. There are other factors, the rock pressure and the decline in pressure. The field has enough history behind it so as to show its approximate decline and what you might reasonably expect to recover from the amount of gas or oil that you might estimate is under your land. I think those are most of the controlling factors.

Let us take, for the purpose of illustration, an ordinary oil and gas lease from A to B, covering a tract of 320 acres of land. Under the provisions of the prevailing oil and gas lease contracts as they were originally executed in the Panhandle, it is practically universal that that lease reads

that it is a conveyance of oil, gas, and other minerals for a definite period of 5 years or 10 years, or some other stated time that we call the primary term, and as long thereafter as oil or gas is produced from the premises. That provision is contained in practically every lease down there. Each lease also shows the amount paid for the lease. This is usually termed the original bonus. The payment of that bonus defers the drilling of a well for one year, after which, under further terms of the lease, the lessee is required to pay a delay rental for the privilege of deferring the drilling of a well for each additional year up to the end of the primary term of 5 years, if it be a 5-year lease. If at the end of the primary term the lessee has not drilled a well and is not producing oil or gas from the lease, the lease automatically becomes null and void. If a well be not started or the delay rental be not paid at the end of the first year the lease automatically terminates. I am familiar with what is known as the obligation to offset that goes with an oil and gas lease. If a well on the land next to the land on which you have the lease is close enough that your lease will suffer drainage, there is an implied covenant under the court decisions requiring you to drill a well equi-distant from the line of your lease as the well on the adjoining tract, so that the withdrawals from the two wells will
998 offset each other. This covenant arises by reason of
the fact that the land owner in most cases reserves one-eighth of the gross production of either oil or gas that is produced from the lease; that the paying and protection of that one-eighth interest is a part of the consideration for the lease. If drainage takes place the land owner loses a part of that one-eighth and therefore the holder of the lease is required to drill such an offset well to protect his royalty owner's interest as well as his own.

It is not necessary that the production from the well on the lease equal that from the well on the adjoining land. The obligation is fulfilled if a well be drilled at a similar distance. Of course you might find a very large well on the land adjoining yours and you might drill an offsetting well which would turn out to be much smaller due to the unexplainable conditions underground that we do not know about when we start the wells.

The obligation is to drill the well at the same distance from the common line as the well on the adjoining tract so as to protect against the gas being drained from the lease over to the other well. The number of offset requirements

is dependent upon the number of offsets drilled around the lease. It is possible, depending upon the form or the shape of the tract of land covered by the lease, for a lease to become heavily burdened with offset requirements in the absence of some special contract to protect against that sort of obligation. If the owner of the lease be able for a consideration to negotiate with the owner of the land or the owner of the royalty interest an agreement by which he absolves himself from an obligation to drill offset wells, and by which the land owner or royalty owner accepts one well on the tract as sufficient development with an express provision that no additional offset drilling will be required, such an agreement would add great value to the lease. The extent of the drilling operations is a matter of great interest to a prospective purchaser. It is one of the controlling factors of the buyer of leases as the drilling of a well involves the expenditure of many thousands of dollars. If the lease or group of leases requires the drilling of a great number of wells, or might require the drilling of a great number of wells, he would certainly not pay much for the lease. The amount he would be willing to pay for it is directly affected by the extent of the burden of development that goes with the lease he contemplates buying, because the operator or purchaser of the lease expects to make a profit and therefore does not want to put in too much of an investment which might go beyond what he would consider is possible if he is to make a profit from it. To illustrate, let us assume that in some neighborhood or vicinity there are four leases which have been acquired by the same owner on lands belonging to the same lessor or different lessors, as the case may be. Let us say that one of those leases covers 320 acres, another 200 acres, another 160 acres, and the other 80 acres. If the primary term be 5 years it will be necessary to drill a minimum of one well to each tract in order to continue the lease beyond the 5-year period. Otherwise the lease would terminate as to each tract on which a well was not drilled and put on production during the 5-year period. This is the minimum drilling obligation. If wells were drilled offsetting these tracts it would be necessary, in the absence of some agreement
999 to the contrary, to drill offsets to protect against each
well which the four wells to be drilled as a minimum happen not to offset.

(Mr. Morgan, counsel for defendants, made the following statement to the Examiner:

It is the obligation of the lessee to drill well for well in the case of offsetting wells, unless there is some special agreement to the contrary. The Texas law carries into the leases, although it is not written there in express words, what is termed an implied obligation to protect the royalty owner against having his oil or gas drained off to other wells. That requires the drilling of offset wells on the lease to protect it against that drainage. That subjects the owner of the lease to liability for the damage sustained by the royalty owner through that drainage, and in some instances the cancellation of the lease. That is not a matter of statutory law but of common law written into leases by the courts in passing upon the rights as between the royalty owner and the owner of the lease. If there should be two wells on adjoining property the owner of the lease might drill one well between them and thus protect the lease against drainage from both wells. However, it becomes an issue of fact under those circumstances. Down in Texas where we have juries in both equity and legal proceedings, there is always a jury's verdict on the facts staring the owner in the face when he takes a chance like that. That common law obligation obtains in other oil and gas states so far as I am advised. It certainly is in Texas a well established law throughout the state. The rule has been repeatedly announced by the Appellate Courts, including the Supreme Court of the state. I would not say that this obligation arises more or less frequently in the Panhandle than in other portions of the state.)

Direct Examination Resumed by Mr. Morgan.

You will find a rather uniform spacing of wells in all fields in Kansas, Oklahoma, and in other producing states. I think it has come about more by the getting together of the principal operators and establishing an offset distance. I can illustrate by a field in which I was operating in Kansas, the Burton field. In the north end of the field the leases were owned principally by one operator and he set the spacing at 40 acres per well. In the south end of the field where the owners of the leases were scattered, leases were divided up among a number of them, and the offset obligation became universal at 10 acres per well, and it did prevail at 10 acres throughout that almost entire southern area.

Questions by the Examiner.

In the Panhandle field the spacing varies. In speaking of oil wells, I think 10-acre spacing has been used up along the north boundary where the oil area is, but in the gas area, in the east end of the field, the density of drilling for gas is one well per 160 acres, and that holds true in some places in Gray and Carson Counties, but in Moore County and Potter County, where the land or leases are held in large tracts, they have apparently either agreed or, at any rate, are drilling one well to 640 acres. Now in all my experience in gas fields I have never known a place where 640 acres has been allocated to one well. It is the largest 1000 unit, I think, that I have ever experienced, but that seems to be the practice there. I do not believe there is any law in regard to that but it has become more or less universal there.

Direct Examination Resumed by Mr. Morgan.

That 640-acre unit may have to be reduced as necessity for additional wells develops through the decline in the field pressure. There is no question about that, in my opinion, because naturally when the pressure goes down the production will go down. This will require a great deal of additional drilling to keep up the delivery of gas from that area. I do not mean to say that in Wheeler County and in eastern Carson County, where the unit is usually 160 acres, that all the leases are drilled to that density. In many instances wells are drilled on 80-acre tracts; in other instances there are wells on 40-acre tracts, on 20-acre tracts, and even on 10-acre tracts.

Going back to the four leases we used in the illustration a little while ago, which we will call leases A, B, C, and D, which are all for the term of five years and in the same neighborhood either adjoining each other or close to each other, I have stated that it would require a minimum of four wells to retain the title to these oil and gas leases beyond the primary term. Until one well is drilled on each tract, it would be necessary, in order to keep the title to the oil and gas lease alive pending the termination of the primary term, to pay a rental at intervals of a year. This rental usually amounts to a dollar per acre. Now let us assume that the owner of those four leases makes a new agreement with the owner or owners of the royalty interests underlying those leases, by which, for a consideration, it is agreed that one well will be drilled on the four tracts at a location to be determined by the lease owner, or by agreement that from that well the proportion of the total market outlet of the owner, which is properly allocable to the total of the four tracts of land be produced from one well, and that no other well shall be required in order to keep the four leases alive, or the title to the oil and gas reserves under the leases alive beyond the primary term, and also that there shall be no further obligation to drill offset wells. Such an agreement would add great value to these leases for the reason that you first have just the cost of one well to drill. You may eventually drill on four tracts, but that would be to suit your market conditions. The point is that you then acquire title to the oil and gas lease. Before that your title depended on the development through the drilling of one well on each tract. It would therefore add great value, in my judgment, to the leases.

The owner, by such an agreement,, becomes the proprietor of this oil and gas reserve and it does not depend upon the drilling of additional wells by the end of a stipulated period of five years, or ten years, as the case may be, and the payment of a rental in the meantime, failing in which the title will absolutely terminate. The owner of the lease is no longer subjected to damage by offsetting wells and underground drainage. The elimination of this hazard, in my opinion, adds to the value. Such an agreement would certainly be looked on with favor by one who was contemplating the purchase of the reserves underlying those leases.

1001 I have been requested to make a study of the leases belonging to Texoma Natural Gas Company in the Panhandle field for the purpose of determining their value at the present time. I was first employed to make this study about April 1, 1938, at which time I commenced to make an investigation into the reserves of that company. I have continued this study at intervals from the date last mentioned to the present time. I have made a very careful study of the holdings of that company. I have been on or in very close proximity to each lease. I have been to each of the gas wells. I have spent many weeks in the office at Amarillo and in the field, and have gone into the records of the company. I have studied each lease individually as to its terms, its location, and all things, both favorable and unfavorable, that would go towards establishing, in my opinion, the value. I have taken into account the things that add to and the things that detract from the value of those leases under the existing conditions. I have renewed my study of the field, the history and age of Texoma's wells, the dates when they were drilled in, the original open flow and rock pressure and the latest official open flow and rock pressure. I have made a study of the wells surrounding the Texoma property on the lands owned by other companies in order to determine the potential productivity in the areas where Texoma's acreage is located. I have checked also the open flow and rock pressure in those areas, in fact I believe I have checked into most of the controlling factors. (Objection by counsel for the two Commissions overruled.)

I have been furnished with a description of all of Texoma's leases and have located those leases on the map at the time of or prior to my going on the leases themselves. I find the greatest majority, the largest percentage of Texoma's leases are located within the areas of higher potentials; that the leases are well blocked, under most favorable conditions to an operator; that the terms of the leases particularly are very favorable; that the drilling of wells to hold intact this reserve is a minimum, and to me it shows the result of a well-trained organization and a great deal of work to put this reserve in the favorable operating position that it has at this time.

By being well blocked I mean that the leases are substantially joined together or blocked together in one large block or in several blocks of large enough magnitude so that the operator or owner of those leases does have quite a control over the offsetting distances and he can protect his withdrawals from them.

The ownership map that has been offered in evidence shows that there are several or quite a number of tracts in northern Carson County that are comparatively small. I have in mind particularly those in what is known as the Burnett ranch referred to in the record. The fact that the company owns these smaller tracts ordinarily would raise a serious objection to the value of the lease for the reason as I have already stated, going to offsetting and drainage protection obligations. However, in this particular location it is generally accepted, and I feel a buyer of leases would accept it, as an area proven for gas only, because there ~~has not been any oil developed~~ in any of the wells. Gas

not be stored. It has to be produced from the wells as
market will absorb it. The fact that this acreage is surrounded
by the large reserves of other gas companies
whose withdrawals of gas are at a rate similar to that of
the Texoma Natural Gas Company, and whose markets
are controlled by weather conditions, industrial con-
1002 ditions, and other factors the same as the markets
of Texoma, in my opinion puts that acreage in as safe
position as if it were blocked acreage. I have therefore
considered that factor in my treatment of those smaller
tracts.

I find that the main body of Texoma's present reserves are so located as that they are readily accessible to a gathering system that would represent what in that field would be a minimum investment in gathering facilities in order to reach them. I have considered that factor. This field being as large as it is—of course the leases of Texoma from the west to the east end are many miles apart but the area over which they are scattered is a proven area and is so considered—the locations of the leases are very favorable for the construction of gathering lines, and their distances apart are not prohibitive from an investment standpoint, so from an operator's standpoint I find them well selected. There is a great advantage, providing the terms of the leases are favorable enough that the drilling of wells would not defeat you, in bringing together in one ownership a large number of leases, say several hundred, as of the time originally taken. Such an assembling of the acreage adds to the value over the aggregate sum of the values of the leases separately. This is particularly true in the Panhandle where the owner of a small lease is at the mercy of a local market which may be developed, a market that he did not himself create or control. Therefore, an isolated tract of 160 acres, or 320 acres, or even 640 acres owned individually would not have much value. It may be in a prolific area, it may be in the highest potential area, but still it would not be large enough to create its own outlet. Therefore, a large reserve or a number of leases under one ownership which could and would create an outlet to a distant market, has additional value over that of an isolated or individual tract. The owner of a large block of acreage can go out and seek, and probably find, an outlet which any one of these individual owners of small tracts would find absolutely out of the question. The reserves of Texoma are sufficient through the pipeline of

Texoma and Natural Gas Pipeline Company. They are of sufficient size, are located in proven areas, and would create an outlet to a distant market. In the case of Texoma I find agreements which have brought to its reserves the advantages pointed out in the illustration I discussed a little while ago. A great majority of Texoma's reserves are held under what they call consolidations. Through these consolidations they have brought about a grouping of their small leases or an understanding as to the development of their larger leases. Contracts have been executed between the land owners who won the royalties under the different leases and the company, consolidating under one contract or operating arrangement several leases under which agreement one well or two wells, as the case may be, will hold these leases in force as long as gas is produced from this one or these two wells. These contracts further provide that all of the leases within that consolidation are held in force even though they go beyond their primary term—and I find some leases that, under their original form, would have expired if it were not for these consolidations; that they will not be required to pay rentals to these land owners and are not required to drill offsetting wells. The owners of the land on which are the leases included in a particular consolidation agreement and on which wells have not been drilled, participate in the royalty from the well that has been drilled on some other tract whether he has any interest in the land on which the well was drilled or not.

1003 These contracts provide that the withdrawals of gas from that well shall be taken in proportion to the open flow and the acreage covered by the consolidation agreement as a whole, and the owner of a tract of land on which there may not be a well participates in the royalty in proportion to the ratio of his acreage to the whole. It certainly is a very very great advantage to an operator because he can defer the drilling of many wells until such time as his market requirements would justify the drilling of additional wells.

I find that of the 140,000 acres in Texoma's reserve there are over 98,000 acres that have been validated under these consolidation contracts. Now, the other acreage owned by Texoma, the larger part of it is held in large tracts like those of the Magnolia lease in Carson County and similar tracts. The Magnolia lease, for instance, covers 4,500 to 5,000 acres.

The record shows that no rentals will be payable on Texoma's acreage after the year 1940. That means that these leases will have all become validated or cured, to use an oil field expression, without the payment of further rentals, by reason of the fact that wells will have been drilled on the tracts covered by those leases or on leases covered by consolidation agreements. That circumstance adds to the market value of Texoma's lease reserves in the Panhandle. When I said that the owner of the consolidation obtains an added value under the consolidation agreement by reason of deferring drilling obligations, I mean that his contractual obligations to drill wells for the purpose of keeping the lease alive or to prevent its termination at the end of the primary term and the obligation to protect against offsets in the case of this more than 98,000 acres covered by these consolidations, have all been discharged and he will not have to drill any other wells unless he wants to drill them to meet the purposes of his business. The placing of several leases, like the four I used in the illustration, under one consolidation agreement changes the value of the aggregate of the four leases taken separately. In fact the individual leases have almost completely lost their orginal identity. You will find in the consolidations tracts as to which the leasehold estate is in full force and effect although the original lease or leases covering such tracts have long since expired by their original terms. If they were operating under their original lease agreements these leases would no longer be in effect.

(At this point counsel handed the reporter a document captioned "Market Value of Leases of Texoma Natural Gas Company by R. J. Wallace" with the request that it be marked as an exhibit for identification. At the direction of the Examiner the document was marked Exhibit 131 for identification.)

I have classified into separate groups or classifications the acreage owned by Texoma Natural Gas Company as of June 1, 1939. I found it necessary to classify the acreage or reserves of Texoma in several different classifications, for the reason that they are in several parts of the field where different conditions exist. I made a classification for all of the acreage as of the present date, but excluded leases which Texoma will cancel during the years 1939 and 1940. I asked for a list of the leases to be cancelled by the end of 1940 and received such a list from the management.

1004 I have grouped Texoma's reserves into eight classifications and have designated those classifications A-1, A-2, A-3, B-1, B-2, B-3, C, and Sour Gas acreage.

In classification A-1 I have included what, in my judgment, is the choicest or best acreage. In Class A-2 I included acreage which I found had some factors which did not classify it as being the highest type of acreage, and so on down in each class. The sour gas acreage is acreage which appears within what is generally accepted as the sour gas area as of the present time. The sour gas line, or line between the sour gas area and the sweet gas area, has been designated and is generally accepted by operators and buyers of leases as being there, although the production comes from one common source. For some unexplainable reason there is a sour gas line there and I have excluded the acreage on the sour gas side of this line.

In classifying this acreage I have weighed all of the elements entering into the value, those elements that add to the value and that detract from the value of these leases. I have classified them into these eight classifications as a result of the exercise of my best judgment as to which classification they fall under in the light of all the factors. I have taken each lease separately and studied it as to its location, as to potentials and rock pressures, terms, conditions as to the location to other acreage, and have made a notation in my exhibit on each lease of these points and have placed it in the classification under which, in my judgment, it would fall in the light of those factors.

I have not included in the valuation of a particular lease on which there is a well or several wells the value of the well itself and the equipment belonging to the wall. I merely used the well as an index to me as to the potential area in which the lease is located, or the production from the well as an index to what a particular lease owner might expect to recover from this land.

In the classification and valuation of these leases I have not considered them as a part of the pipeline system composed of defendants, and have placed no value on them as if they were connected to any pipeline. I have valued them as if they were not connected to the line of Texoma. My judgment is that if this reserve were available to be purchased by buyer that he could and would create an outlet to a distant market.

I have before me a copy of Exhibit 131 for identification. This exhibit was prepared by me and under my direction. I have set out in this exhibit the leases on which I have arrived at the fair market value as of the present time. I have taken each lease separately, shown the lease numbers as corresponding to the numbers of the books of Texoma, the date of the lease, the term of the lease, the book and page on which it was recorded, the name of the lessor, the county in which the lease is located, the number of acres, the description of the lands, and the number of wells, if any, on each lease, the date when the well was completed, its initial open flow and the rock pressure as set up on the records of Texoma.

I have also included the latest open flow and rock pressure observed on the books or records of the Texas
1005 Railroad Commission. I have shown the royalties
payable to the land owners under each lease and whether or not the lease is now producing. I have put on each sheet the numbers of the other leases that are included in this particular consolidation, and I have also noted by remarks as to the location of the acreage with regard to the potential area and as to whether or not it was a part of a consolidation. I have marked on each lease my opinion as to its classification and value. I have placed in this exhibit one of these consolidation agreements of which I have testified as an illustration of what I am talking about. This copy I selected because it is a representative form of contract. Following that, I have briefed each consolidation, giving the county in which it is located, the number of the consolidation as set up on the books of Texoma, the name of the consolidation, the date, the total acreage, the number of leases included in the consolidation, and the lease number of each of those leases and the description of the lands. I have also made a notation as to the number of wells of which this consolidation agreement defers the drilling, by which I mean the number of wells that would have had to be drilled under the terms of the leases affected by the consolidation and which the owner is no longer obligated to drill.

This typical consolidation agreement appears between the tabs marked "Consolidations" and "Moore County." It is an agreement between W. H. Taylor and Texoma

Natural Gas Company. Under its terms, four leases originally executed by this lessor and finally acquired by Texoma were consolidated into one development unit. The first lease was dated April 14, 1926 and covered 608 acres; another dated April 19, 1926 covered 320 acres; the third dated August 16, 1929 contained 209 acres, and the fourth dated April 19, 1926 contained 125 acres in one tract and 160 acres in another tract. While there were four leases affected by the consolidation these four leases in fact embraced seven different tracts of land as of the time Texoma acquired it. That is, they came to Texoma under seven different assignments. That was due to the fact that the land covered by the original lease had been subdivided and a part of it assigned to one owner and a part to another before these leases were finally acquired by Texoma. By the terms of paragraph 2 of this consolidation agreement no further delay rentals were required to be paid on the whole 1,422 acres after the drilling of the first well. Over on the next page, in paragraph 6, we find this provision:

"There shall be no obligation on Texoma to drill offsets to any gas well which may be drilled on or produce gas from neighboring lands; but Texoma may drill additional wells, if, as and when it so desires."

That is the provision about which I was talking when I referred to the advantage and the added value to the reserve covered by one of these consolidations over the aggregate sums of the values of the separate leases not so consolidated. In the record is an exhibit numbered 68 from which I show the Examiner the location of the lands covered by that consolidation agreement. First is the lease of all of section 21 belonging to J. B. Wheatley in Moore County. This is located at the place to which I am pointing on the map. It is a long tract of land, the description of which I have just stated. Right down in that section, in the area colored red below the letters "O." and "R." in the spelling of "Moore" County appears this 608-acre tract. The second tract is the E/2 of Section 19, Block M-1, Moore County, containing 320 acres. This tract adjoins the 608-acre tract. It is immediately south of the east end of the first tract. The
1006 next tract is the west 82.3 acres of Section 18. It is the tract immediately adjoining the first one on the northeast corner and is a long narrow tract. Next

is the north 126.7 acres of the west 251.7 acres of Section 17, a tract which adjoins the first tract on the extreme east, running north and south, and is a very long narrow strip. The land covered by this lease is 126.7 acres at the north end of this narrow strip. The fourth lease covers the south 125 acres of the west 251.7 acres of Section 17 and is the south portion of the same tract off of which the north 126.7 acres above mentioned is cut. And in that lease, quite far removed, a mile or more away, is the NE/4 of Section 20, Block M-1, in Moore County, which is a small square located at the place to which I am now pointing.

As a result of that consolidation agreement those tracts have been brought together in this irregular shaped form here, under one consolidation, with the provision that Texoma shall not be required to drill but one well on the whole 1,422 acres, and that no offsets would be required. If that were in separate leases it would be a very dangerously shaped lease because there are so many boundaries exposed for offsets. A purchaser, in viewing that lease, would take that circumstance into account, and he would place a higher value on it because of its having been brought under a consolidation than he would if it were still under the four leases separately.

A while ago I spoke of the Magnolia fee land which is all under one lease. I could indicate it approximately on this map, but if you wish a description I will have to check that from the records. It is in Block 4 of the I&GN RR Co. Survey in Carson County. It is in the part of the west side of this larger block shown on Exhibit 68, at the place I am here indicating. It is colored in red on this map.

I will now go through the exhibit and explain it briefly. The first article in the exhibit is an introductory statement in which I have included a description of the field itself, its location, approximate number of acres considered to be proven sweet gas acreage, and a general statement as to the location of the Texoma leases. Reference is made in this introduction to the development of conservation measures in connection with the operations of stripping plants through which for several years the gas was being exhausted at a rapid rate and wasted to the air. Reference is also made to some of the factors which

I have considered in arriving at my judgment as to the value of the leases.

The next subdivision is under the tab called "Summary" in which I have taken the leases of the Texoma Natural Gas Company and classified them as to developed leases and undeveloped leases for each county, showing the total acreage under each classification and the total value of the acreage under each classification. I have also shown the total acreage by counties and the total value by counties. This is followed by a recapitulation showing the total number of acres under each classification and the value thereof. I arrive at a total valuation of $13,288,552.10. This appears in the summary of the details shown in the exhibit.

I have also included an index alphabetically of the leases by counties. This index shows the name of each lessee, with the lease numbers that will correspond with
each sheet in each county. The lease number is
1007 indicated over on the last column on the right-hand
side of the index page.

Coming back to my summary sheet, it will be noted that I have classified under the classification A-1 in Moore County 30,931.86 acres. In my opinion, the market value of that acreage at the present time is $3,866,482.50. This is an average of $125 per acre. This is the average value which I have placed on all of the A-1 acreage under my classification of these reserves. I have found A-1 acreage in Moore and Carson Counties. In Carson County I placed under this classification 24,195 acres which, in my opinion, has a value of $3,033,375.

After weighing the various factors, I have classified some of this acreage as Class A-2 for reasons already stated. In the light of those factors it is my judgment that this A-2 acreage has a value of $100 per acre. The Class A-3 acreage, in my judgment, has a value of $75 per acre. The Class B-1 acreage has a value of $50 an acre, the Class B-2 acreage has different values ranging from $20 to $35 per acre. Some is valued at $20, some at $25 and some at $35 an acre. The acreage valued at these three different prices of acreage classified under B-2 is shown by individual leases. On acreage classified as B-3, I place a valuation of $15 as to a part of it and $10 as to the other. The explanation is found in connection with the discussion of the particular lease. On the acreage classified as C-1 I have placed a valuation of $10 or less per acre. I have given no value to the sour gas acreage for the reason that although it has a value for certain purposes, entirely different factors and conditions govern as to the valuation of that acreage and I have not made a study of those factors in the sour gas area. I have given no value to any acreage not a part of the sweet gas reserve.

In each of these classifications and in each of these valuations I have weighed all of the factors that I have stated here, and exercised my very best judgment as to the classification on which each tract or each lease or consolidation of leases would fall. In my opinion this sum of $13,288,552.10 to which these valuations add up is the reasonable market value of these leases at the present time.

Cross-Examination by Mr. Slaff.

There may be an arithmetical error in making up the total valuation placed on the A-2 acreage in Moore County. I can recheck that but I will have to go through most of the leases in order to do so. I applied the $100 an acre to each lease when I classified it and then totaled each lease. These errors, if any, I feel quite certain are attributable to the fact that some of the acreage figured out in fractions and I may not have taken into account the fractions of acres. My regular work sheets are not with me. I will check the matter during the noon hour.

I testified in the rate case before the Kansas Corporation Commission in July, 1931. The Cities Service Company was involved in that case. Also before the Illinois Commerce Commission in July, 1932 for the Peoples Gas Light & Coke Companay. In January, 1935 I testified before the Kansas Corporation Commission for the Cities Service Company. I believe this summarizes all the rate cases in which I have testified. In all these cases I was testifying on the valuation of leases.

1008 *Cross-Examination by Mr. Booth.*

I have made no studies of the life of the reserves in the Panhandle field in connection with my work on these valuations. At no time in connection with my work have I made any studies of the life of the reserves. As to whether I consider the life of the reserves a factor in determining the value of the leases, I consider the producing history of the well, which does indicate to me something of its life, but I would not venture to deal with the lives of the reserves. I am not an engineer.

The life of the reserves is a factor that would be considered, I think, by the purchaser of leases. He would have his engineers make up an estimate of their judgment of the life of the reserves. However, I do find that in cases where you have on a property a well which was drilled several years ago, and which has been producing for several years, and its original flow and rock pressure indicated a certain amount, and at this time it would show a small decrease in rock pressure or open flow, it would indicate or give you some idea of the life; but I could not venture to say how long it would produce or how much gas it would produce in cubic feet.

I think that is a factor which a prospective purchaser of leaseholds would consider in determining the price he might pay for the leaseholds. I do not believe that the total amount of natural gas in the field would affect the market value of the lease. It might affect the percentage of earnings that the owner might expect to make if he were delivering that to a market at a price. The price condition would have to be in there. You have to have a price for the gas recoverable from the reserves per acre; you have to establish that. I think the extent of the reserves does affect the price. I did not calculate the amount of recoverable gas per acre when arriving at my valuation. I did not give any consideration to that item because I do not know the amount of recoverable gas. I could not say that all of the factors which I considered were stated by me in response to questions directed to me this morning by Mr. Morgan. I believe that I know pretty well the minds of the sellers of leases and the minds of the purchasers of the leases. I have been in constant contact with them for a number of years and have taken into consideration those conditions that I feel, from my experience, that I know something about. You cannot break it down into dollars per acre, but I have considered those things along with the entire work that I have been doing.

In response to questions by Mr. Morgan I indicated some of the factors which influenced the market value of leaseholds. Those are the factors which I considered in arriving at the market value of these leaseholds shown in Exhibit

131. There were probably other factors which I did not enumerate. There are things that you see but I cannot just explain what they are from an operator's standpoint which put one lease in a little better favor than another—accessibility and so forth. There are factors that I considered other than those that we have put in. I do not know that I could name or explain just each one. I believe lease for lease I can pretty well do that, generally.

I think I stated the main factors. I do not recall any other factors at this time, but if we will go through this lease by lease I may find that I have made notations of other factors that I considered. I do not recall all of the factors that I named in response to questions by Mr.
1009 Morgan. You might have that read to me. Every
factor I named did have a great bearing on the proper placing of this acreage in the classification to which I assigned it and on its value. As I recall most of the important factors were brought out. I cannot say now that they were all brought out. I am afraid I will have to have those factors before I can answer your question as to whether or not I have named all the factors I considered. I will state that some of the factors that I had to use in arriving at my conclusions reflected in Exhibit 131 were the conditions of each lease as to its terms and the acreage contained therein; those leases that had wells on them, the conditions and the producing history of them, each well, from the time they were drilled in up to the present time. I had the history of each and every well and considered that as a factor.

The acerage as being blocked in with the other acreage owned by the Texoma Natural Gas Company, the consolidations of which I spoke and on which I spent a great deal of time, I considered very important factors. The accessibility of the acreage generally was another factor. I mean that although it covers a large area in miles from the west to the east, yet it is so located that it is readily accessible to the gathering system that might be built to market the gas. I considered also the potential of the area in which the acerage is located and indicated by the wells drilled not only on the leases of Texoma but other lands. I have a record of every well in the field within these areas showing the open flow and rock pressure, and the amount of gas marketed from every well as well as the amount of gas in cubic feet marketed from the wells of Texoma. By the potential area I mean the productivity of the area as indicated by the wells drilled within that area. This is an important element in the minds of the seller and the buyer. I think the factors I have named are the principal factors that I considered in there.

There probably would be other elements that would enter the mind of the buyer and which he might consider of importance, but I think the things I have mentioned would enter into his mind. Those are the things that you would have to know in determining the market value of the leases of Texoma. I know that the purchaser would consider these factors and he might consider others, but I do not know what they would be. These are the factors which I consider to be most important. I do not think of other important factors at this time. I do not think that I know what would enter into the mind of the prospective purchaser other than those factors which I have mentioned. There probably would be others.

Redirect Examination by Mr. Morgan.

I have studied the production history of each well and acquainted myself concerning the quality of gas which has been produced from each well, the rate at which each well would be capable of producing gas, and the rate at which it is producing gas at the present time. It is also true that a prospective purchaser of oil and gas properties frequently has engineering studies made of the potentialities of the leases under consideration. It is not always true, but engineering estimates of the recoverable amount of gas or oil are quite often made by prospective purchasers from the indications derived from the history of these wells and adjoining wells.

1010 *Questions by the Examiner.*

I have indicated the value of an acre, as I say, from my knowledge and my opinion of the minds of the seller and the buyer. There is no question but what several of the Class A-2 or A-3 or B-1 leases will probably develop to be as valuable as that Class A-1 acreage and that some A-1 acreage will not be as valuable as I have indicated. But the law of averages, I am quite certain, will prevail and the buyer of leases under this classification would feel secure that the law of averages would prevail.

In arriving at the $125 per acre basis for Class A-1 acreage I had to take into consideration several conditions there. I first took into consideration and allowed to it the density of drilling, 320 acres per well. In the east part of the territory 160 acres is used while in the west 640 acres is used, but I have never known of another field where as much as 640 acres per well was used. Therefore, I have allocated, and I think a buyer of leases would, 320 acres per well.

I also found from my investigation that the average field price for gas, a fair average field price, would be 4 cents per thousand cubic feet on a 16.4 pound basis. That is recited in a number of leases which I have read and in division orders of this company and other companies which I have read. If a buyer should pay $125 an acre and drill a well thereon costing him approximately $20,000, which I find is a fair average in the field, at 4 cents a thousand, he would pay the one-eighth or one-half cent per thousand to the land owner, and I have allowed 1 cent per thousand for operations, which is very high. The lease would have to produce approximately 7,500,000 cubic feet per acre to amortize the purchase price and the cost of drilling the well and producing it. This field, to my knowledge, has a proven producing area. The dry hole factor has been eliminated and it does not, in my judgment, seem to be a large amount per acre to produce to amortize the investment, and the buyer of the lease would consider that he could amortize that investment at that price and yet make a fair and reasonable profit. That was my approach to the $125 value.

Redirect Examination Resumed by Mr. Morgan.

In arriving at my judgment of the price per acre to allocate to the choicest or A-1 classification, I have made a study of the withdrawals and the amount of gas produced from the acreage that was owned by the several companies who market gas through pipelines. I went to the office of the Railroad Commission and from their books I took the total amount of withdrawals from all the wells of Texoma Natural Gas Company. That information I also had from the companies' records and the records of Canadian River Gas Company, Cities Service Gas Company, some of the properties of Hagy, Harrington & Marsh, and the records of the Huber Corporation, the Northern Natural Gas Com-

pany, the Panhandle Eastern Pipe Line Company, the Shamrock Oil & Gas Company, and the Red River Gas Company. I took those wells of the companies that were connected to pipelines under purchase contracts and took the total withdrawals of gas that had been produced up to November, 1938, which was the date I ascertained this. Not knowing the operating expenses of the many companies here, I used for my problem the allocation of 320 acres per well as the drilling density, and at 4 cents a thousand, which I had satisfied myself was the average field price, I figured out the amount of gas in dollars per acre that had been produced, the gross amount for each company. The overall or weighted average, considering the total number of wells of all of these companies, the total withdrawals, 320 acres per well, gave me an amount of
1011 $334.42 per acre that had been produced from these wells connected to gas pipelines. That gave me some indication of what the capability of earnings of this property was, and with my general knowledge of the field from a good many years of watching it, discussing it with engineers, operators, and heads of companies, in my judgment I am satisfied that there is still over 50 per cent of the reserves yet to be produced.

In addition to that, I knew of some transactions in the early history of the field in southwestern Hutchinson County of some acreage that was sold for more than $125 an acre, at a time when we did not know the producing history of the field. Taking all these things into consideration I placed a price of $125 an acre on my very choicest locations. From that point on, in classifying the acreage as to the many factors that I have explained, to that acreage which falls in Class A-1 I allocated $125 an acre. In other words, I tried to take an overall picture of the whole field for my judgment and not one particular tract at a time.

Questions by the Examiner.

I know that the $334 and some cents is the gross figure. I did not know the operating expenses of the different companies, the large organizations, and things of that kind. It would no doubt cost different prices per acre, but from my experience as an operator I felt that $125 was an acceptable value there. It has already produced a gross of $334 an acre as an average over all the wells connected to the pipeline, and I felt that $125 per acre was a safe value, a good, reasonable price, knowing in my judgment, and from my investigation, that there is well over 50 per cent of the production yet to be recovered. That is customary, I might say, in purchasing acreage. A company will pick out a certain area that they wish to go into. They will allocate a price, $50 an acre for this area, $25 for another, $15 for another. They do not pick out certain tracts within that area. It is a figure which they figure the law of averages will maintain in there. It is very customary among buyers of leases, in my judgment, to do that.

Redirect Examination Resumed by Mr. Morgan.

The weighted average of all these companies' wells connected to gas pipelines of which I could find the record in the Railroad Commission office, using 320 acres to the well and 4 cents a thousand as a field price, showed they had actually produced a gross of $334.42 per acre, on an average. I took as my judgment figure of what a purchaser would consider the choicest of the acreage to be worth, very substantially less than half of what the average production had been, based on that kind of a unit. A purchaser of acreage would unquestionably want to know what has been the average over the entire field, instead of the particular acreage he is considering buying.

Recross Examination by Mr. Slaff.

If I understand your question correctly as to anticipated production, I am quite certain that this field is recognized as a proven field. The dry hole hazard is eliminated and would be from the mind of the buyer of leases. I do not believe I have in mind specific ratios showing the relativity between price or value and production or anticipated production as expressed in dollars. I may be low on that price. I do not know. But I do feel, from my judgment and experience, that I have set a price as to which a buyer would consider that there is over 50 per cent yet to produce and he could pay charges and still realize a nice profit. There is no significance in the way Judge Morgan's question was phrased, that the price I set on this choicest acreage was half or less than half of the production in dollars today; I did not take a ratio of the weighted average at all on that.

1012 **K. V. ZWIENER**, a witness for defendants, testified:

Direct Examination by Mr. Hedrick.

(September 7, 1939.)

My name is K. V. Zwiener. I live at Evanston, Illinois. I was graduated from the University of California at Berkeley in the School of Commerce, majoring in economics. I am assistant cashier of the Harris Trust & Savings Bank, Chicago. This bank has total resources of approximately $285,000,000. I have been with that institution a little over ten years. Early in 1929 I went to the bank in the investment department. Prior to the enactment of the Banking Act in 1933 we maintained a bond department with representatives throughout the country, and I went into that division and represented the bank on the Pacific Coast. Subsequently the department was disbanded because the distribution of corporate securities was no longer permitted under the Banking Act; so I transferred back to Chicago and continued working with the securities division in connection with the purchase of bonds for our own portfolio and in connection with the servicing of accounts that we handled for individuals and corporations. I also made special surveys of investments for use in the handling of trust funds. Of course, we do not actually handle corporation securities any more except on order, but I am practically in daily contact with the markets for all types of bonds. My present work is primarily in one of the loaning divisions working on term credits. That, of course, means that we have to be watching the comparable return that the companies would get in the open market, and we are watching them constantly. I also consult with and work with the bank investment committee which does the purchasing of bonds for our own portfolio.

Our bank has a trust department which handles funds of various clients in a fiduciary capacity.

Of course, we all recognize that there is no security which is absolutely "risk-free." To me, and I think generally, the term "risk-free securities" has meant securities on which we feel sure we will have our principal paid at maturity and the interest will be paid as it become due and payable. To state it differently, they are securities which are closest to being absolutely risk-free that are available.

I believe the United States Government securities, that is, United States Treasury notes and bonds, direct obligations of the United States, are considered to be as close to being risk-free investments as we have available in the market today. I think you can so classify the high grade municipal obligations, that is the direct obligations of states, counties, cities, and other municipal divisions that have a high credit rating. By those having a high credit rating I mean those in which the relationship of debt to assessed valuation is relatively small and that have the support of unlimited taxation. I think such securities are pretty generally
1013 classified as risk-free investments. Bonds of this type are those of the State of Illinois, the State of Missouri, and the State of New York. I do not think you would classify many of our large cities in that group, at least none of them that I know of offhand.

If our bank as trustee were requested by a client or customer to invest a sum of money, say $3,000,000 or $4,000,000, in risk-free securities or the best type of securities available, with the greatest degree of certainty of a return of the principal at its stated maturity, and the payment of interest as it accrues, I think under such instructions I would be limited almost entirely to United States Government or municipal bonds. I do not think there are enough other securities which would meet the qualifications, that is, if there is any limitation on the maturity factors. For the most part, corporate bonds are very long maturities these days, and the yield obtainable does not compare favorably with United States Government or municipal bonds.

Under present conditions it has not been possible to accumulate any sizable block of high grade municipal bonds of relatively short maturities at any one time. It has usually taken a period of time to accumulate these securities. Governments you can obtain on practically any one day and buy a sizable amount. That is, there is always a very substantial amount of trading on Governments between dealers on the New York Stock Exchange daily.

(Company Counsel states purpose of testimony to show what rate of return or what yield an investor would have on investments under the sinking fund theory of amortization.)

The maturity date of a Government bond, of course, is the fixed date on which the principal becomes due and payable. All of the Treasury notes are issued with fixed maturities at a specified date: March 15, June 15, December 15, 1939 or 1940, whichever year you use. In the bonds you have not only your fixed maturity, but the Government has reserved the option to prepay these securities on a specified date. Such date is designated the optional call date. The optional call date would be the date on which the bond can be called for payment at par and accrued interest. The fixed maturity date is the date that the Government actually has the obligation to make the payment of the principal in full.

In the handling of a fund for a corporation of this character, such as Natural Gas Pipeline Company of America, since the fund has to be liquidated on a specified date, we would not buy bonds which have a fixed maturity extending beyond the date on which the fund would have to be liquidated even though the optional date came before the date of liquidation. Under the instructions you have outlined the fund must be returned or liquidated on a specified date. Operating as a trustee, or in a fiduciary capacity, we would not feel that we were at liberty to invest in bonds that matured beyond the specified date indicated, and we would therefore limit the maturity, that is the actual maturity date, within the liquidation date of the fund. It is readily apparent that we would be taking a risk of market fluctuations in any securities if we had a maturity later than that specified liquidation date. In other words, if the fund which the bank had accumulated as a trustee had to be liquidated on December 31, 1954, we would buy securities having a maturity date prior to that time.

1014 I have made a study of the yields of bonds that would meet the specifications I have stated, which would include only United States Government bonds and certain high grade municipal bonds. I was asked by the management of these companies to make such a study. This request came on August 15, 1939, and I made the study immediately after that time. I used the closing market prices as of the date last mentioned in that study.

If we assume that we have a fund of, say $4,000,000, which would have to be invested on the first of January, 1940, and a similar fund to be invested annually thereafter, and all of these funds had to be liquidated and returned to the company by the end of 1954; and if we take into account the market prices as of the date stated, August 15, 1939, for such securities as would be available for that purpose under the statement I have made, the yield to the investor, according to my calculation on Government bonds existing as of August 15, 1939, would be approximately 1.52%. That would mean that the first year we would invest $3,000,000 or $4,000,000 in a 15-year maturity. Using the prices prevailing on that date as a guide, I have taken the corresponding yields as though we were investing the fund for the whole 15-year period as of that date. Answering your question whether 1.52% would be the net yield that the investor would secure, there would be a trustee's fee, of course, for certain expenses involved in the handling of an account of that type, and there would be a charge for handling. Using the usual schedule of fees on a sizable fund, around .17% should cover these charges. That is the yield on the bonds using the call date and maturity, depending upon the coupon rate as a guide of what you might obtain for each one of these individual years.

I have given a little consideration to the fact that there are no Government bonds actually available today that meet the exact date of December 31, 1954, for example. There is not a bond that comes due exactly on that date, so I have added in a little higher yield in some instances because we do not know from this point on what type of government securities will be outstanding. The markets as of August 15, 1939, serve only as a guide.

(At this point counsel handed the reporter for identification a document entitled "Quotations and Yields of United States of America Treasury Notes and Bonds at Close of Market on August 15, 1939." At the direction of the Examiner, such document was marked Exhibit 132 for identification.)

I have a copy of Exhibit 132 for identification in my hands. I prepared that exhibit and will explain what it is and what it contains. The first column is the coupon rate of the various securities listed. The next column gives the maturity date of these securities. The next column gives the optional call date of these securities on which the Government has reserved the right to prepay. Under the column "Optional Call Date" there is no date indicated for "United States Treasury Notes." The reason for that is that the Government has not issued these notes with the optional feature. They are a short term security bearing a very low coupon rate. There is little or no chance of refinancing those because of the shortness of the maturity.

The next two columns of "Quotations" give the bid
1015 and offered prices as of the closing date indicated.

The next two columns show the yield in per cent. The first one would be with respect to the call date, if the issues were callable, and the next column gives the yield to maturity based on the fixed maturity of the notes and bonds. The last column indicates the amount of the issue outstanding in the hands of the public. It is noted that there are very substantial amounts of each maturity outstanding, which gives an idea of the opportunity we would have for purchasing those on any one date.

For example, take the issue of 3¼ bonds due October 15, 1945. This is the fifth item from the top under "United States Treasury Bonds." There is one billion four hundred million dollars of those outstanding in the hands of the public. At the top of the column on the extreme right-hand side there is no amount outstanding for the reason that the bonds there listed were due on September 15, 1939, and payment of those has already been provided for.

Questions by the Examiner.

Take the second item there, 1⅜ due December 15, 1939. They are quoted at 101-10/32 to 101-12/32, which is a negative yield. You do not get any yield on those bonds. If they were selling at par, 100.450, there would be just a zero yield to the maturity date. That comes about in most of the short term securities for a sort of a right value attached to them, because the Government has offered exchanges and the holders of these notes expect to get a new note that will immediately go to a premium that will offset the premium on these. On this particular day the first four maturities on the notes were actually on the negative yield basis. We had to go down to March 15, 1941, before we got to a zero basis and to June of 1941 before we could get a positive yield of any kind.

Direct Examination Resumed by Mr. Hedrick.

(At this point counsel handed the reporter a document entitled "Average Yield Obtainable from Investments in United States Government Notes and Bonds." Such document at the direction of the Examiner was marked Exhibit 133 for identification.)

I have prepared Exhibit 133 for identification, which is a tabulation showing the average yield obtainable from investments in United States Government bonds and notes during the next 15 years, based on the prices of those bonds and notes as of August 15, 1939. I have a copy of that exhibit before me.. This is an attempt to show about what the yield would be on the fund if you invested a certain amount, say, for example, on January 1, 1940, calling that the first year, and the nearest maturity that you could possibly get would be the June, 1954 range, and so on down. The second year you would invest for 14 years, the third year you would invest for 13 years, and the indicated yields in the Government's' outstanding today were used as a guide for obtaining an average yield. The description there is the coupon rate in per cent.

The coupon rate in per cent and maturity date and optional call date, the asked price, the yield in per cent of those particular bonds are shown in connection with the bonds outstanding and listed in Exhibit 132 for Identification.

I selected the particular bonds listed on Exhibit 133 because they come about as close to the maturity as we would want in a fund where the liquidation date is specified 1016 to be December 31, 1954. I, of course, selected bonds with a maturity prior to that date, and these particular bonds here listed have maturities closest to the date December 31, 1954 of any bonds obtainable.

The third column shows the maturity date of the notes of bonds, and the fourth column shows the optional call date. It just happens that the bonds I selected for those years to use as a guide were not optional bonds. As a matter of fact, they give a better indication of yield over a period of time than optional bonds because we are not dealing with the unknown factor of whether the Government will take them away from the owner on the optional date. Of course, treasury notes, which are used from the eleventh year on are non-optional bonds, also, or non-optional notes. If the Government should take any of these bonds away from the owner at a call date prior to the maturity date, we would have the fund on our hands and would have to reinvest it. In that case we would have to invest in other Government bonds of a shorter maturity, with the result that the yield under the conditions that prevailed on August 15, 1939, would be decreased.

I am not attempting to predict what the interest rates or the yields on investments will be over the period of fifteen years. In the fifth column in Exhibit 133 appears the asked price. I used the asked price instead of the paid price because the asked price is the price which the investor has to pay for any security, and the yield is figured on that price. Unless you are in the seller's market it is very seldom that you buy Governments on the bid side of the market. The only indication we have of what we can actually buy them for is the price asked. The second and third columns from the right-hand side under the heading "Yield — %" shows respectively the yield to the call date of the bond and the yield to the maturity date of the bond.

In a general market as it existed on August 15 the yield to maturity on that first issue is about 2.05%. That is about in line with my judgment of what a 15-year obligation of the Government with a low coupon would return at that time. I mean it did not appear likely that a 2¾ per cent bond would be refinanced, so we gave the weight to the maturity factor, although you are not sure even in that instance that you will get 2.05% because the possibility is that it may be called, in which event it would allow only 1.92%.

In the first group of bonds which would be purchased in the first year, of course, the maturity would run down almost to the date of liquidation, and we would have a yield on that particular sum of money invested almost to the liquidation date on the entire fund. The last column gives consideration to the fact that we do not have actual maturities to fit right on December 31, 1954, and if they were noncallable bonds of a fixed maturity right straight through the 15-year period, this, in my judgment, is about the yield that would be obtainable on this type of security.

This 1.52% yield is not just an arithmetical average. We have given consideration to the fact that the first year we have the fund invested for a 15-year period at 2.05%, and therefore you have got to give it a greater weight by 15. The yield of 1.95% on the bonds bought the following year would have to be weighted by 14, and so on. As a result the average yield is pulled up above the arithmetical
1017 average. Therefore, this 1.52% is the weighted average, giving consideration to the fact that the funds are invested in a higher yield of security for over a longer period of time than in the low yield securities. For example, if you had a $4,000,000 fund invested at the beginning of the fourteenth year, you would only receive a return of about .07%, and this schedule weights that in accordance with the 15-year schedule. The longer term bonds have a higher yield to maturity, and the short term bonds, such as those running for only one year, for instance, have a much less yield.

Questions by Examiner.

If, for instance, the fourteenth year began on August 15, 1939, I would have selected that issue on next to the last line for investment. The schedule is based on conditions as of 1939. The relation between Exhibits 132 and 133 is that Exhibit 132 gives all of the issues that are available for investment, that is, all the Governments that are outstanding, including both notes and Treasury bonds, and Exhibit 133 is a selection from those shown in Exhibit 132.

Direct Examination Resumed by Mr. Hedrick.

That is a selection I made of securities having a maturity closest to the date of December 31, 1954 or reflecting about the average yield for a specific period. For example, there in the ninth and tenth years I have used the December 15, 1945, maturity, the 2½ at 1945 in both cases giving the ninth year a yield of about .10 of one per cent better than the yield in the tenth year. That would be about the usual spread at that period.

No investment in the fifteenth year is shown. The reason for that is that there are no Treasury notes available today on which you can obtain a positive yield for a one-year period.

This .17 of one per cent opposite the line "Less Cost of Administration" is the bank trustee's charge, to which I referred, and the subtraction of that amount from 1.52% of course gives the net average yield to the investor.

The reason we could not go out on the stock exchange or over the counter and buy most any kind of a bond for an investment of this character is because we have more of a credit risk in most any type of corporate bond. When you go out in that field it is necessary to be very selective in obtaining the type of security that could be used in a trust fund account. Many issues of bonds outstanding have a high ratio of debt to property or earnings. It might be in an industry where your earnings fluctuate widely that circumstances would necessitate reorganization. Under such conditions we cannot be sure of the payment of the principal or interest as it accrues.

In other words, if this company wanted to invest funds so that it may have some kind of earning and at least get its principal back without fail, the only way to accomplish that purpose would be to invest in these risk-free securities which you say are United States Government bonds and municipal bonds.

1018 *Direct Examination by Mr. Morgan.*

I used the term "$4,000,000 on the first of January" for the purpose of arriving at a basis for my testimony. My testimony would be the same if the amount to be invested varied from $4,000,000 by $1,000,000 more or $1,000,000 less, or if any other date in the year were involved instead of the first of January. I used that figure because we were talking about a substantial amount.

Cross-Examination by Mr. Booth.

I did not say that one of the duties of my position is to advise the bank as to how it shall invest its own money. The policy with regard to investments is not handled by any one man in the bank. It is handled by a bank investment committee. I am not a member of that bank investment committee, but I consult with them in the purchase of securities for the bank's portfolio.

(Colloquy between Counsel and Examiner with respect to question asked by Counsel for Illinois Commerce Commission.)

Questions by the Examiner.

I have never advised corporations on the question of what their policy should be with respect to their sinking fund, whether they should invest in certain types of securities or return the money to the plants.

Cross Examination Interposed by Mr. Slaff.

We are consulted with respect to investments the corporations should make of funds they have available. I have handled that myself directly in a great many instances. We advise them from time to time as to what in our judgment are sound and prudent investments for them to make in the light of circumstances surrounding their corporate existences and conditions at the time.

(Colloquy between Counsel and Examiner with respect to objections on admissibility of Exhibits 132 and 133.)

Cross-Examination Resumed by Mr. Booth.

My testimony is that under the instructions stated to me as a predicate it is desirable for these companies to invest their depreciation or amortization moneys in Government securities. I did not express the opinion in my testimony that was desirable for this company to invest this money in Government securities as shown on Exhibit 132. I was only showing what the yield would be on risk-free investments if the funds were used in such investments. I have not attempted to in any way say what they should do or how they should handle it. If they were trying to accomplish the investments on a risk-free basis, it would be reasonable and proper to use this type of security. I am not making any suggestion or expressing any opinion that it is desirable for this company to put its amortization moneys in risk-free securities. I have made no investigation of the company's financial structure. I know they have bonds outstanding, but I do not know the amount. I happen to know they are 6% bonds. That is all I know about them. I have not explored with the company at all the question as to whether or not it would be more desirable for the company, if it wanted to make a sound, prudent investment, to invest this money in the purchase of its own bonds. I have given no consideration to that subject. I have not consulted with the company respecting whether or not it is desirable for the company to invest its money in additions to the property; I have not considered that in any way.

1019 In the course of my work and experience with the bank I have advised corporations as to how to invest their money. I have specialized on that for about two years or more. I have studied the problem of utility financing, but it is very seldom in general practice that I have ever found utilities, particularly operating companies, investing funds themselves. I am familiar with the fact that utilities do invest earnings in properties, in normal properties and additions. Generally speaking, the utility industry is a very young industry and is growing. They have a good deal of financing to do, not only through normal issue of securities, but they have gone ahead and used a lot of their own money, more than their depreciation reserves, for building up property. Talking generally, it is not unusual for utilities to use their depreciation charges for the purpose of paying for current additions to property.

(EXHIBITS 132 and 133 were offered and received in evidence, over the objection of counsel for each of the two Commissions, to whom exceptions were allowed.)

Cross-Examination by Mr. Slaff.

You have asked me as the basis for a hypothetical question to assume that defendants had $4,000,000 annually as the result of their charges for amortization; that they had a bond issue outstanding amounting to approximately $40,000,000 par at 6% interest; that in addition to that the company also was faced with the fact that it had to spend approximately $1,500,000 a year for additions to its property; that the record showed that in the last three or four years the income of the company on its investment approximated 10 or 12% per year; and that it was also faced with a problem as to whether or not it should invest this $4,000,000 a year in Government securities of the type which I have described; and you asked me whether or not I would consider it a sound and prudent act for the management of that company to take this $4,000,000 a year and either retire part of its bonds or invest that $4,000,000 or a part of it to cover additions to its physical property. So far as the hypothetical case that you have set up before me is concerned, I do not see any reason why those factors should not be given consideration. I think I would have to have more detail as to the type of bond that it is. I mean, obviously a natural gas or pipeline bond does not qualify as a good trust fund investment. It is not that kind of security. I think it depends upon what we are trying to accomplish with the funds. If this fund is something that is to remain intact over the period of years where it must be sure that it is going to be returned, I would want to see that it is going into risk-free investments, and I am not going to put it into a pipeline or into bonds of that type of company.

If a fund is segregated for a specific purpose, that is one thing. If it is a question of managerial policy or business judgment as to what they should do with it, that is another. It depends upon what you are trying to accomplish. If I am charged with the responsibility of seeing that $4,000,000 a year is taken out and placed in a position where I am sure that it is going to be returned to me within a 15-year period, I am going to be absolutely certain—I am sure any trustee would be—that those funds are going to be put in such securities that they would be assured of their principal and interest. It gets down to a question of business judgment as to which way you are going to handle it.

1020 *Cross-Examination by Mr. Booth.*

I am not in position, without knowing more about the particular bonds in question, to pass upon the question of judgment involved and whether or not the management of defendants should invest in Government securities at a return of only 1½% rather than paying off its outstanding bonds, which it will be compelled to retire sooner or later at 6% interest. The question of where you are going to apply the depreciation funds of any utility obviously is entirely one of judgment. In determining whether you will put the money back in the property you might think that is going to earn 6% or 10%, but you have no way of knowing. As to the retirement of the outstanding bonds it might not accomplish the purpose for which you are taking the amortization fund. As I understand it, the amortization fund that I was asked about would be one where you take accumulations of funds over a period of 15 years and return the principal and interest at the end of that 15-year period. It is to be used for the purpose of returning to the investors the money they put in the enterprise.

(Objection by Company Counsel to question by Commission Counsel sustained.)

I am familiar with the fact that utility companies are entitled under the law, normally, to obtain a fair return over and above their operating expenses. I am also familiar with the normal charges to operating expenses that are made by utility companies. One of those normal charges made by utilities is the charge for depreciation. Some utilities base their depreciation on the straight-line and others use the sinking-fund method and I am familiar with those facts. As to whether it makes a difference to the consumer in the rates that he would be required to pay, where a company uses the sinking-fund method in investing its depreciation funds and invests depreciation funds in Government bonds bearing an average yield of 1.52% or in the retirement of the utility's own bonds which bear a coupon rate of 6%, I cannot say that I have seen that particular question enter into it from what I have examined. (Objection by Company Counsel and questioning discontinued.) If these companies have available $4,000,000 a year and bonds bearing 6% interest, I would say that it would be a prudent act of management to invest and use that money to retire a part of those bonds when it can only obtain 1.5% by investing in Government securities. In other words, I would say that if the company can save interest through the investment of a part of their funds, that is the thing we are advising them to do all the time. I mean, the question of refinancing is obvious. There is a saving in there.

Redirect Examination by Mr. Morgan.

If the bondholder and stockholder are synonymous and the same person, as Mr. Booth suggested, and the money is used to retire the bonds, and the lesser amount is accumulated and turned over to the stockholder and he is required to surrender his bonds, he would be putting his money back into the risk after it comes back to him as a stockholder, and he must exercise his judgment to do that or put it into some risk-free security that will accumulate a sum sufficient to get him all of his money by the end of the 15-year period. So if the stockholder and the bondholder is the same man, it does not matter whether you retire the bonds or whether you handle it as a fund and return it through the liquidation of the corporation. He is going to have to put it to risk of some sort of investment, such as I have described here or he will not get his money back.

1021 J. G. DICKINSON, recalled by defendants, testified:

Direct Examination by Mr. Morgan.

(September 8, 1939.)

I have testified before in this case. In my original testimony, I stated that I am the superintendent of production of Texoma Natural Gas Company. I have under my supervision the lease and land departments, the geological department, the accounting department, so far as the Amarillo office is concerned, and the production department. In connection with my duties, I have the supervision and direction of the activities conducted by the several departments under the immediate supervision of the heads of those departments. I award the drilling contracts and execute those contracts for the company. In that connection, I have kept abreast of the contract prices or costs of drilling wells throughout that part of the field in which we have leases.

Since I was on the witness stand before, I have caused to be made under my direction an estimate of the recoverable reserve of gas down to an assumed abandonment pressure of 25 pounds, as of August 1, 1931, underlying the leases owned by Texoma as of January 1, 1939. I picked August 1, 1931 as the date of computing these reserves for the reason that it was the date those reserves were acquired by Texoma. That is it was the effective date of the transfers of the reserves to Texoma.

I used the same recovery factor that was used by the geologists Peterson, Hughes and Thompson, in connection with the reserves which they have brought into the record, which was 90 percent.

As of August 1, 1931, underlying the acreage owned by Texoma on January 1, 1939, computed on a pressure basis of 16.4 pounds per square inch, the estimated recoverable reserves underlying such acreage were as follows:

At zero pounds, abandonment pressure	2,505,680,723 M.C.F.
At 25 pounds	2,349,536,607 M.C.F.
At 50 pounds	2,187,387,385 M.C.F.
At 75 pounds	2,025,240,991 M.C.F.
At 100 pounds	1,869,096,876 M.C.F.
At 125 pounds	1,706,947,653 M.C.F.

I caused Mr. Peterson to reduce to writing an explanation of the methods employed by him in determining these reserves as of the date mentioned. I have this memoranda with me.

(At this point counsel handed the reporter a document dated "Aramillo, Texas, August 24, 1939", addressed to "J. G. Dickinson, Office", captioned "Explanation of Method Used in Determining Reserves As of August 1, 1931, On Acreage Owned by Texoma Natural Gas Company, January 1, 1939", and requested that it be marked as an exhibit for identification. At the direction of the Examiner, the document was marked Exhibit 134 for identification.)

I have recently made contracts for drilling wells for Texoma. We are currently drilling four wells in Moore County. We have drilled other wells during the year 1939. The prices stated by the witness Stoddart, a member of Mr. Hamilton's staff, who testified concerning the reproduction cost new of Texoma's wells, that $4 per foot
1022 in Moore County, $3.50 per foot in Hutchinson County, and $3.25 per foot in Carson and Gray Counties are the current contract prices paid in those areas. They were the contract prices on June 1, 1939 and for several years prior to that time. The differential in price between Gray and Carson Counties and Moore County is explained by the difference in depth of the wells. This difference in depth requires more time for the drilling contractor to withdraw and run his drill pipe when he changes bits. There is also a difference in the formation drilled. In the Moore County area the contractors more ofter lose circulation with its attendant difficulties and expenses. There is a difference in the amount of transportation involved in drilling wells in Moore County and in Gray and in Carson Counties, as a rule. Contractors operating in Moore County are further removed from drilling tool supplies than are contractors operating in Gray and Carson Counties. The price for drilling in Gray and Carson Counties is $3.25 a foot. The customary price in Hutchinson County is $3.50 a foot. Texoma has not drilled any wells recently in Hutchinson County. However, the price of $3.50 per foot is the customary price there. In Moore County the price is $4 per foot. This price per foot includes the drilling of the well from the top to the bottom.

In every case in the drilling of a gas well the actual drilling of the producing formation is done with cable tools. The upper part of the hole down to the top of the gas producing horizon is drilled with rotary tools. The rotary tools are then moved out and the standard form rig is moved in and cable tools are rigged up. The actual drilling of the gas producing formation is done with cable tools, for the reason that the well would be seriously damaged if the mud-laden fluid and water used in rotary drilling were allowed to enter the gas producing formation.

This $4 a foot, or whatever the price happens to be, depending, of course, on the location, covers the drilling by rotary and by cable tools. As a usual thing the drilling of the part of the hole which is done by cable tools is more expensive for the contractor. This condition is brought about by the fact that as the drill goes down below a gas-producing or gas-pay streak, the gas does not lift the cuttings out of the hole. The contractor is not able to keep water down to mix the cuttings with, and it is a question of just sitting there and pounding the stuff into dust, almost, before he can go ahead.

The term "day work", referred to by Mr. Stoddart in connection with his testimony on Exhibit 125, is intended to cover contingencies that are not provided for in the contract and which usually cannot be anticipated. The contractor is obligated to finish the well to its total depth under the contract price per foot. Day work is provided for situations which may happen after the contract for drilling is completed. In other words, it may be necessary to retain the contractor on the well after he has drilled it down to its full depth.

For example, we may wish to conduct some cleaning out operations after the drilling is completed. Sometimes the hole will bridge. That means the sides of the well will cave in and jam off the drilled portion so that the flow of gas is either cut off or restricted. In that kind of a cave-in, we have the contractor run the tools back in the hole and drill it out. That day work is provided for in the contract itself, and the pay for this work is $90
1023 per 24-hour day. That is the prevailing contract
price for that type of work in the field. That price does not vary in different portions of the field like the footage part of the contract. In some of Texoma's wells no day work is required. We are able to complete the well without any day work. In others, it may require five or six days or longer. Our experience has been that the average amount of day work amounts to about one day where the well is completed in a normal manner. (Motions to strike above testimony by Counsel for the two Commissions denied.) I do not have a record of the day work that was performed on the wells now belonging to Texoma but which were drilled prior to Texoma's purchase of these wells.

I have a copy of one of those drilling contracts currently in use in the field.

(At this point counsel handed the reporter a document captioned "Drilling Contract" bearing the date in the first line, 16th of August, 1939, and requested that it be marked for identification. At the direction of the Examiner the document was marked Exhibit 135 for identification.)

Exhibit 135 is a copy of the contract which we executed with the drilling contractor for the drilling of a well on one of Texoma's leases. That contract was executed on the 16th of August, 1939 and is at present being performed.

1024 S. LEROY MILLER, a witness for defendants, testified:

Direct Examination by Mr. Hedrick.

(September 8, 1939)

I am the same S. Leroy Miller who was on the witness stand day before yesterday. I live at Niles Center, Illinois. My place of business is at Twenty North Wacker Drive, Chicago, Illinois. I am in charge of the accounting departments of Natural Gas Pipeline Company of America and Texoma Natural Gas Company. I received my academic training in accounting at Northwestern University. From January, 1925, to October 30, 1930, I worked for the Empire Companies, with headquarters at Bartlesville, Oklahoma. My work with that company covered various branches of accounting.

Since November 1, 1930, I have worked for the Natural Gas Pipeline Company of America and Texoma Natural Gas Company in the supervision of various branches of accounting. From November 1, 1930, to June 1, 1931, I supervised the accounting work in connection with construction cost records of the two companies. From June 1, 1931, to May, 1937, I supervised the accounting records of the Texoma Natural Gas Company and handled such other work as the tax returns and special reports for both companies. Since May, 1937, my work has covered the supervision of the accounting records of both companies. I work under the direct supervision of Mr. S. E. Campbell, Secretary of the two companies.

(At this point counsel handed to the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company—Earnings Statements for Calendar Years 1932 to 1938, Inclusive," and requested that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit 136 for identification.)

I have prepared for the purpose of this case Exhibit 136 showing the earnings statements of defendants for the calendar years 1932 to 1938, inclusive. This exhibit is a statement of the earnings and expenses of the two companies separately and of the companies combined, after eliminating inter-company income and expense. This exhibit was prepared to show in general the information purported to be shown in Exhibit No. 15 introduced through Mr. Woodford, an accountant for the Illinois Commerce Commission. This exhibit is arranged in slightly different order from Exhibit 15 so as to present what, in my opinion, is a more logical sequence of statements. Also, certain expenses have been reclassified so as to make the statements, in my opinion, more uniform. The exhibit is divided into three parts.

Pages 1 to 3, inclusive, reflect the combined revenues and expenses of the two companies after eliminating inter-company transactions. Pages 4 to 9, inclusive, reflect the revenue and expenses of Natural Gas Pipeline Company of America. Pages 10 to 15, inclusive, reflect the revenue and expenses of Texoma Natural Gas Company. These statements were prepared to show the revenue and expenses as reflected by the books of the companies and were not taken from the companies financial statements, as were
several pages of Exhibit No. 15. The financial state-
1025 ments do not present final information, since they
were prepared as of a certain day or for a certain
period. Although in accord with the companies' books at the date they were prepared, the financial statements do not reflect subsequent adjustments that affected the period. The statements in this Exhibit No. 136 were prepared for the period starting January 1, 1932, since the companies considered that date as the beginning of permanent operations. All prior operations were considered preliminary and the resulting deficit of $7,996.92 was capitalized, on the companies' books. Page No. 1 presents in condensed form a statement of profits and losses of the two companies combined, after eliminating the inter-company transactions, by years and for the total period. This statement shows a total net profit for the period of $8,244,435.-

79 as compared with $8,207,995.08 shown on page 16, line 38, Column 1, of Exhibit No. 15. This difference between the two statements, amounting to $36,440.71, is accounted for by five items.

1. Loss for 2½ months of 1931 included in Exhibit No. 15, $7,996.92. This amount is the net loss for the 2½ months from October 15, 1931, to December 31, 1931, which, as I have mentioned before, was considered a period of preliminary operations and this loss was capitalized on the books of Natural Gas Pipeline Company of America.

2. Write-off of corporate expenses included as 1931 expense in Exhibit No. 15, $5,979.02. This amount reflects the total expense in organizing Natural Gas Pipeline Company of America and was charged off on the books of the company in the year 1935.

Questions by the Examiner.

The first figure I am comparing is shown on line 13, page 1, of Exhibit No. 136 and the figure $8,207,995.08 is shown on page 16, line 38, column 1, of Exhibit No. 15.

Direct Examination Resumed by Mr. Hedrick.

The amount $7,996.92, to which I have referred, appears in Exhibit No. 15, on page 7, line 24, column 1 and is designated A. The next item, I believe, we just identified, was on page 16. That is shown in line 31, column A, of Exhibit No. 15. When I refer to Exhibit 15 I am referring to it as corrected by an errata sheet, Exhibit 53.

This amount of $5,979.02 reflects the total expense in organizing the Natural Gas Pipeline Company of America and was charged off on the books of the company in the year 1935. This amount is not applicable to any definite year, and I have therefore considered it as an unallocated charge to surplus. In other words, I have not considered this as an expense of any particular year.

3. Write-off of bond expense applicable to 1931, included in Exhibit No. 15 as expenses of the years 1936 and 1937, $28,210.35. There are quite a number of items in this Exhibit No. 15 which have been combined, and it is rather difficult to identify some of these. This adjustment of bond expense is reflected in two items in Exhibit No. 15. On page 6, line 15, column G is an amount of $19,916.67. That

is the adjustment on the books of the Natural Gas Pipeline Company of America. That is an item of amortization of bond discount and expense. That item is a writeoff, 1026 an adjustment of the bond expenses for Natural Gas Pipeline Company of America. It is shown on page 6 of Exhibit No. 15 on the line with organization expense write-off, but it is in fact an adjustment of the bond expense and had nothing to do with the organization expense. As I recall from my analysis of Exhibit 15, the other part of that adjustment was combined with other figures shown on page 14 of Exhibit No. 15. I am unable to identify that balance from this particular statement, but the amount was included in the year 1936. I would have to analyze each of those figures to state in just which one of those items it is included. I will be prepared to do that on cross examination as requested. I will prepare a breakdown of each one of these amounts to which we have been referring and to which we will refer so that they can be definitely located in Exhibit No. 15, by line and by page number.

This amount $28,210.35 reflects the unamortized portion of the cost of tax stamps affixed to the original bond issued, and was charged to surplus in 1937 as being applicable to 1931 in accordance with the agreement between the Natural Gas Pipeline Company of America and the Bureau of Internal Revenue. From the total of the three items I have just enumerated there should be deducted the total of the following two items in accordance with the books of the company. These charges were made to put the books more in line with the settlement with the Bureau of Internal Revenue concerning tax liability.

4. Surplus adjustment of 1938 taxes not included in Exhibit No. 15, $2,966.30. This amount is an adjustment of the accrual for 1938 income taxes of the Natural Gas Pipeline Company of America. This adjustment was recorded on the books of that company in the first part of 1939 but was not reflected in Exhibit No. 15.

5. Surplus adjustment of 1938 depreciation not included in Exhibit No. 15, $2,779.28. This adjustment of depreciation was made on the books of the Natural Gas Pipeline Company of America in the first part of 1939 and is an adjustment affecting the depreciation as recorded on the books of that company during the year 1938.

The next total of these five adjustments, amounting to

$36,440.71, is the difference between page 1 of this Exhibit 136 and the total shown in line 38, column 1, page 16, of Exhibit No. 15.

Page No. 2 supplements page No. 1 and reflects in some detail the information shown in lines 1 and 2 of page No. 1. This statement reflects the operating revenue and operating expenses for the two companies after eliminating inter-company income and expenses.

These last five items just summarize the differences.

Page No. 3 shows the combined surplus account for the Natural Gas Pipeline Company of America and the Texoma Natural Gas Company after eliminating inter-company transactions. Line 1 shows the combined profits and losses for the year and the period. Line 2 shows dividends declared and paid. Line 3 shows the yearly balance of net profits after payment of dividends. Lines 4 to 7, inclusive show the details of other surplus charges, and line 9 shows the combined deficit at the end of each year. The dif-
1027 ference between the deficits of $939,753.58 shown on
page No. 3, line No. 9, column 8, of this Exhibit No. 136, and the corresponding item amounting to $942,004.92 shown on page 16, line 40, column 1 of the Exhibit No. 15 is accounted for in two items:

1. Loss for 2½ months of 1931 included in Exhibit No. 15 but capitalized on the companies' records $7,996.92. This is the loss for the 2½ months of preliminary operations that was capitalized on the books of the Natural Gas Pipeline Company of America and is the same item that I have referred to previously.

2. Less surplus adjustment of taxes and depreciation for the year 1938 not included in Exhibit No. 15, $5,745.58. This amount is the total of the two 1938 surplus adjustments referred to in the explanation of page No. 1, namely, the adjustment of income taxes for the Natural Gas Pipeline Company of America, $2,966.30, and adjustment of depreciation of Natural Gas Pipeline Company of America, $2,779.28. The net difference between the amount of the loss for the 2½ months of 1931 as reflected by the books of the Natural Gas Pipeline Company of America, amounting to $7,996.92, and the adjustment of taxes and depreciation as reflected on the books of the Natural Gas Pipeline Company of America, amounting to $5,745.58 is a net difference of $2,251.34, which, as I have stated, is the difference between the amount shown on this page 3, line

9, column 8, and the comparable item shown on page 16, line 40, line 1, of Exhibit No. 15.

Page 4 presents in condensed form the profits and losses of the Natural Gas Pipeline Company of America, as reflected by the books of that company. This statement reflects a total profit for the seven years of $10,097,235.29 instead of the $13,813,992.34 shown on page 1, line 22, column 1, of Exhibit No. 15. The difference between these two exhibits, amounting to $3,716,757.05, is accounted for as follows:

I mean the difference between page 4 of Exhibit No. 136, that is, line 12, column 8 of that page and page 1, line 22, column 1, of Exhibit No. 15.

1. Depreciation omitted from page 1 of Exhibit No. 15, $2,669,744.05. During the first two years of the companies' operations the depreciation was not recorded on the books of the Natural Gas Pipeline Company of America. This depreciation was, however, recorded during the year 1934 but was not reflected on the financial statements, which had been previously prepared and which were the source of the information from which page 1 of Exhibit No. 15 was prepared.

Wherever I testified as to the source of Mr. Woodford's information, I based my statement on the source stated in his Exhibit 15 or his testimony concerning that exhibit.

Also for the year 1937 an adjustment of $400,000 was made in the depreciation and this amount, although reflected on page 6, line 22, column G, was not reflected on page 1 of Exhibit No. 15. In other words, Mr. Woodford has a page in his exhibit, showing the over-all adjustment, but he did not carry those adjustments to a particular
1028 page for the particular years. I could take Mr. Woodford's exhibit and by taking page 1 of Exhibit 15, together with page 6, line 22, column G, I would arrive at the final figure, but he did not do that in the preparation of page 1.

2. Bond discount and expense amortization omitted from page 1 of Exhibit No. 15, $258,410.18. During the year 1933 the amortization of bond discount and expense applicable to the year 1932 was recorded on the books of the Natural Gas Pipeline Company of America but was not reflected in the 1932 financial statements, which has been previously prepared and which were the source of the information used in preparing page 1 of Exhibit No. 15.

3. Interest adjustment for 1931 omitted from page 1 of Exhibit 15, $752,163.16. This is the amount of interest expense of Natural Gas Pipeline Company of America applicable to the period from October 15th to December 31, 1931. This interest adjustment is reflected on page 6, line 39, column A, of Exhibit No. 15, but was omitted in the preparation of page 1 of Exhibit 15.

4. Total of miscellaneous adjustments omitted from page 1 of Exhibit No. 15, $36,439.66. This adjustment is made up of a number of small items which I have not attempted to enumerate. I will list those small adjustments in the sheet which I am going to prepare later.

Total of adjustments omitted from page 1 of Exhibit No. 15, $3,716,757.05. These adjustments are shown on pages 6 and 7 of Exhibit No. 15 but should be carried throughout that Exhibit so as to give complete information.

Page No. 5 of this Exhibit No. 136 is divided into three parts: Operating revenue, operating expense, and gas account of the Natural Gas Pipeline Company of America. This statement shows the various accounts as reflected by the books, or, in other words, this statement shows page No. 2 of Exhibit No. 15 after applying the adjustments shown on page 6 of Exhibit No. 15, together with an adjustment of the 1938 taxes not included in Exhibit No. 15, amounting to $2,966.30. This adjustment of taxes has been previously discussed in connection with this Exhibit No. 136. Although there is some slight difference in application of the adjustments as reflected on the books of the Natural Gas Pipeline Company of America between this page No. 5 of Exhibit No. 136 and the adjustments shown on page 6 of Exhibit No. 15, these differences are between the years and the over-all difference is only the adjustment of 1938 taxes that I have just explained.

Page 6 shows the gas sales of the Natural Gas Pipeline Company of America both as to thousands of cubic feet and revenue and is comparable to page 3 of Exhibit No. 15. For the period of years shown the two exhibits agree in totals except that page 3 of Exhibit No. 15 does not reflect the adjustment of gas sales, which adjustment is shown on page 2, line 8, column C, of Exhibit 15. As to gas sales in thousands of cubic feet, the difference in quantities is caused by the fact that page No. 3 of Exhibit No. 15 reflects metered volumes and this page 6 reflects the billed volumes. In other words, this page 6 shows the total gas metered plus adjustments for the excess B.t.u.'s, or heat units of

the gas delivered over and above the contract base. In
other words, there is an adjustment made in the metered
volume of gas caused by excess British thermal units contained in the gas actually delivered. I have used the
1029 billed volumes and not the metered volumes. I believe I mentioned that for the period of years shown
on this statement that the only differences were the ones
that I had enumerated.

Page 7 shows a breakdown of other operating income and non-operating income. This page is comparable to page 4 of Exhibit No. 15 except that this page reflects adjustments shown on page 6 of Exhibit No. 15, and also includes, first, reclassification of interest on treasury bond and, second, reclassification of house rents in accordance with the company's present classification.

The interest on the treasury bond, which was a $1,000 bond held by the company was reflected originally on the books of the company both as an interest expense and as an interest revenue. That was one of the company's own bonds which was held in the treasury. These contra-interest items were eliminated in an adjustment on the books of the company so as to clearly reflect the interest income and the income expense of the Natural Gas Pipeline Company of America. At the time Exhibit No. 15 was prepared, the revenue from house rents was considered non-operating income; but this item was reclassified on the books of the company since the first of the year 1939 and this statement was prepared in accordance with the company's present classification. I find no fault with Mr. Woodford's exhibit in light of the records as they then stood.

Page 8 shows in detail the amounts of gas purchased and the amounts of gas used by the company. This page No. 8 is comparable to page No. 5 of Exhibit No. 15 except that this page No. 8 reflects the amounts paid for gas after applying all adjustments, and page No. 5 of Exhibit No. 15 does not include the adjustments of the amounts paid for gas as shown on page No. 6 of Exhibit No. 15.

Page 9 is a statement of the surplus account of the Natural Gas Pipeline Company of America and is comparable to page No. 7 of Exhibit No. 15. Although there are variations in the year by year totals between this page No. 9 and page No. 7 of Exhibit No. 15, caused by differences in the application of surplus adjustments, these differences wash out in total except for two items of $5,745.58 that were not included in Exhibit No. 15. These two items are the adjustments for taxes and depreciation which I have previously explained.

Page 10 presents in condensed form a statement of profits and losses of the Texoma Natural Gas Company as reflected by the books of that company, and is comparable to page No. 8 of Exhibit No. 15. This statement shows a net loss for the seven years of $1,852,799.50 as compared with a profit of $1,393,518.59, shown on page No. 8, line 34, column 1, of Exhibit No. 15. The difference between the total shown on this page No. 10 and the total shown on page No. 8 of Exhibit No. 15 is accounted for as follows:

1. Depreciation and depletion for the years 1932 and 1933 omitted from page No. 8 of Exhibit No. 15, $895,970.58.

During the years 1932 and 1933, the depreciation and depletion was not recorded on the books of the com-
1030 pany. However, during the year 1934 these amounts were recorded as applicable to the years 1932 and 1933, and should, therefore, be reflected in Exhibit No. 15. These adjustments of depreciation and depletion are reflected on page No. 14 of Exhibit No. 15, but are not included on page No. 8 of Exhibit No. 15.

2. Retirements of property omitted from page No. 8 of Exhibit No. 15, $2,351,340.74. This amount is the write-off of acreage that expired or was abandoned during the year 1933, and the loss on the sale of certain wells and leases during the year 1933. This amount of $2,351,340.74 that was omitted in the preparation of page No. 8 of Exhibit No. 15 is reflected on page No. 14, line 15, column 1, of Exhibit No. 15. From the total of these two adjustments that I have just explained should be deducted the amount of $993.23, which is the sum total of miscellaneous adjustments that I have not detailed, the net total of adjustments omitted from page No. 8 of Exhibit No. 15 being $3,246,318.09.

Page 11 is divided into two parts: Operating revenue and operating expenses of the Texoma Natural Gas Company. The first section of this statement explains in brief line 1 of page 10 of Exhibit 136. The second section of this statement explains line 2 of page No. 10. The difference between the amounts shown in the statement and those amounts shown on pages 12 and 13 of Exhibit No. 15, are caused principally by the omission from pages 12 and 13 of Exhibit No. 15 of adjustments shown on page No. 14 of Exhibit No. 15. Also pages No. 12 and No. 13 of Exhibit No.

15 do not reflect the reclassification of certain write-offs of retirements of property that were originally charged to operating expenses but were later reclassified on the books of the company.

Page 12 shows the gas sales of the Texoma Natural Gas Company, both as to thousands of cubic feet and the revenue. This statement also shows sales in thousands of cubic feet and is comparable in that respect to page No. 10 of Exhibit No. 15. The amounts of gas shown on pages 9 and 10 of Exhibit No. 15 under the captions "drilling wells" and "testing lines" were reclassified on the books of the company so as to more clearly reflect the revenue producing items and the items of expense.

Page 13 shows the details of the gas account and the gasoline account for the years 1932 to 1938, inclusive, and the totals for the period. This statement is comparable to page 11 of Exhibit No. 15.

Page 14 shows a breakdown of other operating income and non-operating income. Similar information in different form is shown on page 9 of Exhibit No. 15. However, since Exhibit No. 15 was prepared there have been certain reclassifications of income on the books of Texoma Natural Gas Company. These reclassifications of income pertain to interest income and house rents. In the first years of operation of Texoma Natural Gas Company the company did separate its interest income from its interest expense. However, during the later years it had been the policy of that company to combine interest income with interest expense and reflect the interest expense as a net amount. That interest has now been separated on the books of the company and is so reflected in this page 14 of Exhibit No. 136. As to house rents, as I have explained in connection with Natural Gas Pipeline Company of America, the house rents were classified as non-operating income on the books of Texoma Natural Gas Company at the time Exhibit
1031 No. 15 was prepared. However, in the first part of
1939 this account was reclassified to other operating income on the books of Texoma Natural Gas Company, and this page 14 was prepared in accordance with the company's present classification.

Page 15 is a statement of the surplus account of Texoma Natural Gas Company and is comparable to page 15 of Exhibit No. 15. While there are variations in the year by year totals between this page 15 of Exhibit No. 136 and page 15 of Exhibit No. 15, these differences wash out in the final total, both statements showing a loss for the seven years of $1,852,799.50 instead of a profit of $1,393,518.59 shown on page 8, line 34, column 1 of Exhibit No. 15.

Exhibit No. 136 was prepared from the books of the companies.

(At this point EXHIBIT 136 was offered and admitted in evidence without objection.

At this point counsel handed to the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Balance Sheets and Statements of Plant and Equipment, December 31, 1931, to December 31, 1938, Inclusive", and requested that it is be marked for identification. At the direction of the Examiner, the document was marked Exhibit No. 137 for identification.)

I prepared Exhibit No. 137 and have a copy of it before me. This exhibit shows the year end balance sheets and statements of plant and equipment of the Natural Gas Pipeline Company of America, the Texoma Natural Gas Company, and for the companies combined after eliminating inter-company balances. This Exhibit No. 137 covers the same type of information shown in Exhibit No. 54 except that it reflects all end of year balances from December 31, 1931 to December 31, 1938, whereas Exhibit No. 54 does not show the balances prior to December 31, 1934, as Exhibit 54 omitted balances prior to December 31, 1934.

Page No. 1 shows the year end balance sheets for the companies combined after eliminating inter-company balances. This page 1 is comparable to page 5 of Exhibit No. 54.

Page 2 shows the year end balances of the plant and equipment accounts of the two companies combined and is a breakdown of line 3 of page 1.

Page No. 3 of this Exhibit No. 137 shows the year end balance sheets of the Natural Gas Pipeline Company of America as reflected by the books of the company and is comparable to page No. 1 of Exhibit No. 54. I have examined the balance sheets presented on page 1 of Exhibit No. 54 and have found that most of the items shown are correct. However, for the year 1934 Mr. Woodford's figures contain certain adjustments, which I was unable to identify, and which produced slightly different results than those I obtained. None of the balance sheets in Exhibit No. 54 reflect the adjustments disclosed on pages 6 and 7 of Exhibit No. 15, nor do they agree with the year end surplus account shown on page 7, line 27, of Exhibit No. 15. The balance sheets in Exhibit No. 54 for the years ended December 31, 1935, 1936, 1937 and 1938 were taken from the company's financial statements and do not reflect any subsequent adjustments.

1032 Page 4 shows the year end balances of the plant and equipment accounts of the Natural Gas Pipeline Company of America and is a breakdown of line 2, page 3. This statement is comparable to page 2 of Exhibit No. 54. In this statement of plant and equipment in Exhibit No. 137 the balances shown as of December 31, 1931 were obtained by analyzing job orders that were open at that date.

Page No. 5 shows the year end balance sheets for the Texoma Natural Company as reflected by the books of the company, and is comparable to page 3 of Exhibit No. 54. All balance sheets shown on page 3 of Exhibit No. 54 were taken from the company's financial statements and do not reflect subsequent adjustments. Nor do these balance sheets tie in with the surplus statement shown on page 15 of Exhibit No. 15.

Page 6 shows the year end balances of the plant and equipment accounts of the Texoma Natural Gas Company and is a break-down of line 3, page 5. This page is comparable to page 4 of Exhibit No. 54. In this statement of plant and equipment in Exhibit No. 137 the balances shown as of December 31, 1931, were obtained by analyzing job orders that were open at that date.

The information used in preparing these statements in Exhibit No. 137 was taken from the books of the Natural Gas Pipeline Company and the Texoma Natural Gas Company.

(EXHIBIT NO. 137 was offered and admitted in evidence without objection.

At this point counsel handed to the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Statement of Operating Revenue and Expenses, Statement of Plant and Equipment Exclusive of Leaseholds, Statement of Accumulated Expenditures for Leaseholds, December 31, 1931, to December 31, 1938, Inclusive", and requested that it be marked for identification. At the direction of the Examiner, such document was marked Exhibit No. 138 for identification.)

I prepared Exhibit No. 138 and have a copy of it before me.

This Exhibit No. 138 was prepared to show by years and for the total period of years three classes of information: (1) Operating Revenue and Operating Expenses; (2) Year Ended Balances of the Plant and Equipment Accounts, Exclusive of Leaseholds; and (3) the Accumulated Expenditures for Leaseholds. This information is presented in three groups: Pages 1 and 2 cover the information for the companies combined; pages 3 and 4 cover the information for the Natural Gas Pipeline Company of America, and pages 5 to 8, inclusive, cover the information for the Texoma Natural Gas Company.

Page 1 shows in some detail the operating revenue of the two companies after elminating inter-company items. Page 1 also shows the operating expenses of the two companies after eliminating inter-company items, and these expenses are divided into two groups: (1) Operation and General Expenses and (2) Maintenance Expense. The item of
1033 net earnings from operations before amortization and other charges is, of course, the excess of the gross operating revenue over the total operation, maintenance, cost of retirements, and general expenses. This item of net earnings from operations before amortization and other charges is shown by years from 1932 to 1938, inclusive, and the total accumulated for the seven years. Line 35 of this page 1 shows for the two companies the accumulated net earnings from operations before amortization and other charges from the beginning of the year 1932 to the end of each of the successive years shown on this page. Line 36 shows the annual average of net earnings from operations before amortization and other charges and reflects the average net earnings from operations before amortization and other charges to the end of each period of years starting with the year 1932. In other words, this annual average might be explained as the result of dividing the total net earnings from operations before amortization and other charges for the period of years (line 35) by the number of years' operation since January 1, 1932.

In other words, take column 5 "Year 1936" the figure on line 36 is obtained by dividing the figure on line 35 by 5. The same is true in the other columns in the exhibit.

Cross-Examination Interposed by Mr. Slaff.

By the term "total cost of retirements", page 2, line 30, I mean the expense of labor and materials used in retiring items of property. That is to say gross amounts of labor and expense involved in the retirement of property. Page 2 shows the balances of the plant and equipment accounts for the two companies combined, exclusive of leaseholds at the end of each year.

Direct Examination by Mr. Hedrick Resumed.

There is a typographical error in the caption. The word appearing "Pland" should be "Plant".

This statement also shows the expenditures of leaseholds to the end of each year.

Page 3 shows the operating revenue, operating expenses, and net earnings from operations before amortization and other charges of the Natural Gas Pipeline Company of America. This statement also shows the total net earnings from operations before amortization and other charges for each period of years since the start of operations, as reflected by the company's books, and the average net earnings from operations before amortization and other charges for each period of years since the start of operations. These last two items were calculated exactly the same as the comparable items explained in connection with page 1.

Page 4 shows the balances of the plant and equipment accounts of the Natural Gas Pipeline Company of America at the end of each year during the period of December 31, 1931, to December 31, 1938. The balances shown on this statement at December 31, 1931, were obtained by analyzing the job orders that were open at that date.

1034 Page 5 shows the operating revenue, operating expenses, and net earnings from operations before amortization and other charges of the Texoma Natural Gas Company. This statement also shows the accumulated net earnings from operations before amortization and other charges for each period of years since the start of operations and the average of the net earnings from operations before amortization and other charges for each period of years since the start of operations.

Page 6 is divided into two parts. Lines 1 to 19, inclusive, show the year end balances of the plant and equipment accounts, exclusive of leaseholds, and line 20 shows the accumulated expenditures for leaseholds. The balances at December 31, 1931 were obtained by analyzing the job orders that were open at that date. Line 20 is supplemented and explained by the following pages 7 and 8.

Page 7 shows the details of the leasehold account at December 31, 1931. This statement shows the amounts expended to acquire acreage from the various companies, as reflected by the books of the company, to December 31, 1931. Also shown on this statement are the amounts of construction overheads apportioned to this account. This sheet 7 details and explains the December 31, 1931 total accumulated expenditures for leaseholds shown on page 6, line 20, of this Exhibit No. 138.

Page 8 shows in some detail the amounts expended year by year for leaseholds and the total net expenditures for leaseholds to the end of each year from December 31, 1931 to December 31, 1938. This sheet 8 is supplemental to page 6 and more fully explains line 20 of page 6, and line 21 of page 2. On this page 8 I show the expenditures for leaseholds year by year, the cost of any property exchanged for leaseholds, the amount of cash received in any sales of leaseholds, the boot received in any exchanges of leaseholds, the net result of which is the additional expenditures for leaseholds. This statement shows that according to the books, the company had expended to December 31, 1938, a total sum of $15,893,513.08.

By the term "boot received," I mean cash received in an exchange of property, over and above the property received. Where we trade one lease for another and get $5,000 or $1,000 in addition, we call that boot received.

I obtained the figures contained in Exhibit No. 138 from the books and records of the companies.

(EXHIBIT No. 138 was offered and admitted in evidence without objection.

Offer of proof by Company Counsel and objections by counsel for the two commissions.

EXHIBIT No. 131 was offered and received in evidence with the understanding that defendants would be permitted to furnish additional sheets correcting any errors in arithmetic that appeared in that exhibit. Counsel for the two Commissions objected to this exhibit and were allowed exceptions.

EXHIBIT No. 134 was offered and received in evidence without objection.

1035 EXHIBIT No. 135 was offered and received in evidence over the objection for each of the two Commissions, who were allowed exceptions.)

1036 S. E. CAMPBELL, recalled by the defendants, testified as follows:

Direct Examination by Mr. Morgan.

(September 8, 1939)

I have testified in these proceedings before. I am secretary of defendants. As one of the duties of my office, I have custody and supervision of the records and books of account of both these corporations.

I have prepared and caused to be prepared under my direction some computations to be offered in this case that are predicated on the exhibits and testimony already in the case. In preparing those exhibits, I was instructed by counsel as to the subject matter to be covered. I prepared them in the form advised by counsel. I do not take the responsibility for the forms. The figures came from other evidence already in the case and I am prepared to point out that evidence in the course of my testimony.

I have prepared a total of four computations.

(At this point, counsel handed the reporter a 1-page document entitled "Computation Based on Field Price of Gas to Be Recovered by Texoma Natural Gas Company after January 1, 1939, and Costs of Drilling, Equipping, Maintaining, and Operating Wells. Witness S. E. Campbell" with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit 139 for identification.)

I have before me Exhibit 139. This exhibit is a computation to show the difference between, as termed in this exhibit, the gross value at the head of the well at the present field price of 4 cents per M.C.F. on the recoverable gas at 25 pounds abandonment pressure from Texoma's leases, and the cost of lifting this gas to the well head.

In the first line following "Total recovery January 1, 1939, through 1954 (from testimony of Dickinson and Bussard)," we have the figure 790,280,674 M.C.F. That figure is taken from the testimony of Mr. Dickinson and from a report prepared by Mr. Bussard, used in connection with his Exhibit 117. That is the total quantity of gas which, according to their testimony, Texoma will be able to recover from its wells by the end of 1954.

In line No. 2, after the words "Gross value at the head of well at present field price of 4 cents per M.C.F." appears the amount $31,611,277. The figure 4 cents per M.C.F. was taken from the testimony of Mr. Dickinson, Mr. Hughes, and others who have testified in this hearing. The sum of money set out at the end of that line was obtained by multiplying the total volume shown in line No. 1 by 4 cents per M.C.F.

In line No. 3, captioned "Operation and Maintenance Expense from January 1, 1939, through 1954 (from an analysis of Exhibit Nos. 102 and 117)" appears the figure $9,805,029. Those figures were taken from an
1037 analysis of Exhibits 102 and 117, and represent the operation and maintenance expense of the production department applicable to the production of gas for the period January 1, 1939, through to the end of 1954. Exhibit 102 was prepared by and offered through Mr. Dickinson, and Exhibit 117 was prepared by and offered through Mr. R. M. Bussard. At the end of line 4, captioned "Capital expenditures of production department as of June 1, 1939 (from an analysis of Exhibits 102 and 117)" appears the figure $4,741,642. That figure was likewise taken from an analysis of Exhibits 102 and 117 and represents the capital expenditures for wells, lease equipment, and clean-out equipment. That was the figure to which Mr. Dickinson testified and which was carried into Mr. Bussard's Exhibit 117.

In line 5, captioned "Reproduction cost new, less viewed depreciation of wells completed and producing as of June 1, 1939 (from Exhibit 125)" appears the figure $2,892,755. That figure was taken from Exhibit 125 prepared by and offered through Mr. Hamilton and his associates.

I added together the sums shown in lines 3, 4 and 5 and arrived at the total shown in line 6, captioned "Total expense, maintenance and capital cost." The figure shown in line 7, captioned "Difference between amounts shown in lines 2 and 6" was arrived at in the manner indicated in the caption.

I have the working papers underlying all these figures and they will be available to Mr. Johaningsmeir and Mr.

Woodford and any other accountants whom the commission may delegate to check them with me.

(EXHIBIT 139 was offered in evidence over objections of counsel for each of the Commissions. The Examiner announced he would withhold his ruling on the admissibility of Exhibit 139 until the next session of the hearing.

Counsel handed the reporter a document composed of 2 mimeograph pages captioned "Natural Gas Pipeline Company of America and Texoma Natural Gas Company (Combined) Earnings Statement Covering Entire Life of Project" with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit 140 for identification.)

I have before me Exhibit 140 which was prepared by me and under my direction. This exhibit covers a combined earnings statement of the companies for the entire life of the project, beginning January 1, 1932, and extending to and including the end of 1954. The period from October 15, 1931, to the end of that year is not covered by the exhibit for the reason the books of the company were set up as of January 1, 1932. All previous transactions were capitalized.

Page 1 is a summary sheet which reflects the total revenues of the companies combined, the total operation, maintenance, and retirement expense, the total cost of the capital expenditures including replacements, gas reserves and working capital and the liquidating salvage value. It reflects the total revenue remaining after taking out the capital expenditures anad reflects the average rate of return on the average investment for the life of the project. By the last expression, I mean the average annual rate of return on the average annual investment throughout the life of the project.

1038 Under the sub-caption "Revenue," line 1 "From domestic sales," the figure recorded in column 1 was taken from Exhibit 138 to which Mr. Miller testified as being taken from the companies' books. In Mr. Kesinger's statement on future sales and revenue, he expressed his opinion that the average yearly income from domestic sales from January 1, 1939 on, as long as sufficient gas is available to meet the full domestic requirements, would not exceed the average realized for the three-year period 1936, 1937, and 1938.

For the period from January 1, 1939 to November 1, 1953, from a study prepared by Mr. Bussard, under Mr. Kesinger's supervision, there will be sufficient gas available to meet the domestic requirements. For this period of time we have applied to each year the average of the three-year period 1936, 1937, and 1938. After November 1, 1953, the amount of gas available will apparently progressively diminish up to the end of 1954. These figures were worked out in Mr. Bussard's study and we have used those figures and computed the amount of money for that period of time strictly in accordance with the companies' domestic sales contracts.

Those figures for the decreasing quantity of gas to be produced from and after November 1, 1953, on through the year 1954 were the same figures employed in the computation set up by Mr. Bussard in his Exhibit and explained in his testimony.

The figure set out in column 3 is the sum of the amounts shown in columns 1 and 2. The figure $9,752,872 shown in column 4, is the yearly average for the entire period and is obtained by dividing the amount contained in column 3 by 23.

The figure in line 2, captioned "From industrial sales" was obtained from Exhibit 138. In Mr. Kesinger's testimony on future sales revenues, he stated that in his opinion the income from industrial sales, as long as gas was available to meet all the industrial requirements, would not exceed the average realized from industrial sales through the years 1936, 1937, and 1938. From Mr. Bussard's study, gas available will meet the requirements of the industrial sales from January 1, 1939 to September 1, 1952.

For this period, we have arrived at the total revenue by applying to each year the average realized by the two companies during the three-year period 1936, 1937, and 1938. After September 1, 1952 to November 1, 1953, the gas available for industrial purposes progressively diminishes until by November 1, 1953 there is no more gas available for industrial sales, except that which would fall under domestic contracts. So during this period from September 1, 1952 to November 1, 1953, we have applied the gas available for industrial purposes to the industrial contracts, carrying the higher prices, dropping out the lower price contracts. In computing the revenues from industrial gas during that period of decline from September 1, 1952 to November 1, 1953, we have only discarded so much of the lowest price gas as will not be available and have applied the available gas to the highest price gas under our contracts for industrial gas during that period.

Column 3 is the total of columns 1 and 2. Column 4 is the yearly average for the entire 23-year period. The item "Revenue from Texoma's Field Sales" represents sales to the Lone Star Gas Company and the Coltexo Corporation. In Mr. Dickinson's testimony, he stated that the wells from which Coltexo was taking gas would be abandoned by the end of 1941. During this period the amount available
1039 from these wells to Coltexo Corporation progressively
diminishes, and these amounts taken from Mr. Bussard's study were used in computing the revenue from the Coltexo Sales. These figures appear in column 2. The figures in column 1 are taken from Exhibit 138 and Mr. Miller's testimony.

The Lone Star Gas Company sales extend throughout the period at an amount equivalent to the quantity of gas they took from Texoma during the year 1938. That is to the end of 1944. After 1944, the gas available from the wells serving the Lone Star Gas Company progressively diminishes and the amounts used were taken from Mr. Bussard's study which reflects these quantities by years. There is no allowance in these figures for any gas that might be produced from other wells to be drilled down there where the wells connected with the Lone Star Gas Company are located.

The price used in determining the income from these two sales is the price which is now contained in the sales contracts with these two companies and is based on the present price under the existing contracts. Column 3 is again the totals of column 1 and 2, and column 4 is the yearly average for the 23 years. Line 4 is simply the total of lines 1, 2, and 3.

Passing on to line 5, caption "Revenue from gasoline sales" the figures contained in column 1 were taken from Mr. Miller's Exhibit 138. The amount shown in column 2 was taken from Mr. G. M. Davidson's testimony as reflected in Exhibit 121. The amount shown in column 3 is the total of lines 1 and 2 and the amount shown in column 4 is the yearly average for the 23 years.

In line 6, caption "Revenue from other operating income" in each one of the 4 columns, this item represents house rents less the cost of maintaining the company houses. The amounts shown in column 1 were taken from Mr. Miller's Exhibit 138. The maintenance portion that was deducted in arriving at the amounts shown in column 2 was taken from Exhibits 94 and 98 to which Mr. Powers and Mr. W. H. Davidson testified. The gross revenue from which this maintenance was deducted was based on the company's present rent schedule for company houses and covers the present houses as well as the future houses to be constructed. It is assumed that all the houses now in existence and which will hereafter be constructed in line with the testimony of the witnesses who have testified on that point will be fully occupied and that rents will be paid throughout the remainder of the period. That is true with the exception of some bunk houses the rooms in which are not 100% occupied. All the houses are occupied.

The amount shown in column 3 is the total of columns 1 and 2, and the amount shown in column 4 is the average for the 23-year period. The total revenue is derived from the addition of the figures in lines 4, 5, and 6 in each one of the columns.

The amount shown in column 1 of line 8 was taken from Mr. Miller's Exhibit 138. The amount shown in column 2 was taken from the exhibits of the various superintendents who have testified and whose exhibits were summarized by Mr. Bussard in Exhibit 117. In addition to the figures taken from these Exhibits, it was necessary to add to those figures the amount of payments which will be made to
Canadian River Gas Company covering the payment
1040 for gasoline extracted from gas which they furnished
to Colorado Interstate for resale to us. That gas is treated at our Fritch gasoline plant.

Going back to line 5, captioned "Revenue from gasoline sales" it will be noted that Mr. G. M. Davidson's figures of gross revenue include all the gas which will be produced by that gasoline plant at Fritch and approximately ¼ of that gasoline comes from the gas produced on the Canadian River's reserves and purchased by us from Colorado Interstate Gas Company. I say approximately 25% because that figure varies slightly from month to month. In order to offset the inclusion of that amount of gasoline for which under contract we must account to the Canadian River, we have added that amount to the operating cost. Otherwise, we would be including in our revenue money that in fact goes to the Canadian River. I do not have with me the working papers showing how I arrived at the net amount which I added in there. It is among the underlying work sheets supporting this exhibit and it, together with all the other facts underlying this exhibit, will be available to the accountants of the two commissions if they desire to check my figures.

The amount shown in column 3 is the total of columns 1 and 2 and the amount shown in column 4 is the average for the total period of 23 years. You will note that in the next line we make a deduction in each one of the columns for "Company used gas" as shown by the word in parenthesis "Deduct". This is explained by the circumstances that the companies for their bookkeeping purposes to reflect the departmental operating cost make a charge to the departments for the gas each department uses. Since the cost of producing that gas is already in operating expenses in various forms, we deduct the charge made to the departments in the aggregate in order to avoid any duplication of charges. The amount shown in column 1 is taken from Mr. Miller's Exhibit 138. The amount shown in column 2 is taken from the departmental exhibits summarized in Exhibit 117. Column 3 is the total of columns 1 and 2 and column 4 is the average for the 23 year period.

In line 10, captioned "Maintenance Expense", the amount shown in column 1 is taken from Exhibit 138. The amount shown in column 2 was taken from the various exhibits of the department superintendents summarized in Exhibit 117 except that we have deducted from those expenses shown in those exhibits the expense of retiring property which we have set out here as a separate item. The two lines 10 and 11 constitute the same totals as those set out in the exhibit to which I have referred. The totals in column 3 and the average in column 4 were obtained in the same way as the other totals and the averages of this exhibit to which I have testified.

In the line captioned "Expense of retiring property" the amount shown in column 1 was taken from Exhibit 138, the amount shown in column 2 was taken from an analysis of the department superintendents' exhibit, summarized in Exhibit 117, and represents the cost of retiring the property to be replaced. The amount shown in column 3 is the total of columns 1 and 2 and the amount shown in column 4 is the average for the 23-year period.

The figures in line 12, captioned "Maintenance contingencies (10 per cent)" are based on the testimony of several witnesses. In the testimony of Mr. Kesinger, Mr. G. M. Davidson and the departmental superintendents, they stated that the maintenance items included in their exhibits which were summarized in Exhibit 117 were the minimum maintenance expenses that they would foresee at this 1041 time but they did not allow for unforeseen or contingent items. In Mr. Biddison's testimony in respect to the maintenance exhibits of the various departments, he stated that in his opinion, the figures reflected by the department heads should be increased at least 10% to cover the unforeseen items that always occur. On the basis of the testimony of these various men, I have provided in this Exhibit an item of maintenance contingencies of 10% which is 10% of the amount shown for maintenance expenses and the expense of retiring property shown in lines 10 and 11. Through this procedure, I arrived at the amount shown in column 2 which is the same amount reflected in column 3 and column 4 reflects the 23-year average.

The figures represented in line 13, captioned "Net operation, maintenance and retirement expense" are the sum of the amounts reflected in lines 8, 10, 11, and 12, less the amount shown in line 9.

The figures shown in line 14, captioned "Revenue remaining for amortization and return" were obtained by deducting from the amount shown in line 7 the amount shown in line 13. The amount shown in column 1 of line 15, captioned "Capital expenditure excluding cost of gas reserves" is the aggregate capital expenditure to date including replacements but deducting any salvage obtained from the materials reclaimed as obtained from analysis of the books and records. The amount shown in column 2 was taken from exhibits of the various departmental superintendants on future capital expenditures and replacements as summarized in Exhibit 117. The amount shown in column 3 is the total of columns 1 and 2.

In the testimony of Mr. Kesinger, Mr. G. M. Davidson and the departmental superintendents, they stated that the items of replacement as reflected in their exhibits were only those that they could foresee at this time and did not include any unforeseen items or contingent items. In Mr. Biddison's testimony with respect to the items of replacement, he stated in his opinion that the amount provided for replacements in the various exhibits of the departmental superintendents should be increased by at least 10% to cover unforeseen and contingent items.

On the basis of the testimony of these men, I have included an item for replacement contingencies of 10%, that is 10% of the total cost of replacements as obtained from an analysis of the exhibits of the various department superintendents after deducting the current salvage obtained from the retirement of the property replaced. These are the figures set out in line 16 under the caption "Replacement contingencies."

The figures shown in column 1 of line 17 under the caption "Cost of gas reserves" was taken from Exhibit 138 prepared by Mr. Miller. The amount shown in column 2 totaling $2,800 is an expenditure which has been made during the first part of 1939 and is reflected on the books. The amount shown in column 3 is the total of the amount shown in columns 1 and 2.

In line 18, captioned "Working capital" the figure $975,000 was taken from the testimony of Mr. Eastman and from Exhibit 125. That figure is applicable from the beginning of operations and is not repeated in the second column. We did not add to the working capital from year to year, since this figure does not change.

The figures shown in line 19 under the caption "To-
1042 tal capital expenditure and working capital" are the
totals of the figures shown in lines 15, 16, 17, and 18 for the first three columns. The fourth figure, $71,777,589, is the average of the yearly averages. That is obtained by taking the sum of the capital expenditures and working capital at the beginning and end of each year, dividing that sum by 2 each year throughout the period and adding together the 23 yearly averages, dividing that sum by 23, which gives the average yearly average.

The figures set forth in lines 21, 22, 23, and 24 under the sub-caption "liquidating salvage value" were taken from Exhibit 122 as corrected by Exhibit 124. That exhibit was explained by Mr. G. M. Davidson. The amount shown in line 23, entitled "Working capital cash," is the total cash used by Mr. Eastman in the computation of his working capital. We have reflected it as salvage at full value. The amount shown in line 24 is the total of lines 21, 22, and 23.

Question by the Examiner.

I have included in line 18 working capital, which is made up of cash, material, and supplies and other items. You will note in line 22 we show the salvage of the warehouse materials. We reflected the cash in line 23.

Direct Examination by Mr. Morgan Resumed.

The total in line 25, captioned "Total Capital Expenditures and working capital, less total liquidating salvage value (total amortization) $78,284,009," is the difference between the amounts shown in column 3, line 19, and the amount shown in column 3, line 24.

The amount reflected in line 26, column 3, is the difference between the amount reflected in column 3, line 14, and the amount reflected in column 3, line 25. The amount shown in line 26, column 4, in the amount $4,589,790 is the average of the amount shown in column 3 arrived at by dividing the amount in line 26 by 23. That gives the yearly average of the revenue remaining for return. The figure 6.39 shown in line 27, caption "Average rate of return" is determined by dividing the $4,589,790 shown in line 26, column 4, by $71,777,589, which is the average total capital expenditure and working capital shown in line 19, column 4.

On page 2, the first column is the same as column 1 from lines 1 to 19 shown on page 1. The last two columns on the page are the same as columns 3 and 4 of page 1 to and including line 19. The lines in between are merely the break-down of these figures by years for the years 1939 to 1954, inclusive. That is the break-down of the figures shown in column 2 of page 1.

(EXHIBIT 140 was offered in evidence. Counsel for each of the Commissions stated objections to the admitting of this exhibit, and the Examiner reserved his ruling until the next session of the hearing.

At this point counsel handed the reporter a document captioned "Natural Gas Pipeline Company of America and Texoma Natural Gas Company (Combined) Earnings Statement Based on Book Cost as of January 1, 1939," with the request that it be marked for identification. At the direction of the Examiner, such document was marked Exhibit 141.)

1043 I have before me Exhibit 141 which was prepared by me and under my direction. This exhibit is a combined earnings statement based on book cost as of January 1, 1939 of the defendants. By book cost I mean the actual cost as reflected in the books of the companies insofar as those costs have been entered down to January 1, 1939. The figures shown in column 2 of lines 1 to 10, inclusive, are the same figures shown in the same lines in column 2 of the same lines of Exhibit 140 and were derived from the same sources. Since this exhibit covers the earnings for 16 years, the amounts reflected in lines 1 to 10 inclusive of column 3 are obtained by dividing the amounts in column 2 by 16. This 16-year period extends from January 1, 1939 through the year 1954. The basis for the figure in column 2 of line 11 is the same as stated in connection with the item "Maintenance contingencies" in exhibit 140 and is 10% of the amount reflected in line 10. The figures shown in column 3, line 11 were obtained by dividing the amount shown in column 2 by 16. The amount shown in column 2, line 11 of this exhibit differs from that shown in column 2, line 12 of Exhibit 140 for the reason that included in the maintenance contingency in Exhibit 140 was 10% of the cost of retiring property. In this exhibit, the cost of retiring property has been classified under reserves for replacements and is shown in line 15; and the 10% contingencies on this item is included in line 17 and has been omitted from the contingent item in line 11.

Line 12 is the sum of lines 8, 10, and 11, less the figure shown in line 9. The figures shown in columns 2 and 3, line 13, captioned "Revenue remaining for replacement, amortization and return" represent the difference between the amounts shown in the two columns in line 7 and the amounts shown in the two columns in line 12.

The figures $3,105,244 and the average figure $194,078 were obtained from an analysis of Exhibit 117. The latter figure is the result of dividing the former figure by 16.

The figure $109,449 shown in line 16, cost of retiring capital replaced was obtained from an analysis of Exhibit 117 and the amount shown in column 4 is the 16 year average. It is the same figure shown in column 2, line 11 of Exhibit 140.

The amount $541,253 shown in line 16 under the caption "Salvage value of retirement (deduct)" was taken from an analysis of Exhibit 117. The amount shown in column 3 is the 16-year average. This item, salvage value of retirements, does not refer to the liquidating salvage value which was the subject of Exhibit 122 entered by the testimony of the witnesses, G. M. Davidson, Taubman, Solow and Smith, but the salvage realized when the material is placed in stock for future use or which is used in construction work in progress or trade in for costs of part of new material, such as automobiles, mechanical office equipment, and so forth. When this material is carried into other work, or other equipment, or into the warehouse it is retired at its original cost.

The item under the caption "Replacement contingencies (10 per cent)" was obtained on the same basis that the replacement contingencies were determined in Exhibit 140, except that the item shown in line 17 in Exhibit 141 is 10%
of the amount shown in lines 14 and 15 column 2,
1044 less the amount shown in line 16. The totals in column
2, line 16 were taken from an analysis of Exhibit 117.

The totals shown in line 18 are the sums of the amounts shown in lines 14, 15, and 17, minus the amount shown in line 16.

The figure $49,830,479 shown in line 18 under the caption "Capital expenditures per books, excluding gas reserves" was taken directly from Exhibit 138 submitted by Mr. Miller. The figure $2,485,079 shown in line 20 under the caption "Viewed depreciation (deduct)" is the amount which represents the viewed depreciation shown in Exhibit 125 adjusted to the amounts shown by the companies' books by accounts. There are quite a number of computations involved in these adjustments, because we had, in Exhibit 125, to spread back the overheads by accounts and then arrive at a per cent depreciation which we applied to the amounts in the corresponding accounts on our books. This amounts to a percentage relationship derived from Exhibit 125 applied to the accounts as stated on the books. The steps we took and the figures we used in arriving at this figure are among the underlying work sheets supporting this exhibit and will be available for inspection and checking.

The figure $12,402,884 shown in line 21, captioned "Cost of gas reserves, less depletion to January 1, 1939" is arrived at by computation based on the total cost of the companies' gas reserves to date less any salvage realized as reflected by the books. That amount is multiplied by a factor which is the ratio of the recoverable reserves at 25 pounds abandonment pressure under the leases of Texoma as of January 1, 1939 shown by Exhibit 28 and supporting testimony and the amounts recoverable at 25 pounds abandonment pressure under the same leases on August 1, 1931, which was the date Texoma acquired its leases. The ratio of these two numbers is the factor used to multiply by the total book cost to date to arrive at the figure of $12,402,884 shown in column 1. By book costs in this connection, I mean the actual cost of the leases as reflected by the books.

The deduction for depletion is not the same figure reflected on the books of the company for the item "Depletion of reserves." The company books reflect depletion based only on the gas taken out of the leases by the company, while this figure is based on all gas that has passed out or from under the leases between August 1, 1931, and January 1, 1939 inclusive. In other words, in this exhibit we have depleted the leases not merely by the quantity of gas which Texoma has produced from the leases but by the total quantity of gas which has moved out from under those reserves between the two dates last above mentioned both by production and by drainage to other wells.

The figure $9,338,983 reflected in column 2 of line 22, captioned, "Cost of additional property" was taken from the exhibits of the departmental superintendents covering additional capital expenditures in the future, which were summarized in Exhibit 117. That is, the total additional capital expenditures reflected by those exhibits less the amounts which will be paid out for replacements. This represents property in addition to that which we held on January 1, 1939. It does not include any replacements.

The figure shown in line 23, captioned "Going concern value" was taken from the testimony of Mr. Hamilton and "Working capital" shown in line 24 was taken from the testimony of Mr. Eastman and is reflected in Exhibit
1045 125. Mr. Emery also testified on the subject of going
concern value. I do not have the exact figure in mind, but it was slightly in excess of the $8,500,000 shown in this exhibit. I took the lower figure in this computation. The total shown in line 25, column 1, is the sum of the amounts shown in lines 19, 21, 23, and 24, less the amount shown in line 20. The total shown in column 2 of the same line is the sum of the total shown in column 1 and the amount shown in column 2, line 22, which gives a total of $78,562,267. The amount last stated is the total capital employed in the course of the 16-year period.

In line 26, we have the caption "Total rate base," which is an average figure and is the average of the 16 yearly averages amounting to $75,305,459. The figures liquidating salvage shown in lines 28, 29, 30, and 31 are the same figures as those reflected in lines 21, 22, 23, and 24 of Exhibit 140 and were obtained from the same sources. The total, $77,513,135, shown in line 32, under the caption "Total to be amortized" is the difference between the total shown in column 2, line 25, and the total shown in column 2, line 31.

The amount shown in column 2, line 33, $69,960,256, is the amount if set aside in 16 equal annual amounts of $4,372,516, the amount shown in column 3, beginning December 31, 1939, with interest compounded annually at the rate of 1.35% would equal by the end of 1954 $77,513,135, the total shown in column 2, line 32.

The total shown in column 2, line 34, is the total shown in line 13, column 2, less the totals shown in columns 2, line 18, and line 33. The amount shown in column 3 of line 34, is the yearly average of the amount reflected in column 2. The figure 4.79% shown in line 35 under the caption "Rate of return" was determined by dividing the amount shown in column 3, line 34, $3,603,964, by the amount shown in column 3, line 26, entitled "Total rate base" or $75,305,459. The result of this division gives the percentage of 4.79%, which is the average rate of return based on the average annual revenues and the average capital employed.

The first column, page 2, is the same as column 1 on page 1 down to and including line 26. The last two columns are the same as columns 2 and 3 on page 1 to and including line 26, the other columns are the yearly break-down of column 2, page 1, for lines to and including line 26.

(EXHIBIT 141 was offered in evidence. Counsel for each of the commissions objected, and the Examiner deferred his ruling on the admissibility of the exhibit until the next session of the hearing.

At this point, counsel handed the reporter a document captioned "Natural Gas Pipeline Company of America and Texoma Natural Gas Company (Combined) Earnings Statement Based on Reproduction Cost New, Less Existing Depreciation as of June 1, 1939," with the request that it be marked as an exhibit for identification. At the direction of the Examiner, such document was marked Exhibit 142.)

I have before me Exhibit 142. This exhibit was prepared
under my supervision and is a combined earnings
1046 statement of the two companies based on the reproduction
cost new, less existing depreciation as of June 1,
1939. By "reproduction cost new, less existing depreciation" I am referring to the reproduction cost new of the physical property as testified to by Mr. Hamilton and his associates and shown in Exhibit 125 and the viewed depre-

ciation as reflected in this same exhibit which is the depreciation prepared and testified to by Mr. Biddison. In other words, this is a computation based on the figures which speak for themselves in the exhibit, except that insofar as the value of the physical property is concerned we have used the figures which are arrived at by deducting viewed depreciation from the reproduction cost new of the properties owned and held by the companies as of June 1, 1939. The other figures contained in the exhibit are figures which are explained by the captions in the several lines opposite those figures.

It will be noted that this earnings statement is based on a period beginning June 1, 1939 and extending to December 31, 1954, or a period of 15 years and 7 months. The figures in columns 2 and 3, to and including line 18 were arrived at in the same manner as the figures for lines 1 to 18 inclusive shown in Exhibit 141 were adjusted so as to leave out the first 5 months of 1939 and the figures then represent the period of 15 years and 7 months. We took out the first 5 months of 1939 in this study instead of leaving them as we had in Exhibit 141 because in Mr. Hamilton's reproduction cost new study, he applied his study to the property of the companies as of June 1, 1939 and we did not attempt to apply this back to the beginning of the year. We started at the same time his valuation was effective.

The amount shown in column 1, lines 19 and 20, were taken from Exhibit 125. The amount shown in column 1, line 21, is the value of the gas reserves as testified to by Mr. Wallace. Those figures are based on Exhibit 131 which has been received in evidence. In connection with the testimony of Mr. Wallace, subject to some corrections in arithmetic, the figures here used are the uncorrected figures. When those errors in arithmetic in Exhibit 131 have been corrected, we will correct Exhibit 142 to conform to it.

The amount shown in column 2, line 22, after the caption "Cost of additional property" was taken from an analysis of the cost of additional property shown in Exhibit 117, with the property which was installed during the first 5 months of 1939 omitted, as these items were included in Mr. Hamilton's figures. The amount shown in column 1, line 23, "Going concern value" was taken from Mr. Hamilton's testimony and the amount shown in column 1 of line 24, entitled "Working Capital" was taken from Exhibit 125.

The total in column 1, line 25, is arrived at by adding the amount shown in lines 19, 21, 23, and 24 and deducting the amount shown in line 20. The total shown in column 2, line 25, is the sum of the total in line 25, column 1 and line 22, column 2. The amount $82,245,330 shown in line 26 after the caption "Total rate base" is the average of the yearly averages based on a period of 15 and 7/12 years. The figures in the next 5 columns under the caption "Liquidating salvage value" for "Capital expenditures," "Warehouse stocks," "Working capital cash," and "Total liquidating salvage value" shown in column 2, lines 28, 29, 30, and 31 are the same as those shown in lines 21, 22, 23, and 24 of Exhibit 140.

1047 The amount, $84,294,995, shown in line 32 as the total to be amortized, is the difference between the amount shown in column 2, line 25, and the amount shown in column 2, line 31.

The amount of $76,302,249 shown in column 2, line 33, after the caption "Amortization allowance" is the amount which, if set aside in 15 annual payments, each in the amount of $4,896,401, shown in column 3 of the same line, beginning June 1, 1939, and one additional payment at the end of 1954 equal to 7/12 of $4,896,401, together with an interest rate compounded annually at 1.35%, would by the end of 1954 equal $84,294,995, the total amount to be amortized as shown in column 2, line 32.

The amount shown in column 2, line 34, is the amount shown in line 13, column 2, less the amount shown in line 18, column 2, and line 33, column 2. The amount $3,031,987 shown in column 3, line 34, is the yearly average of the amount shown in column 2, same line.

The figure 3.69% shown in line 35 after the caption "Rate of return" results from dividing the total in column 3, line 34, by the total in column 3, line 26, of this Exhibit 142.

On page 2 of this exhibit, the first column is the same as column 1 on page 1 to and including line 25. The amount shown in the last two columns of this sheet are the same as columns 2 and 3 on page 1 to and including line 26. The second column on this page is a monthly average for the last 7 months of the year 1939. This represents just a monthly average for the last 7 months of 1939 and is not reflected on page 1. The figures shown in column 2 of page 2, Exhibit 142, are 7/12 of the amount shown in column 2 of the same page of Exhibit 141.

The other columns under the captions "1940" through "1954" respectively are the break-down into the yearly figures of the figures shown in column 2, page 1, lines 1 to 26 inclusive.

(EXHIBIT 142 was offered in evidence. Counsel for each of the Commissions objected, and the Examiner withheld his ruling on the admitting of this exhibit until the next session of the hearing.)

1048 (October 2, 1939.)

(Counsel presented the affidavits of Robert Ricks and others, all bound together in a document styled "Natural Gas Pipeline Company of America—Texoma Natural Gas Company. Affidavits of Appraisal of Lands in Fee and Rights of Way" with the request that they be marked as an exhibit. At the direction of the Examiner, the documents collectively were marked Exhibit 143 for identification. EXHIBIT 143 was offered in evidence. At the request of the counsel for the two Commissions, the Examiner announced that his ruling would go over until the following day.

At this point, counsel handed to the reporter the data furnished by witness G. M. Davidson, entitled "Natural Gasoline Production and Prices", with the request that the document be marked as an exhibit for identification. At the direction of the Examiner, the document was marked Exhibit 144 for identification. EXHIBIT 144 was offered in evidence. At the request of counsel for each of the Commissions, the Examiner deferred his ruling on admitting this exhibit until the following day.

Counsel then handed the reporter a document styled "Reconciliation of Statements Included in Exhibits 136 and 15", prepared by Mr. Miller at the request of the Examiner, with the request that it be marked as an exhibit for identification. The document referred to was at the direction of the Examiner marked Exhibit 145 for identification. EXHIBIT 145 was offered in evidence. At the request of counsel for each of the Commissions, the Examiner deferred his ruling on that exhibit until the following day.

At this point, counsel handed the reporter a 1-sheet document styled "Texoma Natural Gas Company, Summary of Market Value of Leases, By R. J. Wallace," explaining that it was a correction of the summary page of Exhibit 131. At the request of the Examiner, the document was marked Exhibit 146 for identification. EX-

HIBIT 146 was offered in evidence. At the request of counsel for the two Commissions, the Examiner deferred ruling on the offer until the following day.)

1049 ROBERT H. DELAFIELD, a witness for defendants, testified:

Direct Examination by Mr. Morgan.

(October 2, 1939.)

My name is Robert H. Delafield. I live at Hewlett, Long Island, New York. My place of business is at 61 Broadway, New York City.

I am vice president of the Columbia Gas & Electric Corporation, vice president and director of Columbia Engineering Corporation, a subsidiary management company, and a vice president of most of Columbia Gas & Electric Corporation's principal subsidiaries and a director of many of them. For some 17 years before I went to Columbia Gas & Electric Corporation in 1931 as a vice president I was employed in various capacities by the National City Bank of New York or the National City Company. Those capacities included early training as a statistician and securities salesman. I was subsequently managing director of the company's business in New England and a buyer of securities in New York.

I went with Columbia Gas & Electric Corporation as financial vice president in which capacity I have continued to date. My duties as financial vice president include the placing of securities for the purpose of raising funds for the companies of which I am an officer. Since going with the company I have personally negotiated the sale of all securities sold by Columbia or any of its subsidiaries, and I have also been in charge of setting up those securities. For 17 years, with the exception of time out for the last European war, my time was devoted wholly to the securities business. In the past eight years it has been an important part of my duties but only one of a variety of duties. I have had occasion in connection with my duties to inform myself concerning what is commonly referred to as the rate of return earned by corporations and the relation of that rate of return to the issuance and placing of securities for the purpose of raising capital.

As a securities buyer that is, of course, an important element in the consideration of the credit of any corporation. Since I have been connected with the utility business I have carried on and had carried on under me extensive studies into the subject of rate of return, both from the standpoint of the economics of our own business and also from the standpoint of appearances before regulatory commissions. I have testified before regulatory bodies on this subject. In connection with my testimony and in preparing myself to testify we made a great many intensive studies over a long period of years, and I should say that in the last nine years I have had at least two assistants who devoted a quarter or a third of their time to this particular subject. They worked under my direction. That study has involved the study of business and returns and profits on business not only in this country but in other countries, and not only in present and in recent years but in the past. We are not through with that investigation yet but we have done a great deal of work over a 9-year period.

Rate of return is the rent for capital. On the income statement there is gross corporate income, or income available for interest. That is the income that a company makes after the payment of all its operating expenses and after accruals for taxes, depreciation, amortization
1050 and similar charges. In other words, it is the amount of money that the provider of the capital obtains for permitting his capital to be used in any enterprise.

That includes all security holders. Bondholders, if there are any, preferred stockholders, if there are any, common stockholders, small creditors, bank lenders, and so on.

Particularly in extractive industries, as in the case of the natural gas business, where the business of the company is selling its assets, it is common, or not infrequent, to set up an amortization fund or reserve to return to the investors the amount of money that they used to purchase those assets. That is ~~not~~ rate of return or any part of rate of return. The investor in an extractive industry is entitled to receive the capital that he put in plus a proper return on that.

I would like to illustrate that, if I may, with the simple example. If a man bought a country grocery store, buying the stock of the store for say $2,000 and you do not allow amortization you would be saying to that man "You can run this business, you can make what profit you can on it, but at the end of the period when you wish to get out of business you must throw that $2,000 stock away, you are not allowed to get back the money which you paid for it." The natural gas business is exactly the same. You do not have grocery store stock but you have a stock of gas in the ground which you purchase and which you deliver with pipes instead of a delivery wagon. Those are the things you have in your business that you need to sell, your inventory of material, and each time you sell some of it you have less of it.

The amortization is a provision for the return of the capital to the investor. The rate of return may be distinguished from the return of the capital by referring to it as the return on the capital. The rate of return on any business or any investment is made up of two parts: first, is the fundamental section of the rate which is called "pure interest". That is the rate that any investor would receive if he were fortunate enough to make a riskless loan. The other part is what is known as a "risk premium", which is the amount in addition to pure interest that it is necessary to offer to the investor to attract or entice his money into any venture. Pure interest is a thing that at any one time is always the same. It may vary from time to time. Risk premium, however, not only varies from time to time but is different at any one time for a different type of risk.

Pure interest is the same for all borrowers of any kind or type. Now a given borrower at a given time might borrow at less than the pure interest rate by reason of some perculiar condition. As an example of that is a municipality borrowing on a tax exempt security. Tax exemption might force the rate on that security below the pure interest rate. Simultaneously a gas company might borrow money without tax exemption, with substantial risk, and while the factor of pure interest will be the same in the two investments the actual rate of return will be, of course, totally different.

I do not mean by pure interest the least rate of interest that is being paid by anybody as of a particular time. It is very difficult to put your finger on the exact 1/100 of 1 per cent of determination of what pure interest
1051 would be at any given time. There are a great
many measures. By applying many measures you

come to a judgment figure. It has been frequently done over a long period of years. Ordinarily, you would look to the yield on very high type securities, as, for example, Government bonds. Now you have frequently periods, as you have in my opinion in the last seven years, when Government bonds generally, for a multitude of factors, sell at much less than the pure interest rate. There are other factors in there.

During the past seven years I believe that we have been in a period of marked credit inflation that tends to raise the price of securities and consequently lower the yields. That would not affect the pure interest, the actual pure interest rate existing at that time, but it might affect the price at which securities were selling in a free and open market. Markets are sometimes supported. As in the case of Government bonds, some three weeks ago you had a short decline on news that affected the credit where immediately the risk premium was coming into play, but the market was supported and resultant prices do not give you a true index of pure interest or risk premium. There are perhaps better measures that you can apply. One that would give you a good index would be the investment of a very large and diversified fund. For example, last year, at the end of 1938, the savings banks in New York stated a total bond investment of somewhat over $2,350,000,000. That was a widely diversified investment, held by many banks in securities that had been purchased under the New York Savings Bank Law, which is a rigid law, supposed to prevent the investment of the savings banks in unduly risky securities. On that huge fund the return for the year 1938 was 2.87 per cent. Now that is probably a pretty good index of what pure interest was during the year 1938. The per cent I have stated was the gross return on the total bond investment account of all savings banks in New York State, and against that return, of course, was the cost of operating those savings banks. They had other assets too, real estate mortgages and what not, but against that earning would have to be assessed the cost of operating the fund.

There are a great many reasons that might affect the yield on a given security. I have used Government bonds as an example. There might be a variety of reasons at any one given time from the standpoint of financial institutions, banks, why the liquidity of Government securities would encourage investment at much less than the pure interest

rate at any given time. There are other advantages to banks, particularly banks that are members of the Federal Reserve system, in purchasing Government securities. The ability to immediately rediscount them gives them a value other than their investment value. This characteristic of liquidity applying to Government bonds would attract any other type of investor as well as banks. In situations confronting business and industry such as we have had in the past few years there has been more capital than there were uses to which to put it and the investor, as a matter of fact, had the option of allowing his money to lie idle or put it in something that would yield him some return until he could find a place where he was willing to put it and take his chances on a higher return. To such an investor it is desirable to have his money in a liquid investment such as a Government bond, so that the moment that the opportunity arose he could shift that capital from a temporary investment where he was just getting what return he could in the meantime and put it into the investment which he really desired at a return which was satisfactory to
1052 him. We have had a perfect example recently in the sharp, sudden decline not only in the market for Government bonds but in the market for all high grade bonds in general, that was synchronized with the declaration or the outbreak of war in Europe. I think the underlying reason for a sharp decline in the bond market was that American investors were freeing their capital, getting it into the form of money so they could reinvest in other undertakings, for example only, in the stocks of industries that they thought would be quickly benefited by war. These investors run to sell these bonds and at the same time other investors, like banks, try to get out and save themselves losses before the market breaks. Thus we had a cumulative effect that resulted in the breaking of bond prices.

Risk premium is the part of the total rate which compensate an investor for the risk that he runs in any given investment. I think it may clarify it if I remind you that the rate on short term money is always less at a given moment than the rate on long term money. This is a simple example. The reason is that the average investor has a better idea of what is going to happen in the immediate future than he has as to the distant future. The risks of making a long term investment are greater than the risks of making a short term investment. If a given company went to the public at a given moment and asked for a six months' loan and a 20-year loan we all know from experience that the rate on the 20-year loan would be higher. That is the public's appraisal of the added risk in that long period.

There are other risks involved than the time element in making investments. Each industry has risks of its own which are peculiar to it, and there are some risks that are common to all industry. I should say it is never possible to figure out the exact per cent that would compensate for given risks although it is, of course, possible to figure out what measure the public will put on that risk. The price of a security in the market, if it is selling in the open market, is made by a great many buyers voting with their dollars to buy or sell, and it is that expression of opinion which is absolute and final that shows you what compensation they desire for particular risks. When you are trained in the pricing of securities and the analysis of these risks, and of that opinion on prices, as expressed by the public in their buying and selling, you can appraise the amount of risk premium that is required for a given risk to attract capital to it.

At any one moment if the Natural Gas Pipeline Company of America wants to finance, it would have to finance in the market in competition with not only all other people who wanted to finance at that particular moment, but all other people who had securities outstanding at that moment. For example, if this company offered its stock at a price which compared, on a risk premium basis, unfavorably with the stock of General Motors, or American Can, or some other undertaking, it would be almost if not entirely impossible to dispose of that stock. Economically, you cannot sell the same commodity in the same market at two prices at the same time. When you are selling credit you are merely selling it as you would butter.

Even a moderately informed investor if he were considering the purchasing of securities of a natural gas pipeline and producing company, would look around to see what other securities could be had for and the
1053 returns on those other securities. In fact we have a most complicated machinery set up to prevent the investor from looking at just one thing when he makes an investment.

That is one of the important elements in the Securities Act of 1933 which is administered by the Securities and

Exchange Commission. The whole purpose of that Act is to inform the public as to investments and prevent them from looking only at one thing and thus being uninformed.

In addition to the information available through the administration of that Act, the investor ordinarily undertakes to inform himself concerning opportunities in securities in general when he is contemplating the purchase of a security. Without exaggeration, having personally sold millions and hundreds of millions of dollars worth of securities, I know from experience that in practically every sale I have ever made when price became the final consideration, the investor, no matter who he was, always looked at price on a comparative basis and compared it with the price of other securities.

I have made studies of the rates of return on various businesses in the Chicago district.

(At that point counsel handed the reporter a document captioned "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Data Concerning Rate of Return, Witness R. H. Delafield" with the request that it be marked for identification. At the direction of the Examiner the document was marked Exhibit 147 for identification.)

Exhibit 147 is a list of 128 companies, each one of which has some type of securities listed on the Chicago Stock Exchange. It includes all of the companies with securities listed on the stock exchange except regulated companies, finance companies, and companies actually in bankruptcy or receivership. In other words, it is, as far as we can make it, a complete list of those companies whose securities are listed or traded in on the Chicago Stock Exchange, which companies are not under regulation, with the two exceptions of finance companies and companies in bankruptcy. It includes not only profitable companies, but companies which in some of the three years shown, that is 1936, 1937, and 1938, operated at a loss.

The exhibit is set up to show in the left hand column the name of the company, in the second column the general description of the business, the third column the location of the principal plant or plants of the company, and then in three successive columns, each with three sub-columns the total invested capital as at the end of each of the years 1936, 1937, and 1938, the net earnings before interest, which the rate of return, and the relationship of those earnings before interest to the invested capital, which is the rate of return expressed in per cent.

In submitting this exhibit, I point out that there is no intent to compare the risk involved in any particular one of these undertakings with the risk involved in the business of defendants. The purpose is simply to show what rates of return were made by business in general and by successful business in the general area and region where these companies operate, or in markets where they would have had to compete for capital had it been financed in this period. That list covers the first three pages of the exhibit.

1054 This rate of return shown in the column under the caption "Rate of Return, percentage" represents the rate available for interest and dividends after all charges such as depreciation and other charges comparable to amortization and operating and maintenance costs, taxes, and things of that kind are paid. There are a large number of companies here and it is conceivable that one company or another company might keep its books in a way that would keep those factors out, but most of them do not. We have examined their statements and the net earnings before interest are supposed to be after all charges, cost of doing business, and accruals. Of course, the percentage figure would relate that to the capital investment, which is the sum of the capital of all kinds and the surplus, less net of depreciation reserves, where reserves are on the books. Net of depreciation reserves means just the capital involved in the business. The reason that it is net is because it gives you, as nearly as possible, the best index on the book figure that you can reach. That is the net sum of the capital on the liability side of the sheet and the surplus.

I took the particular three years shown in this exhibit instead of taking one year and making that the basis of the study because in the business life of a country there are cycles which affect all business, and to pick one year might very well give an improper index of the earning capacity of business as a whole. I think that is exemplified in the fact that the average rate of return for these 128 companies in 1936 was 9.3 per cent. In 1937 it was 8.37 per cent. Now we know that 1938 was a year of marked business recession and in that year the return was 4.37 per cent. The average for the three years on all companies—and this is a weighted average, in other words, the capital is multiplied by the earnings, so to speak, and then divided into it—the average for the three years is 7.32 per cent. I just add the capital and earnings all up and then divide. I should have explained that each one of these average rates, when you come out at the end, may be either cast up from the mean or cast down from the mean. In this instance it is cast down very heavily, because there is one very large industry, the packing industry, which has not been particularly prosperous in recent years. That is a large capital industry and consequently if it fell below the middle it would tend to draw the whole average down. On page 3 of this exhibit you will notice that Armour & Company, with a capital of almost $300,000,000, had an average return of only 3.63 per cent during that period. That would tend to draw the whole average down.

The red figures on page 3 indicate losses for those particular companies in any of those years. Now if you were to use this 7.32% as a measure for regulatory purposes obviously you could not regulate to loss or to destruction. If you drop out the red companies and use the black companies you come to an average of 7.48 per cent. That only eliminates those companies which show a red return in the average column at the extreme right side. A pipe line company desirous of placing its securities would not find itself in competition with those twelve companies who operated at a loss. They would not offer any competition in financing. This is also true of those others in the lower portion of the final column beginning with the company which offers only .39 of 1 per cent as a return on its investment. In reality I think that these defendants if in search of capital would be in competition with the successful companies of the group. You could eliminate a large number of those companies, let us say those that are less successful than the average. They would not be strong competitors for capital at any one moment. If we eliminate all those who made returns of less than 7.32 per cent on the investment we have left companies with an investment of somewhat over $924,000,000 making a return of somewhat over $108,000,000. (Objection by Commission Counsel to above testimony overruled.) That includes those companies
1055 which in the final column made 7.32 or above as a return, and 108 related to 924 is 11.73 per cent. That is to say those companies which earned as a return the average or more for the whole group actually earned

11.73 per cent on their investments. There ars 128 companies in all shown on this list. Those companies which made a return greater than the average numbered more than one-third of the total number of companies and practically one-half of the capital involved.

Columbia Gas & Electric Corporation, on a consolidated basis, that is including the subsidiaries, has a gross revenue of approximately $100,000,000 per annum. Of that approximately two-thirds arises from natural gas operations and a little less than one-third from electric operations; the small balance is from incidental businesses. There are two or three natural gas subsidiaries with a few shares of stock outstanding. Outside of those there are only two natural gas companies that have issues of securities like bonds or preferred stocks in the hands of the public. These are two natural gas companies each of which has an issue which was originally $6,000,000 and now somewhat less in the hands of investors. Each one of these two companies has assets of approximately $100,000,000. We finance the capital requirements of our other natural gas interests through the holding company instead of issuing the securities directly on the gas properties. There is a reason for this. The financial history of the natural gas business is not particularly fortunate, and natural gas companies as a class, do not generally have high credit, and their securities in the past have not been popular and readily salable to the public. When we finance through the holding company we are able to finance on a better basis because we have substantial electric earnings in addition to the gas earnings.

I spoke of two natural gas issues. Those were issues of $6,000,000, the par value of serial notes sold in 1934. They were sold privately to the Metropolitan Life Insurance Company and to the Mutual Life Insurance Company in New York, each taking a part of each issue. One was a loan to the Ohio Fuel Gas Company, the assets of which on the balance sheet were in the neighborhood of $120,000,000 and which earned interest on its notes about 14 times. The other was notes of the United Fuel Gas Company with book assets of approximately $85,000,000, which earned its interest, at the time the notes were sold, 14 or 15 times. The earnings have since improved. When those notes were sold to the insurance companies, with one exception, a life insurance company in New York had never bought a natural gas bond. Those were the first natural gas bonds they

bought. They bought those notes in January, 1934, on a 5½ per cent basis and insisted that Columbia Gas & Electric Corporation guarantee them, in order to get behind the credit of the operating subsidiaries, the credit of the parent with its electric business. That is an indication of the difficulty there was in the past in selling natural gas bonds. Both these companies have distributing facilities. There are two advantages in having distributing facilities that immediately occur to me. When you have an asset there that may not go entirely out of use with the complete extraction of your natural gas, that is one; the other is you have control of your market for the sale of natural gas, which is of vital importance. Since the sale of the two issues of $6,000,000 each of natural gas bonds in the year 1934 there has been marked change in the situation. The life insurance companies which in the past several years have been the largest single class of security buyers, have been substantial buyers of natural gas bonds. Just after those particular sales another company sold some natural gas bonds to the life insurance companies privately,
1056 and the life insurance companies which were then
seeking investments and had no natural gas bonds, proceeded to build up the natural gas sections of their portfolios and created a peculiar demand for the bonds of natural gas companies for the past four or five years when we have been in what we term an institutional market.

An institutional market is one in which the securities are sold to institutions rather than to private investors. Life insurance companies are the largest segment of the institutional market, and I might exemplify that by saying that unless you know in advance today that the large life insurance companies will buy an issue of this type, your sales problem becomes extremely difficult and almost impossible.

Coming back to the natural gas pipelines and production business for a few moments, we have classified this business as an extractive industry. It is a mining undertaking which is selling its assets to make earnings. Now not only is the natural gas business a mining undertaking at its production end, that is at its source of supply, but it is a regulated business at its distribution end in most instances, and it is therefore more risky than, for instance, a copper mine or gold mine, because not only have you the risk involved in the supply of any material that is under the ground, but you have a market at the other end the price of which is controlled in the first place, and which you cannot stop serving in the second place. If a copper mine were forced to sell because of economic conditions at prices which would not yield a profit, all you would have to do is shut down and leave a watchman. A gas company cannot quit business, and that is a very real risk.

From my personal relationship with buyers of securities I know that they have considered natural gas pipeline and production bonds risky. It is borne out by the ratings that natural gas bonds are given by the various statistical services, and it is also finally confirmed by the prices at which they sell. We have made a great many studies into that subject to see how the bonds of natural gas pipeline companies have been rated with reference to other securities. I have a list of those bonds which we have considered in the making of that study or used in the chart which we have made as a result of that study. On page 4 of my exhibit, 147, we compare the yield on securities over a period from the beginning of the year 1929 to the end of the year 1938, the yield on 15 high grade municipal bonds as published by Standard Statistics, 40 high grade public utility bonds as published by Moody, and 40 high grade industrial bonds as published by Moody, with 9 natural gas bonds which we have made up ourselves. The 9 natural gas bonds included at the end of this period were Cities Service Gas Pipeline Company 6's at 1943, North Central Gas Company 5½'s at 1955, Macon Gas Company 4½'s at 1952, El Paso Natural Gas Company 4½'s at 1951, Kansas City Gas Company 6's at 1942, North Penn Gas Company 5½'s at 1957, Oklahoma Natural Gas Company 4½'s at 1951, Panhandle Eastern Pipeline Company 4's at 1952, and Southern California Gas Company 4½'s at 1961. That is a selection of natural gas bonds which represents about the best that the industry has to offer. This study was not made for the purposes of this case. It is a study that we use for our own comparative purposes constantly in comparing the prices of natural gas bonds and I think reflects very fairly the investing public's appraisal of the comparative risks of those different types of securities.

1057 We use this study in other rate cases and we use it in pricing bonds ourselves. Of course it is kept up to date.

Beginning in the year 1929 and following the black line you will note that the yield on the natural gas bonds was throughout the year from 5.80 to as high as 6.40 per cent. At the same time 40 high grade industrials were selling to yield about 5.45 and 40 high grade utilities to yield about 5.25. The high grade municipals were down here at 4.25. Of course the primary reason for that is tax exemption. That is another factor that enters into their price. Now from the middle of 1931 to the end of 1934 these natural gas bonds sold at prices which at all times yielded more than 7 per cent. In other words, the senior securities of these natural gas companies, which are I believe entirely representative of the industry, the best that they had to offer, the most riskless security that they had to offer sold at the public's own price to yield the public more than 7 per cent on the investment. The comparison at the middle of 1934 is about 7.75 per cent for the natural gas bonds, about 5.25 per cent for the 40 utility bonds, about 4.45 per cent for the industrial bonds, and about 3.75 per cent for the municipal bonds. There are two very interesting points in this graph. You will note that at the beginning of the year 1933 the yields on utility bonds and yields on the industrial bonds cross, and from that time on the industrial bonds have sold on a more favorable basis than the utility bonds. You will also notice, so far as the natural gas bonds are concerned, beginning in the year 1934 there is a steady drawing together of the curves, indicating that the natural gas bonds sold on a more favorable basis in relation to the other bonds, and that I ascribe to the fact, to which I have just testified, that the large institutions who had never before been buyers of natural gas bonds stepped into the market and created for this period a peculiar demand for those securities.

The circumstance that early in the year 1933 the yields on the public utility bonds crossed the line of yields on the industrial bonds and became higher from that point forward through the year 1938 than the yields on industrial bonds is of significance. Of course I may be influenced by my interest and studies on this particular subject. I feel that it was just about that time, and just prior to that time, when the regulated rates of return of utility companies were very much reduced. In other words, we had been, generally speaking, in times of rate of return for utility companies of 7, 7½, 8 per cent, and so on—I mean electric companies, this group. Beginning about 1932 or 1933, there was a sharp cut in that as the result of a group of decisions which brought these returns down to 6½ or 6 per cent. Again I know from contact and relationship with professional investors like institutional buyers, that this

has been a cause of great concern to them. They had before them the example of the financing of the railroads operating on a legal rate of return fixed by law at 5¾ per cent, and the result of that, and I think that is the strongest influencing factor right at that period. In other words, it is my view, from my knowledge of the subject, that the change in the year 1933 from a situation in which public utility securities had theretofore sold at a lower yield and at a higher price than industrial securities to a situation where they began to sell for a higher yield and a consequent lower price is due to the pressure on the rates. You translate that into rates of return, because the rate of return in itself, I think, is one of the most important factors. It is pressure to reduce the earnings of the
1058 property which is immediately reflected in a decline
of their credit standing with the public. With very minor exceptions, almost all of the financing there since 1934 has been for refunding purposes. There have been some exceptions but very minor ones in relation to the whole. That indicates that there has been a retarding of the flow of new money into the industries whose securities have been negotiated as opposed to the conditions which obtained in prior years.

In its origin the natural gas industry was a by-product industry. There was a period of extremely rapid development during and just prior to the war years, that is 1913 and 1914. The biggest gas years I think in the history of the industry occurred in 1917 and 1918. At that time the natural gas companies were largely private undertakings, owned by groups of men, usually men who were in the oil business, because it was a by-product of the oil business, and subsequently, when natural gas began to stand independently on its own feet, which was in the middle 20's, it was only then that you could get the public, other than the public who were interested in and intimate with the oil business, to put money in any large volume into the natural gas business. There were, of course, exceptions. I can remember for many years the only natural gas bonds that I ever heard of were the Kansas City Gas 6's. As far as I was concerned, dealing in the general market of securities, there were no others. There were a few others which were traded occasionally in Pittsburgh and Cleveland, but in big markets they were never heard of. People did not deal in natural gas bonds.

Of the 9 companies which I have used here in this chart

on page 4, seven are either solely distribution companies or have important distribution facilities. Two exceptions are the Cities Service Pipeline Company which is a transmission system and Panhandle Eastern Pipe Line Company which is essentially a producer and transmitter although it has small distribution facilities. There are only 7 of these companies which, at the end of 1938, we could get complete figures on, and the combined capital ratio of those 7 was 42 per cent bonds, 20 per cent preferred stock and 38 per cent common stock. I have stated that to be the nearest per cent. I have investigated the earnings in relation to the interest requirements of the interest-bearing securities of these seven companies. We found that using the composite picture of those seven companies, that their bond interest was earned three times, that their bond interest and preferred stock dividend requirements on an overall basis was earned twice. That indicates to me that the public's requirements for the ratios on natural gas securities are inclined to be more rigid than they are for some other types of securities, notably electric securities. I have not made a specific study, but speaking as a generality, if a sound and successful electric company earned all its interest charges twice, or a little better than twice it has a pretty good credit. If it earns its interest charges and preferred dividends overall 1.6 or 1.7 times the preferred stock I think would sell at good prices. Now, I have not made a specific study of that. Those are judgment figures just from experience, in dealing with electric utility issues. It is quite common, for example, in dealing with electric company mortgages, to put a qualification in that bonds may be issued for 66 per cent of the cost of new property, provided that all interest is earned twice. I have never been able to get that kind of a provision in a natural gas mortgage. Had those earnings been less than three times the earnings on the bond issues I think the bonds would have sold at lower prices and at higher
1059 yields. That would have been true also with reference to the preferred stock. Based on my knowledge of the natural gas business and my experience in the handling of securities of all kinds, including those of natural gas companies, I doubt if that sort of return, 3 times the interest on the bonded indebtedness, amounting to an average of 42 per cent of the whole capital, and twice the combined interest on the bonds and preferred stock aggregating 62 per cent, would have been an adequate return to

sell the common stock at par, had it been necessary to finance the amount that went into the common stock also. We are thinking here in terms of bonds that are selling in the market all the time in small lots, and preferred stock selling in small lots, 5, 10, 20, or what have you. Now those securities are entirely different than securities involved when you go out and sell a new issue. Even with your own bonds, if you have a company and its bonds are selling, for example, at 100, and you issue additional bonds under the identical mortgage for added property which will add to earnings, you do not get the same price as for the bonds that are selling in the market. You get less. So what I mean by talking about minima is I am exaggerating here against new financing. I do not think you can necessarily go out and sell bonds at par on a 4½ per cent basis and sell preferred stock on a 6 per cent basis and then sell the common stock at such ratios as I have discussed. I do not think it would happen that way. . .

The natural gas business being an extractive industry, the buyers, whether they be bankers or institutions, always want to be sure that there is a margin of safety beyond the maturity of their obligation in the available supply of gas. For example, if you can satisfy them that you have a 25-year supply of gas they will not lend you money for 25 years; they will lend you money perhaps for 20. As you come down, if you can satisfy them you have a 15-year supply of gas they might, if they are extremely hungry, lend you money for 12 years, but usually with a very heavy sinking fund. A skillful and careful buyer would only lend you money for 10 years. By "heavy sinking fund" I mean it is quite customary in natural gas bond issues to have a 100 per cent sinking fund. If you will look again at this chart, that fact distorts the yield on natural gas bonds, as shown by this curve downward. By that I mean the Panhandle Eastern Pipe Line Company has an issue of bonds outstanding which will mature in 1952, so that the yield as used in this is taken to 1952. As a matter of fact, those bonds have a 100 per cent sinking fund so that their maturity is almost half way to 1952, and if this were taken into account the yield would be much higher. In other words, the money is being accumulated against the bonds in what is called a sinking fund for the purpose of protecting the owner against having to look to the resources as of the time the bonds mature.

Based on my knowledge acquired in dealing with the marketing of securities of all kinds and my knowledge of the natural gas business as an officer of the Columbia Gas & Electric Company, handling its securities as its vice president in charge of financial problems and in the light of all my knowledge concerning the attitude of the public towards the hazards and risks involved in the business of a natural gas pipeline producing company, I have an opinion as to what is a necessary and required return for a natural gas pipeline and producing company. I am familiar in a general way with the two companies involved in this proceeding. I know where their properties are and where their source of supply is. I know
1060 of course about the Panhandle of Texas gas field, its extent and its distance from Chicago, where these pipelines find most of their market. I have an opinion as to the necessary rate of return or the required rate of return to which these companies are entitled. I prefer, if I may, to answer that question by stating what I consider the minimum rate of return. I do not think that the Natural Gas Pipeline Company of America can continue to exist and finance and maintain its credit and raise the necessary money in the future for the additions it is going to have to have to do its business on a return of less than 8 per cent. Now, I am being very careful not to testify that that is a fair return, because in this type of extractive industry, after all the study that we have done, I am convinced that it is not. I think this type of industry is entitled to and should have for the future benefit of the investors in the company and for assurance of continuity of supply for the customers, a more adequate return on the necessary capital. In referring to rate of return I am relating the earnings to the rate base. I am not interested in the amount of the rate base, the dollars involved, or anything like that. It is simply a percentage relationship, the rate base to the amount that has to be paid to raise that capital.

I am familiar with the use of the term sinking fund as I have used that expression here. I am familiar with the practice among regulated concerns and regulating bodies of setting up and requiring from the standpoint of the regulating body, that reserves be set up for the return of the capital, either to offset depreciation as in the case of a utility which is continuing on, or for the purpose of returning capital in the case of a project like a natural gas producing company, which has a terminable life, so as to distribute the amount evenly by annual installments over the prospective life of the project, or for the life of the physical property as in the case of a utility. There are various methods of creating those funds. You refer to either a straight line method where a given sum is periodically deposited, designed to accumulate a final fund, or a sinking fund method where the amount is periodically deposited, which with interest and with interest on interest, creates a sum at a certain year. The purpose of an amortization fund, particularly in an extractive industry, is to return the capital to the investor, get his money back for him. If you wait until the last year, the business is over, there is no more, and to protect him you have to assure him by annual or periodic payments throughout the life of the business. That, incidentally, distributes the burden of returning the capital among all of the companies' customers from now until the project has reached the end of its life. Now if that fund is to be accumulated by the straight line method it is a simple matter of dividing the total amount to be returned by the number of years during which it must be accumulated. If it is to be accumulated by sinking fund accrual, you would set up a lesser annual sum than you would on a straight line basis, and then you would fix a rate of interest which you are sure you can get on that sum for the whole period for the life of the fund, and at the end of each period you reinvest the return on the fund itself, and do that each time, and for a small annual accretion therefore you build up the larger sum at the end. In other words, you make a smaller annual deposit but by putting your annual deposit to work, you do not have to put up so much out of the property itself. To state it differently, the amounts set up under the sinking fund are such amounts as, together with the interest and the interest on the interest, will amount to the total sum to be returned at the end of the project's life.

1061 From the standpoint of the investor and the standpoint of the company which owes the investor the duty to return that capital by the end of the project's life, an interest rate which is so low that you can be absolutely sure of getting it must be used in accumulating that fund by the sinking fund method. The only way to build up a sinking fund is to put a rate on it that you can be just as certain as it is humanly possible to be certain will never be broken. I believe that the biggest amortizers of funds like this are the life insurance companies. Life insurance companies use in New York 3 per cent, but that 3 per cent is not quite a true figure, because they are using for their mortality tables the 1885 American tables, and they have shortened the present span of life and therefore very much diminished the risk. As a practical matter I would not want to use 3 per cent, because I do not believe I could feel sure, over 15 or 20 years, of getting 3 per cent on every investment. I would much prefer and I would at this moment be more apt to pick a rate of 2 per cent which, I think, is a logical rate under existing conditions. That is a judgment figure, but it is a figure I would pick today if I had to accumulate a certain fund, to be sure of doing it. I would not go out and buy stocks with this kind of fund if you get 7 or 8 or 10 per cent return on stocks for the risk of losing your principal. That is why you get it. According to the previous testimony, I say you could not do that. You have to find the nearest to a riskless investment that you can find for a sinking fund or amortization fund. The company accumulating such a fund must avoid every possible risk, from the practical standpoint, and mathematically it is essential that they avoid risk and pick a low enough rate so that the very functioning of the interest on which they are relying to accumulate the fund can operate.

Cross-Examination by Mr. Slaff.

As to whether or not I would compound that interest annually, semi-annually, or quarter-annually, in figuring the 2% ordinarily you can compound semi-annually, simply because the fund is usually invested in bonds, and most bonds pay their coupons semi-annually.

Prior to my coming with Columbia and subsidiary companies I never testified in a rate case. Since that time I have appeared in rate proceedings before various commissions, I appeared before the Illinois Commerce Commission in 1932, testifying for another company. It was, I think, the case of the Central Illinois Light, having to do with the gas rate at Springfield. I have appeared before the Ohio Commission in cases involving the Ohio

Fuel Gas Company, the United States Fuel Gas Company, Cincinnati Gas & Electric Company, as far as rates are concerned, and I have appeared before that commission frequently for various companies in connection with matters of financing. I have appeared before the Pennsylvania Commission in a rate case for the Union Heat & Light Company, I should say in about 1933 or 1934. I have appeared before the West Virginia Commission in rate cases involving the Natural Gas Company of West Virginia, the Cumberland and Allegheny Gas Company, and in matters of finance involving the United Fuel Gas Company. I appeared, I think by deposition, before the Virginia Commission in matters, I think, involving service company contracts and financing. I am not positive whether that was a deposition or simply an interrogation. I made several appearances before the Ohio Commission in the Ohio Fuel Gas cases. I should say I appeared before that Commission in 1933 and 1934, and again
1062 in 1937. These proceedings involved the same municipality but they were different cases. All involved gas rates. In each one of those Columbus cases the United Fuel is brought in as the supplying company, and I appeared for it in those cases. I appeared in no other cases involving the United Fuel before the Ohio Commission, so far as I remember.

The Cincinnati Gas & Electric Company case was a gas rate case which was settled. It was tried, I believe, in 1934 and I appeared for it in that case. Now that, of course, would also involve an appearance for the United Fuel. I appeared as a voluntary witness in the Union Heat & Light case before the Pennsylvania Commission in 1933 or 1934. It involved gas rates. The Natural Gas Company of West Virginia case was a gas case, and my appearance was in the year 1932. The municipality involved was the city of Wheeling. The Cumberland and Allegheny Gas Company case involved gas rates. I am sorry I do not remember the name of the town that is involved in that case. That was in 1937 or 1938, the latter year I think. I believe I testified on rate of return for the Cincinnati Gas & Electric Company in an electric case in 1933, which case in turn was settled. That would be before the Ohio Commission. In Ohio you are required to submit your testimony. I do not remember whether my testimony was just submitted or whether it was submitted and I appeared. In either case the testimony is there. The case was settled and withdrawn.

Cross-Examination by Mr. Booth.

I have stated that I believe the term rate of return has two specific aspects, namely, pure interest and risk premium. That was the conception of rate of return which I had when I expressed my opinion in response to the question of counsel for defendants. I said in direct testimony that a good measure of pure interest at the present time was the rate on the bonds held by all New York savings banks, which in 1938 was 2.87, and I should think that between 2¾ and 3 per cent of the eight per cent in that range would be pure interest and the balance risk premium. While that is one element in my conclusion as to an overall rate of return, I did not specifically allocate 2¾ or 3 per cent as the factor of pure interest and the remainder to risk premium. So that there may be no misunderstanding, may I say that if at that moment the pure interest rate had been 2½ instead of, say, 2¾, I might still have arrived at 8 per cent as the minmum return. The principal factors in my mind in arriving at 8 per cent were, first, the rate necessary to compete with other industries for capital, which I arrived at by the first part of the exhibit put in this morning; second, I arrived at that rate by calculation and experience as to the amount of return rate that this company would need to be able to finance in competition with other companies, knowing the terms on which other companies financed. I divided that into pure interest and risk premium because, this being a peculiarly risky business, risk premium is a very important factor in arriving at the rate of return, but I wouldn't necessarily have to divide them three and five, although those are approximately the figures that I did have in mind in coming to that conclusion—2¾ and 5¼, roughly. That is my own personal judgment of it. I have stated in my testimony that the interest rate in determining the amount of interest that should be applied computed in connection with the amortization fund should, in my opinion, be 2 per cent. That is an experience figure, and, as I said, the largest amortizers of large funds are the life insurance companies who have great experience in the amortization of 1063 risks, where they actually amortize the policy on a man's life. They use 3 per cent, but I know that there are factors of safety in there that if I was setting up a sinking fund to retire a given amount of money, I wouldn't have, and I reduced that to the amount which I have felt over a period of years I could be assured of getting from outside securities that I could buy, allowing for a slight factor of safety there. If I may give you a perfect example, in that fund you would have diversity. If you went through a period such as we have been in in the past five years, I might well buy underlying bonds of the Cincinnati Gas & Electric Company on a 2.9 basis, and I might well buy underlying bonds of the New York Edison Company on a 3¼ basis, but I would also have to have some Government bonds in there as a matter of security, and those would be on a less than 1 or 1¼ per cent basis. Now when you think of the kind of fund you would have to have, you could conservatively make an investment that you could be sure of yielding you 2 per cent, because it must yield you 2 per cent. The investment must be on as risk-free a basis as you can find. That would be the purpose in investing that fund. If I invested it in securities of the class just described, namely, a combination of Government, New York Edison and Cincinnati Gas & Electric, and perhaps some municipal bonds or telephone bonds of A.T.&T. subsidiaries, and securities of that class, I obviously would not have a risk-free investment, but that would be as risk-free as I could get. Some of those bonds in the next 20-year period may well default. There is no such security as a risk-free security. The Government securities are as nearly risk-free as you can get.

Questions by the Examiner.

I observed that the life insurance companies use 3 per cent, because that group of institutions is the most widely experienced group in amortization They use that figure. I think I explained in my direct testimony and again just now that I know the life insurance companies have certain safety factors that I wouldn't have. Therefore, I must take a lower rate. I am governed by the fact that, as just stated, I would have to have some Government bonds. That would tend to draw the rate down. I might have some telephone bonds which would push the rate up, but I would be afraid to average, to attempt to average more than 2 per cent on a fund the whole purpose of which was never to lose one payment of interest or one payment of principal.

Cross-Examination by Mr. Booth Resumed.

I had the contracts between defendants and Chicago District Pipeline Company available for study and did study them when I was preparing for this case some time ago. That was 18 months ago, however. I think I might be able to answer a specific question as I am generally familiar with that contract. I read those contracts to be familiar with them but I didn't attach to any specific part of the contract a specific risk and say this would add one-eighth of one per cent, or anything like that. To be perfectly specific in my answer, there isn't any one particular provision to which I attach special significance in arriving at my conclusion as to the fair rate of return for defendants. The big risk factor in this particular business is that it contracts for its retail market and doesn't control it itself, and putting it in a conversational way, it is consequently at the mercy of the seller of gas who is only interested in this company as a means of getting that material. It
1064 is in a very weak position where it can't set up a type of rate, for example, retail rate, which might encourage the type of business which this company might need at a given time. That is a great risk. What I mean to say is that the fact that the market was a contract market was an important element of risk to this company. I don't think that the company is in a very weak position, but this situation presents an important element of risk. I concluded that the business would be less risky if defendants owned the distribution. I am not trying to avoid your question; I am trying to answer it specifically. It isn't a matter of a contract or a provision in a contract. It is a fact. These companies do not control their market and that adds to the risk of their business. I repeat that there is no specific provision in the arrangements between defendants and the Chicago District Company to which I attach special significance in determining the rate of return for defendants. It is the fact that the market and the supply are divorced that bothers me. I don't care how they are divorced or what the arrangements of sale is. It is the basic fact. I don't have to look beyond that into the details of the arrangements; they might be good or bad, and these, as I remember them, didn't bother me at all. There was nothing in them that upset me. What does

bother me is that the man who produces his gas and carries it 900 miles can't make the terms of his sales at the other end, subject only to regulation.

I did not say that the 8 per cent would be a reasonable or fair rate of return at this time. I was very careful to testify that it was a minimum rate. A minimum rate is the least, the smallest rate that I think a company could live on. I have no doubt that you will look at testimony in recent cases, or other cases, and I have testified often to an 8 per cent rate of return to gas companies in different kinds of businesses, each time testifying that it was a minimum rate. Now I don't think the risks in those different types of companies are identical, and I don't think that the fair rate for this company might necessarily be 8 per cent. I do think that it could get by on it; if you considered the risks and weighed them very carefully you arrive each time at a rate that is so high that under regulation there just isn't any use proposing it. An 8 per cent return is the minimum on which these companies can live, in my opinion.

Further Cross-Examination by Mr. Slaff.

I am not concerned with the rate base; that is the business of other witnesses, but I mean 8 per cent on the allowed rate base. If you allow X as the rate base and that rate base is extremely low in proportion to cost or to reproduction cost new, or to some other yardstick that you would apply, it of course would have the same effect as an unduly low rate of return. If you allow a generous rate base and a rate base which I would consider would include elements that many regulatory bodies do not consider now, then I think that you should allow 8 per cent on that rate base.

Further Cross-Examination by Mr. Booth.

As to the peculiar risks of the business of defendants, in the first place, I have stated several times on direct that it is an extractive industry and there is the risk of exhaustion of gas perhaps prior to the estimates of the geologists. I said the risk that it might be exhausted prior to the estimates of the geologists. I have a book of some
500 natural gas circulars published between 1920 and
1065 1930, and a single reading of that book and an estimate of gas supplies will convince you that the risk of

exhaustion of supplies prior to the geologists' estimates is something that is foremost in the minds of all investors. I have made no studies, nor am I qualified to make any studies, with respect to the life of the Panhandle field, or to state that it will, in my judgment, expire earlier than the date to which witnesses have testified. But that isn't the question. The question is whether there is a risk that it may expire earlier, and I am qualified to state that there is a very strong risk that it may—that field or any other gas field. I consider that of some importance in arriving at my conclusion as to the 8 per cent fair rate of return for these companies. There are other risks. I consider the risk, for example, of this property being reduced in value and use by a possible discovery of gas near the markets. You may have been familiar with the fact that there has been some drilling in southern Illinois and some gas found there which might affect the value of this property adversely if developed into a big discovery of gas. There are some mechanical risks that we all face in the long distance transmission of gas. It is almost impossible not to have occasional blow-ups, occasional failure of machinery, accidents that occur, and the chance is multiplied in a sense by the length of the line. I don't know that there is a direct relationship but the risk increases as the line becomes longer.

I have already spoken about the contract market. Now from the standpoint of finance, and without being unnecessarily combative on the stand, there is a risk in the minds of investors now that arises from the fact that the status of regulation at the moment is not fixed. Investors don't know what they are facing from a regulatory standpoint and that risk assumes great importance in their minds. You seldom deal with a large investor who doesn't bring up this point that I made this morning of the reducing rate of return which they are convinced will put the utility companies out of business. That is a risk. Further reductions will have a bad effect on the credit of these companies, this company and all other companies.

You ask whether there might be or is a tendency for regulatory bodies to use as a rate base the investment or prudent investment or original cost in the properties, so as to assure the investor always a return upon the investment that has been made in the property, might be a counterbalancing factor entering into the rate of return. I think, at the expense of lengthening the record, I will illus-

trate what I mean. In a property with which I am familiar we have a building which we purchased in 1921 or 1922 from the telephone company. For that building we paid approximately $200,000, $5,000 a front foot. Immediately across the street within a week a building sold for $8,000 a front foot. We made a good buy. But that building cost the telephone company, twenty-one years earlier, when it was on the outskirts of the city, $15,000. If you follow the theory of original cost, that is original cost to the first user who dedicates the property to public service, you see what they would do to part of your rate base. That is particularly true in a natural gas company where a utility might buy acreage and develop it and if you buy it from them you don't get the advantage of that cost to you in your rate base. That is a very real risk. If the theory of original cost were to be applied to gas producing lands it might have a serious effect on the future of natural gas companies. The only state in which prudent investment is used is in Massachusetts, and I think that if prudent in-
vestment were carried out as it is there, it wouldn't
1066 have a very great effect, but there is a wide range of
interpretation of the prudent investment theory. I
do not consider it to be a counter-balancing factor.

There are two risks that apply particularly to this company, in increasing costs. The first risk of increasing costs is the increasing costs that might come from a period of inflation and would affect any utility company or any company with fixed rates, where the costs increase more rapidly than the price of the product. That applies to all companies. But there is a particular risk that applies to defendants which is the cost resulting from a diminishing supply of gas. If, for example, the geologists erred three years in their estimates of the gas supply available, costs would increase more rapidly toward the end of the period because it is more expensive to get gas out of a field at a low pressure, and that is a risk in this business. If they erred in the sense of arriving at a conclusion, namely that the life of the field would be somewhat longer than they actually testified to, that would be recompensed for, of course. Now there is another risk in the natural gas business that is peculiar to the natural gas companies, and that is that in recent years, especially since 1929, there has been a sharp contraction in the individual use of gas by residential consumers. I don't remember the figures for the country as a whole. In our own system with over a million customers, the per customer consumption has dropped from about 78,000 feet per annum to about 58,000 feet per annum. The residential load, of course, is the most valuable part of the load, and a drop in that is disproportionate in loss of revenue to a drop in the industrial load. That apparently is caused by a change in the mode of life of people. Also a factor in that is the greatly improved appliances of which we are very glad. That is a risk. Until we know the borders of that decline in the gas business it is a very real risk for any investor, and it is a particular risk for this company with its contractual market, because if they find their domestic load falling off, they can't immediately take steps to correct it which they could if they owned the market, and the purchaser of the gas who buys at a price hasn't the same interest in correcting that as the producer of the gas. He is in a little different position.

A very extensive investigation has been made by the American Gas Association in the communities where natural gas is sold to determine whether there has been a decline in the use of gas in those communities. That investigation was headed by my immediate assistant and of course I am familiar with it and have discussed it with him several times. I am familiar with the situation of this company and many others in this country. I haven't the faintest idea as to what the drop per customer has been in the communities served by defendants. I believe there has been a drop. I say that the gas industry as a whole has suffered a sharp drop in the domestic consumption of gas. In a given situation a company might not have suffered such a drop. Supposing this company hasn't, the fact that the industry is suffering that loss is a risk to this company because if it hasn't felt it yet it may feel it tomorrow and the investor has to consider that. I don't know, but I am perfectly certain that these companies have suffered a drop in customer consumption. I am not interested from the standpoint of this particular company, in whether or not it has had that drop yet. It is a characteristic of the industry. I can't quite truthfully say that I have made no special study of the market of this particular company or the companies which distribute its gas. Of course I studied them quite thoroughly when I started this investigation about two years ago. I completed it about 18 months ago. I haven't done any concentrated work on the subject during the last 18 months except to review the results. The conclusion I testified to is the same as 18 months ago.

1067 There are other risks I would like to speak of. One is the rising cost of regulation. I have already spoken of one phase of it and another is rising taxes, which we are all familiar with. The natural gas business is unlike any utility business that I know of from a competitive standpoint, because it is in direct competition with other commodities. I would exemplify that by saying it would be inconceivable to any of us here to remove these lights and substitute candles and kerosene oil lamps, but we are perfectly familiar with the fact that people shift in and out from gas furnaces and gas heaters to coal; kerosene oil is widely used as a medium for cooking and that is in competition with gas. There is a further competitive element, and that is even under the new Natural Gas Act there is direct competition with other gas companies, and where you simply supply a market and you haven't the distribution system, you only have to lay a pipe to the edge of that market, so to speak; you don't have to replace a distribution system. It isn't so difficult for a man to walk in and get a certificate of convenience and necessity and plunk a line into your market. That is a serious risk. You don't walk in and get a certificate of convenience and necessity by paying a dollar fee, of course, but you are familiar with the wording of the law, and I think there is one recent decision within two months that exemplifies that very well. I am talking about Section 3 of the Natural Gas Act of 1935. The Lea Bill. That is the section of the act which enjoins the Federal Power Commission to grant certificates of convenience and necessity to those offering lower prices.

These are the major factors that I have considered. I don't think there are others that I have given consideration to. In the direct testimony I have very carefully stated it wasn't my purpose in putting in this exhibit to make a direct comparison of risk between any one company here and this company, and then amplified that to say that, supposing a man has $128,000—there are 128 companies here—and invested $1,000 in each one of those, and had the choice of doing that or investing $128,000 in the pipeline company, obviously he would run the less risk by investing in the 128 companies. That is a little impractical, he wouldn't do that. I don't think I am in position to compare any one company with the risks of these companies; but the fact is that these companies and a large group of them, the group risk being comparable to the risks in these companies, afford investments at higher rates of return than the 8 per cent which I consider the minimum for these companies. If we take a group of them the diversity factor reduces the risk in any one company. It isn't my purpose in this exhibit to show that individually the risks of any company listed there are comparable with the business of defendant companies. The businesses of the companies listed are not comparable with those of defendants but the risk of these companies as a group is comparable to the risks of these defendants. Some may have comparable risks, but I haven't analyzed them from that standpoint, and I am not in a position to testify as to that point. I am not interested in it from that standpoint. I haven't analyzed the risks of any of these particular companies.

The lists of the companies which make up Moody's Index for 40 high-grade industrials and 40 high-grade public utilities and the Standard Statistics Index for 15 high-grade municipals, shown on page 4 of my exhibit, are
changing lists. I would have to send that list to you.
1068 I would have to send you a list for every week since
1929. It is all published in the front of the manuals, but I can have it typed for you if you wish. That will involve my supplying ten lists, each list to embrace about 95 companies.

I am not familiar with the amount of new money, if any, that is needed by defendants now or in the future. I don't know that they need any.

Further Cross-Examination by Mr. Slaff.

The figures for invested capital and net earnings before interest shown on my Exhibit 147 stated at the sum of $238,263,948 of invested capital for Sears, Roebuck & Company, we took from the balance sheet of that company as published in the manuals. It was either Moody's or Poor's manual. They are all the same. And we added on the liability side all of the outstanding stock, all of the debt, if any—Sears, Roebuck hadn't any—plus the surplus. Now that is just what this is. The slight increase you see as you go along there, I think, is just added surplus from year to year. By debt I do not mean long term debt only. There are instances when the companies have short term debt that is in a sense permanent capital. In these periods there are very few because this is not a borrowing period; and where we might have missed one, it wouldn't make a bit of difference. For instance, if there were under current liabilities, a maturing bond issue, we would include that as capital, but it is an effort to get the total invested capital in the business, whether arising through the sale of securities or through surplus.

We may have used annual reports in a few instances, but usually we use the manuals just because it is easier. The reserves are net. In other words, we don't add in the depreciation reserve on the books as a part of the capital. The net earnings before interest for which this company shows a figure of $31,088,939 is the gross income on the income account—the gross corporate income. The same method was pursued for all companies.

Redirect Examination by Mr. Morgan.

By gross income I mean the income that is left after depreciation and operation and maintenance and all taxes and charges of that character. That is income available for interest.

Questions by the Examiner.

I cannot recall exactly the rate of return to which I testified as proper in the various hearings at which I have appeared. Usually I testified, as I have testified this morning, to a minimum rate of return. I don't think it has always been 8 per cent. In the case of some distribution companies it might have been lower, but frankly the more I have studied it the more convinced I am that industry can't go on at as low a rate. Naturally, testifying as a witness for the companies I don't want to make requests I realize in the light of existing regulation are out of reason. I think it will not work. I think we are going to pay the penalty of regulation.

I did know the sinking fund provisions for the outstanding bonds of defendants. As I remember the sinking
1069 Fund provisions, the bonds are cancelled and killed as
the sinking fund is accrued, so there would be no problem of reinvesting the fund. On these nine natural gas companies for which I have an overall figure that 42 per cent of the capital was in bonds, 20 per cent preferred and 38 per cent common, I think I can get a breakdown of the seven companies of the nine that enter into those figures.

I think I read into the record this morning the interest rate on the bonds of those seven companies. For instance, starting with Cities Service Gas Pipeline Company 6's, 6 per cent is the interest rate. North Central is 5½.

I can give you the other bonds which entered into the natural gas bond yield curve if you would like to have them. That is the table headed "Index of Natural Gas Bond Yields." There are five columns; lefthand column Poors Rating; next, Bonds Included in Index since January 1, 1929; next, Due Date Interest, next, "Date In," and next "Date Out." The table follows:

INDEX OF NATURAL GAS BOND YIELDS

Poor's Rating	Bonds included in Index since January 1, 1929		In	Out
B**	Cities Service Gas Pipe Line Company	6/43	1-29	12-38
B*	Texas Cities Gas Company	5/48	1-29	2-38
B**	Dallas Gas Company	6/41	1-29	9-38
—	El Paso Natural Gas Company	6-1/2/43	1-29	4-36
A	Kansas City Gas Company	6/42	1-29	
—	Lone Star Gas Company	5/42	1-29	10-37
A	North Penn Gas Company	5-1/2/57	1-29	
—	Oklahoma Natural Gas Company	6/46	1-29	7-36
—	Southern California Gas Company	5/57	1-29	3-31
A**	Southern California Gas Company	4-1/2/61	4-31	
B**	El Paso Natural Gas Company	4-1/2/51	5-36	12-38
B**	Oklahoma Natural Gas Company	4-1/2/51	8-36	
B**	Panhandle Eastern Pipe Line Co.	4/52	11-37	
B*	North Central Gas Company	5-1/2/55	3-38	
B**	Macon Gas Company	4-1/2/52	10-38	
B*	New Mexico Gas Company	5/51	1-39	
A	Arkansas-Louisiana Gas Company	4/51	1-39	

A**	Very high grade investment bonds.
A	Investment bonds believed to be reasonably safe.
B**	Obligations which possess good security, but which need constant watching.
B*	Obligations wherein the speculative element is present. Not suitable for trust funds.
	All groups but B* are suitable for bank investment.

(EXHIBIT 147 was offered and received in evidence over objections of counsel for each of the two Commissions who were granted exceptions. EXHIBIT 139 was received in evidence over the objection of counsel for each of the Commissions to whom the Examiner granted exceptions. EXHIBIT 140 was received in evidence over the objection of counsel for each of the Commissions to whom the Examiner allowed exceptions.)

1070 JOHN A. COOKE, a witness for defendants, testified:

(October 2, 1939.)

Direct Examination by Mr. Morgan.

My name is John A. Cooke. I live at Evanston, Illinois. My office address is on La Salle Street, Chicago. I am a Certified Public Accountant. I am a partner in the firm of Peat, Marwick, Mitchell & Company, and we practice under the term "Accountants and Auditors." I have been a partner in that firm since the end of 1930. I went with this firm in 1920 but was admitted to partnership in 1930.

Prior to going with this firm I received my accounting training in England and was articled with a firm in Manchester, England, for five years. I received a degree for accounting in England.

Our firm is equipped to handle all types of professional service which are considered to come within this profession. Our work includes generally: auditing examination for registration of securities with the S. E. C.; Federal income tax work; returns and investigation work; industrial accounting; and systematizing the accounting records of companies. We also go into specialized lines, including banking examinations, brokerage examinations, and other activities of that kind. We cover the whole field of accounting service. We have twenty-eight offices in the United States geographically spread throughout the country, with headquarters and executive offices in New York. I am one of three partners residing in Chicago.

You have asked me to assume for the purpose of the observations I shall make hereafter the following facts: that defendants have a maximum life of 16 years; that the proper rate base on which they are entitled to earn, if they be subjected to regulation under the Natural Gas Act, is $75,000,000; that a proper annual rate of return is 8% of that rate base; that in order to distribute the burden of returning to the investors the capital or the amount of the rate base a fund is to be set up in equal annual installments over the period of 16 years; that these companies have bonds outstanding which bear 6% interest; that during the next 16 years amounts aggregating substantially $10,000,000 will be required for the purpose of additional property as opposed to replacing property for use in the operations of defendants; that 1.35% is the rate of interest which would be received by an investor in Government bonds, the most nearly risk-free of any securities available for the investment of a trust fund; that this fund of $75,000,000 is to be returned to the investors who now own the securities of the company at the end of 16 years and that provision is to be made distributing the burden of returning that capital among all those who purchase gas during that period of 16 years by setting up equal annual installments or installments accrued as a reserve for the return of the capital. (Objection by Counsel for the two Commissions overruled.)

Based on those assumptions, this $75,000,000 can be accumulated through a sinking fund. It could be accrued, of course, by dividing the amount by 16 and setting up 1/16 of $75,000,000 every year. However, inasmuch
1071 as money held for any length of time can be put out
at some rate of return, it would be helpful to the fund to use the sinking fund means and accumulate the income which would arise from the investment of funds placed either with a trustee or held by the company itself for some future purpose.

A sinking fund, generally speaking, is a fund which is set aside outside of the control of the company for a specific purpose. The money is turned over at fixed times, maybe annually or semi-annually or over some other period, and divorced entirely from the company's control and operation, so that the money once placed in the hands of the trustee is then available to that extent to repay the sum ultimately to be accumulated in that fund.

In this particular case, having assumed $75,000,000 to be returned, a fund would have to be provided over a period of 16 years, which, by annual sums placed in it, would accrue in one of two ways, either of itself to $75,000,000, or with the addition of interest earned to $75,000,000 at the end of that period. If it accrues itself to that sum, the method would be what is commonly known as a straight line accrual. If the sinking fund method is used, the interest to be added to the annual installments must come from outside the company's activities. I make that statement for the reason that the company, as you have assumed, is entitled to a return of earnings. Then the earnings must of themselves go into the direction to which they are intended to apply, namely to the security holders. Therefore, if any rate fixed—I am now speaking of rate of income, of fixing the earnings of the company—is such that it only allows the amount which is required or permitted under the rate rulings to return a sum of money to the security holders plus an amount which is determined under the ruling for the amount to be paid into the sinking fund each year, then there is no margin over and above that to help accumulate in the sinking fund any sum beyond that which is placed in as principal rather than interest.

If the money which is placed into the sinking fund is invested outside, then the activities of others working with that money return, presuming there is no risk, an earning to the fund which does not in any way affect the company's operations, but in that case the outside money helps to build up the amount to be accumulated. The interest must come from the outside, however, if it is to be of any help in the sinking fund accumulation.

If there are bonds and stock ownership equities which represent this value of $75,000,000, this 8% per annum on the rate base amounts to $6,000,000. That amount is available as a return on the assumed value of the property and should go to the security holders, whether they be of one kind or another. It goes as far as is needed as interest, and the balance will be paid as dividends. The amount available for dividends depends upon the amount of interest that has to be paid on outstanding interest-bearing obligations. If there were no bonds, then the entire 8% would go to the stockholders as dividends. If the outstanding bonds assumed are retired as time goes on, any retirement of bonds increases the amount in dollars and cents available to the stockholders. This $6,000,000, which represents the accrual resulting from applying the rate of return to the rate base each year, is a fund that remains constant and belongs to the interest-bearing securities and to the stockholders as dividends in such amounts respectively as the amount of interest and amount remaining for dividends may happen to be at any given period during the continuance of operations.

1072 I have already said that the interest must come from without. It is immaterial what rate you use as far as the source from which that income must come.

If you could get 6% from outside investments, safe investments, so that the fund would not be impaired at the end, then I could have no objection to using 6% as the accumulation, regardless of where it came from. However, to go further, I say and maintain that it must come from without because, on the figures first assumed, the $6,000,000 belongs to the security holders as earnings year by year without any detraction therefrom.

On that assumption any saving, so-called, by the purchase of the company's own bonds merely alters the relation between interest and dividends in the 8%, and since a lesser amount must be paid for interest, a greater amount then is available for dividends to the stockholders. If you attempt to build up the sinking fund with the 6% obtained through the so-called savings on the bonds you have bought, you then and to that extent divert income permitted under the assumed 8% on $75,000,000. You divert that income to a capital use, and it is not then available for an earnings use. In other words, if the saving in interest be added to the amortization accrual, that saving is at the expense of the equity holders. You cannot spend it and have it. As you have two figures to work for and you only have a certain amount allowable, it can be used only one way or the other, and if you use it as the compound interest feature of the fund, or pay it into the fund without any recovery in the rate set, then it decreases the amount available for the stockholders as dividends.

On the assumption of the figures already given, $75,000,000 accumulated on a sinking fund requirement, computed on a 6% compound interest basis, would in approximate figures require two million nine hundred some-odd thousand dollars per year to be paid into the fund for sixteen years. That money is compounded at 6%, and we must assume further in that compounding that you can retain the 6% investment and keep on paying interest with such bonds outstanding and that you can use the interest to reinvest in bonds for the full amount of the $75,000,000. If there are not $75,000,000 worth of bonds, you cannot follow that plan by the 6% investment in the company's own bonds; but leaving that for consideration later, let us presume there are $75,000,000 worth of bonds in this case. At the end of the first year the payment would be $2,825,000 approximately. At the end of the second year you would pay into that fund $2,925,000 in cash plus the interest on the $2,925,000 worth of bonds which presumably had been acquired. That, on a 6% interest basis, is pretty close to $170,000 interest.

I do not propose to follow that through, since these figures can be checked by any method of calculus, but at the end of the tenth year, for example, to illustrate the point, we would still pay this figure of $2,925,000 into the fund, and under such an arrangement I must assume that the amount last stated has been allowed for rate purposes. I must also assume for my illustration that the 8%, the rate of return, on $75,000,000 is usable, in which case the $2,925,000, as I said before, must be placed in the reserve fund. The $6,000,000, which is 8% on $75,000,000, the total amount returnable to the security holders, is the return on the $75,000,000 and is the only fund out of which any payments can be made; but under this sinking fund of 6%, in that year you have approximately $2,000,000 that must be placed in the fund for the accumulation of interest. Therefore, the $2,000,000 can only come
1073 out of the $6,000,000 balance of earnings there,
leaving only $4,000,000 for the security holders, which amount is not 8% return on the $75,000,000. In other words, 16 times $2,925,000 lacks $28,000,000 of accumulating $15,000,000 in 16 years. Unless the interest added to make up this $28,000,000 comes from outside the company's operations, it must come out of the sum representing the 8% allowed on the $75,000,000 rate base. In the ultimate wash-out the security owners would be short just $28,000,000 of the two funds to which they are entitled as the owners of the securities of the companies.

Cross-Examination by Mr. Slaff.

Our firm does accounting work for Cities Service System and its subsidiaries. Among other companies we have represented are the successor to the Texas-Louisiana Power. We did some work for General Water Works. We did work in the Associated Gas Group recently for the receivership. We have done some special work in connection with the reorganization of Middle West. In recent years we have done work for the New England Power group, formerly in the Insull group, and I believe some of their work is still handled by our Boston office. I do not know the names of those New England companies. They are in Augusta, Maine. We have done work for the Kentucky utilities before they went into the Insull group and while with it, and for other Lexington utilities. We have done some work for the Motor Coach Group. This is all that I remember, although it is not all of the work we have done in the utility field.

I have never testified on the subject I have covered in my testimony here. I have never testified for any utility.

Redirect Examination by Mr. Morgan.

I have never testified in a proceeding involving natural gas producing and pipeline companies.

(EXHIBITS 141 and 142 were received in evidence over the objection of counsel for each of the two Commissions, to whom the Examiner allowed exceptions.)

1074 J. A. EMERY, recalled by defendants, testified:

(October 3, 1939.)

Direct Examination by Mr. Morgan.

I have testified before in this case. In my former testimony I stated that I had made a study of two phases of this case, namely, the going concern value assignable to the properties of the two companies and the rate of return which is required on the rate base. I stated in my testimony before that my firm, Ford, Bacon and Davis, Incorporated, is engaged in a general engineering business. They have engaged in practically all of the phases of the natural gas business beginning practically with the beginning of the development of natural gas. As I stated before, they have made original estimates, surveyed marketing prospects, designed and constructed lines, participated in the financing or the raising of necessary capital, developed the markets, operated the lines, and actually marketed the gas in the course of their activities. We have had an interest in the Southern Natural Gas Company, which purchases its gas in the Louisiana fields and transports it to Alabama and Georgia.

In connection with my preparation in this case and in other cases, I have given thought and study to the subject of financing a natural gas pipeline project and to the necessary rate of return to attract capital to this character of business. To obtain the money necessary for the establishment of the enterprise, it is necessary to hold out sufficient inducement. First the safety and facility of conversion of the capital must be provided for, and second an adequate rate of return. By safety of investment I mean that a man who is investing capital desires to make sure that he will get it back. I am referring to the return of the capital through provisions for returning the capital intact at some time in the future or the facility for selling out the properties.

Most all enterprises entail risks, some more than others, so the degree of risk must be carefully examined into. An investor is interested in the degree of risk involved in connection with the return because that is an index of the safety of his principal and his interest on the return of the capital. It makes a difference to him as to the risk involved. The greater the risk, the greater the return he must have.

By rate of return I mean the annual compensation for the use of the capital. That means the amount remaining after all charges to which the company is subjected, including operating expenses, taxes, and, in the case of an extractive industry, depletion or amortization.

I spoke about the influence of risk or hazard and have stated that the greater the risk, the greater the return must be in order to induce capital to enter a particular kind of enterprise. As I have already stated in my former testimony, I am familiar with the natural gas business and that my firm has had to do with a great many different types of enterprises and activities. The natural gas industry, particularly when it includes production, is more risky than the average business. When compared with an ordi-
1075 dary utility such as an electric utility, a manufac-
tured gas utility, a water distribution company, or any type of continuing enterprise, there is more risk involved in the natural gas business. I say this primarily because it is a so-called extractive or mining industry, but there are other important reasons. The pipelines are subject to most of the risks of the distributing companies who purchase gas at wholesale from the pipelines. In addition to those risks, the pipelines have risks peculiar to themselves. The reason I say that the pipelines have the same risks as the distributing companies is because if the busi-

ness of the distributing companies suffers, the business of the wholesaling pipeline from whom these distributing companies purchase their gas must suffer also. The amount of gas available on which the life of the pipeline depends is bound to be known only to the extent of an estimate, the geologist's estimate, which may or may not be right. The field also is subject to drafts for other purposes, such as other pipelines, carbon black manufacture or gasoline processing. Then the field as it stands is subject or may be subject to damage in the future by the intrusion of salt water or the migration of sour gas into sweet gas areas.

It is not possible to predict with certainty the full extent of the drafts on a field over a long term of years. There is always a possibility that others will enter the competition for the product itself. If another pipeline should be built from the same source of supply, or if other carbon black industries should enter the field and utilize sour gas for the manufacture of carbon black, such a development would tend to limit or reduce the amount of gas available for these companies, and it would shorten the life of the companies and would increase their operating expenses in later years by reason of the reduction in pressure.

If we assume that through the investigations and researches of the geologists the extent of the present reserves of gas in the Texas Panhandle field can be ascertained with a reasonable degree of certainty; that the number of wells that have been drilled and which will hereafter have to be drilled can be ascertained with a reasonable degree of certainty; and that the cost of operating those wells and maintaining the equipment used in connection with the production of gas from these wells, and the operation and maintenance of the other pipeline equipment, including the pipeline itself, the compressor stations, and other facilities, can be ascertained with a reasonable degree of certainty under conditions assumed to be most favorable; the providing of an annual reserve for amortization over the indicated life of the field based on such assumptions does not remove the hazard involved in the question of whether or not the capital of these investors will be returned to them by the time the field is exhausted. It is almost certain that in a term of years there will be some circumstances not favorable, even assuming that the market is always available and favorable, or the estimates are made altogether under favorable circumstances. If the funds provided for the return of the capital be distributed over the entire indicated life of the field, which, in the light of defendants' testimony, we will assume to be 16 years from the first of January, 1939, an investor would consider his money subject to hazard because he could not count definitely on all conditions being favorable. That circumstance makes the required rate of return to attract capital higher.

1076 The fact that estimates of the kind I mentioned a little while ago are always attended with uncertainty and that the field might last a year or two longer than 16 years instead of playing out or becoming exhausted one or two years short of that period does not remove the hazard I mentioned. Of course, it reduces the odds somewhat but does not remove the hazard. It is naturally always a guess in the natural gas business as to whether a field may run longer or shorter than expected. If it should run shorter than expected, the investor has very litle chance of recovering all his capital. If it runs longer than expected, the situation must be dealt with according to the conditions at that time by the regulating body. The Federal Power Commission cannot protect the investors in defendant's properties against losing a part of their capital due to the lives being shorter than that indicated by the testimony under the most favorable conditions principally because his business is a highly competitive one, and even if they were permitted to charge higher rates in an effort to recoup the deficit, they could not get them. Secondly, the process of getting rates raised is something that requires time. In the first place, the condition has to run long enough to constitute proof, and in the second place, it takes considerable time to establish that as proof.

Since this company operates in several states and is itself subject to Federal regulation, it would have to expect more than one rate proceeding before it could succeed in increasing its rate. There would be a rate case in the Federal Power Commission, and every one of the distributors purchasing gas from this company would have to go and get its rate increased in order to meet the increased price which the Federal Power Commission might provide.

There is a hazard involved in the circumstance that the pressures of the gas any place in the field will inevitably decline as the gas is withdrawn from the reservoir from which it is taken. As the pressure declines the yield of gas declines, and the cost of pumping it from the wells and putting it into the lines increases. The circumstance that the volume of recoverable gas from a well decreases as the pressures decline is met by the drilling of more wells so far as the field will permit. In other words, it requires more wells to produce 210,000,000 cubic feet of gas at 175 pounds pressure than it would at 350 pounds pressure. The record shows, as I am informed, that the company has undertaken to predict the cost of additional wells which they can now foresee, the cost of providing field compression necessary to get the gas from the wells into the main line, and the minimum cost incident to the drilling of such wells and the boosting of the gas into the line.

If it be assumed that these predictions are accurate, they do not remove the hazard, because it cannot be expected that all conditions will be favorable for 16 years. Even if the witnesses have testified that to the minimum figures for capital replacements and for maintenance should be added 10% to cover hidden requirements or contingencies that cannot now be definitely foreseen, the hazard I have been discussing is not removed, because that allowance for contingencies does not apply to the operating expenses. While an investor would doubtless require protection to the extent of 10% for contingencies, he would still feel that there were hazards beyond that.

1077 There are other hazards confronting the investors in these particular pipelines. There is naturally a considerable hazard attached to a line 1,000 miles long. In this particular case the line is operated at high pressure and is so designed that there is a higher stress on the metal than on any other line that I know of. The stress utilized by these pipelines is approximately 70% of the elastic limit and something less than 50% of the ultimate strength. That is considerably higher than the usual stress at which steel is worked in the transportation of natural gas and entails great vigilance and skill on the part of the operating organization. This is true because of possible variations in the texture and thickness of the metal, because of the possibility of mechanical shocks, and because of deterioration due to the impact of changing pressures. When stress is applied and taken off and then applied again a great many times it produces some deterioration in the metal and in its strength. That is a subject about which a great deal is not known at the present time. It is commonly referred to as fatigue.

There is no history prior to the operations of these pipelines from which they can arrive at a certain conclusion as to how long they will be able to continue applying the stresses at which they are now working the steel. This is the only pipeline system that I know of which applies such large stress. The fact that for the past seven years, or nearly eight years now, this pipeline has been in operation and that during the last three or four years it has subjected its equipment to this stress and that notwithstanding some breaks and interruptions they are still operating the lines at such stress and are transporting 200,000,000 to 210,000,000 cubic feet daily through the lines, does not mean that they will continue to be able to do that indefinitely over a period of the next 16 years. Deterioration of the metal must be looked for. I should have added that in the welding and construction of the line there are internal stresses set up in the metal, and when those operate together with the stresses due to the load they might exceed the elastic limit. Such cases are likely to turn up not only at the beginning but at any time during the life of the line.

If as a result of these high stresses and the aging of the line it should turn out that the volume of gas and the pressures at which that gas is transported are too large or too high, the immediate result would be the expense of repairs and the interruption of the business, but if it became necessary to reduce the pressure, it would reduce the earnings substantially. The situation could be handled only by reducing the pressures at which the gas is transported. Naturally, that would result in a smaller volume of gas moving through the system.

As the senior vice president of my firm and a member of its executive committee I keep in touch with all of its activities. Naturally I keep closer in touch with some things than with others. Of course, I cannot keep in touch with all of them as to details. The firm entered the natural gas business in about 1907 when they made a very extensive study of the natural gas business in West Virginia and western Pennsylvania as a part of a report on the Philadelphia company which owned these properties. As a result of this report the syndicate invested in the Philadelphia company, and the firm took an interest in that syndicate. The Examiner asks me ~~how I fitted~~ into that study. My answer is practically not at all. I was in the south at that time, and came to the New York office later than that.

1078 The first intimate contact I had with the natural gas business was in a study of the market of the Union Gas Company, operating largely in southern Ohio. Then I organized and for about six months was in charge of a valuation of the East Ohio Gas Company, the Peoples Gas Company, and the Hope Natural Gas Company. After my intimate connection with that valuation I was engaged in consultation from time to time as long as the work was in the office.

Questions by the Examiner.

All phases of the business were covered in that connection because it was supposed to lead up to a rate case. I do not remember definitely what was done regarding rate of return in which the matter of hazard would have been discussed. For the past twenty years I have been more or less intimately connected with natural gas matters. That has been one of the activities of the office. Financing matters are almost always discussed among us. I do not know of any of them that have been under my supervision in that respect.

I had some rather intimate connection with the projection and construction of the Edmonton system in Alberta, Canada. The matter of hazard in the natural gas business is something that is always thought of in connection with natural gas operations. In connection with my preparation for this testimony I consulted with engineers very thoroughly as to the operating characteristics of these pipelines. In our office there are several engineers who devote practically all their time to this business, and I discussed it very thoroughly with them. They advised me as to what the hazards would be in the operation.

Direct Examination by Mr. Morgan Resumed.

I sent one of my partners, Mr. Hill, who devotes practically all of his time to the natural gas business, over the properties of these companies and have a report from him directed to me concerning the stresses under which the lines are operated and the operating conditions which he found there. Mr. Hill is an engineer. He was vice president and had entire charge of construction and the first two years of operation of the Edmonton Company. He had charge of construction of the Interstate Company and was its president for several years. He had charge of construction and was general manager for several years of the Colorado Interstate. He had charge of construction and was vice president of the Southern Natural Gas Company for several years.

I think the public would consider these hazards in their attitude toward investments in natural gas properties. My firm has participated in the sale and in the financing of such a company. My firm built 250 miles of the line involved here. Mr. Hill, the man who went over the property, as I stated a little while ago, was the man in charge of that building. The line crosses about thirty rivers, most of which have changeable banks, so that in a great many cases there is danger of the disruption of the line by floods. It is a very important hazard because it entails a good deal of money for repair and loss of business during repair.

There is also danger from landslides and earth settlement and mechanical shocks due to obstructions in the line.

At the distribution end of the line this company's 1079 business is subject to the same hazard as the distributing company, in that it is in competition at all points with other fuels. The principal market for domestic gas is in cooking, and that is being encroached on by electric cooking. House heating by gas is in competition with oil and coal. All industrial gas business is highly competitive. The company is continually faced with a restriction in business due to changes in the prices of coal or in the methods of burning it.

These companies are subject also to the general hazard of inflation. A large part of the governmental agencies are operating under unbalanced budgets. That means that sooner or later they will have to be worked out either by increased taxation or an inflation of the currency. An inflation of the currency would mean that wages and all prices of materials would have to be increased. The other alternative of increased taxes would affect these companies. It has affected them already. More taxes have been applied than were in force at the beginning of operations, and the rate of taxation has been raised. My staff and I have investigated the books and records of the company bearing on its operating costs and its taxes and other costs of that character. We have found a substantial increase in the taxes, both in number and in rate per thousand. These increases might be met by increased rates after a rather expensive delay, but first they must conduct operations at the increased cost long enough to give proof.

It is my view that investors in natural gas securities have taken cognizance of the risks which I have discussed here, and would take cognizance of the special hazards confronting these companies, and that they have considered these risks in the prices they have paid for natural gas securities. I am able to determine that they have taken cognizance of these hazards by comparing the ratios of market price to earnings. I have made a study to determine what appraisal the public has made of these risks and hazards. First I made a search of market and financial records and have obtained a list of all natural gas companies having transmission lines, all of the securities of which are dealt with so that market prices can be obtained, and I have found 11 companies which answer to that description. I confined this study to those which have transmission lines so as to get companies as nearly similar to this one as I can. I make a distinction between a company which owns distributing facilities only and those which own facilities for producing and transporting gas. The risk is less in the case of companies which distribute only, and I have not included them for that reason. The risks in the case of companies which distribute only are less because their property will be useful after the natural gas reserves are exhausted. All of the capital does not become useless upon the exhaustion of the source of supply, and the distributing companies are less subject to competition than pipelines.

The fact that a transmission line owns a distributing company and is not one standing on its own bottom, that is, one which is confined to transmission and/or producing properties, is a circumstance which enters into the risks involved in the securities or capital investments. The ownership of a distribution system which buys from the pipeline insures to the pipeline the control of the market and also adds to its total investment a proportion of lower risk property. All of its investment is not tied up in something that will be lost when the source of supply has been exhausted.

1080 I have not included in this list of 11 companies all the pipelines which are engaged in the transportation or production, or the transportation and production of natural gas, but only those for which I could obtain records of the market sales of all the securities. I have no way of knowing how the public appraises the securities except by what the public has done when the securities were offered for sale and when they have been sold in the exchanges and markets. I consider that the best evidence of value and of the required ratio of investment to return.

(At this point counsel handed the reporter a document entitled "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Data Concerning Rate of

Return, Witness J. A. Emery," with the request that it be marked for identification. At the direction of the Examiner the document was marked Exhibit 148 for identification.)

The list of companies who own transmission lines, concerning which I was able to get the data above mentioned as to the fair appraisal of their securities, is: Interstate Natural Gas Company; El Paso National Gas Company; Memphis Natural Gas Company; Southern Natural Gas Company; Lone Star Gas Corporation; Mountain Fuel Supply Company; National Fuel Gas Company and its subsidiary Pennsylvania Gas Company; Union Gas Company of Canada; Kansas Pipeline and Gas Company; and Oklahoma Natural Gas Company.

Of these 11 companies only one is confined to the production and transmission of natural gas, the Interstate Natural Gas Company. Three are confined in their operations to the transmission of natural gas. These are the El Paso Natural, the Memphis Natural and the Southern Natural. The next five are what we call integrated operations. They include in their operations all three activities, production, transmission, and distribution. The other two, the Kansas Pipeline and the Oklahoma Natural, have transmission and distribution but no production, except that the Oklahoma Natural has a small amount of production.

I have listed these companies on page 1 of Exhibit 148. The group of figures in the first three columns of this exhibit gives the market appraisal of the value of the securities at the high price of the year 1938, at the low price, and at the average price between the high and the low. The next column shows the earnings in 1938 applicable to return on investment. The next group of three columns shows the rate which the earnings bear to the market appraisal at the high prices, at the low prices, and at the average, respectively.

The figure $23,823,825 shown under the subcaption "High" in the first column of figures opposite the name Interstate Natural Gas Company on page 1 of this exhibit is arrived at by multiplying all of the securities outstanding by the high price of the year. (Objection by counsel for Illinois Commerce Commission overruled.) There were 952,953 shares of common stock of no par value outstanding, and the high price of the year was $25 per share. Multiplying the number of shares by the price gives us a total of $23,823,825. There is nothing but common stock outstanding in that company. The low price paid for that company's stock during the year 1938 was $17.50 per share and the high price, in 1938 was $25.00 per share.

1081. If you figure the value of all the stock at the high price, you get the valuation already stated, which, applied to the earnings of the company applicable to this stock, gives an earnings price ratio of 8.53%.

Over there under the caption "Annual interest and earnings" as set out the earnings for the year 1938 applicable to this stock. These earnings are after all necessary charges, such as operating expenses, taxes, depreciation, amortization, etc. This return is attributable to the stock itself and is available for dividends on the stock.

If we multiply the total number of shares by the lowest price paid for these shares during the year, we find the market value is $16,676,678, which, applied to the earnings, gives an earnings price ratio of 12.19%. Those are the figures shown in that line on page 1 for the high and the low. The average investment and the average return are obtained by taking the average of the investment valuation and dividing it into the earnings, which produces 10.04%. The reason I have taken the high and the low and the average is that it is hardly fair to take a figure for the valuation of one of these properties based on the sales in one day, and I consider the fairest way is to take the sales over the range of the year and show the highest and the lowest. The result we reach is what I have termed the public's appraisal of the value of that stock at the high price, the low price, and at the average.

These rates of return shown in the last three columns here are the actual yields in 1938 based on the high price and the low price and the average of the two prices which the investors in that stock actually earned in 1938.

I got the information as to the other companies in exactly the same way. In the case of the other companies there was generally a variety of securities, bonds and stocks. On page 3 we find the detail as to the securities of the El Paso Natural Gas Company. On the first line there were $6,000,000 face value of 3½% coupon rate bonds outstanding. There was no market quotation during 1938 on those bonds, but there is a record of a private sale at 98½, and I have consequently used that price for both the high and the low. There were $3,480,000 of Serial Bank Loans. Those are not traded in, and I have entered them at par. The bank never advances any more than the principal of the note. There were 14,797 shares of 7% preferred stock which sold at a high of 109, giving a valuation of $1,612,873, and at a low of 102, giving a valuation of $1,509,294. There were 600,853 shares of common stock, of which the high price was 29⅞, giving a valuation of $17,950,483, and the low price was 17, giving a valuation of $10,214,501. The total valuation of these securities at the year's high price was $28,953,356 and at the low price was $21,113,795.

The next column shows the interest applicable to the bonds and loans, the 7% applicable to the preferred stock, and the balance applicable to the common stock, making a total of $2,479,154. This was 8.56% of the valuation at the year's high price and 11.74% of the valuation at the year's low price, and those figures haveen carried into the line opposite El Paso Natural Gas Company on page
1082 1, to which I have added on page 1 the average of the
market price and the average return. The average return on the average of the high and the low appraisals was 9.9%.

(Mr. Timberlake, assistant to the witness, made the following statements which were adopted by the witness: "I do not have the face amount of the first mortgage bonds under sale at 98½ that I was discussing. It will require quite a little investigation to determine how many shares or bonds were sold at that particular price, and unless it was listed on the open Stock Exchange, it would be impossible to get the number of shares or bonds that were sold at the price. The first mortgage bonds were all sold at that price. It was not a public offering. It was taken by private interests and the whole issue was $6,000,000)."

I have the same detail as to each of the other nine companies worked out on pages 4, 5, 6, 7, 8, 9, 10, 11, and 12 of the same exhibit. I dealt with just the securities that were outstanding and which were negotiated during that year, and if I did not have such securities, I did not use the companies'. It was only those securities on which the public, either by public sales, or by private sales, made an appraisal value of the securities by the price it put on those securities. Turning back now to page 1, we find that based on the highest market valuations the one company classified as a production and transmission company earned 8.53% on the highest appraisal of its securities, 12.19% on the lowest appraisal, and 10.04% on the average of the high and the low appraisals. I would say that this company, the Interstate Natural Gas Company, comes nearer to the Natural Gas Pipeline Company of America than any other company on the list in that it owns only production and transmission facilities.

The investor in the securities of the three companies following this one, which I have classified as transmission companies, earned at the high price 8.03%, at the low price 10.4%, and average of 9.06%. I should have said regarding the Southern Natural Gas Company that besides a small amount of production it also has a small amount of distribution. It owns two small distributing subsidiaries.

The next five companies, which I have described as integrated companies, omitting the Pennsylvania Gas Company, which is a subsidiary of the National Fuel Gas Company, earned 6.62% at the high price of the year, 8.8% at the low price, or 7.55% at the average between the high and the low price.

he other two companies, which I have classified as transmission and distributing companies, earned at the high price of the year 6.18%, at the low price 8.06%, an average of 7%. The over-all average of all these companies, including all four of the classes of companies, earned at the high price of the year 7%, at the low price of the year 9.28%, an average of 7.98%.

It seems to me very clear that the companies shown in the upper brackets, that is beginning with the production and transmission, require higher rates of return than those in the lower brackets, which are confined to transmission and distribution. As between those engaged in production and transmission and those which have no production, there is a distinction evidenced by the fact that the average return required in the one instance is 10.04% and in the other an average of 9.06%. When we introduce the distribution facilities the required return is still further reduced, and is there only 7.55%. When we eliminate the production from the integrated company, the required average is 7%, which is still lower than that of the integrated company which owns production. As compared with the average of all of them, these figures indicate that the investor requires from 1% to 2% more for those companies which have no distribution facilities.

Page A of Exhibit 148 contains a summary of the average required rates of return to which I have just testified.

It shows the same information in summary that is shown in the last three columns on page 1, grouping the companies as we have grouped them on page 1.

On page 4 where we have "B—Taken as Par," the reference is to bank loans which we considered to have the value of par. I don't think the footnote C on page 5 enters into the computation in any way except to show a division of earnings between the Class A and Class B
1083 stock. On page 9 the footnote B points out that there were apparently no sales, and the price was based on the end of the month bid quotations. I pointed out that the data for this company was not used, however, because it is a subsidiary of the National. It is set forth on page 1, but the figures concerning its earnings did not enter into the average. To the footnote B on page 10 I might add that I think the earnings applicable to these issues mentioned in the footnote B are not included in the annual interest and earnings applicable to the securities listed. In footnote D on page 11 it is noted that the information was obtained from a Securities and Exchange Commission report. I think it was in connection with some financing. It is a study that the S. E. C. makes every year of public financing of public utility securities.

Cross-Examination by Mr. Booth.

I have a general knowledge of some of the companies included in Exhibit 148. I studied the public reports of various companies, and I conferred with Mr. Hill, who is quite familiar with most of them. I mean the same Mr. Hill, an officer of my firm, to whom I referred in my testimony earlier today. He has devoted practically all his time to natural gas matters for 18 years since he has been with us, and for several years prior thereto. As to whether or not I am in a position to state how these companies and their operations are comparable in a specific way to the operations of defendants, that depends on how far you want to go specifically. The Interstate Natural Gas Company produces and transmits gas and buys some gas. It sells its gas largely, if not altogether, under contracts calling for large deliveries. Its transmission line is considerably shorter than that of Natural Gas Pipeline Company. It is only about one-fourth as long. As to whether this line is comparable to defendants' line, it is not as large as the Natural Gas Pipeline Company of America.

Questions by the Examiner.

The pipeline is about 250 miles long, as compared with 950 for defendants. In size the pipeline is 22 inches in diameter, and it extends from Monroe field in northeastern Louisiana to a point below Baton Rouge. It has the same physical obstacles to overcome that the Natural Gas Pipeline Company has. Its principal markets are Baton Rouge, and at a point to the south of Baton Rouge it connects with the pipeline to New Orleans, which it supplies. It sells at wholesale to a transmitting company that in turn supplies New Orleans. I don't know just what the connections are between that transmission company and the distribution company in New Orleans. I think they are both owned by the same parent company.

The capacity of the pipeline is 160,000,000 cubic feet per day. I don't know just what the division of business is, but I think that roughly half of it is sold at Baton Rouge and half of it goes south. In Baton Rouge they supply the local distribution company, but principally the refinery of the Standard Oil Company. If the Standard Oil Company's refinery in Baton Rouge were to be left out, I don't think the industrial load in Baton Rouge is comparable to that in Chicago. They supply the company which supplies the domestic market in Baton Rouge. The demand for domestic gas in Baton Rouge I would say is somewhat less than in Chicago per capita because of the less heating required and the large Negro population. The population of Baton Rouge is about 50,000. That is not comparable to Chicago in size.

1084 *Redirect Examination by Mr. Morgan.*

Due to the fact that these companies have a pipeline which is about four times as long as that of Interstate Natural, the defendants have the greater hazard. There is more hazard in a 1,000-mile line than there is in a 250-mile line. I stated a little while ago that the line is 22 inches. They have some 22-inch line. The line from Baton Rouge to New Orleans, which is owned by the Southern Gas and Fuel Company, a subsidiary of United Gas Company, is an 18-inch line.

(EXHIBIT 148 was offered and received in evidence over the objection of counsel for each of the Commissions, to whom the Examiner allowed exceptions. EXHIBITS 144, 145, AND 146, offered in evidence at a prior date, were admitted in evidence without objection.)

From the notes I have with me I am not able to prepare a complete answer to the Examiner's questions as to what the explanation may be of the circumstance that the Southern Natural Gas Company's securities sold in the year 1938 indicated a lower return on the market appraisals of the valuations involved than did those of Lone Star Gas Corporation and the Union Gas Company of Canada. I will be prepared to discuss that point on cross-examination.

Just before adjourning Mr. Slaff asked me if the City of Baton Rouge was comparable to the City of Chicago. I had pointed out that half of the Interstate Natural Gas Company's production goes to New Orleans. I don't know just what the proportions are for domestic or city distribution. So far as the volumes are concerned, the City of New Orleans as an outlet for natural gas is comparable to Chicago.

The essential problems of production and transmission in the case of these companies listed in Exhibit 148 and those of defendants are all of the same nature, and the differences are only those of degree. I know of no case in which the problems of the Natural Gas Pipeline Company do not involve more hazard on account of differences in degree than these others set out in Exhibit 148. When I use the expression "Natural Gas Pipeline Company of America" I mean to include Texoma, for I am treating them as one project.

Another reason why these companies in my opinion would require a higher rate of return than the average of the companies with which we deal in Exhibit 148 is that there is a market for the securities or for most of the securities of the companies listed in that Exhibit. If there is no market for securities, any investment in them becomes frozen, and an investor is more hesitant to freeze his money than to invest it in something that is traded in. There is no market for the securities of defendants, and consequently, an investor would be more hesitant to invest in them, other things being equal, than in these other securities, and therefore he would require the inducement of a higher rate of return.

I point out also that this table in Exhibit 148 is prepared on the basis of 1938 prices and markets. It is notorious that on account of the plethora of money, yields were low at that time, and therefore I would think that normal yields could be expected to be higher than those shown here.

1085 Also, the projectors, investors in, and operators of these defendant companies have shown and developed an outstanding degree of skill and enterprise in three particulars. First, the pressure at which the line is operated is much higher than that on any other line in existence before it was built, and I know of no other line of any importance that is operated at anything like so high a pressure today. Second, the design and operations of the line is such that the working stresses on the walls of the pipe are much higher than on any other line that I know of. This results in a smaller investment per unit of capacity. Third, the capacity factor of this line is much higher than that of any other large system. In all these particulars these companies have shown an extraordinary spirit of enterprise, and in my opinion they should be compensated for that in the rate of return. If there is to be no incentive for such enterprise, naturally such enterprise will stop.

I have made a study of the records of this company with a view of determining the difference in the net earnings of the company available for interest and dividends that would have resulted had they followed along the established engineering practices and built a pipeline capable of operating at the then prevailing pressures. I have compared the net earnings of the company at the higher pressure under which they operate with the estimated net earnings they would have realized if they had dropped the pressure back to nearer the standard rate. (Objections by counsel to the two Commissions overruled.) I have not gone back to what other companies use but only to 500 pounds. That is, I have compared the earnings operating at about 700 pounds, as at present, with the earnings if they went back to 500 pounds. By the standard rate of pressure I mean the maximum amount of pressure used by the other pipelines, which runs from 400 to 450 pounds. Comparing the actual earnings with the estimated earnings at 500 pounds pressure, the earnings at 700 pounds pressure show 1.6% greater on the estimated cost of reproduction and 1.8% approximately greater on the book value. My comparison was based on the operating results of the years 1936, 1937, and 1938.

The actual sales for the three years averaged approximately 74,000,000 M. C. F. per annum. If the pressure were reduced to 500 pounds, it would only be possible to pass about 56,000,000 M. C. F. through the line, and that added to the field sales makes a total of approximately 59,000,000 M. C. F., as compared with the 74,000,000 M. C. F. average.

The revenue from the 74,000,000 M. C. F., including gasoline revenue, was $14,853,600. I have considered that if the capacity of the line and the amount of gas delivered is reduced, it will all come out of the cheaper gas, so that the estimated operating revenue is not decreased in proportion to the decrease in gas transported, and amounts to $13,032,914. The operating expense, variable with the volume of gas sold, now amounts to $1,741,839, and I estimate that that item would amount for the smaller quantity to $1,367,343. The operating expenses not variable with the amount sold were $2,134,630, and I have estimated that that would be the same for the smaller volume, making a total operating expense of $3,876,469 at the present time and an estimated total operating expense for the smaller volume of $3,501,974. These operating expenses also include all taxes except income taxes. Income taxes actually paid amounted to $658,839. It is estimated that on the smaller volume the income taxes would be $419,717 annually.
1086 Deducting the income taxes and the expenses from the revenue gives a net income before return and amortization at the present time of $10,318,291, and I estimate that for the smaller volume the figure would be $9,111,223, or a difference of $1,207,067, which is 1.8% of the book cost and 1.64% of the estimated cost of reproduction new less depreciation. I used the figures of Mr. Hamilton as the basis for the reproduction cost new comparison. The cost of a pipeline equipped to handle gas at 500 pounds pressure would have been less than the present pipeline.

I have presented this estimate on a conservative basis. That is, if I had taken into account those lower capital costs, there would have been shown a greater saving or a greater net earning, due to the increased pressure. I have prepared these figures on the most conservative basis merely for the purpose of showing that there was at least this much of the revenue that was attributable to the employment of higher pressures. If I had undertaken to go through the laborious task of trying to develop how much less, if any, a pipeline of 24-inch capacity would cost with the old thick walled steel that was employed at that time and which would have permitted of pressures not in excess of 500 pounds, there would have been a greater difference reflected than the differences I have stated. That brings in the question of stress, on which I have not made an estimate but have testified that it results in lower operating costs.

There was this reason why I did not make the adjustment in this figure for saving in weight of pipe. I am not sure that we could get a pipe with thinner walls. If we started out to run at 500 pounds pressure, I am not sure that we could get the pipe with the corresponding lesser thickness.

Questions by the Examiner.

There are so many expenses in connection with the pipeline that do not vary with the thickness of the pipe that I do not think there is any chance that the cost of the line for operation at 500 pounds would be sufficiently less than the cost of the existing line to offset that difference in net income of $1,400,000. Prior to the investigations and the pioneering in design initiated by the founders of these pipelines there was nothing that I know of in 24-inch pipe except a thick-walled pipe. Those who are employing a thin-walled pipe and who are using 400 and 450 pounds pressure now are using the same thicknesses as were used in this line. The pipe is sold by the ton generally. I do not think there would have been much if any difference in the cost of the pipe itself between the 500 pound line and the existing line. There might have been some difference in the joints, valves, and compression apparatus. I am not prepared to say that there would be any less cost in building the pipeline out of the type of pipe available when this project was first conceived and when these men first went to work on it. I would like to state that a determination of that question would be a rather extensive computation, and I did not attempt to go into it. I therefore took what I thought was the conservative side in setting up these figures. Now I do not by any means add these figures to any previous figures that I have set up for what I think is the required rate of return. If I may anticipate my testimony, it would have been to the effect that I think consideration should be given to this and the company should be allowed a part of it in rate of return, not the whole figure. What I have really done here is to assume the same type of
1087 pipe and the same line using the lower pressure.

(Objections by counsel to the two Commissions to the above testimony overruled.)

Direct Examination by Mr. Morgan Resumed.

The rate of return which I am going to name when we get to it does not include any allowance for this additional earning on account of the employment of higher pressures. My opinion was that this improvement should be shared by the company and the consumers and that some part of this should accrue to the benefit of the company. That is something that should be allowed in addition to the rate of return to which I am about to testify. There would have been no less cost in building a pipeline of the old type of pipe unless there would have been some difference in the cost of the joints and valves. I do not know what that would have worked out to. The right-of-way would have cost no less. There would not be so much compression apparatus required for a 500-pound line. I have simply assumed this pipeline as built and equipped operating on a pressure of 500 pounds instead of a pressure of 710 pounds. I am not prepared with the figures to show how much less would be involved in the pipeline as it exists. (A motion to strike witness' testimony denied.)

Based on the investigations I have made as to the type of business in which defendants are engaged, the risks and hazards which go with that business, and the risks and hazards peculiar to their business, and in the light of the public's appraisal of that type of business and the return required, and the other facts and circumstances concerning which I have testified, I have an opinion as to the required rate of return for the defendant companies.

(Document entitled "Estimated Earnings on Account of Increased Capacity and Delivery of Natural Gas When Operating at Higher Pipe Stresses," marked Exhibit No. 149 for identification. EXHIBIT NO. 149 offered and received in evidence over the objection of counsel for each of the two Commissions, to whom the Examiner allowed exceptions.)

In my opinion the required rate of return for these two companies is between 9 and 10 per cent per year. In arriving at the figure I have named, I have given some consideration to the compensation to which defendants are entitled by reason of the skill and management of the property. If you exclude that part of the compensation and confine it to the compensation for risk in addition to pure interest, exclusive of reward for incentive or pioneering and enterprise, I would say that a fair and reasonable return or what would be a required return would be not less than 8%. I mean that such a return would be required in order to attract the capital necessary to finance these companies.

1088 WILLIAM C. GILMAN, a witness for the defendants, testified:

Direct Examination by Mr. Morgan.

(October 3, 1939)

My name is William C. Gilman. I live in Westport, Connecticut. My place of business is at 55 Liberty Street, New York. I am a partner in the firm of Gilman and Hickey. We are financial consultants primarily in the public utility field.

We are employed by corporations to assist and advise them in the development of plans in connection with the sale to the public of securities and in connection with development of financing, reorganization and recapitalization plans. We are employed by investors to investigate special situations in which they propose to invest their money. We are employed by underwriters to investigate situations where they propose to buy securities and in turn distribute them to the public. We have appraised securities for public appraisal bodies and have performed various other services generally coming within the scope of consultants in financial work.

I attended McGill University of Montreal, Canada from 1912 to 1914. From 1914 to 1919 I was with the British Army in France, as a captain in the Royal Field Artillery. From 1919 to 1923 I attended the Massachusetts Institute of Technology in Cambridge, Massachusetts, graduating in 1922 with a degree of Bachelor of Science, and in 1923 with a degree of Master of Science.

I am a licensed professional engineer in the State of New York. Since my graduation from the University, I have been employed by the General Electric Company, the Central Hudson Gas and Electric Corporation, the Electric Bond & Share, and the Carolina Power and Light Company. While I was with the General Electric Company I was in the Engineering Sales Department from 1923 until 1925. From 1925 to 1927, I was with the Central Hudson

Gas and Electric Corporation as manager of a division of the Commercial Department. In 1928 I was with the Electric Bond & Share and the Carolina Power and Light Company primarily in training to go abroad. From 1928 to 1935 I was with the Equitable Life Assurance Society of the United States as engineer in the Treasurer's office.

In the last-named position, it was my responsibility to investigate, make trips over and study public utility and industrial companies, to prepare reports thereon and recommendations for the Treasurer and the Finance Committee with reference to possible investments by the Society in the securities of the particular companies. The Equitable is one of the large insurance companies, one of the five largest in the United States and, as such, invested many millions of dollars each year. In the field in which I was responsible the comparative figures representing investments in securities were $100,000,000 in 1928 and $300,000,000 when I left them in 1935.

It was my duty to visit the public utility and other companies, to inspect their properties in the field, in-
1089 vestigate every phase of their business, to prepare appraisals of such companies for our own purpose, to prepare comprehensive reports of such companies, and make recommendations to the Treasurer and the Finance Committee with reference to the investment policy with respect to that particular company. My duties required me to take note of the risks and hazards that confronted the company I was investigating. The type of securities usually acquired by the Equitable were bonds. The fundamental policy of the Society, which is an insurance company holding trust funds, was to obtain safety in investments, and it was all the time looking for safe places to put money. It was, of course, at the same time trying to obtain as satisfactory a yield as possible, commensurate with the safety which we demanded. There is very definitely a difference between the factor of safety of an investment in bonds and one in preferred stock, the given conditions being the same. The bond is usually secured by a mortgage upon the property and the issuing company covenants that if conditions are not met, the property goes over to the bondholders. It is a definite promise to pay. The preferred stock is simply a share in the ownership and a promise to pay dividends ahead of anything being paid on the common stock. The preferred stock is senior to common stock and consequently much safer from an investment

point of view. The risks involved in bonds are not necessarily commensurate with the risks that are involved in the total investment or in the investment looked at as a whole. The securities represented by bonds have the first call on the total earnings of the enterprise and are safer than an investment in the whole enterprise.

In the early days of my employment with the Equitable, we had no holdings at all in the natural gas pipeline industry. During the latter part of my time with the Equitable, we did start looking into the industry and we did make certain investments in the industry. I remember the first one that was made by that Society. It was an investment of approximately $4,000,000 in the bonds of the Northern Natural Gas Company. That was the first large purchase by institutional buyers of the bonds of a natural gas pipeline company. They bore a coupon of 4¾ percent, originally 5 percent by contract but reduced to 4¾, and they were a very short maturity—12 years. The Metropolitan Life Insurance Company, the Prudential Life Insurance Company and the Mutual Life Insurance Company of New York participated in that purchase. Approximately 40 percent of the total fixed capital of the Northern Natural was represented by that issue of bonds.

I heard Mr. Delafield testify that a short time before this the Metropolitan Life and the Mutual Life bought two relatively small blocks of bonds of two subsidiaries of the Columbia Gas and Electric Company, that those companies required the Columbia Gas and Electric Company to guarantee those bonds as a condition of that purchase. From talking to the Assistant Treasurer of the Metropolitan, Mr. Mellon, who negotiated the purchase of those bonds, I learned that they would only buy the bonds of the two particular companies if guaranteed by the Columbia Gas, as they wanted that additional financial protection which they thought came with the guarantee of Columbia. (Objection by Commission Counsel overruled.) The Columbia Gas and Electric Company represented a large integrated natural gas situation and also had some electric subsidiaries of some substantial importance. The Northern Natural Gas Company is in the business of transmitting and producing natural gas, but it owns or controls, directly or indirectly, some substantial distribution facilities. At the time we purchased those bonds, the ownership of those distribution facilities was considered an element of strength.

1090 While I was with the Equitable, it did not purchase any preferred stock or common stock. I know of no institution which has invested in any substantial amount in the preferred or common stocks of natural gas companies.

I left the Equitable in 1935 and came to Washington and joined the Securities and Exchange Commission. I was assigned to a division which at that point was not defined, but later became the Public Utilities Division. The bonds of Northern Natural Gas Company that were acquired by Equitable before I left were 12-year bonds with sinking fund provisions in the security which called for retiring practically all of the bonds before their maturity in 12 years. (Objection by counsel to the Illinois Commerce Commission.) I think I have already testified that the amount of the bonds was about 40% of the total reported value of the property. There were two or three men associated with me, and over a period of time we attempted to organize the Public Utilities Division of that Commission. During my time with the Commission, this Division grew until it was a substantial organization. Counting lawyers, accountants, engineers and financial analysts, the organization embraced approximately 100 men. I was then directing head of that Division, while I was with the Commission.

I was responsible for the administration and the personnel of that Division, and was responsible to the Commissioners as the head of the staff for the administration of the particular statute entrusted to us. It was the responsibility of the staff, under my direction, to handle all of the various applications which were filed with the Commission by registered utility holding companies and their subsidiaries with reference to the issuance of securities, acquisition of assets and securities, and all other and various matters in that rather complete regulatory law. It was our duty to analyze those applications and to prepare recommendations to the Commission with reference to approval or non-approval of the particular applications.

We had rather definite requirements under the statute, findings that had to be made in connection with the approval of the issuance of securities which under Section 7 of the Act were rather definite and specific. That section referred to such matters as whether the security bore a proper relation to the security structure of the company, whether it bore a fair relation to the earning capacity of the company, whether in general the terms and conditions of the issuance of the security were compatible with the public interest, the interest of investors, and consumers. I am quite confident that, among the security issues on which we passed and made recommendations, there were some natural gas company securities. To an extent, the natural gas pipeline companies owning only production and transmission facilities fall within the scope of the Act; although, by definition adopted by the Commission, companies which did not perform any distribution function were classed as non-utility companies.

Cross-Examination Interposed by Mr. Slaff.

The Public Utility Holding Company Act of 1938 sets out what are non-utilities, but in order to find out whether or not a natural gas company or a gas company is or is not a utility company, it is necessary to refer to that definition of a gas utility established by the Commission. That definition defines a gas utility to be a company which has facilities for distribution of gas at retail. The statute itself so states, but you have to look at the rule in order to get the proper interpretation of the term "at retail".

Direct Examination Resumed by Mr. Morgan.

1091 My duties with the S. E. C. did not require me to go out into the field and inspect the properties and operating methods and obtain other facts concerning the situation of the company whose securities were under consideration, but we did send our men out under certain circumstances. That was not the general case. It was only in special cases where such questions arose that we thought it best to send men to the field. We sent no men out with reference to any natural gas company. There were very few such companies within our regulation as a matter of fact.

The Commission itself or the staff were not required by law to establish valuations in the sense in which I think the term is being used in this case. We had no power or duty under the statute to establish valuation for rate purposes; but it is obvious that the Commission in matters of security issuance and dealing with matters in connection with the acquisition of utility assets or utility securities was required to and did look into such matters as valuation.

Some idea of the valuation would certainly be required Every release of the Commission covering the issuance of securities under Section 7 of the Act in the opinions and findings will be found to include some statement as to the assets behind the securities being issued. In most normal cases, that statement will take the form of an analysis of the property account and an attempt by the Commission to discover and locate write-ups of property or appreciation of property and such matters; in other words, the Commission attempts in such cases to find, within the limits of practical possibility, the valuations as a basis for the sound issuance of securities.

Cross-Examination Interposed by Mr. Slaff.

I would say that those valuations are more than book figures with write-ups eliminated, because the Commission had available to it in many cases historic cost studies and such matters. These are brought out in the hearings. I think we could define "book figures" as being those figures which exclude any known appreciation, write-up on the company's own books or inter-company profits and such items.

Direct Examination Resumed by Mr. Morgan.

We concerned ourselves with the earnings or the rate of return of the companies coming within our jurisdiction. In every case, in connection with the issuance of securities it was a matter of concern as to the amount of the earnings going to service the securities. The rate of return is of a different character. The Commission had no direct responsibility with reference to a matter such as rate of return as that term is used here, but the Commission in an indirect manner had some responsibility. With reference to looking into the matter of rate of return, under Section 10 of the Act in connection with applications to approve the acquisition of utility securities or assets, the Commission was required to approve the acquisition unless it found that the consideration was not reasonable and did not bear a fair relation to the sums invested in or the earning capacity of the utility assets underlying those securities. The Commission interpreted "earning capacity" as requiring some consideration of what rate of return the company was currently

earning. I think of one instance where we considered the valuation behind the securities and the rate of return and things of that sort. Mr, Booth is very familiar
1092 with that case. It was one of the early cases and one of the important cases and involved an application to acquire utility securities by the Commonwealth Edison Company, which proposed to acquire large amounts of securities of the Public Service Company of Northern Illinois, Western United Gas and Electric Company and the Illinois Northern Utilities. The acquisition was on the basis of an exchange offer, and exhaustive studies were made by the Commission in an attempt to arrive at the answer as to whether or not the application should be approved. In connection with that application we went into the subject of the rate base of each of the companies involved and the rate of return on that rate base. We came to no final conclusion for we were not required to come to a conclusion and publish our idea of the rate base. However, in arriving at the fairness of the exchange, we had in our own minds to determine whether the exchange offer was fair and in accordance with Section 10.

We were required by the Commission and it was our duty to prepare these studies in order to make available to the Commission all of the pertinent information and the recommendations so that they would have everything before them available in order to reach the proper decision. The Commission does not recommend to the public that it purchase certain securities and that they do not purchase others. The Holding Company Act imposes very definite financial standards which must be met in order to issue securities. These investigations were primarily to find out whether or not the companies who proposed to issue securities were meeting those standards. The practical effect of a refusal by the Commission under the Holding Company Act to allow a declaration to become effective or to allow the issuance of the securities is a pretty good indication that the securities are not of a quality which should be sold and made available to the public. I think the fact that such applications are approved is of some substantial influence in the minds of investors in persuading them that the securities may be desirable to purchase.

I continued in my position with the S. E. C. for two years, at the end of which I went back to New York and formed the partnership of Gilman and Hickey. We have occasion and have had occasion to devote considerable studies to the rate of return of regulated companies and such matters. Prior to our employment in this case, we were employed by other companies to perform services in the field of rate of return. In the latter part of 1938 I testified as to rate of return in a case involving the Brooklyn Rapid Transit Company. In the spring of 1939 I testified as to the rate of return in a matter involving gas rates in the case of the Rochester Gas and Electric Company before the New York Public Service Commission.

Cross-Examination Interposed by Mr. Slaff.

I do not remember the exact date of my testimony but it was in the spring of 1939 in Rochester, New York, before Commissioner Burritt. Mr. Gilroy acted as counsel for the Commission. In the summer of 1939 I testified as to the rate of return in the matter of gas rates of the Brooklyn Union Gas Company before Commissioner Van Namee. Mr. McAvoy was counsel for the Commis-
1093 sion. In the spring and summer we testified by affidavit in the matter of electric rates of the South Carolina Electric and Gas Company in South Carolina. In the summer of 1939 my partner testified in Georgia in the matter of the rate of return in the Georgia Power and Light Company.

Direct Examination Resumed by Mr. Morgan.

I assisted in the preparation of statistics and the development of ideas presented in that last mentioned proceeding.

I have been requested to make a special study of the requirements for the rate of return of defendants. I was engaged in May, 1939, since which I have devoted a substantial amount of time to this matter. I have spent a considerable amount of time in my office, considerable time in conferring with company executives and counsel, and some time in a trip over certain portions of the physical properties owned by those two companies. I visited the northern end of the properties at Joliet, the measuring and reducing station, and I visited the properties at the southern end of the line including the compressor stations at Fritch and Gray, Oklahoma. I had previously visited one or two compressor stations in the central part of the line a number of years ago. I spent some time in the offices of the company at Chicago and Amarillo, Texas. I requested certain information from company officials, such as maps, contracts and balance sheets, income statements, breakdowns of operating statistics over a period of years extending really from the start of the company's existence to the end of 1938, and certain figures covering portions in 1939. In addition to that, I studied I think it is volume 62 of the Federal Trade Commission investigation which contains a substantial amount of information about the historical development of this enterprise and its history up to the end of that study, which was as I remember 1933.

I have read the testimony of Mr. Floyd C. Brown. I chose his testimony especially because he was vice-president and general manager of the company and a man with whom I had talked. I felt that his testimony, being general in character and primarily devoted to such things as the development of the enterprise and its present status in the field of natural gas supply, would provide me with certain information which I should have and which probably could be obtained in that way better than by addressing to him a series of questions or a questionnaire. I also talked with the general superintendent and other executives concerning the mechanical and engineering problems with which defendants have had to deal and are now dealing. I talked particularly with Mr. Kesinger about such matters. I submitted a list of information where I felt I needed to have it, and I was furnished everything that I asked for. I have gone into other sources of information besides the records and properties of these companies in determining what ought to be the rate of return for them. In forming my opinion as to a proper rate of return for such companies as these I would rely primarily upon my background and experience in financial matters, having been in that field for a great many years. However, I should and have always given such cases study in connection with certain statistics and financial data for use primarily as a check and a guide on the results.

1094 (October 4, 1939.)

I prepared a summary of certain parts of the study I have made in this connection. I have not included everything I gave consideration to, of course, but certain parts of that study I have set down on paper in a document captioned "Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Data Concerning Rate of Return, Witness, W. C. Gilman".

(At this point counsel handed to the reporter the document just described, with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit 150 for identification.)

Exhibit 150 contains financial data of various types which I considered of some importance and value in checking my judgment as to a proper rate of return for a company such as defendant.

On page 1 is a tabulation of natural gas company bonds, showing the bonds of eight natural gas companies. We show the price of the bonds at September 15, the latest available date, and the yield to maturity as of that date.

On page 2 I show a tabulation of gas company common stocks. I think the language explains what this page tends to portray. Page 3 shows a list of all mortgage bonds of domestic electric and gas utility companies traded on the New York Curb Exchange September 15, 1939. Page 5 shows a statement of preferred stocks of electric and gas operating utilities listed on the New York Curb Exchange.

Page 6 and succeeding pages to 15 show a tabulation entitled "Rate of Return on Invested Capital for a Large Number of Industrial Classifications".

The sheets from pages 7 to 15 being the supporting data for the material shown on sheet 6.

The chart at the end of the exhibit shows the average ratio of earnings to market prices of 12 operating public utility common stocks compared with the average yield on 10 high grade utility mortgage bonds rated by Moody Aaa.

Cross-Examination Interposed by Mr. Slaff.

Pages 7 to 15 show the companies making up the category of the companies on page 6.

The data supporting a return of 6.88 on invested capital for Automobile Parts and Accessory Manufacturers would show the invested capital for each of the companies, a total invested capital for all of those companies, and the return expressed in dollars for each of those companies and for all of those companies. That is
1095 found in my work sheets. The original sources were the Form 10 reports of these companies to the Securities and Exchange Commission. Practically all the American companies who have securities listed on the National securities exchanges are included in this rather wide cross section of American industry. As I say, the primary sources were the Form 10 reports to the Securities and Exchange Commission, but they were collected together, and my actual source is from a study at the Securities and Exchange Commission of those Form 10 reports. A separate study was made of each particular industry. An example of one of these studies is that of the Chemicals and Fertilizers entitled, "A Partial Report of the Census of American Listed Corporations. A Works Progress Administration Project Sponsored by the Securities and Exchange Commission". They have gotten out some 36 of these reports already. I have included every one that has come out.

Cross-Examination by Mr. Morgan Resumed.

Turning back to page 1, I tried to select eight companies which were typical of this industry, to some extent comparable with the companies under consideration. I obtained the prices of the bonds at September 15, 1939, and from that calculated the yield to maturity on those bonds. It will be noted the yield to maturity is with some substantial variations, extending from somewhere around 3 percent to something over 5 percent. It is indicative of the prices and yields to investors from natural gas company bonds outstanding in the hands of the public.

On page 2 are listed 16 companies. There are natural gas companies and there are also listed here a number of companies which furnish mixed and artificial gas service, because I believe it is desirable to show some of those companies. This page shows the earnings price ratio at which the common stocks of those companies are selling. It will be noted that the earnings per share

are the latest reported for public information, the market price was as of September 15, and the third column was obtained by dividing column 1 by column 2 to obtain the earnings price ratio. It shows simply that some companies' stocks are selling on as low a basis as 6.51 percent, and that other company's stocks were selling on as high as a 14.0 percent basis.

Questions by the Examiner.

It was not possible to use the same gas companies listed on page 1 for the purposes of those listed on page 2 for the reason that a number of those companies listed on page 1 have no common stock outstanding in the hands of the public. That was the only reason for omitting them. As a matter of fact, one of the difficult things in this case, is to find a sufficient number of securities on which to formulate a judgment. I think I have a sufficient number to do so, but it is a fact that there are not many natural gas pipeline companies as compared with electric companies or gas companies on which to make comparisons which are ordinarily made in the financial world in trying to appraise securities. I made no comparison of this list with Mr. Emery's list. Mr. Emery's list had to do with annual figures to the end of 1938. These figures are up to September of this year.

1096 Another thing that I should call to the attention of the Examiner is that some securities have been sold privately probably since Mr. Emery's exhibit was prepared, in which case it is impossible to get a quotation and therefore impossible to obtain a yield. I think the El Paso Company, since the end of 1938, has refinanced on a private basis. With respect to the Southern Natural Gas Company, I designate the issue as first mortgage sinking fund 4½'s. That is the same issue designated by Mr. Emery as first mortgage bonds 4½'s. I do not include the Adjustment Bonds or the Alabama First Mortgage Issue of 1951, which is shown on Mr. Emery's list. In my judgment I included the bonds best suited to portray what I wished to portray. The Adjustment Mortgage Bonds are another issue of bonds of the Southern Natural. I felt that the first mortgage issue was most indicative for my particular comparison.

Cross-Examination by Mr. Morgan Resumed.

I have not compared my data with that of other witnesses. I have not seen their exhibits and they have not seen mine.

Page 3 shows a list of all mortgage bonds of domestic electric and gas utility companies traded on the New York Curb Exchange on September 15, 1939. In my opinion, these companies here are in competition for capital with other electric and gas utility companies, and in fact with all industry in the United States. They can only attract capital and can only maintain their credit if their earnings or the rate of return on their fair value is maintained in such a manner as to support their credit standing. Investors do not go out looking for the lowest yield they can find. On the other hand, they go out and look for the highest yield that they can find, commensurate with safety. In other words, they are looking for a product of the yield multiplied by safety to reach a maximum figure. The thought that investors go out looking for the smallest yield is not borne out in the practical world. Investors are looking to the high yield, and that is one of the reasons why I have prepared this exhibit. It shows a rather wide list of electric and gas utility mortgage bonds which were traded on a national market, the New York Curb Exchange, and to that extent it is a non-selected list. It included all of the bonds traded on that Exchange during that day, covering utility companies all over the United States.

The yields obtainable vary all the way from 3-odd percent to as high as 9.57 percent, with an average yield on the whole list of 5.12 percent, which is some indication that some investors could at that date go out and invest in a diversified list of mortgage bonds of electric utility companies and gas utility companies and perhaps obtain a yield of as high as 5 percent.

Similarly, page 5 shows a list of preferred stocks of electric and gas operating utilities listed on the New York Curb Exchange. I have included in this list all of such companies which had outstanding any substantial amount of such stock which has fair marketability. There are some 35 companies, and the average yield on the whole list is 6.4 percent. That average does not show on the page but I have calculated it. It is the straight arithmetic average of the yields set out in the final column on page 5.

That is true also of the average yield of 5.12 stated for pages 3 and 4.

1097 Page 6 shows that for the years 1934, 1935, 1936 and 1937, and the average for those four years where available, the average from 1935 to 1937 when the 1934 figures were not available, computed as shown in Note 2 at the bottom of the page. The averages for the units used are again a pure arithmetic average. Those lines are not the names of firms, but classes of industry. For example to explain one of them, the Automobile Parts and Accessories Manufacturers shown in line 1, it appears that a return on invested capital in 1934 of 6.88 percent was earned. The earnings in 1935 were 13.82 percent; in 1936, 16.50 percent; in 1937, 15.2 percent; and the average for the 4 years, 13.10 percent. These figures are obtained by studying the reports of a large number of companies who go to make up this industrial classification. There are approximately 42 companies who are listed on page 7, which include all companies of any importance who had securities listed on National security exchanges. They are the same companies that the S. E. C. in their reports to which I referred a whille ago used as the basis of their computations.

Questions by the Examiner.

I could only estimate the proportion of the total industry in the country that have securities listed on the Exchange which are represented by this compilation here on page 6. The only American industries excluded from this are the regulated industries, the Public Utility Industries and the railroads, and a few other industries, such as the hotel industry and service industries of that character. The list, it will be appreciated, is a very wide list, covering practically all of American industry. It was my purpose to get the widest cross section, the widest appraisal of what capital is earning in American industry, because I think it is of some importance in consideration of a problem of this kind.

We have to adopt some kind of a statistical method, and it gets down to a question of a degree of accuracy. It is possible that a finer result would have been obtained if we had taken the net operating result for each months' period divided by 12 and going along by that method we could do it for each day of the year. It gets down to a question of refinement. I think for the broad purpose and for dinary statistical purposes the method employed here is the common one. I should call attention to the fact that while it is stated here, I want to make it clear, that this rate of return is before income tax.

Direct Examination Resumed by Mr. Morgan.

The chart at the end of the exhibit shows by the bottom line Moody's 10 public utility bonds Aaa class, which is the standard or one of the standard indices of yields of high grade bonds. It is published monthly and available in all the services. It shows an almost continuous downward trend in the rate of interest yield to investors on high grade public utility bonds from 1932 down to September 1, 1939, when it will be noted that there was a substantial upward movement. Of course, everybody realizes that at that time there was a substantial upward movement and high grade bonds declined rapidly in price.

This, as I say, is a standard index. I had nothing to do with its preparation. I simply adopted it as being an indication of the movement of high grade bond yields.

1098 There is no such index of public utility or electric and gas utility common stocks. I felt it desirable to construct such an index, and this index above the bond index has been prepared. That has been made up of 12 operating utility common stocks, and shows quarterly during the period the ratio of earnings to prices during that time. While it will be noted that the bond yield has shown almost continuous downward movement, there has been no such similar parallel movement of earnings price ratio on utility equity stocks. In fact, the movements have been at times quite violently opposed, and the earnings price ratios of the stocks are substantially above the yields on the bonds and are trending upward at the end of this curve. The companies selected were considered to be 12 of the outstanding electric and gas utility companies in the country. Those included were the Boston Edison Company, the Cleveland Electric Illuminating Company, the Commonwealth Edison Company, The Duke Power Company, the Hartford Electric Light Company, the Southern California Edison Company, Ltd., the Consolidated Edison Company of New York, Inc., the Consolidated Gas and Electric Light and Power Company of Baltimore, the Pacific Gas and Electric Company, the Detroit Edison

Company, the Brooklyn Union Gas Company and The Peoples Gas Light and Coke Company.

The earnings price ratios shown on the chart are established quarterly, that is the earnings available for dividends as the result of the given year's operations are related to the average of the high and low market price of July and October of the same year, and January and April of the following year.

That is another well known statistical method. As a matter of fact, I originally ran into it in a Federal Communications Commission study of the theory that investors' appraisals of securities at any particular time are to some extent based on the past earnings of the company and what their expectation of the future earnings of the company is. So we equate the earnings say of 1939 to the price which existed, the average high and low, of January and April, 1940, where those fellows were anticipating the 1940 earnings, and in July and October of 1939 where ostensibly the earnings were available to them, and they knew what the earnings were and could so adjust their price ideas. The printed figures on the left margin of the page shown on the chart are meaningless. The only figures that mean anything are the figures on the right and on the left, denominated 1.0, 2.0, 3.0, and so forth, which means percent. In the case of the bond yield, it is the yield in percent. In the case of the stock index, it is the earnings price ratio, a percent. This exhibit was prepared by me and under my direction.

I have checked the exhibit and adopted the figures as my own.

(EXHIBIT 150 was offered in evidence.)

Questions by the Examiner.

The four points on the common stock graph, as applied to the year 1938, were so determined because the results for the 12 companies are obtained by taking the result for each company in turn, adding them together and then dividing by 12. Let us take the first company, the Boston Edison Company, for 1938. From the report of that company we find the earnings available for dividends on the common stock on a per share basis. I did not have the figures but they are shown in the annual report of the company to its stockholders for the year 1938, or they can be found in Moody's Manual, which is considered an official financial document.

1099 All of these companies make their fiscal year correspond with the calendar year. In any event, in every one of the cases here, we have obtained an earnings figure for the calendar year end. Then with that one figure of earnings per share established, we would find four prices of this company's common stock by referring to such financial data as the Commercial and Financial Chronicle, the Bank and Quotation Supplement, and possibly the New York Times for the daily quotations. I said four figures, actually for the month of July and for the month of October, 1937, we would obtain the high and the low price of that stock during each of those months, and would add them together and divide by 2 to obtain the average price at which the stock sold in July, 1937 and the average price at which the stock sold in October, 1937. Then we would do the same thing for January, 1938 and the same thing for the month of April, 1938. Then we would have four prices established. We would then take those earnings which we had previously found for the year 1938 on a per share basis and divide those earnings in turn by each of those prices; namely, for July and October, 1937 and January and April, 1938. That would establish four earnings price ratios, one for July, one for October, 1937, and one for January and April, 1938. Then at this particular point, I should say first of all, since we are only dealing with one company now, we have to combine the 12 companies, and then having obtained those figures for those particular months, put them on the chart. The straight average is arithmetical and not weighted.

For simplicity purposes in preparing the chart, the established earnings price ratio for July is set right in the middle of the year 1938. That method was pursued consistently throughout the four quarterly periods. Again it comes down to a question of refinements. Possibly for more extreme accuracy, the figures should have been half way between June and July, but in matters of this kind I do not think that is essential. This chart was prepared to show the ratio of the relation between high grade bond yields and the earnings price ratio on high grade utility stocks to indicate a substantially wide spread.

The bond curve was Moody's Public Utility Bond Index AAA of public utilities. I think actually it is prepared by Moody monthly for their own purposes, and in order to have some similarity here, I have plotted it quarterly. You will see by the way the chart moves, that the line at the beginning of 1937 goes in a straight line. In other words, where Moody's had a curve, I had a series of straight lines. Moody would have a smoother curve, though it would not be a curve because they only do theirs once a month. Of course, if you do it once a day, you have probably a smooth curve. The reason I stagger my earnings and average high and low prices is that the earnings price ratio itself is an indication of the investor's appraisal. In other words, it is earnings divided by the price. It tells what the investor is willing to pay. A common method of talking about that sort of thing is to talk about the price earnings ratio, which is the reciprocal of the other, and I think it is perhaps more commonly known. People will say they would pay seven times the earnings for stock, or 10 times the earnings for stock. It is a direct appraisal of the market by the relationship of the earnings. In other words, we use our July and October, 1938 price figure with our earnings figures, because there is a market relationship.

I probably did not make it clear as I originally stated it. My theory, and I think the well established theory is that the people who are buying stock today and who are establishing price for stock today by their orders to buy stock, are buying the stock of a particular company with 1100 several thoughts in mind. They have seen the latest Annual Report, they know what the company earned historically. Also, they are buying on what the company is going to earn because they have some idea or some information, or think they have, on what the company is going to earn in 1939. Therefore, the truest measure of this thing is by having this earnings price ratio calculated this way, rather than always on the basis of hindsight.

If we tried to do it any other way, we would be up against the proposition in 1939 of working on 1938 figures. I think it is well known in 1939, September 15, conditions are quite different that at the time those earnings were established during the year 1938. Industrial activity in this country is at a much higher tempo today than it was in December, 1938 and during that year as a whole. So in order to obtain a fairer measure of the appraisal of the equity, this method has been adopted which attempts to combine in this chart, ideas of hindsight and foresight. There are other factors in addition to earnings, which determine market price, but this contract only uses and only establishes the relationship between earnings and price over the period.

Direct Examination by Mr. Morgan Resumed.

There are hundreds of factors which go to make up the price. The price is established in the minds of investors and with the investors all over the country. All such matters and everything that could be thought of enters into such things. The public's appraisal of those elements is wrapped up in the price which the public is willing to pay.

Cross-Examination by Mr. Slaff.

The reason I used the average price for one month out of each quarter instead of the average quarterly prices for each of the four quarters is that I wanted to obtain that relationship four times a year. This method will show you more rapid fluctuations, which I think should be done, than by adopting the average price of any quarter. I do not agree with you that a more accurate appraisal of the showing would be by taking quarterly high and low averages. I think we are getting away from that. The old-fashioned way of doing this would be to take the average of the high and the low for the year and equate that to the earnings for that year. I think that was from a statistical point of view improper. I think we have gone far in advance of that, and this method is much better. The reason I do not go still one step further and take the high and the low from July 1 to July 15 is there comes a question of degree in all statistical methods, where the additional refinement is not worth while in view of the results to be obtained. I want again to emphasize that this chart was not prepared primarily with any thought in mind of establishing any point of departure and saying that the utilities' stocks are worth about twelve to fourteen times earnings; that is, high grade utility companies such as included in this chart.

The chart was prepared primarily, as I said before, to show the relationship in the movement of utility high grade bonds' yields in comparison with earnings price ratios on common stock.

For your own information, Mr. Slaff, I will say that this method was the method which was developed primarily

originally by the Federal Communications Commission in their study of rate of return which you have
1101 available; and I felt that it was such a good method of presenting the data that I adopted it. As a matter of fact, they prepared a chart practically like that but they included some telephone companies, which I excluded from this particular list because I did not think it was pertinent at all. I am referring to the study that was prepared under Mr. Wheat's direction.

Cross-Examination by Mr. Booth.

The calculations on pages 6 to 15, inclusive, showing the percentage earned on invested capital were made by the Securities and Exchange Commission W. P. A. project. However, I had checked at the New York Stock Exchange a sufficient number of these calculations from the original sources to satisfy me that the compilations are correct. I made no calculations as to what the rate of return on the invested capital would be after payment of income tax. I would not say that I have no idea what the return would be on any of these corporations after the income tax deduction. It would be somewhat smaller. For purposes of comparability, in comparing a large number of companies of this kind, I understand it was not possible to make the comparison after income tax. I know that in the determination of public utility income for rate-making purposes the income is computed after the payment of income tax and other expenses. I know how this calculation was made and it is explained in Note No. 2, the net operating results, and I personally have checked some of them myself to determine exactly how the net operating result was obtained.

I was going to make absolutely clear in the record that particular point of the income tax. You will note that Note No. 2 says: "Computed by taking the net operating result for the period before interest and prior claims and income tax." That is, before interest, before prior claims, and before income tax, and dividing this amount by the total invested capital at the end of the period. It is obvious that nobody could determine whether or not the items of depreciation and depletion have been adequately taken care of before the net earnings were computed. I made no study to determine that. These figures are from the sworn reports of the companies. I do not know what each particular company did with respect to depreciation in any particular year, but I have been over the reports and have noted the item of depreciation at that time. I would not be in a position to state that any company in the United States or in the world had in a particular period taken the proper amount of depreciation and depletion without a careful study.

You asked as to whether or not it is my opinion that an investment in, for instance, the business of the snuff manufacturers would be attended by a risk comparable to an investment in the Natural Gas Pipeline Company of America and Texoma. It is my opinion that an investment in a well selected American snuff company would be a more safe investment than an investment in the Natural Gas Pipeline Company of America. As a matter of fact, the Equitable Life Assurance Society, with which I was associated, had substantial investments in an American snuff company. I think you made a bad selection, because the statistics of the snuff industry in this country are rather amazing. I will say that the statistics for the snuff industry show a degree of stability which is at least equal to that of the natural gas industry in this country.
1102 I would not attempt to compare a particular industry in so far as any one of the fifty points of comparison that might be made to the particular companies involved here. In matters of this kind, while the Bluefield case definitely said, "Investments of the same character and of the same degree of risk must be used," from the practical financial point of view they did not say anything that investors for years have not always had in mind, what other industries are paying, and they would only put their money in these regulated industries if they could obtain a higher return in that industry commensurate with the safety they wanted. So, from the standpoint of economic principles, the Bluefield case did not do anything. I would not attempt to compare any particular company with these companies here, but the very breadth of this list covering all American industry, practically, outside of the regulated industries, gave a measure of what is being earned in other industries at the same time, and that is the only way to get such a measure.

I have not, on paper, made any comparison of any of these businesses with the business of defendants. I have been in the investment field and been responsible for the investment of large sums of money for a great many years.

In the processes of my mind, I am always automatically making comparisons. I have told you I did not make a comparison of the risks of the companies shown in this exhibit on page 6 and the risks of investment in defendants.

Direct Examination by Mr. Morgan Resumed.

The figures shown on pages 6 to 15 of Exhibit 150 simply put down in one place in tabular form what capital is earning in other businesses. Anybody in forming an opinion as to a proper rate of return must know these figures. He may not do that exactly in this way. He may not have the figures in exactly this shape. He may have them in some other form, or he may have other tabulations made, but anybody forming such an opinion must have an opinion as to what capital in other industries is earning. The conception of a fair and proper return must be taken into consideration in connection with the competition for capital. Regulated industry companies, such as the pipeline companies, only can get capital and their credit will only be maintained if they stand well with investors and are able to offer investors a rate of earnings which, combined with safety, is better than generally obtainable from other industries, and to that extent I used this compilation here. In my thinking, I did not rely solely on this exhibit nor any other exhibit as of any great weight, but in forming my opinion on rate of return I rely generally on my knowledge of the financial world extending over a number of years. The facts set out in this exhibit are a part of my general knowledge.

There were three snuff companies used in making up the line on page 6. Now, in the use of the term "comparable", it is not necessary that the companies compared be identical in all respects. "Comparable", in my understanding, means things that have characteristics, which are similar or dissimilar; that is, characteristics which are capable of being compared. If I had the time I would appraise the risks confronting these two pipelines companies and
1103 make up my mind whether it is more or less a risky enterprise than any one of these groups of industries listed here. But I have not used this as a basis for saying that these companies are entitled to a certain rate of return because the automobile manufacturers were making 22.03 percent and the snuff manufacturers something else, 13.98 percent, and the beverage manufacturers 37.69 percent. As I said when I made my original explanation preliminary to all of these exhibits, I have simply used this as a form

or guide or check on my judgment in the conclusion as to which I came in the matter of a proper rate of return for these two pipelines. In my opinion, it is not possible to find any other natural gas pipeline company or any other industry in the United States, which would have absolutely the same risks in every particular as the risks which have confronted and which do confront these two particular companies.

Cross-Examination Interposed by Mr. Slaff.

I do not think the word "corresponding" has the same meaning as the word "comparable". I do not see any connection between the two. As I understand the word, "corresponding" means something which resembles. However, when I use the word "corresponding" I mean two things which resemble each other in a general sense. (Objection by counsel to Illinois Commerce Commission taken under consideration.)

Questions by the Examiner.

As I stated earlier, it would not be possible to go through and make the calculations on the companies listed on pages 6 to 15 of this exhibit after deducting the income tax, and, of course, it would be utterly impossible for the Federal Power Commission to calculate proper depreciation, as counsel calls it, on those companies.

Cross-Examination Interposed by Mr. Slaff.

I used the securities listed on the New York Curb Exchange on pages 3, 4, and 5 rather than the utility securities listed on the New York Stock Exchange because the latter is very narrow. There is a much more representative list on the New York Stock Exchange. I did not bring those listed on the New York Stock Exchange into my computations at all. I thought that I had enough. I selected the New York Curb Exchange as giving a representative list.

Direct Examination by Mr. Morgan Resumed.

In connection with my examination of the properties and records of defendants, the reading of the testimony of Mr. Brown, and in the light of my knowledge of the natural gas industry and the Natural Gas Pipeline and production industry, I have a judgment or an opinion of the character of the risks and hazards that have confronted and which now confront defendants, as those risks and hazards are viewed by investors. I have made use of this judgment in arriving at the conclusions which I will later express as to a proper rate of return for these companies.

I am and have been for a long time familiar with the
character of ordinary electric utility business, and the
artificial gas utility business. I have been continuously
engaged for more than ten years in daily contact with
problems involving utility securities and matters of utility
financing. In connection with this study, I have given
thought to the comparative safety or security of investment
in the ordinary continuing utility and in a natural gas pipe-
line company engaged in the producing and transmitting
of natural gas. I do not think there is the same
1104 degree of safety and security in an investment in a
natural gas pipeline company security backed up by
production and transmission properties as in the ordinary
electric utility field. The natural gas pipeline and produc-
tion industry is a more risky industry from an investor's
point of view. I must speak generally. There may be
some small or medium sized or even large sized natural
gas pipelines which in a particular case are better than
some electric companies which happen to be in receiver-
ship at the time. I am simply emphasizing that I am
speaking generally, and I say that generally the electric
industry is a much safer industry from an investor's point
of view than the natural gas industry. I base that state-
ment upon my long continuing study and observation of
the electric industry, and a study of its investment charac-
teristics, and the study of the results of many hundreds of
companies, and a continuous attempt to appraise, as all
people who are responsible for the investment of funds are
responsible for appraising, their risks. That is the ap-
praisal of the public in dealing with securities and the
valuations placed on these securities as compared with
securities by a natural gas pipeline company.

As between an electric utility and a utility distributing manufactured gas as a class, my opinion is that as a class the electric utility industry offers greater security than the manufactured gas industry. I say that because I am familiar with the characteristics of an electric industry. That industry as it exists today has at least, insofar as its domestic market is concerned, a practical monopoly in service which it furnishes. Nobody is competing or can compete with the use of electric energy in the home, with the great number and increasing number of appliances for utilizing electric current. The output and consumption of electric energy are generally increasing from year to year. Similarly, in other fields the electric industry, generally speaking, is making over a period of years good advances. The gas industry, however, as an industry, is not in any such position. For a number of years the gas industry has been suffering in competition and has lost substantial amounts of its domestic business. Investors at the present time are somewhat skeptical of the future of the manufactured gas industry. They are not sure where it is going.

Electricity was first used in the American home for lighting purposes. At the present time it is used in the home in a countless number of ways. There are myriads of numbers of appliances which are available to the householders, reasonable in price and offer great convenience to the householder, and consequently they have had rather wide public acceptance with consequent good results for electric companies. Some of the common appliances which every home has are the ironer, the toaster, the coffee percolator, the fan; and then getting to the larger appliances, in some cases, the washing machine, in some cases an electric water heater, air conditioner, electric blanket, and a new appliance which has recently come into great prominence in a very large scale is the electric roaster, of which some several hundred thousand will be sold this year, and which will come into homes, and will to the extent that those homes now have gas service reduce the consumption of gas because they will be used once in a while. They probably won't be used every day for cooking, but the device is such a satisfactory device from the housewife's point of view, from the standpoint of convenience, that she will use it to cook a meal once in a while. They just put the food in the roaster and turn on a key which automatically turns off when the meal is roasted. That sort of a device is a device which offers some substantial hazards to the gas company in the territory wherever one is sold, and automatically results in an expansion of
1105 electric energy consumption. I did not mean to overlook the electric sweeper and electric refrigerator. Of course, the electric refrigerator is one of the most important electric appliances.

The manufactured gas business is to a great extent in competition with other fuels and other methods of doing the same job. All the manufactured gas industry provides is a heating service. It delivers to you B.t.u.'s for which you pay dollars. It can only and will only be able to continue furnishing those B.t.u.'s if it can bring those B.t.u.'s to you cheaper than you can get them anywhere else. Such things as oil, and, in certain cases, such things as solid fuel are in direct competition for heating purposes. I have already stated that the electricity is in competition so far as the use in the kitchen is concerned.

Let us go one step further and introduce the distribution of natural gas, by which I mean an owner who has provided himself with the facilities for distributing natural gas only, but does not own the production and transmission system. I mean to compare the manufactured gas industry which manufactures and distributes gas with the natural gas distributing company which purchases its natural gas from others, and does not own its production and transmission facilities. From a short range point of view, many investors would be inclined to regard the company distributing natural gas and obtaining the gas under contracts as being a desirable sort of a thing, inasmuch as the company is in a position today to sell B.t.u.'s at a cheaper price; but from a long range point of view, conditions may be quite different. If the natural gas company which is purchasing and distributing gas is confronted with the failure of its supply and it has to go back into the manufactured gas business, and perhaps build plants or something like that, it will be faced with the difficulties of rate increases in all probability, and all of the difficulties which go with that change back from a high heat gas to a low heat gas.

This change back is an extremely difficult thing. Once the customers are expecting to receive the natural gas of, say, 1,000 B.t.u. heat content at so much per thousand feet, and they are changed back to manufactured gas with some 550 B.t.u. heat content at somewhere near the same rate, they are paying about the same money for half the heat. They do not like it. A company having to undergo such a change would probably go through a financial crisis unless a public service commission acted with great promptitude and with greater promptitude than they ordinarily act. We have had several cases of that kind already in this country, and substantial financial hardships have been encountered.

For example, in Elmira, New York, the gas company has had to change back and forth from natural to artificial gas and vice versa a number of times. In fact, it has changed so many times it is difficult to keep track as to which kind of gas they are using there. They were originally a manufactured gas company and then they went to natural gas because that became available. The natural gas supply failed absolutely and they had to rebuild and put in manufactured gas plants. A few years ago natural gas again became available from the Tioga fields in Northern Pennsylvania and natural gas is now being served.

The City of Chicago has undergone the same experience in its past history. At one time in the '90's, at the turn of the century, there were substantial pipelines running into Chicago supplying natural gas to the gas companies
there from the Indiana fields. Those fields were in a
1106 very few years exhausted and the supply completely
failed. The result was that the users of that natural gas had to go back to artificial gas.

Going one step further, let us compare the risks and the security of a natural gas pipeline company which owns distributing properties only and which purchases its gas from some other source, with what has been referred to here as an integrated company—a company which owns production and transmission facilities for producing and transmitting its own gas and its own distributing company.

In my opinion, generally speaking, a company having a natural gas distribution system is a safer and a less risky investment than an enterprise which has a pipeline connected to a distribution system, so-called integrated enterprise.

This is because from an investor's point of view, generally speaking, the safest form of an investment is to have an investment in the facilities which are used for distribution at their point of use. The distribution system includes the pipes and the mains laid in the street, the services and the meters running right into the house. They will probably be used for many years to come, whether artificial gas or manufactured gas, or some new gas that should be invented is used. It is probable that those pipes have long life in the streets, already laid, and will continue in use for many years to come, and therefore will be of use. No one can tell, generally speaking, with respect to the life of a pipeline which runs from a particular field, or even a particular group of fields, to a particular spot, and their sales of gas. With the failure of the gas supply at the supply end, the pipeline is, from an investment point of view, a loss; and to that extent an investment in the distribution facilities alone is regarded as a safer type of investment than in the one where pipeline and distribution facilities together are owned. As a matter of fact, a natural gas distributing company, if the source from which it is purchasing its gas should fail, always has the possibility confronting it that it might be able to purchase gas from some other source. And if there be no such source available, it can always turn, as I have observed, back to the distribution of artificial gas.

If the source of supply should become exhausted as in the case of the integrated company which owns distribution facilities also, there is always the possibility of saving for permanent use a part of the investment that is used in the distribution end of the line, and only a part of the total investment is lost by reason of the failure of the supply; namely, the investment in the production and the investment in transmission facilities. If this integrated company be compared with a pipeline company which owns production and transmission facilities only, it appears that an investment in the integrated company is a safer proposition than one in the company which has no control or owns no distribution. I heard the statement of Mr. Delafield on that point, in which he stated at some length the advantage of owning the distributing market facilities. I am in agreement with that observation but I did not form my opinion from hearing Mr. Delafield's testimony. That is my independent judgment and was my judgment before I heard Mr. Delafield testify.

1107 There are other reasons why securities of an integrated company offer a safer and more desirable security from the standpoint of the investor than those of a company owning only production and transmission facilities. Any company which owns distribution facilities or controls distribution facilities can save a part of its investment if the production goes sour and the pipeline is abandoned. The distribution system usually represents a substantial part of the total investment. It might be 50 percent of the total investment. This part of the investment, as I have already observed, will continue in use for furnishing heat in gas form to customers insofar as we can see ahead today; but that is not the case with reference to the transmission system from the source of supply to the place where the distribution system takes up, because they have no distribution system.

Among those companies owning only transmission and production facilities, a distinction obtains in the case of those companies which rely solely upon one source of supply as opposed to a number of sources of supply. An investor would naturally, other things being equal, consider the company which had a multiple source of supply as being a safer investment than the company which relied on a single source of supply. When I speak of all other things being equal, I am excluding supply. The fact that a single source of supply might be a large one might change the degree of the hazard on that point but it would not remove it. The hazard would still be there. It would be a greater hazard with one source of supply than a multiple supply, assuming that the multiple supply were reasonably adequate for the particular job at hand. However large the supply, it will last just as long as the total quantity divided by the total removal will permit it to do that, and it depends altogether upon who all are taking and how much as to how long it is going to last. Of course, a single source of supply from which a number of companies are taking gas represents a more risky situation than would one where a single source completely under the control of the company in question exists.

I would like to make my position clear on the question of a single or scattered source of supply. My position is this: An investor considering a pipeline which had only one source of supply would be somewhat fearful of the failure of supply in that field, whereas if this company had contracts to purchase gas from four or five fields and was obtaining gas from four or five fields with a multiple source, it is a less risky proposition. It is an application of principle of diversity. If one of the fields failed, the other four would be left, if there were five sources of supply. I have assumed in each instance that there were a number of owners who were producing on the same sources of supply. That is the situation in practically all of the fields from which natural gas is being produced.

I think my memory is sufficient for me to state the companies on pages 1 and 2 of Exhibit 148 which have more than one source of supply. The El Paso Natural Gas has one source of supply. The Arkansas-Louisiana Gas Company, the Columbia Gas and Electric Company, the Lone Star Gas Corporation, the North Penn Gas Company and the Panhandle Eastern Pipeline Company all have more than one source of supply. The Southern California Gas Company and Southern Counties Gas
Company have more than one source of supply, if
1108 my memory is correct, and I know that the Southern
Natural Gas Company has only one source at the present time, the Monroe field. Turning to page 2, the El Paso Natural, Republic Natural, Southern Natural, Mississippi River Fuel, Memphis Natural, each has only one source of supply. The Oklahoma Natural Gas Company, Mountain Fuel Supply Company, Columbia Gas and Electric, Lone Star Gas Corporation and the National Fuel Gas Company, each has a number of sources of supply. I am not sure as to the Pacific Lighting Corporation, but I think it has a number of sources.

Cross-Examination Interposed by Mr. Slaff.

The highest earnings price ratio of the common stock as reflected on page 2 is that of the Oklahoma Natural, which has a number of sources of supply. Referring to bonds shown on page 1, the highest yield 5.24 is for a company, the North Penn Gas Company, which has many sources of supply. But you cannot put these things absolutely in slots. In generalizing and answering questions as to the degree of risk, you must say generally what you believe.

Questions by the Examiner.

The companies shown on page 2 with their common stocks are listed, some of them, on the New York Stock Exchange, some on the New York Curb Exchange and some over the counter. The companies like the Providence Gas Company and Springfield Gas Light Company are not listed on the Exchanges. The stock of the Oklahoma Natural Gas Company is held publicly.

Direct Examination by Mr. Morgan Resumed.

In going over the comparative safety and security of investments in different types of utilities, and in the natural gas pipeline companies, this morning, I was stating the comparative risks of those industries in general as a class. It should be emphasized that any particular company in any one class may have a different risk from that class as a whole. I have known electric companies which have the highest order of risk of any of those considered getting into bankruptcy. As between bonds and preferred stocks of the same concern, the bonds are the senior security, and of course have the lowest degree of risk. As between the two classes of stock, preferred and common, of course the preferred stock is senior and is the higher order of security. The common stock is the riskiest type of security. Investors would not buy the bonds of a natural gas pipeline company extending over the entire period of the indicated life of the source of supply of natural gas. The investors would wish to buy a bond which matured and was paid off some years certainly before the end of the projected life. The purchaser of stock in taking the risk involved would demand his price. He would demand a yield sufficiently high to compensate him for the risk that the supply would terminate prior to the time indicated. That is the only way he can be compensated for that risk, is by getting a higher rate. He has an investment in the residual earnings of the enterprise after the bondholder and/or the preferred stockholder is paid. He has the riskiest position. If any miscalculations are made, he is going to suffer because he is on the tail end. In other words, if the risks are such that the owner of the superior security gets hurt, the stockholder is counted out altogether.

1109 There are other risks confronting the pipelines involved in this inquiry which I think would enter into the value of their securities if offered to the investing public. Any natural gas pipeline company which produces and/or purchases natural gas and transports it through a line for sale is subject, of course, to the principal hazard of the possibility of failure or shortened life of the supply. Under ordinary circumstances, a project of that type would be engineered and financed from an economic point of view on the basis of a definite life and assured life. If there are any mistakes in those calculations and the life is shorter, investors may suffer. The possibility of error one way or the other is something that definitely must be taken into consideration by investors who are considering the securities. From the investor's standpoint, there is a hazard as to the amount of additional capital investment which will be required, but I would not place that in the No. 2 position. To go ahead and enumerate the risks as I see them in the natural gas pipeline producing and transporting companies, the primary risk is the risk at the supply end. In my opinion, of second importance is the possible risk at the other end, depending upon how the gas is sold. If the company contracts for the sale of all of its gas and has no control of its markets and owns no distribution facilities of its own of any kind and controls no distribution facilities, that is a risk which investors would very definitely evaluate in considering the securities of such company.

Other risks which should be taken into consideration and would be taken into consideration by investors at the present time are such matters as regulation. Regulation under a new law which nobody knows anything about, nobody knows how it is going to work.

Other risks which to some extent are common as to other public utility companies in greater or less degree are the risks of rising costs, with fixed contract prices for your output, rising expenses for labor, materials used in the maintenance and the ordinary operation, and taxation.

Particularly, investors will take into consideration taxation when they have observed a tendency on the part of many people to urge taxation on companies of this kind on a two-cent per thousand cubic foot basis, where the taxes might be rather easily assessed. Such factors are hazards which investors are bound to and would take into consideration in arriving at whether or not they would be interested in the securities or the price which they would pay for them. In the emergency, or the so-called emergencies which have existed during the last 10 years or so, the public utility companies as a class, electric and gas utilities, have certainly had to stand their share, or more than their own share, of the special taxation to meet budget deficits. I know there is a very vociferous public opinion which is asking for the taxation of natural gas. The miners' groups and groups like that are extremely anxious to see natural gas taxed, their point of view being that natural gas with a tax hooked onto it becomes uneconomic for industry, where the margins are very thin, and then that particular industry will have to use coal, because the natural gas company will not be able to sell its gas and there will be more work and higher pay for the miners.

It appears here that approximately 25 percent of the total gross revenues of those companies is derived from the sale of gas for industrial uses under what are called interruptible contracts. That situation adds to the hazardous position of these companies because of the thin margins which exist between the price received per thousand and what the gas costs delivered at the point of sale.

1110 Investors would take cognizance of the fact that the gas is being transported a distance of 950 miles, or more, by these pipelines before it reached the principal ultimate market. Investors are, generally speaking, slow to act and will act only in making investments in securities of companies which are to some extent seasoned, and a company such as this company, which has very long pipelines, the longest pipeline in the world, the largest diameter of pipe, the highest pressures used in the line, and being the only one of its kind and type, naturally does carry a greater risk than would the conventional type of natural gas pipeline with a shorter length and lower pressure. The reason being that, generally speaking, if anything goes wrong with this line it goes wrong in a big way. The pressures are very high, the fittings are expensive, the compressors are expensive, and our technology is not complete on the subject. By that I mean that there is no history in this type of line from which to gauge its future conduct as it ages.

If a distributing company has a line failure on some part of the line, it does not put the whole system out of business. Distributing companies are usually looped in so many places that a failure at one particular part of the line affects only a small portion of the distribution system. That is not true of pipelines. A failure of the main line at any point is an interruption of service, provided the gas in the line between the break and the point of sale is not sufficient to carry you over the time when you can get the line repaired.

From the standpoint of an investor, the circumstance that there are 31 different streams, including the Mississippi and the Missouri Rivers, and many other rivers of major magnitude, including the Canadian River, which in many cases are very flashy, between the initial compressor station on the south end of the main pipeline, and the City of Chicago, would enter into the evaluation or the appraisal of the securities of defendants.

Taking into account my knowledge of the facts concerning the extent and character of the investments of these pipelines, their location geographically, and with reference to streams and other considerations, the fact that they are a pipeline producing and transmission system with no control over their markets and with no distribution systems, and in the light of their special risks, and of the risks which they have in common with other pipeline companies, and with other business organizations, and in the light of the general background of information which I have concerning the evaluation and appraisal of securities and the requirements for raising capital money on the securities of business institutions, and in the light of all of the circumstances which in my judgment enter into a reasonable and proper appraisal of the various risks and hazards which have confronted these pipelines, and now confront them, I have an opinion as to what would be a proper and reasonable rate of return, or a fair rate of return for these companies.

In arriving at my opinion that not less than 8 percent is a proper rate of return for an enterprise such as defendants, after proper amortization, I am primarily guided by my own experience, knowledge and judgment of investments, and my experience in that field extending over a period of years. However, in order to check that judgment, I have prepared the exhibit which I formerly testified about, namely, Exhibit 150, containing a number of statistical tabulations. These tabulations are the sort of
1111 thing that anybody who was forming an opinion as to such a question would be bound to take into consideration. I was putting down in black and white what goes on in my mind in forming an opinion as to a proper rate of return. You have to give consideration, in forming such an opinion, to what yields exist on other natural

gas company bonds, to what other natural gas company stocks are doing, and you have to give consideration to a great many things. These exhibits simply put down in black and white what I considered points which were deserving of some emphasis as being among the things considered in forming this opinion.

The rate of return to which I have testified does not include any part of the amortization required. That minimum of 8 percent is based on the assumption that the proper provision for amortization or return of the capital investment will have been made. If the period of amortization be over the entire period of the indicated life of the field, an investor would want his 8 percent during the time his funds were used, but at the same time he would want to be assured that those funds were returned to him when the project was finished. If in fact 15 years is the life of this project, he would want to have his funds returned to him at the end of that period. If the project lasted only 12 years, it is obvious that he will lose a part of his investment.

From a practical point of view an investor would demand that the period of amortization under regulation be less than the life of the project as expected at the time he made his investment, in order to provide a factor of safety. If at a later time it is found that the project is going to last longer, the amortization could be changed at that time with no loss to anybody. If, however, the amortization is extended throughout the indicated period and not over a shorter period, there is a risk there. If the organization is set up under regulation on a 15 or 16-year basis, and actually works out to be only a 10 or a 12-year proposition, the investor will lose. Therefore, the investor before he goes into the thing will demand some compensation for that risk. I have included that element of risk in the 8 percent I named as the rate of return.

The Northern Natural Gas Company bonds to which I have referred were for a period of 12 years, and represented only 40 percent of the total capital value. The Equitable and the other companies fixed the maturity. We would not buy a bond with a maturity of more than 12 years. We had the engineers' reports which indicated a life of from 15 to 20 years, but we insisted on setting them up on a 12-year basis because we wanted to play safe. That was in 1935.

Cross-Examination by Mr. Booth.

I have not stated and certainly not at any one place all of the factors of the exhibit I produced here in arriving at my judgment as to what constitutes a proper rate of return for defendants. Rather than to undertake to answer your question as to whether or not I considered any other factors to which I attached any significance, I would rather mention right now the factors which I have taken into consideration in forming my opinion so as to have them in one place. I have not in any one place here
1112 enumerated the factors which I have taken into consideration, and I did not wish to reply to your question, "Are there any other factors that you have given consideration to," without thinking the thing through very carefully and giving careful consideration to all of the factors that I have considered, and I will be glad to name them right now.

In forming my opinion as to a proper rate of return for a company such as defendants, I gave consideration to such matters as the financial history of the company, the record of operations and earnings extending over a period of time from the time it became a going concern up to the end of 1938 and through the middle of 1939. I gave consideration to all of the facts which I determined in my investigation of the company from its records, and a physical inspection of the properties, such as its supply of gas in Texas, its sale of gas in Chicago under contracts. I gave consideration to the investors' appraisal of the natural gas industry, and I gave consideration to the present day financial conditions, the state of the money market. I took into consideration the returns which are available to investors in other businesses, the fact that these companies are now regulated or at least the rate case is in progress, and of course I took into consideration by general background and knowledge of the public utility business and the natural gas business extending over a substantial number of years. I may have left some factors out of that statement—it is not always possible to sit in the witness chair with questions thrown at you and detail a long list of things that you took into consideration. Certainly, I took all of those things into consideration, and there may have been some of the minor ones that I should have specified, but I think that they would fall into the general category of the conditions of the general money market and the demands of investors. I referred to risks of the natural gas business and to the possible failure of the line and the shortening of the life of the operations as one of these risks. I have said that I included among my considerations such matters as the risks inherent in the natural gas industry. I have given consideration to that circumstance as one of these risks. I spoke of the possibility of the shortening of life and possible over-estimate by geologists as to the life of the company. I also referred to rising costs as a possibility and the possibility of taxes on natural resources and the absence of control over the markets.

As to what I meant by the latter statement, any natural gas company which has control over its market through the ownership or control of the distribution facilities is, in my opinion, in a much stronger position from the point of view of the investor than a company which has no control over its markets.

In response to questions by counsel for defendants I pointed out the degree of risk attending companies like defendants and that it would be higher in a case of a company that was solely a natural gas production and transmission company than in one which had an integrated system, owning distribution facilities as well. I assumed, of course, that defendants have no control over the market because they own no distribution facilities. I am familiar with the situation under which defendants operate and I am saying that the conditions under which they operate tend to make it a more hazardous enterprise than if it controlled its distribution. I have attached a somewhat higher risk to the business of Natural Gas Pipeline Company because it does not own the distribution facilities in the City of Chicago and the adjoining cities in northern Illinois and does not control the market.

1113 I have not said that they have no control at all over their market. I know that defendants have contracts with Chicago District Pipeline Company.

In arriving at a proper rate of return for defendants, I have assumed the facts as I found them out.

I assumed that defendants had no control over the market as I have been using that term in my previous testimony, thinking of ownership of distribution facilities and in no other manner, and I attach a higher risk to the business and operations of defendants in arriving at my judgment as to what constituted a proper rate of return than I would have, had defendants owned the distribution facilities which were ultimately used in the supply of gas to the consumers. The bulk of defendants' gas is sold to Chicago District Pipeline Company as the first purchaser. The largest purchaser from the latter is Peoples Gas Light and Coke Company.

I have, among my papers here, the complete breakdown of taxes in Illinois and other states, paid by defendants. My memory is that the taxes paid to the State of Illinois are not large. In comparison to the size of the enterprise and its gross operating revenues, the ad valorem taxes paid in Illinois are relatively small—$40,000 in 1938, out of total taxes of about $629,000 paid by Natural Gas Pipeline Company for that year. The latter amount included ad valorem, federal income and other taxes.

Redirect Examination by Mr. Morgan.

I considered all of the risks that I discussed in my testimony in arriving at my opinion on rate of return. I certainly meant to include all of the factors which I had mentioned as I proceeded with my testimony from the very start, when I attempted within the limits of my memory to summarize them. I wanted to have this summary in one place and have it clear that when I enumerated the factors that I had taken into consideration, that I had not left out things that I really should not have left out.

Questions by the Examiner.

As to the weight I gave data shown on pages 6 and the following of Exhibit 150, in arriving at my conclusion, I certainly could not say what percentage I gave it. I think really all of that data in that section of the exhibit, as well as all of the exhibit, puts down in black and white, and under convenient headings, information which is available, and must be available to anybody in forming an opinion of this kind. The person considering the subject would roll this data around in his mind and give it the weight which he felt it deserved in arriving at a judgment figure. He would not have to know more about the industries which I have classified there before he could do that.

That particular list on those pages is a very, very large cross-section of American industry. I wish to make it clear that in reaching an opinion that 8 percent is a proper rate of return of this company, I am not influenced
1114 in any way by the fact that the steel industry or the automobile industry, say, earned 15 percent and consequently that there should be a tendency for a higher rate of return. I have not been influenced by any individual industrial classification, or the fact that profits were particularly large in particular industries or lower in other industries, but it was interesting, and I think of some value, to have before me a whole review of American industry showing what invested capital is earning over a period of years.

It is valuable for trend purposes, because you can see there, for the years 1934, 1935, 1936 and 1937 what happened in those years. 1937 was the year of business recovery and profits, generally speaking, were larger. As to whether I consider a 4-year period as here selected to be a good trend period, I do not think so. I could only select the 4-year period because these reports were data which were originally taken from the Securities and Exchange Commission reports, and that Act only became effective in the year 1934, so reports under the substantial breakdowns which are required for that particular kind of a tabulation only became available to the general public as of that year. From that point of view that is the best that we could get.

If I am to express an opinion as to whether principal or minor weight was given to the gas company studies shown in the same exhibit, a greater weight would, of course, be given to the statistics of the gas companies because those are the companies which are most nearly comparable to defendants. I do not mean to say that I did not give any particular weight to these other industrial classifications. If I had not, why should I bring the exhibit in?

I am familiar with the Federal Communications Commission publication of June 15, 1938, with special reference to the Long Lines Department of the American Telephone & Telegraph Company and with the observations made in that study. I think it is one of the best works on rate of return that has ever been produced. That is my bible, as far as that is concerned. I wish to make this observation, though: That that particular study was prepared by the Communications Commission with reference to establishing a proper rate of return for the Long Lines Department of the American Telephone & Telegraph Company. I think every one of us will admit that the Telephone Company has an absolute monopoly, to the extent that there is anything that is an absolute monopoly,—a real monopoly in communications service. To that extent it was perhaps proper that any comparison should not include any such things as industrial companies, but defendants are really primarily industrial companies who are in competition all the time with other fuels, such as oil and coal.

The Telephone study, except for one or two indices of that kind, did not go outside of the field of regulated enterprises. I feel, however, that it is desirable and necessary to go outside of that field in the case of defendants, because I feel that it is a different kind of an industry than industries which are primarily monopolies.

It is obvious that the rate of return for a single industry, contained in that list on pages 6 to 15 of Exhibit 150, is meaningless. In the case of the beverage industry, which shows an average return of 47 per cent, one company in that classification, namely the Coca Cola Company,
1115 makes a large return and overshadows the industry
as a whole. Similarly, you will find that in certain years other companies have made very low returns. All that the exhibit does is to show the rate of return for a very, very large cross-section. I think that some significance should be given to the average down at the bottom, and perhaps leaving out any individual industrial classifications.

The fact that this data on page 6 of my exhibit did not show what the investor is now getting by way of return on his investment, but merely a rate of return on the capital invested, which may have been invested years ago, does not affect the use of these figures, in my opinion. It is obvious from the heading on my exhibit and from the studies themselves that it is a return on invested capital, which may have been invested years ago. I would still use those figures for reference purposes because it is useful to know what capital is earning. It would be more useful to know what capital which is being invested today is earning or getting on its investment, if it were possible to obtain such data in as comprehensive a way as that information is set out in the exhibit. That would certainly be another measure. I would say it would have at least equal and perhaps greater value.

(At this point EXHIBIT 150 was received in evidence over the objection of counsel for each of the Commissions, to whom the Examiner allowed exceptions.)

Redirect Examination by Mr. Morgan Resumed.

In stating, in reply to questions by Mr. Booth, that in appraising the risks attendant upon the investment in these companies, I asumed that they have no control over their market. I understood that they have contracts with the distributing companies who market the gas to the ultimate users. I so stated at the time and in saying that I assumed they had no control, I meant they had no such control as was not given them through operations of their contracts, of course: I was differentiating between the control which comes through ownership of distribution facilities as distinct from these companies which have contracts for the sale of their products. I was talking about the retail marketing policies of the distributing companies and all of the other things that are within the control of the companies which sell to the ultimate consumer at retail.

Recross Examination by Mr. Booth.

I have said that in arriving at my judgment as to the rate of return, I regarded that these companies are a riskier enterprise than would be the case if they owned the distribution system; and, in arriving at my judgment, I assumed that they had no control over the market, except such as they acquired through the contracts for the sale of their gas. These contracts do not give control over the markets in the sense that I was using the word "control". As I was using the term, I mean the company which owns the distribution facilities and sells the gas at retail to the public, and in that sense controls his market. I did not say this morning that I considered the fact that defendants had this contract with Chicago District Pipeline Company was of no significance. I gave consideration to the terms of the contracts under which gas is sold, the length of the contracts and the prices at which it is sold. These, I think, are the principal factors concerning those contracts. I have not said those particular factors increased the risk of defendants. If a company had no contract whatever, and was simply selling its gas on a day-to-day basis, the prop-

1116 osition would be much riskier than that of defendants. They are in a much better position than a company that would have a day-to-day or a month-to-month contract. And I considered that on the whole the relations between defendants and Chicago District Pipeline Company had the effect of increasing the risk over that of a company that owned its distribution facilities.

The fact that these contracts were for 15 years from the date they were written, with a privilege of extending for 5 years on the part of defendants, reduces the risk from that of a company which operates on a day-to-day basis. I know of no natural gas pipeline company that operates on a day-to-day basis. In arriving at my consideration of the risk, I took into consideration all of the terms of the contracts which I read. I should hate to state from memory the terms of all the contracts. I have stated what I consider to be the principal features, the life of the contract and the rate at which the gas is sold. There are many other provisions in those contracts with reference to the adjustment of the contracts, taking care of the impurities of gas, and all sorts of things. The principal factors which I took into consideration in those contracts as affecting the risk were the terms and the price at which the gas was sold.

I testified that 8 percent was the minimum rate of return for defendants. This I consider a proper or reasonable rate of return for defendants.

1117 **H. B. DORAU**, a witness for defendants, testified:

Direct Examination by Mr. Morgan.

(October 4, 1939)

My name is H. B. Dorau. I reside at Ridgewood, New Jersey. I am professor of economics at New York University and chairman of the Department of Public Utilities and Transportation in the School of Commerce of that university. I lecture in courses in public utility economics and courses in property valuation. I also conduct graduate seminars in public utility problems and in economic theory in the Graduate School of Business Administration. I came to New York University in 1931 and have been teaching public utility courses in that university from that time down to the present.

Prior to that time I had been professor of economics in Northwestern University, teaching courses in public utilities and directing the research projects in public utilities conducted by the Institute for Economic Research at Northwestern University School of Commerce. I was on the faculty of the School of Commerce of that university from 1925 to 1929 in which year I was granted a leave of absence to engage in economic consulting work for investment banking firms. My leave of absence was extended for a second year to 1931.

During that two-year leave of absence from teaching and research I had a variety of experience as consulting economist in connection with investment and financing proposals.

Prior to my tenure at Northwestern University I taught as a member of the Department of Economics at the University of Wisconsin from 1921 to 1925. That was my first teaching appointment.

I graduated from Lawrence College, Appleton, Wisconsin, in 1919 with an A. B. degree. I did my graduate work at the University of Wisconsin from 1919 to 1923 and was awarded degrees of Master of Arts and Doctor of Philosophy by the University of Wisconsin.

I have always engaged in business and government consulting work to the extent that my university appointments permitted. My first employment came in 1920 when I was retained by the public utility acquisition committee of the Common Council of the City of Milwaukee. My special responsibility was to determine the probable cost of capital to the City of Milwaukee should it acquire the electric business, and compare that probable cost with the experienced cost of capital to the private company serving the city. That was a study to determine the annual value of capital in the employment of the public utility business under two forms of ownership. I would say it was in the nature of a rate of return study.

1118 I have made a number of investigations of the cost of capital to regulated enterprise. I made an early study of the cost of capital for public service enterprise which was published in the Chicago Journal of Commerce in 1923. I initiated studies on the cost of public utility financing in 1925 which were published in the Journal of Land and Public Utility Economics and which studies have been kept up to date by myself and others since that time. I have published comprehensive articles on the changing cost of public utility capital. I made up a detailed study on the cost of capital experienced by the railway industry under the operation of the Transportation Act of 1920 which study was presented to the American Economic Association in St. Louis in 1927 and subsequently brought up to date and published in various banking and economic journals.

I have appeared as a witness in the field of public utilities before regulatory bodies on a few occasions. I have appeared before the Interstate Commerce Commisison, before the Illinois Commerce Commission, before the Pennsylvania Public Service Commission, and have acted as consultant from time to time for the Board of Public Utility Commissioners of the State of New Jersey. I have been responsible for the presentation of economic briefs and analyses in connection with a consirable number of public utility cases on which I did not appear as a witness.

I have written textbooks and other published articles in the field of economics and public utilities. I have here a list of those publications and books which I do not pretend is comprehensive or all-inclusive, because my memory fails me on a great many of these things. I have never had time to keep a scrap book and record everything that I have done. The list includes:

Dorau, H. B. "Public Utility Financing, 1919-1925," Journal of Land and Public Utility Economics, July, 1925.

"Public Utility Financing, A Review of 1925," Journal of Land and Public Utility Economics, April, 1926.

"The Cost of Railway Capital under the Transportation Act of 1920," American Economic Review, March, 1927. Journal of Land and Public Utility Economics, February, 1927.

"Northwestern University Responds to the Demands of an Important Business," American Gas Association Monthly, March, 1927.

"The Rise and Decline of Municipal Ownership in the Electric Light and Power Industry of Wisconsin," Journal of Land and Public Utility Economics, May, 1927.

"Municipal Ownership in the Electric Light and Power Industry of Massachusetts," Journal of Land and Public Utility Economics, August, 1927.

1119 And Alexander Marjorie. "Some Measures and Measurements of Telephone Utility Taxation," Journal of Land and Public Utility Economics, November, 1927.

"Gross and Net Earnings of Public Utility Enterprises Exclusive of Steam Railway, Telephone and Telegraph Utilities, 1913-1926," Journal of Land and Public Utility Economics, February, 1928.

"Appliance Merchandising Policies and the Future of Gas—Should the Gas Company Set the Standard for Appliance Selling in the Territory Served with Its Products?" Gas Age-Record, March 3, 10 and 17, 1928.

"Merchandising as a Factor in the Gas Industry," Gas Age-Record, June 16 and 23, 1928.

"Cost of Railway Capital," Journal of Land and Public Utility Economics, May and November, 1928.

"The New Competition—How to Meet It," American Gas Association Monthly, December, 1928.

"Cost of Railway Capital," Journal of Land and Public Utility Economics, May, 1929.

"Railroads' Command of Capital," Investment Banking, August, 1931.

"Some Alternative Bases for Public Power Projects," The Southern Economic Journal, April, 1938.

"Dispersion of Prices for Domestic Electric Service," Public Utilities Fortnightly, June 9, 1938.

"Rates in the Electric Industry Under Municipal Ownership," Annals of the American Academy of Political and Social Science, January, 1939.

"The Impact of Economics on Accounting," Edison Electric Institute Bulletin, January, 1939.

"The Outlook for Public Utilities," Trusts and Estates, January and February, 1939.

Books and Pamphlets.

Dorau, H. B. and Hinman, A. C. "Real Estate Merchandising," A. W. Shaw Company. Chicago and New York: 1926. Pp. 363.

Dorau, H. B. and Hinman, A. G. "Urban Land Economics." The Macmillan Company. New York. 1928. Pp. 570.

1120 Dorau, H. B. "The Changing Character and Extent of Municipal Ownership in the Electric Light and Power Industry." The Institute for Research in Land Economics and Public Utilities.. Chicago. 1929. Pp. 102.

"Materials for the Study of Public Utility Economics." The Macmillan Company. New York. 1930. Pp. 975.

"Some Economic Considerations Bearing on the Place and Significance of the Holding Company in the Organization and Functioning of the Public Utility Industries." Submitted to the Committee on Interstate Commerce of the United States Senate. May 1, 1935. Pp. 24.

"Agriculture" in Spahr, W. E., and Others. "Economic Principles and Problems." Farrar and Rinehart, Inc. New York. 1936. 3rd ed. Vol. II. Pp. 446-486.

"Economics of Public Utilities" in Spahr, W. E., and Others. "Economic Principles and Problems." Farrar and Rinehart, Inc. New York. 1936. 3rd ed. Vol II. Pp. 490-530.

"Land" in Spahr, W. E., and Others. "Economic Principles and Problems." Farrar and Rinehart, Inc. New York. 1936. 3rd ed. Vol. I. Pp. 196-222.

"Control of Public Services" in "Planned Society, Yesterday, Today, Tomorrow." Edited by Findlay Mackenzie. Prentice-Hall, Inc. New York. 1937. Pp. 989.

Editor or Editorial Supervision:

Lagerquist, W. E. "Public Utility Finance." A. W. Shaw Company. Chicago. 1927.

Bailey and Knowles. "Public Utility Accounting Procedure." A. W. Shaw Company. Chicago. 1928.

That list shows the books or publications of which I was the sole author and also those of which I was co-author or joint author. My responsibility in connection with each is clearly stated in the list.

In some instances I edited these publications and was not the original author. Editing a publication involves a wide range of responsibility,—sometimes a very considerable responsibility in the selection, rejection and arrangement of material and sometimes less responsibility. I merely mention two here because they are rather closely related to the field with which we are concerned, namely, Lagerquist on Public Utility Finance, which I subsequently edited for publication, and Public Utility Accounting Procedure by Bailey and Knowles, which I took a hand at arranging or improving for publication.

1121 I have been asked to make an investigation of the factors influencing the necessary rate of return to which defendants in this proceeding are entitled. To the best of my recollection I was employed in the beginning of April, 1939. I have not kept a clock record of the time devoted to the gathering of information and the development of my conclusions in this matter. That is impossible with the conditions under which I work, but I have devoted a very substantial part of my time since that date to special consideration of the question of the necessary rate of return for an enterprise of this character. I have had the assistance and advice of my associates in the Department of Public Utilities of New York University and others trained and qualified by experience to participate in statistical and economic investigations of this character. I have had the aid of qualified economists, statisticians, lawyers and engineers in the work of assembling information and determining quantitatively and statistically the facts upon which I base my opinion. I have directed the work of all those who have contributed to that study and their work has been done under my immediate supervision. I have kept up with it as to progress.

The word "return" to my mind refers to that part of the revenue of an enterprise remaining after the deduction of necessary operating expenses including rents, taxes and provision for accruing depreciation, but before provision for interest, dividends or other appropriations which in one form or another constitute compensation for the employment of capital. The return may thus be designated as the "wages" of capital, or more appropriately the return available for all the providers of capital for the various economic functions which they have performed.

There is no provision in the "return" as I am using that term here for the return of the capital through depreciation or amortization or some such provision. I consider provision for depreciation as an appropriate operating expense which has to be deducted from the revenue before you arrive at the wages of capital.

There is a distinction between return on capital and the return of capital in an economic sense. The capitalist requires an annual wage on the capital and looks forward to the ultimate return of his capital. Therefore I would say that the provision for depreciation represents the anticipation of the return of capital, and therefore should not be included in the calculation of the return on capital. Capitalists are simply of that variety who expect a return of their capital as well as a return on their capital.

Here I am speaking of the return on capital only being determinable after adequate provision for accruing depreciation. The wages of capital to which I referred a while ago are received by the enterprise which engages in the business to which attention is being directed. What I mean to imply is that strictly speaking the security holders won't receive the return. The security
1122 holders receive their respective shares out of the
sum which constitutes the return on the capital of the enterprise in whose securities they may have invested. They receive a return according to the particular contract on which they may have invested or engaged their capital. I also mean to imply that it is my opinion that security holders as a whole viewed separately rarely receive the whole return which the enterprise may receive. There are generally charges and adjustments to be made which cannot be made in any other way except subsequently against the amount which was earlier thought of as part of the return. Consequently, I would distinguish between the security holder's return and the return receivable by the enterprise as such, because as a matter of historical fact, the security holders rarely receive the whole return allowed to the enterprise.

What I meant to call attention to was that the amount calculated or anticipated as the return to the enterprise is rarely the amount which the security holders as a whole receive in compensation for the performance of their economic functions.

From the standpoint of an economic analyst it makes no difference as to the rate of return to which an enterprise is entitled whether its securities be in the form of bonds or preferred stock or common stock, or ordinary interest-bearing indebtedness like that to banks. The fact that some capital is compensated on a contractual basis in the form of bond interest, and other capital is compensated by an agreement among stockholders that some shall be preferred over the other classes of stockholders, does not make any difference. I do not conceive the problem of the return determination to be confused by the nature of the capital bargain made among the various classes of security owners. That is a bargain which they make with each other among the groups represented. There is a difference between the earned return and a return to be earned. The return earned is of course a historical fact subject to determination within the limits of accuracy of accounting and statistical devices. It is something that has occurred and is in distinct contrast with and a very different sort of thing than the return to be earned, which is the question arising in connection with a rate case. Thus, one is an established past fact; the other is a presumption or an opinion, a judgment or anticipation, and since the past and future are very different, and since estimates and expectations and past established facts are different, they are two very different quantities and two entirely different concepts, in fact.

The return is ordinarily understood to be the product of the rate base multiplied by the fair rate of return. Thus, while the return is a number of dollars and is the ultimately important fact to be determined, it is only ascertainable by applying a previously determined rate of return against a previously determined rate base.

The return is ordinarily expressed as the rate of return applicable to an annual period because the year is
the unit of accounting and financial record keeping,
1123 and therefore it is convenient to express it as a
return in a year. A return of 8% then means 8% of the rate base each year. By the expression "fair return" or "reasonable return" I would say that it means the income on the value of the capital employed which in the best opinion and judgment is necessary to fully compensate the capital employed for all the necessary economic functions performed by its investment in a given enterprise under a given set of circumstances. The use of the word "fair" is meant to imply the dependence on judgment and opinion since it is a future fact which is being estimated.

A fair return in my opinion cannot be ascertained with the same degree of precision as can a past return because the latter is an experience and the former is an expected fact. Since the one involves judgment and imputation for the future it can never be hoped that it will be precise to the same degree that an experienced fact is. The necessary return as distinguished from the rate of return is never directly determinable. The return is the product of the multiplication of the base value by the rate of return. Neither rate base nor rate of return is an ultimate end but on the contrary they are but the indispensable means to the important end, namely, the return stated as the number of dollars.

I am not prepared to offer any opinion on the rate base. In my study concerning the rate of return I assumed that the rate base is going to be determined and since the rate base is not as yet determined I cannot determine the return as such. All I can concern myself with is the rate of return which will have to be applied to some rate base out of which the ultimate fact which interests all parties, namely, the return, the number of dollars, will have to be derived.

I have made a study of the records and the facts concerning these two companies and the character of business in which they are engaged in an attempt to prepare myself to the best of my ability concerning this subject of a rate of return here.

I have devoted my study and am prepared to testify here concerning that subject only. It is essential in order to obtain a fair return for an enterprise to have both a fair rate base and a fair rate of return. The presumption is that if the return, namely, the number of dollars, which is the vitally important thing, is to be fair or to be arrived at at a figure which would be deemed to be fair, then the two calculations which are necessarily previous to that determination would presumably also have to be fair.

In approaching the subject I tried to make the distinction between ascertaining the return actually earned in some past period, and ascertaining the return deemed fair or necessary for some future period. I should like to make the distinction again between ascertaining a past return and a present or future return to the effect that one
1124 is the ascertainment of a fact. I say that because I
want to make it perfectly clear that determining the necessary return for the future involves the process of valuation. It is unavoidably an imputation process, since even identical past transactions do not establish what the necessary return shall be for the future. It is an imputation process even more remote than that which is engaged in when the owner of a thousand bushels of wheat imputes a value to it based on yesterday's price at which some other wheat was sold. The process of determining a fair rate of return is the same as determining the fair value for rate

base purposes. It involves the gathering and selecting of evidences and the passing of judgment as to the significance and weight to be attached to each form of evidence.

In my opinion the appropriate evidence of the necessary return is the present annual value of capital under the conditions under which it would now be employed. It is assumed that the return to be determined is the presently necessary return. This in my opinion is the common understanding and apparently the law of the land. The question is not how much of a return was necessary five years ago or how much of a return may be necessary five or ten years hence, but what are the necessary present annual wages of capital under the circumstances of employment were the enterprise to be undertaken today. The use of present annual value of capital is entirely in harmony with the use of the present capital value for rate base purposes. Thus, the sum to be determined is the present necessary supply price of capital under the conditions which enterprising capital would face were it considering committing itself to this kind of employment today. I mean to say that the fact to be determined is at what prospective return would capital employ itself if a given enterprise were initiated under present day conditions. It is my understanding that experienced money cost refers to the price at which a given enterprise actually was able some time in the past to secure the capital which it now commands. I understand present necessary supply price of capital to mean the price at which such an enterprise could now expect to command the capital necessary to establish itself under present conditions.

In my opinion the experienced past cost of capital of a given enterprise has nothing in particular to do with the present annual cost of capital employed. The experienced money cost of an undertaking may have been higher or lower than the present annual value of the capital employed under present conditions. If the experienced money cost is recent and the conditions of capital employment have not significantly changed, experienced money cost may be significant evidence of what the present annual value of capital under given conditions of employment would probably be. Since all valuation consists of imputing a money-worth to goods which actually are not being exchanged, it is necessary to seek and appraise the evidences of value in the absence of such adequate market demonstration. The evidences of value, in my opinion, with respect to rate of return and with respect to other valuations, do not have equal significance at all times. Apparent evidences may have no real significance at some other 1125 times. Thus, it is possible that the past experienced cost of capital does not reflect even as of that date the annual value of the capital employed. In the case of the Natural Gas Pipeline Company of America it appears that there was no public bargaining for the capital, that the yield on the bonds at the offering price was nominal, since equity ownership and residual claimant interests purchased these bonds. In such absence of any bona fide market transactions for this capital the nominal apparent experienced money cost, in my opinion, loses all significance.

The experienced money cost and the required return are not at all necessary on the same level. The lapse of time between one bargaining and another would very likely introduce changes which would make the present annual value different from the experienced cost of capital even if the experienced cost were a bona fide reflection of arm's length bargaining for capital.

(October 5, 1939)

They are not only not necessarily on the same level but they are rarely on the same level, because we are living in a dynamic economic society in which those relationships are continually changing.

To the fact that a company had succeeded in issuing bonds that would yield to the investor 6 per cent back in 1931 or 1932 I would attach no particular significance. In the first place that is seven or eight years ago. There have been significant changes in economic relationships during that period. Furthermore, I would want to know under what conditions and circumstances those bonds were issued at that time, particularly whether or not they even reflected with any degree of accuracy the market's valuation of that kind of a return at that particular time, and quite obviously whether it was an arm's length bargain. In other words I would want to know that it actually reflected, even as of eight years ago, the capital market conditions for such capital as may have been acquired under the conditions then existing; that it even had the essentials of an index of the value of money as of that time.

I think it is important to recognize that the present necessary supply price of capital is not a single homogeneous form of economic compensation. From the accountant's point of view and from accounting records it would of course appear to be such, because it is regarded as a num-

ber of dollars of income, or viewed as a number of dollars of income to be obtained; but when you approach the problem of an economic valuation of such a return it is necessary to recognize that it is made up of a number of non-homogeneous elements, each of which is subject to influences peculiar to itself. That these various elements cannot be too accurately identified or segregated from the whole is in my opinion no excuse for failure to recognize that they exist. I think this is particularly important when dealing with a peculiar industry and it is also important when dealing with an industry having peculiar and unusual circumstances, because not only are you faced with the problem of recognizing the fact that there are in the so-called return a number of non-homogeneous forms of reward, but that the relative importance of these various
1126 elements changes from time to time, and that under one set of economic conditions one of the elements may be much more important both relatively and absolutely than it would be at another time. These components can be broken up in a number of ways. For the purposes of my own thinking I like to break them up into two parts initially, one of which we may define or consider as loan interest and the other as that amount over and above loan interest which constitutes the necessary inducement to enterprise in the form of rewards over and above what loan interest would be in such an undertaking.

As every one probably knows, loan interest itself is far from a homogeneous form of compensation. Any effort at more accurate and refined appraisal would envision the elements that go to make up loan interest. Thus we recognize in economics the primary element of pure interest. We recognize also that there is in loan interest a risk premium. It ought to be recognized that there are over and above risk premiums certain compensations for uncertainties which are really not of the nature of risks. There is I believe in a great many interest loan contracts a fourth element, namely, a necessary compensation for the performance of the work of watchful care and attention to the investment.

Pure interest is of course an economic conception of a portion of the loan interest. I consider it the most fundamental but it is by no means quantitatively the most significant. What is important in the first instance to understand is that this pure interest is not synonymous with and never measures the loan interest rate. In economic science pure interest is understood to be the market value of time preference. It measures the difference between the present value of the future gratifications and the present value of present gratifications. Thus pure interest, assuming the freedom of capital to move and assuming the absence of other restricting factors, would tend to be the same at a given time and place with respect to a given people, irrespective of the field of employment.

Therefore, it is not a difference in pure interest which would call for a decision as to the comparative relative rates of return to be allowed in different kinds of undertakings. The movements of pure interest rate are difficult to trace and never express themselves in the form of a market price. When the loan rate of interest, for example, changes it is not necessarily any evidence that the pure interest element has changed because the loan interest rate may be changing on account of the change in other factors. In fact we have reason to believe that the pure interest element does not change violently from time to time, that the people's disposition to prefer present over future gratifications does not fluctuate widely as the yields on contracts at loan interest fluctuate, for example.

In my opinion there are no loan contracts of any character whatsoever which accurately reflect pure interest. Moreover, I believe it is an error to assume that the yield on government bonds reflects pure interest. Government bonds play an important part in our monetary system.
1127 They serve several special and unique functions as
investments for the funds of commercial banks and moreover they enjoy a peculiar market because of the confidence that the people have in the government and the efforts which the government makes or has made in recent times to maintain a market in these bonds.

Moreover, to say that the yield on government bonds reflects pure interest puts us in a dilemma because we find government bonds yielding different rates of interest from a fraction of one per cent for short term obligations to in excess of two and approaching three per cent on other obligations. So if one were to say that the yield on government bonds reflects pure interest one would be put in the position of saying that there are many different rates of pure interest. The fact is that people buy government bonds, in my opinion, at prices which frequently sacrifice a portion of pure interest in order to obtain something which they consider of more value than the pure interest at the particular moment, namely, liquidity, the putting of one's self in the position to quickly withdraw from a given security and to be able to buy at another opportunity when the attractive time comes around. Government securities have, in my opinion, yielded less than pure interest under many circumstances.

There are many illustrations of the same kind of behavior. When people purchase common stocks where there is no present return and possibly no early expectation of return they are sacrificing an immediate return and balancing that off against future expected compensation. Because of accounting conventions we get in the habit of using the year for such calculations and for many investments the year is a perfectly arbitrary measure for such calculations. People usually envision a period of time and expect that in that period of time they will get a full and adequate compensation.

Take another illustration. A man who buys a vacant piece of land and is shown not to receive any return or any rent for a period of five years. I think it would be entirely inappropriate to use that as an illustration that people are willing to invest in land at no return. A piece of land that is expected to appreciate affords another illustration. It is common knowledge that when buyers and sellers get together on the price of a piece of land which it is understood is likely to appreciate, the ratio of available income to the price paid is very low, because the investor in that kind of an opportunity envisions the annual return plus the incremental or changing return will compensate him fully.

Years ago some interesting studies were made of farm mortgage rates and farm earning rates in the State of Iowa. It was surprising to find that the farmers were apparently paying a mortgage interest rate in excess of their current earnings rate. The paradox, however, was resolved by an understanding of the fact that they had gone through a period of rapid appreciation of land values and that they were envisioning a total gain in the value of the estates plus the current return which would be fully compensatory. The point is that the total return expected is not necessarily embraced in the current rate of return.

1128 *Cross-Examination Interposed by Mr. Slaff.*

"Pure interest" is not the return on a riskless loan as that term is viewed in economics. The effort is made to identify it with the differential existing in human being's valuations of the future and present gratifications. Insofar as they have notions of risk that enter into that calculation they would probably act differently than this pure conception of a distinction between present and future gratifications. For the purposes of the analysis which I propose to make, and in the usual method of thinking, we conceive pure interest as not including any compensation for the assumption of the risk.

As to whether I define "pure interest" as return on a "riskless loan" as you say Mr. Delafield did, I think I have answered you when I said that the conception of pure interest is the reward and compensation for pure time preference and not for any other element or any other function or the assumption of any other economic burdens. Thus by implication, my earlier answer seems to point to the fact that risk and uncertainty and the other elements are to be recognized as independent of this factor.

Direct Examination by Mr. Morgan Resumed.

There is no such thing as a riskless loan; consequently I am unable to compare those two things. Pure interest would more nearly approach the yield on as near to a riskless loan as one might be able to envision. I am perfectly aware that it is common practice to make reference to what are considered the most secure types of loan contracts as a reflection, but in a more refined analysis I merely want to point out that that is not strictly accurate and true.

The fact is that people are willing to sacrifice their entire valuation of time preference under some circumstances in favor of liquidity or in favor of security. Thus, the people who have maintained their purchasing power intact, in spite of inducements of any sort during the period of depression, were sacrificing the total of their valuation of the time preference in favor of the other things that they could only get by making that sacrifice. That does not mean that these people are bereft of any time preference. It simply means that they are willing to sacrifice and take the greater gain or choose the lesser loss under the circumstances they face. In other words, pure interest in its relation to the interest on a riskless loan would approach the latter when there are no other considerations than interest involved in the investment.

The observation I made with reference to government bond yields during periods of low economic activity to an extent applies to all high grade bonds. It is a practical observation drawn from the financial markets that those bonds which most nearly approach in security the position of government bonds are rather quickly influenced by the changes in government bonds. Exceptionally well-secured loan contracts of every character, maybe bonds, and the highly protected private securities, all represent what one might call a sort of bomb cellar to which capital retreats in periods of economic distress.

1129 As I pointed out, it is common knowledge that a great deal of capital prefers to remain totally liquid in times like these, receiving no loan interest at all rather than commit itself to any fixed obligation. There even have been periods in history when the indicated market interest rate appears to have dropped to zero and it is reported in earlier economic history that at times people even have paid interest for the safekeeping of funds under conditions of great hazard or great uncertainty. Thus, the phenomena of what we refer to as negative interest.

It is not reasonable, in my opinion, to assume that just because people choose the greater loss or the lesser gain at such times that they lose their sense of time preference. I think that such extreme illustrations merely illustrate the fact that pure interest return will be sacrificed at times in favor of other elements for the return. Thus the yield on high grade bonds tends to a considerable extent to be inverse to the necessary reward for the assumption of risks and uncertainty and the assumption of entrepreneurial responsibility,—lowest at the time when there is the least disposition to be enterprising and rising promptly when the possibility of gain commensurate with risk, uncertainty and enterprise appears. This in rather recent weeks has again been rather dramatically emphasized by the quick flight of capital from these economic retreats or bomb cellars to liquidity in the hope that the war situation would bring on an opportunity for enterprising capital to earn that kind of a return.

"Enterprising capital" is a general term which I use to imply capital which is interested, willing and able to assume some of the risks, hazards, uncertainties and even an entrepeneur position in industry. You would distinguish that kind of capital from the kind that insurance companies have, for example, which they are restricted in that instance by law from employing in that way. You would distinguish it from the type available with savings banks, the type administered by trustees. You would distinguish it from the estate of those who are wholly and totally dependent upon certainty of return for what funds they may have to protect them in old age or otherwise. It is the capital which is in a position to be utilized, either legally or economically, by virtue of the amount of money which the individual has or the position that he finds himself in with respect to the assumption of risks and uncertainties which would justify him in not merely employing his capital to equate time preference, but to assume some risks and hazards even to the employment for the support of the entrepreneur in a business engagement.

It is a matter of common knowledge that different types of loan interest contracts require a varying amount of the investor's attention and consideration. Obviously in the face of this fact the investor would avoid that type of commitment which would require his continuing attention and concern unless that type of commitment promises to yield somewhat more than a commitment which did not require that amount of attention. I think a good illustration is again found in the old-fashioned real estate mortgage investment which requires a great deal of capital management. It was usually necessary to give attention to
1130 investigating the property and the security. Following that it was commonly necessary to write once or twice about collecting the interest. Then you had to see to it that the insurance was kept up on the property and that the taxes were paid, and when you got all through and received your 6 or 6½ per cent return on the farm mortgage, which was probably very well secured, you undoubtedly had earned a fairly decent wage for the management of your capital, all of which was pretty effectively disguised as part of the loan interest rate. If you need any more evidence that there is an appropriate valuation to be attached to that kind of a function, we need only observe that there are commercial agencies, banks, trust companies and others who assume to perform the function of capital management and charge you a right handsome fee for it.

The cost of capital management is the amount received by the holder of the contract and is the amount paid by a business enterprise. I am not talking about any function performed by the agents of a corporation or business in whatever they may do to manage the assets of that enterprise. I was talking about the amount of care and attention which the owner of the securities had to give to certain types of securities as compared with other types about which he might feel very much freer and certain as to the future,—the contrast between the type that he has to give thought to, the kind that worries him a bit before he goes to sleep at night, as distinguished from the kind that he feels he can put at the bottom of a safety deposit box and forget about it until he wishes to dispose of them or until his estate has to liquidate them.

Well established industries and well established concerns in well established industries could offer loan contracts which would appeal to the investor, having a smaller necessary element of compensation for this exercise of the function of capital management. In contrast, a pioneering establishment which had not yet existed long enough to establish any kind of a presumption in the investor's mind as to what the kind and character of the investment really is would undoubtedly give him a very considerable concern. The point of the discussion is that the wages of capital management constitute an important element in the loan interest rate, and that this element is of varying significance in different industries and in different enterprises in different industries, as well as varying from time to time with general economic conditions. Consequently it is my opinion that this element is worth considering because it appeals to me as being peculiarly significant in the first place in the natural gas industry, and in the second place in this kind of an enterprise in the natural gas industry.

I am not talking about the expenses of operating a gas pipeline or gas production or any other activities of the gas companies. I am talking about the compensation that the person who is asked to invest in the securities of an institution of this kind will require for putting his money into this sort of thing. We are trying to refine an element which is often rather crudely dealt with into its component parts and it is important to do so whenever there is any peculiar significance to be attached to this particular element. It is my opinion that the natural gas industry
1131 is one where that sort of consideration is entirely
worth mentioning and giving some weight to.

Question by the Examiner.

To some extent it makes a difference as to how the investment is made, whether by lots of small investors or by a few large ones. For example, certain types of investments which would require a great deal of care and attention can better be handled in large blocks than in small groups. If an investor of $1,000 were to invest in a situation where a great deal of this attention had to be given, the labor of attention would probably overwhelm the total of the possible return that he would get. That was often my contention with respect to the real estate mortgage investment—that the amount of labor and attention required on the part of these people absorbed almost the whole return and that they were really kidding themselves into thinking that they were getting something comparable to or better than alternative investments available in the way of marketable bonds, for example.

Direct Examination by Mr. Morgan Resumed.

Any kind of an investment which requires additional attention, labor and concern on the part of the investor would require a higher return than one which did not. I hope I made perfectly clear that I am not trying to say that the money spent by a business in the development of its market and opportunities, or the money spent by the business in its experimental work, is involved here. I am not trying to count double. It is entirely unreasonable, I believe, to understand that the expenditures of the business enterprise are involved here.

What we have in mind is simply the time and attention, the energy, care and concern which the people who put up the money give to it over and above the attention which is given by hired managers, technicians, specialists, which the enterprise itself may hire. The very fact, I think, that an entrepreneur capitalist chooses to go into this kind of an undertaking suggests that he sees the possibility of selling what he has to sell in the way of capacity to give consideration and concern to the investment.

Furthermore, I think it is entirely contrary to the fact to assume that these enterprising capitalists can and do sublet all these functions of giving care and concern to the investment. As a practical matter, if they have confidence in their own opinion and are of that class, they probably cannot find the people in whose decisions they have equal confidence to their own and, secondly, if they went out to hire the performance of all of these functions they probably would have to pay substantially what it is worth and there would be no margin in it for them. If the people who have this capital were not disposed to look for a return to compensate them for the performance of that function, they would in all probability be buying relatively risk-free bonds and becoming passive capitalists rather than enterprising and active capitalists.

1132 I make the distinction between cost, as I have used that term here, and expense that is commonly made in economic analysis. Not all costs reflect themselves in the form of expenses. I conceive an expense as a cost which has reflected itself on an accounting statement or as a fact in a business record by virtue of one party paying another for something. But there are a great many instances under which costs do not reflect themselves in the form of expense and that is, of course, what I had in mind in the distinctions that I have been trying to make here with respect to the wages of capital management. The payment for an expert employed by the enterprise itself becomes an expense of that business and is accounted for and recorded on the books of account. But the performance of the function of capital management does not take the form of a transaction. It is something that the individual does directly for himself and consequently accounting as a system of business record keeping has not developed any devices by which in a practical way we can record and reflect costs which do not express themselves in the form of expenses.

In simpler forms of business undertaking that of course is well understood. The farmer who employs a hired man has an expense for the hired man but the labor which he himself performs is just as much a part of the cost of producing his potato crop as the expenses that he incurs on account of the hired man; and it is just as worthy of recognition in an analysis as if he had made the expenditure. Consequently, the function performed by the capitalist, in my judgment, for himself in engaging in capital management is a cost which should be recognized even though it does not take the convenient and obvious form of an expense in the accounting records.

Question by the Examiner.

In my opinion there is no complete difference in the concept of the wage of capital management, whether the management process takes place after the investment is made or as a preliminary thereto. The performance of the functions of capital management to a considerable extent precede the actual commitment of capital. In fact, much of the work is done normally prior to an actual commitment. It continues while the capital is committed, in fact, continues until the time that the investment is liquidated. As a result it is a continuous function, starting from the time the individual incurs these costs in the exercise of care, attention, concern and the application of intelligence which are not reduced normally and readily to an expense record.

Direct Examination by Mr. Morgan Resumed.

To apply the principle of the illustration, the man who makes the loan on the farm will inspect the land, have the title examined, draw the note and mortgage, file the mortgage, pay the fee and do a lot of things before he lets the money get out of his hands; but he knows at that time, if he is an experienced investor in farm mortgages, about those things that he is going to have to do hereafter in order to get the interest and see that the things are done which must be done for his protection,—that the insurance is not only placed on the improvements but kept on them during the continuance of the loan. That kind of transaction happens to be in a field in which I have some personal experience and it comes readily to mind as one
1133 which illustrates the performance of an indispensable
economic function which demands that it be compensated but which is often overlooked simply because it does not take an obvious identified form in market transactions; and it was my opinion that since it did not take the form which would be readily reflected as an expense that the appropriate way to recognize its cost, its compensation, is in the return and that is in fact the way in which it is normally compensated and, I believe, the only appropriate way to compensate it.

Questions by the Examiner.

You ask whether the labor incident to changing an investment could not be charged off against the existing investment rather than charged off against the future. I believe it is in the nature of human investment psychology to look forward much more than to look backward. While the money is being held and the owner is looking for an investment the cost incident to the interval might be termed negative interest. As it was suggested to me in connection with some investment banking investments in 1929 and 1930 and even in 1931, "Why not take a look at the possibilities in the natural gas business?". The question was put to me as a consultant and this particular organization had not had any experience in that particular line, had not been in it before, and my advice was that the cost of just getting constituted and acquainted and going through all that for that concern made it rather impractical even as an opportunity in that day when opportunities were getting scarcer and scarcer. Because we look forward I think it is dominantly in anticipation, and I think appropriately it begins when you have a reasonable thought of considering seriously a given opportunity.

Direct Examination by Mr. Morgan Resumed.

I am talking about the cost even prior to the planning, designing, weighing and balancing of the terms, and the difficulties that enter into the matter from the time a particular enterprise is conceived of. I think that just as soon as the investor has a reasonably substantial interest in considering the possibilities of a given line of employment of his capital he will then be conscious of the amount of extra attention, concern and effort that this particular line would impose upon him in the light of the return which is probably available; and he would make a comparison between that and the alternatives that would be available to him which in his mind probably would not require the same amount of attention. If he is thoroughly discouraged about the amount of attention or consideration that he would have to give the employment of capital under those conditions he will probably have recourse to a passive investment in the form of well-established bonds.

In other words, my thought is that if one who incurs these costs of whatever character they may happen to be which are not included in the operating expenses after the enterprise is put into operation, but costs which are outside of that such as the cost of mapping out, planning, etc., and putting the enterprise on a going basis into which the money is to be invested, and the cost of keeping up with that investment after it is made, is denied compensa-
1134 tion for that, men will cease to be enterprising and will put their money in passive investments. If we

are to have capital for enterprises of this sort we must compensate those who perform those services. It is by no means a theory but an actual fact that investors do distinguish among investments on the basis of the time that they have got to give to them. In certain sections of the country there is a lot of old accumulated capital, third and fourth generation capital, traditionally alleged to be the case at least with respect to New England. For a great many years you were asked, "Well, have you got distribution in New England? Have you got dealers in New England?" "Yes." "Well, you cannot sell this kind of security in New England, because they just want the kind that you can put down in the bottom of the strong box and forget about it."

An example of the early history of this enterprise illustrates my point: Two of the original participants, whom we will call "X" and "Y", participated in the performance of the enterprising function at the inception and through a period of the development of the enterprise. At a later period they decided that under the conditions as they were developing they would withdraw from it. Thus it represents a continuing or a recurring function. They undoubtedly did not make the decision to withdraw on the toss of a coin or anything of that sort. They undoubtedly gave a great deal of thought to the probable outcome under the conditions as they were developing, and they were performing this selective judgment-exercising function at that time.

If a pipeline were constructed after research and a line constructed without research would have been less economical, you ask me to state who should receive the increased earnings brought about by the research. The answer to that question cannot, in my opinion, be given absolutely and categorically. It involves an amount of economic analysis which is probably to a degree unknown except to those who engage in that sort of refined thinking. The first statement I would like to make is that it depends upon whether the enterprising capitalist envisioned the probable gains from taking these pioneering risks, whether they were entirely fortuitous or whether they were part of his inducement as a first and most fundamental consideration; and secondly, whether or not he viewed these as just sufficiently adequate to make the undertaking attractive to him and interesting in the light of all the risks and uncertainties involved. If he viewed this gain as merely compensatory then he would, if he were asked to put himself in the same position today, view the sharing of those compensations with any one as a reduction in the total probable return which induced him to act the way he acted; and that of course would make the whole undertaking unattractive and uninteresting to him.

1135 I want to make it perfectly clear that that answer is based on the assumption that the return envisioned was just compensatorily interesting to him under the circumstances as they existed. If, as a matter of fact, he envisioned as compensatory an amount which would have been half that much, it might make some difference. All of that is based on this understanding, that the way in which our economic system works under the competitive system, it is normally the fact that a considerable number of people are envisioning the opportunities that exist. It is rarely the case that there is only one person or one group who sees the economic opportunity available in a given time and place. It is only reasonable to assume that these various people who are potential developers of a given situation do not envision it as equally attractive. Thus, to make the illustration a bit more realistic, let us say that there is a group that looks forward to an additional return, on account of this situation, of 5 per cent. There is another group that looks forward to an additional possible return of 3 per cent above. Another one, just for illustration, gets down to finding that if there is a possibility of 2 per cent additional return it looks attractive and interesting to them. There is that competition, and those who are willing to undertake it at the lowest return, normally those who are ready sooner to undertake the engagement, tend to express for our kind of an economic system the best price at which we can get that done at that time. Of course, assuming that there is no monopoly of the opportunity, that there is an opportunity for this competition of the people who are willing to assume these functions at different prices, and that there is every opportunity for free bargaining in every sense to achieve or get hold of this opportunity, the fellow who is willing to work for society for the lowest price, in general and on the average, gets the opportunity.

From that standpoint, therefore, on the basis of those assumptions I should say that it is reasonable to conclude that in the normal working out of the competition for opportunities to invest, the price at which people are willing finally to undertake it reflects fairly the price which society would have to as of that time pay to get that function performed and assumed. If the assumptions there made hold true, then the only possible conclusion is that the marginally necessary compensation for the performance of this function is the socially lowest cost; and if it is such, it ought to go to the people who perform the function. If they were not allowed it and saw that they were not to be allowed it is only reasonable to assume that they would not take on this function. I mean if they were not allowed the incremental return for the exercise of this economic function. That is, in my opinion, a well-established economic thought, that the ordinary processes will drive this return down to the price at which the group that would do it for the least would do it; and that is the group which normally gets into possession of the opportunity. There is, however, as I mentioned, the time element involved. Another group might want to wait longer and should that be the case, if society wants it done then, and we do believe that time is of the essence in the development of improved methods, it is necessary to compensate at the rate at which the most effective or the most economical performance of this function would perform it.

1136 The fact that all of the increased increment of return attributable to design, skill, management and enterprise be allowed the enterpriser who furnished those elements does not mean that the public is denied any benefit from the enterprise just because the public does not receive its benefit in the same identical form. In fact, if society did not benefit and had not benefited from the application of that enterprise principle, the principle would not have lasted as long as it has. The public gets its share and gets it in a bigger and more important way, I think. I reached that conclusion by this line of thought, that if one is to come into a market with a new product or attempts to produce a product in a new way, he is undoubtedly implemented with an idea or a technique which makes him believe that he is going to be able to produce a better product or produce the same product at a lower cost. Industrial history definitely suggests that unless he has some such advantage, unless he can offer the product at a lower cost, or a superior product, or offer it under better service conditions, his chance of success is indeed very slim, that the inertia of customers, the disposition to stay by the products that they have and to use the kind of service they have used, would put up an awful battle, an awful resistance to his succeeding in getting a part of the existing market or service. Consequently, it is implicit in ordinary human behavior with respect to such business that he would only get ahead when he had something to offer the customer which was differentially better. It is out of these improvements and this lowering of costs of production that society has gotten its really important dividends from the enterprise principle. Moreover, suppose it were no better product or not significantly better, or the service were not significantly better, the entering of an established market and attacking the customers of an established business would cost much money and would presumably take a very considerable period of time,—so much so that the ultimate gains on the same technological or economical basis as previously existed would not be attractive or interesting to such an enterpriser.

He has then to really have something differential to offer society to envision any reasonable chance of gain for himself; and society gets its dividends through improved products or lower prices as a result of allowing the enterpriser to believe that he can obtain the rewards for his efforts.

Cross-Examination Interposed by Mr. Staff.

In my previous answer I attempted to state that the amount necessarily allowed to secure the functioning of this kind of a system was the equivalent of the expectation of the marginally necessary return by the entrepreneur. The expectation had to be held out to him. In other words, you had to hold out this much or whatever the amount is, and if it matched his vision as to what was likely to be attractive, that is what he would go to work for. The excess under the strict interpretation of the competitive marginal analysis would be what would be denominated as a surplus or extra gain, but it does not necessarily have anything to do with the gains to society as a whole. He may have had a much better thing than he envisioned and society may have gathered much larger by-products gains. I don't mean by that that he had in mind society's advantage necessarily. I am not imputing any philanthropy to him. Neither am I imputing to society any philan-
1137 thropy toward him. It is usually a stiff, hard bargain, each trying to get what it can out of it, but I

just want to make clear that my answer to your last question did not imply that society would thereby be getting less, but simply that the entrepreneur might be getting more and society might be getting tremendously more. Witness only a few of our striking industries in which that has happened where the possibilities were in no sense realized and where the gains to society today were in no sense appreciated or understood. Both may be in excess, and of course the opposite may also be true, and that is that the expectations of the entrepreneur are not necessarily realized, and he may have been completely mistaken as to whether this would be a benefit to society and they get no dividends either.

If it becomes the understanding of people potentially disposed to be enterprisers that there is to be no allowance of any compensation for the exercise of these functions, they naturally will not be disposed to assume them. Consequently they will not go ahead and attempt to apply new things and new techniques to the development of new products and new markets. As a result of that the progress of our industrial system would be hampered; the disposition to go into these things would be discouraged, and society would lose the benefit of the improvements. More than that, I think it would lose the benefits of the efforts to do the things more economically, which is another result of the operation of this kind of a system. Those who succeed in developing the techniques and methods which economize on our natural resources, which economize on the use of capital, grant a secondary type of dividend and gain to society in that they make these same resources available for alternative employments.

1138 I believe it is important to distinguish between the wages of capital and the compensation for risk-bearing and uncertainty. They are two entirely different things, in my opinion, and have nothing necessarily to do with each each other except that they are commonly associated and commonly met with in the assumption of a business undertaking. Moreover, I believe that risk and uncertainty which I have linked together are to be distinguished.

We find it useful in economic analysis to note that certain classes of uncertainties develop under conditions which give you some kind of an opportunity to forecast or appraise. It is not uncommon to think of a risk as in effect an insurable uncertainty, that is an uncertainty with a sufficiently broad or well established probability basis or experience base so that there is some possibility of appraising the element of risk. The distinction, I think, could well be made by an illustration drawn from the insurance business. An insurance company spreading its risk over thousands of lives, has the guidance of an actuarial experience which reduces the necessary compensation which has to be offered for the chance of death, for example, to a determinable risk, a relatively measurable risk. So any type of business uncertainty with respect to which there is a sufficient experience and background such as an industry in existence long enough and employing a technique well enough known to have been tested, thereby becomes more a matter of the risks involved, because you have got some sort of an actuarial background even though you do not have the kind of thing that the insurance company has access to.

I would like to contrast an uncertainty with a risk by using the same illustration of the insurance company. An actuarial record is based on the past. It is still possible that an insurance company will experience a loss out of line with the actuarial basis on which they have calculated their risks. Consequently, there are the chances of loss over and above the calculable or approximately calculable risks which have to be recognized; and those we choose to distinguish as uncertainties, indicating by that distinction that they are simply hazards which are as yet so new, as yet so rarely experienced, that we have no good basis for bringing it down to more approximately measurable quantities.

In a more practical sense, what I mean is this. The ordinary investor gets used to industries and the characteristics of industries and he establishes something of a measure or opinion as to the degree of risk involved. You approach him with an opportunity for investment in an industry in which no such experience may exist and he is inclined to look at it in the nature of a gamble.

This investment has elements of such uncertainty in it. Although uncertainties are not readily reflectable in the ordinary range of risk compensations, I think it is rather important to distinguish those two when you are dealing with an industry which has such outstanding characteristics that the element of uncertainty is even of more importance than the element of risk as the latter term is defined in the specialized sense.

I did not mean to leave the impression that loan interest is all of the rate of return to which an investor is entitled. I thought I had clearly testified initially that the return could be divided into two important elements: one,
1139 loan interest, and two, the return to enterprise over and above loan interest. What we have been concerned with here is the break-down of the loan interest element only and I did not mean to imply at all that the loan interest is synonymous with necessary supply price of the capital for an industry. If you were to restrict or conceive loan interest as synonymous with the return, there would be no inducement to be other than a lender. That is the implication of loan interest.

This additional compensation is what I have in mind as the compensation for enterprise. The compensation for being a borrower rather than merely being a lender, the compensation for assuming a position of gatherer of loan funds, if such are needed or are available constitutes this additional compensation. Whether an individual chooses to take that position depends upon the sum total of the economic and I might add political circumstances prevailing. Under many conditions, he chooses to sit back and let somebody else do it, that is, he will say let somebody else be the enterpriser and let him use my money under proper protective conditions, but I do not see fit for the rewards apparently available to take this pioneering position of performing the enterprise function and employing other people's capital under the rigid terms which they are disposed to impose upon me. There is not anything new or peculiar about that observation. It has been regularly accepted and observed in regulatory practices that the return has been something more than loan interest.

The natural gas industry appears to be a relatively young industry with a distinctly changing technique, an industry which seems to offer the promise of further expansion and public service, one which because of these circumstances appeals more particularly to the enterprising capital and enterprising capitalists who are willing to assume the hazards of this kind of an undertaking. The enterprising capitalists would not be satisfied with loan interest, or for that part, in my opinion, with a fixed and rigid rate of return. It just is not in the nature of true venturesome capital to engage itself on a cost of service contract.

In my opinion, the public utility industries have not prospered and grown under a system of regulation of the profits. In a very considerable part, the industries classified as public utility industries had their very rapid growth and development during an era in which the regulatory process was still relatively approximate and loose in its application of what we understand to be the regulatory formula. Enterprises in those industries during the 15 years of the most rapid development still had the idea that there was a chance of an enterprising profit. I had in mind roughly the 15-year period in which the electric industry doubled in each five years, say 1924, 1929, or 1930 something like that. That despite the imposition of regulation as a legal fact, entrepeneurial investors still persisted in the belief that there was a chance for an enterpriser's return in those industries; and as a matter of fact the regulatory process was not imposed with the rigidity which the regulatory formula would imply in all of the states of the United States throughout the period of development and growth of these utilities. Item after item has been added to the range of regulatory function, additional authority has been granted, commissions got themselves organized and oriented and gradually got to work. It took a very considerable period of time before the theory of regulation started to approach the fact, and I say that advisedly, of a rigid application of what we understand to be the regulatory formula.

1140 Consequently, I answer that question with some assurance that I do not believe the traditionally regulated public utility industries grew, as they did grow, under the system of profit regulation. They did believe that there was a chance for the enterpriser's profit, and as that prospect narrowed somewhat, the holding company era of activity became apparently a part of the frontier in which there was still some chance of the exercise of the entrepreneurship and the gaining of such an additional reward.

It is only in relatively recent times and still in relatively restricted quarters that there is an increased warning to the entrepeneurs and investors that this regulatory formula is going to be imposed with increasing rigidity, precision and exactness, and it is that in my opinion, which is primarily making the investors feel that there is not going to be any chance for an adequately compensatory return.

I have not looked at the figures recently, but a few years ago was rather amazed to find that somewhere around one-half of the operating electric utilities were recorded not to have any taxable income. (Objection by Commission Counsel overruled.)

As I remember it, it was one-half in number rather than in capacity. I have not had occasion to look into the question of the proportion of the invested capital in that industry which was involved.

In my opinion, the imposition of a style of regulation which was developed for and adapted to relatively mature and maturing industries, upon a young and growing industry still in the stages comparable to the early stages of these industries now so much more readily regulated, would be a distinct threat to their growth and development. This statement is directed entirely toward the question of how the rate of return should be considered and envisioned in the course of imposing regulation of this kind on an industry.

In my opinion, if there is going to be a regulation of an industry in which it is apparent that there is a large function for enterprisers to perform, which is an industry still in the state of development and in which those social results may be looked forward to from the function of the enterprise, then all I would want to say is that the responsibility for properly rewarding and encouraging that enterprise definitely falls on a regulatory authority and it will have to assume the responsibility of keeping the enterprise properly fed, clothed and alive, if it desires to keep enterprise alive in an industry of this sort.

I believe that if the mature and rigid formula of regulation is imposed on an industry in its teen age that it will discourage its growth and development and that the way in which that can be avoided is by a proper and appropriate recognition of the reward for the disposition to be enterprising. (Objection and motions to strike above testimony by counsel to the two Commissions overruled and denied.)

I am conscious of the distinction between a past investment and investment still to be made. A past investment is helpless. That commitment has been undertaken, but its alternatives after it has sunk itself in a fixed and helpless form are very different from what its alternatives are at the time when it is still free to make a choice.

1141 Consequently, my concern is not with respect to the helplessness of a particular commitment but rather with respect to the effect such treatment of past invested capital will have upon an enterprising capital still available for investment in this kind of an industry, given attractive returns. Putting it another way, the only protection which past invested capital really has is the necessity of meeting the terms of capital which is still footloose and fancy free. I think it is a matter of increasing importance because of the increasing scope and range of regulatory activities. The power of an industry to command more capital is pretty largely measured by the treatment which past investments receive within those limits.

Presumably, we are still relying upon a system of individual enterprise and initiative as distinguished from a system of state socialism or communism; and while I am not passing my judgment on alternate systems, if we choose to operate under this kind of a system, it seems perfectly obvious that great reliance should be placed upon the adequacy of the stimulus offered to enterprise.

Cross-Examination Interposed by Mr. Slaff.

By the use of the term "presumably" I meant to indicate that we are aware that in this country as never before there is an enlarging opinion, or let us say sympathy, with some of the foreign ideas such as state socialism and communism, but as yet we seem to be on, let us say, the alkaline side in the equation and relying predominantly on a system of private initiative and enterprise.

Direct Examination by Mr. Morgan Resumed.

To me there is a distinction between rate regulation and profit regulation. I believe you could have rate regulation without reaching the point of rigid profit regulation. I do not believe it follows that you can not have regulation without inappropriate discouragement of enterprise, if I may say so. I think there is a wide difference between imposing restraints on private action and conduct in public interest, and the extreme, for example of imposing the rigidity of the public utility regulatory formula in an effort to regulate. It is to be observed that more and more industries are being subject to regulation. My expectation is that this range of industries subject to regulation is going to increase.

I think it distinctly in error and represents rather careless transposition to assume that every industry that is going to come under regulation is going to be put under the scheme of regulation evolved as more or less suitable to the public utility industries. I think in fact that anyone concerned with the desirable development of a system of public regulation would have in mind that the same suit of clothes is not likely to fit effectively any kind of industry and every type of circumstances. I view distinctly with alarm the disposition to take one suit and measure and impose it upon a given industry, irrespective of its characteristics. (Objections by counsel to the two commissions to the testimony with respect to "views" and "alarm" overruled.)

The fundamental of the public utility formula of course is the traditional concept of a fair return on the fair value of the property used and useful in the public service. When that principle was first enunciated, its meaning and implication were of course not at all clear. It has had a considerable period of development in the minds of people who have engaged in regulatory practice and of course in the minds of the courts in subsequent opinions following the opinion of the Court in Smythe *vs.* Ames. In my opinion, the particular value of the court's opinion in Smythe *vs.* Ames—understand that this is from the standpoint 1142 of the economic consequences—was its comparative tolerance, its lack of rigidity and fixation, in fact the very thing which a great many people complain about with respect to the attitude expressed by the court in that particular case. What I mean to imply by referring to the rigidity with which that formula is now being increasingly envisioned with respect to the more mature industries under regulation, is the idea that rates are necessarily fixed at a level which does not allow the enterpriser to envisage the possibility and likelihood of profit in the traditional sense of a possibility of profit.

As a matter of economic experience it does not always follow that the gains for which an investor hopes in enterprise are actually realized by the enterprising investor. Definitely, expectation is one thing while realization is another; and I have expressed my opinion, I believe, very clearly that it is expectation which functions in our kind of an economic system. In fact, we observe that it is not the number of failures in an industry really that discourages people from going into that industry, it is rather the conclusion that no one has a chance to make a profit in a particular industry that discourages them. If the possibilities of profit and gain appear to be there, the amount of disillusionment which comes with realization does not seem effectively to destroy the disposition to be enterprising.

As a matter of fact, if every investor realized all that he expected when he invested money in a given type or class of industry, it would cease to be a risky industry. It could not then involve such a degree of risk and uncertainty as to call for the exercise of the entrepeneurial function if such were the results.

The idea that I am trying to express is not new or novel or unique in any sense. I was reflecting merely what was in my opinion the accepted economic premise with respect to the relationship. In fact, it is an idea which is about as old as organized economic thought and as far as I know has not been successfully challenged throughout the evolution of economic thought. I would like if I might be permitted just to quote a classic paragraph from Adam Smith, the first of the economists, on that particular point:

"In the greater part of mechanic trades, success is almost certain; but very uncertain in the liberal professions. Put your son apprentice to a shoemaker, there is little doubt of his learning to make a pair of shoes. But send him to study the law, it is at least twenty to one if he ever makes such proficiency as will enable him to live by the business. In a perfectly fair lottery those who draw the prizes ought to gain all that is lost by those who draw the blanks. In a profession where twenty fail for one that succeeds, that one ought to gain all that should have been gained."

The successful hazard-takers do not gain all in the operation of the economic system. The evidence is perfectly clear on this point. They do share the difference with society. If I may finish that quotation from Adam Smith, he went on to say:

"The chance of gain is by every man more or less overvalued and the chance of loss is by most men under-valued, and by scarce any man who is in tolerable health and spirits valued more than it is worth."

1143 The point of that observation is being increasingly appreciated in the operation of our economic system in that the disposition to be optimistic on the part of human beings leads in general to overvaluation of the chance of gain; a willingness to take the risks and hazards for less than their mathematical chance.

I would say that prior to regulation, the natural gas pipeline industry and the natural gas industry as a whole were subject to both large losses and possibly large gains. The history of this industry is strewn with cases of loss which make it clearly classifiable as an industry in which many may lose, and apparently from the records, some can make substantial gains.

In my opinion, if the principle of regulating the rate of return or the power to regulate the rate of return implies the refusal to recognize the necessary compensation for assumption of an enterpriser's position, it would clearly discourage the flow of capital. In a gamble in a lottery in which there may be gains but the gains are small and rather predictable, there is not going to be anyone who is going to very freely take any large hazards and risks; and it seems to me that this goes back to the principle which I tried to explain earlier, that it merely involves the adequate recognition of the innate characteristics of this industry to offset the very probable investor reaction to the imposition of regulation.

In my opinion it is entirely inappropriate in the sense that it does not meet the economic necessities of the situation to assume to transpose rates of return which are appropriate for the characteristics of an industry such as the electric or water industry to the natural gas industry. There may well be something to be gained by studying and observing the behavior of investors under a given type of bargaining under a given rate of return, but to make an easy casual transposition of rates of return that are more or less traditional in one type of industry to an industry whose characteristics are very different will not get the desired economic results.

Even among those utilities which are of the character I have described as being on a more permanent basis and which will continue on indefinitely, the rate of return allowed in one instance is not necessarily the same as in other instances. From my study of the rate of return determinations, it seems clear that earlier in the history of the public utility regulation there was a disposition to make rather marked distinctions among and between the utility classes. Urban transportation was frequently recognized as having a different status. It was not uncommon for commissions to recognize the difference between electric and gas companies in the determination of the return. I may say, however, that my following of the more recent tendencies seems to indicate that as these industries have gotten older and have come along under a rather common formula of regulation, that the disposition to impose a more nearly even rate of return has apparently developed. I am not condoning it or approving it from an economic standpoint, but that is my conclusion from observing rate of return determinations. I mean that reference to other rates of return is not a useless point of reference, but nothing more than that for the moment, at least.

What I have been trying to say from an economic standpoint in trying to predetermine the investor's probable re-
action to this industry in allowing his capital to go
1144 into it, is that he is conscious of the distinctly differ-
ent characteristics of this industry. The natural gas production and transportation industry in my opinion does not have the legal or the economic characteristics of a public utility; and I am of the opinion that it cannot as a practical fact make the kind of bargain for capital that a public utility can make. (Objections by counsel to the two Commissions to the above legal conclusion of the witness overruled.)

In my opinion a public utility which engages in natural gas production and transportation and distribution should be distinguished from a natural gas pipeline which does not engage in distribution activities as far as representative risks are concerned. I believe there is no justification for confusing those conditions simply because there may be an identity of physical plant, or there may be an identity of dealing in the same kind of physical product. There are in my opinion public utilities which distribute natural gas. In that sense there are public utilities that are in the natural gas business. I find also that there are public utilities which own also natural gas reserves and engage in what we call the production of natural gas. Some of the gas fields are sufficiently remote to make it necessary for the same public utilities to engage in the transportation of natural gas as well.

What I mean to say is that just because a public utility produces natural gas that it distributes does not in my opinion necessarily make a natural gas producer a public utility. If I may speak to a very simple illustration; a horse is an animal, but all animals are not horses.

Question by the Examiner.

A public utility is an enterprise characterized by certain distinguishing legal and economic characteristics. Those characteristics go to both the conditions under which the service is supplied, and the conditions under which it is produced. We seek for the characteristics of a public utility both in the character of the supply of the service and in the character of the demand for the service. One of the commonplace requisites is a high degree of the control over the market, more or less casually referred to as a monopoly.

Normally the practical economic monopoly which follows from the character of the investment is recognized by the law as a legal status in addition to the economic status. Thus we have on the supplier's side usually and most characteristically in my opinion a degree of control over the market enabling such an enterprise to exercise control over the price to the extent of differentiating in the price and maintaining price schedules which differentiate among classes of markets in which possibly the power to discriminate in prices—and I do not use the word "discriminate" in any inappropriate sense—I mean discriminate in the sense of differentiate—the power to differentiate in prices in the market is probably one of the most fundamental requisites and circumstances prevailing. Some people talk about the milk industry, for example, as a public utility, and one of the reasons why in my opinion it can never conform to that classification might make the answer to your question clearer.

A milk distributing company might even have a substantial part of the market as some of them do in some communities, but it still can not conform to the formula because it does not have such a control over the market as will enable it to differentiate or discriminate among customers. It cannot, for example, successfully engage in differential pricing, it cannot establish the kind of a
1145 pricing structure and rate schedule that a public utility can.

I understand that one large milk distributor once tried that,—he thought it was a good idea to offer a gallon at a differential price. The net result was that that milk company experienced the distinction which I have in mind, namely, Mrs. Jones and Mrs. Green and Mrs. Brown said, "Did you hear about it? You can now buy a gallon of milk at this differential price." So Mrs. Green and Mrs. Brown said to Mrs. Jones, "You buy the gallon, and you sub-retail to us" and the net result was that of course the differential market was broken down promptly and the milk company retreated to the system of prices which it had to employ.

The nature of a public utility however is not to be found merely by examining the conditions under which production takes place. We have to examine in addition conditions under which distribution or the demand expresses itself. This is in looser and easier language commonly referred to as the essentiality of the service, the necessitous character of the service rendered to the people.

It is clear that you cannot have this status by merely having one of the circumstances prevailing. There are many necessities in this world of human beings,—the essential requirements to have food, clothing and shelter, which are probably most necessitous, but we do not assume to put industries providing these essentials in the public utility category, because normally on the supplying side, these services are rendered under the conditions of competition giving to the customer alternatives which make such exercise of public authority unnecessary and impractical.

So in attempting to find a fundamental concept on which to distinguish public utilities, we say that is necessary to view both sides of the equation. We have a coincidence of the two standards, one, the production under conditions of restriction which is for practical purposes the single provider in the single market situation, and on the other side, a necessary or essential product. When you have the coincidence of a control of the market on one side and dealing in an essential on the other side, you have the requisites of a public utility status, particularly if the conditions of service are such that it gives the enterprise control over its product down to the final disposition in consumption, because if the technology of the industry is not such as to give it that control down to the point of final consumption, it can not conform to the economic behavior which we find in a public utility.

Thus in the briefest sort of way, we have the implication of a high degree of monopoly on the one side and an essential service, on the other, which two requisites combine to place the customer in what we denominate a position of dependency.

Direct Examination Resumed by Mr. Morgan.

Every institution affected with the public interest is not a public utility. I recognize an economic distinction between what is commonly referred to as a natural gas distributing company which owns no distribution or production facilities, one which is known as an integrated company owning distribution, transportation and producing facilities, and still a third class which owns only transpor-

tation and producing facilities. Imported economic differences are to be noted with respect to this hierarchy of enterprise. The investment in the distribution property employed under the public utility status, is commonly
1146 regarded as being more secure since it is exposed to
fewer of the hazards of industrial enterprise than an investment in property not so devoted. A public utility which also invests in natural gas production and transportation is investing in an industrial area which is characterized by a larger degree of risk and uncertainty. I believe it represents an exposure to a type of risk that is not common to traditional class of industries recognized as public utilities. I certainly believe that the degree to which the risks and uncertainties are present in this kind of enterprise is unusual and not closely comparable to the degree of risk present in the traditional public utility industries.

The distributing company from an economic standpoint enjoys a practical protection by virtue of the indisposition of any informed investors to place their investments in a duplicating distribution system, for example. And in addition it is rather common to have the law put its seal of approval on that economic fact by the granting of franchises amounting to a legal monopoly on top of what is a rather practical economic monopoly under most conditions.

(EXHIBIT 143 previously offered was received in evidence over the objections of counsel for each of the two Commissions, to whom the Examiner allowed exceptions.)

The natural gas pipeline company subject to the jurisdiction of the Federal Power Commission and the type of utility to which I have referred as enjoying a legal monopoly ought to be distinguished in two respects: (1) A production-transportation company is not engaged in distributing services as a public utility, and (2) it does not, by virtue of an economic characteristic or the legal sanctions granted through a franchise or similar protective device, have a monopoly. It is my understanding that the natural gas pipeline company has not been granted an exclusive franchise of any character whatsoever and that it is possible under the law for a competing company to enter the same markets. I understand that the law is interpreted to mean that if a competing company can offer to render services at lower prices that it may have access to the market.

The three classes of natural gas companies to which I have referred cannot be regarded as being of the same character and as involving the same risk in appraising the rate of return to which they are entitled. I believe there are three clearly distinguishable stages: (1) the public utility distributing company which may be distributing natural gas; (2) a public utility distributing company which may own transportation facilities which bring the gas which it distributes, and (3) a public utility distributing company which owns not only the transportation facilities but possibly also production facilities and natural gas resources. None of these three are reasonably comparable to a company which has only the last stage, either production only, or production and transportation, because in the first three cases we have a public utility which, incidentally, has investments in these other forms, and in the latter case we merely have a company with an investment in the production and transportation facilities.

In my opinion, the natural gas distributing business is a more hazardous business than the electric distributing business because it has to rely upon a supply of natural gas which is exhaustible. I accept it as a matter of common knowledge that natural gas supplies are exhaustible.
1147 Even though a distributing company may have some protection by virtue of the fact that it has a fairly effective economic protection due to the indisposition of investors to duplicate the investment in distribution facilities and even though it may have a legal franchise which gives legal sanction to that status, yet because it depends upon a source of natural gas supply which is exhaustible, I think it introduces a hazard which is not present in a continuing operation such as the electric industry. When the natural gas supply runs out, there are some alternatives open to such a distribution system, but those are not costless alternatives. It may be able to find a source of supply in another direction. It may have to resume the operation of manufactured gas plants and wean its customers back to accepting the prices and limitations of use which ordinarily accompany manufactured gas production. That also is not a costless experience. The customers will not like it and particularly they will not like the readjustment to a different level of cost prices of the rates.

Furthermore, such readjustment period would undoubtedly afford an excellent opportunity for the electric company, which may reasonably be assumed to be present, to further extend its invasion of the service area of the gas industry.

I have had occasion for a number of years to watch the opinion of courts and commissions in matters of this sort and it appears to me that there has been a rather decided observation on their part of the fact that the natural gas industry is fraught with risks and hazards that are unusual and should be distinguished from those in public utilities; but I would like to make clear that I do not recall any such decision which was not dealing with a public utility company that was engaged in the natural gas business and that the distinction between that level and that of a production and transportation company is another matter.

It seems to me that qualitatively the distinction last mentioned would mean that if the public utility company which had a substantial part of its investment in the more hazardous forms of capital and resources were allowed a return which recognized that, then certainly it might seem reasonable that a concern which had all of its investment in that portion which was recognized as more hazardous would certainly be entitled to a higher rate of return. If the investment were, for example, 50-50 as between a public utility distributing investment and a production and transportation investment, and if a natural gas distributing public utility, for example, were allowed a 7% rate of return, and the one which had half of its investment in natural gas resources and transportation lines were allowed an 8% return, then by simple arithmetic we might arrive at the conclusion that the portion of the investment which was in production and transportation had been envisioned as entitled to something like 9% to get an average of 8%.

In connection with my statement relating to the transposition of rates found for an ordinary electric utility over to a natural gas company, I merely wish to point out this: The differences may be of two types: (1) there appear to be some real differences of kind in the character of the risks and hazards involved in natural gas transportation and production, and (2) there was other hazards which are hazards in different degree. I merely meant to draw the conclusion that the significance of unique risk and the degree to which certain common risks and hazards were present here made it difficult if not impractical to engage in that kind of a ready transposition of rates of

return from a public utility situation to a gas pro-
1148 duction and transportation situation.

I am not at all convinced that a recognition by the regulatory bodies of the necessity of holding out the possibility of increased reward to enterprising capital would result in the public's paying more for the service that it would in the case of a public utility. In fact the burden of much of my testimony up to this point is to the effect that they probably will not pay more. I am of the opinion that in the industries where risk and uncertainty play such a large relevant part, the imposition of a fixed or limited rate of return may actually result in a higher overall cost of the service. That was the point and burden of the discussion on the willingness of people to overvalue the chance of gain, the disposition to take a gamble where there was a possible compensatory return. I am convinced that people will receive service at a lower price under certain circumstances when we rely upon the disposition and willingness of the enterprising capitalists to take the chance, than they would otherwise. To put it in another form, I think there are conditions where a regulated industry actually develops a higher cost of capital than an unregulated industry. In fact, it is not an unusual observation at all to note that the industry where there is the largest chance of gain actually averaged out at the lowest cost of capital because of willingness to accept the risks and hazards that were so great in the light of an inducement in the form of the possibility of something extra in the way of a return.

Personally, I have been of the opinion for some time that the cost of capital to public utility enterprises was probably unduly high compared with the circumstances actually prevailing in those industries merely by virtue of the fact that under the circumstances in which that investment finds itself we do not make use of the capacity to get responses from this profit-seeking motive. It does not necessarily follow that the cost to the public is going to be more because latitude is allowed for the inducing of capital.

What I mean to say is that they will probably receive service at an earlier date, will stand good chances of receiving more adequate service at an earlier date, and there is distinctly the possibility that there will be a fuller exploitation of the opportunity if something is held forth as an inducement to capture this capacity of human beings to respond to the possibility of an extra gain. (Upon objection of company counsel examiner strikes statement of counsel for Illinois Commerce Commission to which objection is made by counsel to the two commissions.)

When I stated that it does not follow at all that the cost of the service will be increased by allowing compensation for enterprising capital, I meant to express the opinion that there is something valuable to capture and to exploit in the performance of the enterprising function, that if enterprise is induced to perform efforts will be made to find more economical ways of performing the services, the services may be rendered more fully, will probably be rendered more adequately and a wider range of uses will be sought out, and the result of the whole will be to contribute to a larger measure of economic well-being and at no necessarily higher costs than would otherwise maintain.

In arriving at the proper conceptions of these hazards, I have exposed myself to a great many sources. I have examined the literature of investment and security analysis to determine what general attitudes were being expressed with respect to natural gas investments. I did this in the belief that it has a practical significance, because what investment analysis and investment opinion is about capital to be put in these industries reflects itself through their advice and counsel, through their published opinions and finally gets down to the investor, and, whether they are right or wrong, they influence the investor's
1149 opinion and react with respect to his investments.

There is a literature that is particularly concerned with the questions of analyzing the relative desirability of investments. I have a few available expressions of opinion from the authoritative publications in that field, dealing with the subject of natural gas securities. These I consider generally accepted and rather widely used and they may illustrate what the opinion is in these matters. They are taken from books and sources that are in general circulation among the investment public, investment counsellors and economists and others who are interested in informing themselves on that subject. I have taken recourse only to those who have some standing as authorities and are widely used and are significant in that they are influencing investment opinion.

One of the classic treatments on investment is the text by Hastings Lyon, Counsellor-at-Law, New York City, and lecturer on Finance, School of Business, Columbia University, entitled "Investment", published by Houghton Mifflin Company. Another source is entitled "Investment Analysis" by Walter Edwards Lagerquist, Professor of Finance in Northwestern University, published by The Macmillan Company. And still another is a volume entitled "The Principles of Bond Investment" by Lawrence Chamberlain and George W. Edwards, published by Henry Holt and Company. Then there is "Principles of Investment" by J. E. Kirshman, published by A. W. Shaw Company. Also "Investment Principles and Practices" by Badger and Guthmann, published by Prentice-Hall, Inc. Another volume "Jordan on Investments", also published by Prentice-Hall, Inc. Another volume "Investments and Investment Policy" by Burtchett, published by Longmans, Green and Co. and "Security Analysis" by Graham and Dodd, published by McGraw-Hill Book Company, Inc.

I have gathered together whatever I could find on the natural gas industry in these treatises for convenience. I have a photostat of the pages which seem to have a bearing on the natural gas industry.

(At this point counsel presented to the reporter a document composed of approximately 12 pages of photostated material of treatises with the request that it be marked for identification. At the direction of the Examiner the document referred to was marked Exhibit 151 for identification.)

In addition to those authorities from which quotations are set out in Exhibit 151, there is one authority which I found since I had this exhibit prepared and no quotation from which is contained in the exhibit. I believe the reproduction of pages 396, 77, and 78 from Graham and Dodd's "Security Analysis" was not reproduced in the exhibit. I can read what it has to say in the record, if you wish, or I can provide a copy, if you wish.

(All of the following testimony of Dr. Doran from transcript page 5686 to transcript page 5721 was admitted over the objections of counsel to the two commissions.)

I have stated that these quotations are part of the literature that goes with the investment business and which is consulted by those who are interested in informing themselves concerning investments and investment practices. I did not consciously exclude any that I thought

had any substantial currency or were at all widely
1150 used. Every good library of commerce and finance would have those texts, I am quite sure.

Questions by the Examiner.

I am well acquainted with the literature in this field. I have advised investors. I have taught courses in finance. I have used some of these volumes as textbooks, and I am aware of the relative standing of these texts. I have advised publishers with respect to textbooks in these fields, and I consider this assembly here a selection from the top of the list. There are less known items available that could have been gathered if you wanted to make the record voluminous. There are privately published things which the publishers did not see fit to touch; but these are the volumes which from time to time, are the popular ones used in schools of business and commerce for the training on investment analysis. These are the volumes you will find on the shelves of investment analysis offices and represent, in my opinion, the best of the literature that is in comprehensive textbook form. It is more than a cross section of the literature. It is the best of it, in my opinion.

My opinion as to the value of it is that here we get evidence as to the general attitude on the natural gas industry as it flows down through various layers and finally gets to the investor. Somebody is approached on the matter of investment in the natural gas industry and the fellow has never had any experience in the natural gas industry. He probably pulls down "Jordan on Investments" or Graham and Dodd, or something else. These are, in my opinion, the best and most generally available. My point was these opinions are influencing, because they are the widely used ones. These volumes even reach deeper into the fabric of opinion than that. They are the ones which shape the opinions and attitudes of the investment analysis people as they are being trained and developed. I cannot from memory say that I agree with every conclusion set forth in these quotations. I do not offer it as to that. This is the type of opinion which is influencing the attitude toward natural gas securities. Some of these fellows are wrong, some of them do not know about some things in my opinion, but that is my opinion against theirs.

Cross-Examination Interposed by Mr. Slaff.

There are a lot of other things that influence investors. He is influenced by what he reads in the stock exchange pages day by day, in syndicated columns, by what financial columnists write day by day. I would not presume to exhaust the things that influence him. I meant to add while I admit the full range of the impact on the investment mind from appropriate and inappropriate sources, I certainly resent any implication that the works of men of professional standing, who are devoting their lives generally to specializing in this particular field and who give considered professional consideration to it in formally published works that they are willing to let go out, are to be put in the class with columnists and reporters of the Curb or Market activity for newspapers or things of that sort. I resent the implication that they are to be put in the same class. I have a series here covering a substantial period of time; and I think the record will develop the degree to which the earlier opinions are borne out by the most recent opinions. I do not know whether the opinions expressed by the authors represent the views of the authors today. I have not asked them. In my opinion, Mr. Lagerquist has not changed his mind.

151 (EXHIBIT 151 was offered and received in evidence over the objection of counsel for each of the two Commissions, to whom the Examiner granted exceptions.)

The paragraph on page 384 of Mr. Lyon's work on "Investment" reads:

"This discussion of gas as the basis of investment has been confined to the manufactured product. There are areas in the United States producing natural gas that enters largely into the domestic and industrial life within reasonable transmission distance of the producing fields. Substantial commitments of capital have been made in the development of the natural-gas fields. Limitations both of space and of knowledge make it seem inexpedient to enter on a consideration of any special characteristics of investment in natural gas, further than to say that the asset does not seem susceptible of measurement to the extent of most mining properties, and in this respect to approximate the oil business rather than the other extractive industries. This, however, is not to say that it may not be a perfectly proper field for investment for one willing to consider what the risks may be and to assume such as are found."

From page 390 of "Investment Analysis" by Walter Edwards Lagerquist, I read:

"The great draw-back with the natural gas companies is sudden exhaustion of the supply which may take place at any time. This is especially true where several municipalities use the same supply. Corporations which supply natural gas and do not make provision for the ultimate exhaustion of their gas wells must, of course, lose their original investment."

Also the paragraph on page 395:

"While the same general tendencies are to be found in the earnings of natural gas companies in relation to population, the ratios are entirely different. The tendency for the ratio of margins to increase with the increased output, however, is very much greater in natural gas companies than in artificial gas companies. There are so many variables entering in the control of costs of natural gas that while this tendency is very pronounced in the whole group, there may be wide variations in the costs within each division of companies in the group. But this fact only necessitates an analysis of the other factors used in determining the values of gas companies."

I will now read the sentence on page 380 of the "Principles of Bond Investment":

"In those sections supplied by natural gas there has not existed the same need for higher rates because of increased coal prices, but the exhaustion of supply has frequently embarrassed the producer and has made necessary the installation of artificial gas plants with resulting higher prices."

I will now read the sentence underlined on page 480 of the Badger and Guthmann work in 1936:

"The rapid growth in the recent past of long dis-
1152 tance pipe lines for the transmission of natural gas
from oil fields to the large metropolitan centers has
added new problems for the investor."

At the request of Mr. Booth, I will read the remainder of that paragraph:

"The companies which produce such gas are usually oil companies, but the transportation, which is a major cost factor, is generally undertaken by independent corporations, in which a gas utility may have an investment interest. To the extent that natural gas instead of manufactured gas is sold to the consumer, investment in production facilities may be reduced and the customary plant turnover and operating ratio increased. Since natural gas has greater heating value than manufactured gas, there has been a tendency toward the measurement of gas, not by cubic feet, as before, but by a unit of heating value, the therm."

From page 486 of the same work, I read:

"The greatly increased availability of natural gas at low prices in recent years has done much to enhance the position of this branch of the industry. Since more than half of the sales of natural gas have been for industrial purposes, the fluctuations in demand are sharp. The mushroom growth of many natural gas producers not engaged in retailing, and the low levels to which business activity has dropped, have resulted in a great deal of financial disturbance among such companies. Natural gas companies which sell wholesale to utilities instead of retail to the ultimate consumer should be regarded as industrials with a depletion type of asset rather than as utilities. Very often the gas business is carried on by the same corporation that conducts the local electric light and power operations. While this combination may hinder the type of analysis outlined, it should tend to reduce the somewhat greater investment risk usually attributed to an independent gas company."

I read next from page 158 of "Jordan on Investments":

"Until recently, the great bulk of the gas sold by the American public utility companies was manufactured through the destructive distillation of coal."

"The cost of the construction and operation of the long-distance pipe lines, however, largely offsets the basic saving in production cost. While there can be little doubt that the development of natural gas will play an increasingly important part in the entire gas industry, for many years to come the great markets of the North Atlantic Seaboard, because of the enormous expense of constructing adequate pipe lines from points west of the Mississippi River, must rely primarily upon manufactured gas."

From the next page of the same work, I read:

"A frank appraisal of relative advantages leads to the opinion that securities of gas companies, particularly of those operating in large cities, usually make good investments, although somewhat less attractive than those of electric companies."

"To a degree, the large sums invested in gas transmission lines have been committed despite uncertainties 1153 with respect to potential supply in the wells, to potential market at destination, and to actual cost of operation."

Then on page 160, this language appears:

"From an analytical standpoint, the following comments are offered. These comments refer only to manufactured-gas companies, as experience with natural gas in its present stage of development is too meager to afford reliable standards of performance."

Passing to page 265 of Burtchett's work on "Investments and Investment Policy", we read:

"In natural gas, the supply, method of transmission, distance moved, and potential exhaustion of the wells are to be examined. The great number of variables which enter the costs of natural gas company operation make it more difficult to analyze than the manufacturing gas utility."

"So far as financial structure is concerned, there are few unusual peculiarities. Fixed charges (debts plus preferred shares) ought to be lower in a type of utility in which there is inter-commodity competition (e. g., gas-electricity-oil for heating) than where no such substitute exists (e. g. water). While some investment writers condone fifty per cent of the capital structure in the form of bonds, it has appeared that forty or forty-five per cent would be a better figure in most cases."

"Natural gas companies appear to open to the uncertainty of supply. While some progress has been made in estimating the amount of gas which may be expected from a given well, there is sufficient uncertainty as to raise serious loss risks through sudden exhaustion of gas wells."

I will now read the excerpt from "Security Analysis" by Graham and Dodd, to which I referred and which does not appear in this exhibit:

"Investment Practice Recognizes Importance of the Industry.—This conception has been solidly grounded in investment practice for many years. The threefold classification of enterprises—as railroads, public utilities, or industrials—was intended to reflect inherent differences in relative stability and consequently in the coverage to be required above broad interest requirements. Investors thought well, for example, of any railroad which earned its bond interest twice over, but the same margin in the case of an industrial bond was ordinarily regarded as inadequate. In the decade between 1920 and 1930, the status of the public-utility division underwent some radical changes. A sharp separation was introduced between light, heat, and power services on the one hand, and street-railway lines on the other, although previously the two had been closely allied. The trolley companies, because of their poor showing, were tacitly excluded from the purview of the term 'public utility,' as used in financial circles, and in the popular mind the name was restricted to electric, gas, water, and telephone companies. (Later on, promoters endeavored to exploit the popularity of the public utilities by applying the title to companies engaged in all sorts of businesses, including natural gas, ice, coal, and even storage.)"

The book from which I read the last quotation was
1154 published in 1938 I believe.

It is very disappointing to find so little attention being given in the best literature on investment analysis to the investment problems of the natural gas industry. In general, the authorities seem to view this industry as affording little opportunity for investment as such—I use the term investment in a restrictive sense as distinguished from the assumption of business risks and undertakings. The authorities seem to feel that general advice and counsel in the matter of investment in the natural gas industry is too dangerous to be offered.

Such expression definitely affects my judgment in arriving at the rate of return for this company. An industry which gets that kind of a lack of recommendation is an industry which, from an investment banking standpoint, would be considered as having additional difficulties facing it in raising money. It would be considered at a disadvantage.

This discussion goes to the natural gas industry of which Natural Gas Pipeline Company of America is only one company.

I have examined the treatment given natural gas securities by Moody's Investors' Service. I consider that as a recognized publication and I know that it is very extensively circulated. I was interested in determining what the experience of natural gas securities was with the rating process which Moody's engage in, so I went through the Moody manual, identifying the natural gas companies, excluding the concerns which were only local public utility distributors of natural gas, and I found 87 issues of companies engaged to various degrees in the natural gas industry, with the exclusion that I have indicated. I think I examined the 1938 volume which was then the latest one available, the 1939 volume having come out in August, or a little later.

I found that Moody's assumed to rate only 32 of 87 natural gas issues. Out of these 32 issues which were given rating, only two were rated Aaa. Aaa rating is Moody's highest classification. I found no issues rated Aa, but I found three issues rated A. The 27 remaining issues which were rated were all rated Baa or less. In fact, the largest number of issues rated were found in the Ba classification, the next to the lowest rating.

The distinction between companies engaged in the producing and transporting operations only and those having a broader field of operation is sometimes somewhat difficult to make; but I believe there were 18 securities which could be classified as being those of companies engaged in production and transportation. Of these 18, only 6 were rated, and of the 6 that were rated, three received Baa rating and three B rating.

I have attempted to make a study of the experience of investors in natural gas investments and investigated the receiverships among natural gas companies during the period 1930 to 1938. The basis for that study is the recording of companies in receivership in Moody's Manual, and I found there were 29 natural gas operating and holding companies,—excluding again public utility companies engaged only in the distribution of natural gas—that were in receivership during this period 1930 to 1938. I attempted to ascertain the bond capitalization of these natural gas companies in receivership during the period 1930 to 1938 and found that the amount of bonds outstand-
1155 ing at the time of the receivership, or the last report available before the receivership, was in excess of $125,000,000. Then, in order to see what the significance of such a figure might be, I attempted to get a basis for comparison in the bond capitalization of all natural gas companies of these classifications that were found in the Manual on which there was a report. I ascertained that to the best of my ability and found that the debt capitalization in receivership represented approximately 24% of the estimated bond capitalization of all natural gas holding and operating companies of the classification indicated above that was publicly outstanding. Of the total bond capitalization in receivership, $90,878,000 was applicable to operating companies and the remainder of $34,566,000 to holding com-

panies, thus the ratio of bond capitalization in receivership of the holding companies was 30% and for operating companies 22%.

I also found that 17% of the estimated preferred stock capitalization of operating companies of the above classification was in receivership during this period and that 5% of the preferred stock capitalization of holding companies of this class was in receivership, representing, for holding and operating companies together approximately 9% of preferred stock capitalization in receivership.

The investor experience, whatever the causes might be, certainly influences the attitude of other investors. An industry that has a substantial percentage of bond capital in receivership would not be viewed as very attractive. In fact, the financial position and condition of industries is often considered in light of the amount of the industry in receivership. Thus, the railway mileage in receivership is a rather common factor that is published and given attention. For years, the problems of the urban transportation industry were reflected by the statistics on the miles and capitalization in receivership, as evidence of the bad financial condition prevailing in the industry.

Cross-Examination Interposed by Mr. Booth.

I consider the results of that investigation as throwing additional light on the general financial position of this industry and in that respect upon the reception which securities of a natural gas company would receive. I would say that that was a factor that influenced my opinion as to the kind of a capital bargain that a natural gas company could make. That observation would apply to these companies or any one that was burdened with the natural gas label.

Direct Examination Resumed by Mr. Morgan.

My investigation disclosed that over the 11-year period 1928 to 1938 investors in natural gas operating and holding company preferred stocks were paid dividends of 48% of the stipulated preferred dividend to which they were entitled. The average does not reflect the low level to which the proportion of dividends paid to dividends possible fell during this period. In 1933, 1934, and 1935, only 21% of the required amount was paid. In 1936, 27% was paid, in 1937, 43%, and in 1938, 42% was paid.

The experience of the investors in the operating company preferred stocks was naturally somewhat better; but over the 11 year period they received in all only 71% of the
1156 indicated dividend payable. Their returns also in the depression years fell to substantially lower levels. During 1933 and 1934 they received only 55% of their due, of their preference expectation. In 1935, 54%. During 1936 the percentage paid was 59%, and by 1938, it had risen to 89%.

These figures are compiled from published records, Moody's or wherever we found records to determine payments. The receivership study is based on the scope and accuracy of Moody's reports. The receivership records of Moody's are generally accepted as accurate. The derivation of this is entirely my own. There is no secondary source for that information. I think it is only fair to note, however, that preferred dividends are sometimes passed and made up subsequently; and an objective appraisal of the investors' experience would fall short of what it ought to be if it did not relate the back dividends as they came along. I did that and found that by adding in the back dividends, the investor in natural gas operating company preferred stocks averaged 72¼% of his stipulated dividend as compared with the 71% without giving effect to this judgment.

The significance of this investor experience with natural gas company preferred stocks is made clearer, I believe, if we are allowed to make comparison with the experience of public utility investors with their preferred stock investments. We are well aware that investors have had some dubious experience in recent years, and an absolute figure of 71 or 72% does not necessarily of and by itself mean so much; so I carried the process a bit further in order to get some standards of judgment and measurement. Entirely comparable figures, I was unable to develop. The figures used for comparison purposes are from 1930 to 1936. I think this is justified because there was relatively little disturbance to those relationships after 1936, and that, if anything, by emphasizing the period 1930 to 1936, it puts an electric and other utility companies in a worse position because, as we noted with respect to the natural gas companies, they did recover considerably and were better off in the later years. So despite the fact that I could not bring this all the way to 1938, I feel that the comparison is conservative and it is certainly adverse to the point I believe I am making.

The figures for the seven years, 1930-1936, which do not give effect to the resumption of dividends which took place to some extent in 1937-1938, show that investors in electric operating public utility company preferred stocks received an average of 88% of the stipulated preferred dividend, and that for the same period, investors in gas operating public utility preferred stocks received over the seven years, 1930-1936 inclusive, over 77% of their dividend commitment. Investors in preferred stocks of composite gas and electric operating companies received 96% of their stipulated preferred dividends over the 7-year period. Even investors in the preferred stocks of composite electric and traction operating utility companies fared very well, receiving more than 97% of the preferred dividends possible over the same period. Investors in the preferred stocks of composite electric, gas, and traction operating companies, apparently experienced some of the results of including both traction and gas service, and averaged on a relatively small volume, probably too small to put a great deal of reliance on, nevertheless 72 percent of the preferred dividends possible.

By comparison of these results with those obtained in
studying natural gas companies, the investors in the
1157 preferred stocks of natural gas companies, excluding
again those engaged only in public utility distribution, fared substantially worse than the investors in the preferred stocks of public utility companies.

In my opinion, the most fundamental characteristic which has a bearing on the risk and uncertainty which an investor in natural gas faces is the limited economic life which is imposed on the whole investment by the exhaustible character of the natural gas resources. I do not mean physical life. I accept the opinion of geologists and technologists that there are great hazards with respect to the probable physical supply of gas. That seems to be a matter of sufficiently common acceptance to justify my accepting it. I had in mind, however, what I consider a much greater hazard than that of an uncertain physical supply. I meant the economic life of a natural resource as distinguished from the physical life with which the geologists deal.

The physical life might in the extreme be measured by the time that the last bit of gas was physically exhausted from the ground. Obviously an economic undertaking could never go that far, since the cost of bringing the final supply of gas would be prohibitive. The economic supply consists of that part of the physical supply which has economic significance, that is the part which can be made available at a cost which is equal to or below the price obtainable in the market. Thus, the exhaustion of the economic supply in the case of a wasting natural resource would always be something very much closer at hand than the exhaustion of the physical supply.

It will not pay to exhaust the last bit of natural gas from one's natural gas resources. When we talk about economic supply, we always mean available supply which is really physical supply at a cost.

A pioneering enterprise would certainly involve more risk than an enterprise with a background of experience; and investors would as a practical matter consider it as involving more risk because he does not have the experience basis to go on. Applying that principle to these pipe line companies which built a pipeline system from the Panhandle of Texas to the city of Chicago, a distance of more than 950 miles, the investor who faced the opportunity, if opportunity it be, to invest in that kind of a venture would naturally be concerned with the question as to whether it was economically feasible to transport gas that distance. He would be concerned as to whether continuity of service could be maintained with sufficient certainty to make the enterprise profitable. He would be concerned about the fact that no one else had previously attempted to transport gas at such high pressures over such distances; and consequently, I believe, he would be impressed with the large measure of sheer uncertainty, as distinguished from risk, which exists in the absence of any basis for calculating and establishing an opinion as to the degree of risk involved. I think, however, he would be more concerned with the question as to whether or not it would be profitable to transport gas such distances even though he might feel reasonably assured that it was technically possible.

The major question remaining for him would be whether or not the cost of transporting the gas such distances, the very length of the haul, would not eat up the advantage of bringing the product which is relatively low priced at one point to a market as far away as Chicago is. Certainly, in the absence of any well certified past experience 1158 as to what costs are likely to be, not only immediately but over a period of time in which his investment is helpless and fixed, he would most logically put it down as an investment involving such wide uncertainties as to be beyond calculation as to the appropriate degree of risk to be assigned to it.

Obviously, it is not always possible to know in advance, in a project of this character involving a great deal of technological pioneering, just how it would work out after its projected working out is set down on paper. The economic and industrial history is replete with instances of what seemed to be good technological ideas which did not work out economically.

This was in large part a transportation venture. Transportation is the moving of a commodity from one point to another. This was a specialized transportation investment made for moving a commodity from one rather specific point to another rather specific point, consequently it was under the peculiar difficulty that it had to be entered upon and engaged in as a whole. It had to be built as a pipeline from the source of supply to the only market which was conceived adequate and appropriate to make it an economical venture, consequently no piece meal construction, no approximation of the investment, no trying it out was possible, it had to be a venture where everything was put on one throw, either win or lose, since a half line obviously was no line at all.

From reading the record in this case, I have undertaken to understand the technical difficulties as they have been reported in the record and as they are presented in the records of the inception and development of this enterprise. I understand that the principal technical difficulty which faced the enterprise was to achieve a combination of circumstances in which the investment per unit of transportation capacity could be made low enough so that the difference in price between gas in Texas and gas in Chicago would yield an attractive and compensatory return. Technically, this resolved itself into the development of a type of pipe which had the strength to carry high pressures and which, on the other hand, had a capacity per pound of steel required to transport the volume of gas needed in the Chicago market, and served it adequately on an economic basis. This required a character of materials to be employed in the pipe, a method of fabrication and a choice of proper size to make the undertaking as a whole economical. The pressures at which the gas had to be transported were significant because by increased pressure it was possible to increase the effective capacity of the line. The pressures could only be such extremely high pressures if the strength of the pipe were adequate. Great strength of pipe, however, could not be achieved by merely increasing the weight of the pipe or it would increase the investment per unit of transportation capacity. So it really was a very complicated, industrial economic problem of finding a balance of all these considerations which would make it feasible to engage in this unique transportation service.

I attempted to acquaint myself with the experiences during the period of construction and operation. I recall as particularly interesting the freeze-ups which developed by virtue of the sudden expansion of certain gasses that were ingredients in the gas transported due to the high pressures at which they were being transported. That was a very interesting one to me and I happened to recall it.

1159 I have heard the evidence here concerning the high stresses at which these lines have been operated, and have read the testimony of other witnesses on that point. It is my understanding that whenever one pushes technological processes to their limits, that it brings with it unusual behavior, and sometimes even freakish disturbances. Thus the effort of reaching high pressures brought with it the thing I referred to as the formation of a type of ice. That principle seems to be true in industry in general. As one pushes to the limit of technological performance one reaches a point where the hazards and risks inherent in that technological phenomenon become greater. In fact, the hazards seem to increase more than proportionately after you get up to a certain point, just as the cost of increasing the speed of a ship multiplies more than in proportion with the increase in speed. (Objections by counsel to the two commissions to above testimony overruled.)

Questions by the Examiner.

I was merely expressing an economic analysis, faced with that kind of technological extensions. I do not know the limit of technological advance in the gas transmission industry. If a person is professionally competent to do any kind of industrial economic analysis, he is aware of the fact that as you push technological development further you run into the hazards of performance of that character; and if placed in the situation in which it was represented that there were such pushings to the margin and extremes of technological behavior, he would conclude there were economic hazards not prevalent in a number of operations.

Relatively and comparatively here was an enterprise which was proposing to transport gas at unusually high pressures. From an economic analysis standpoint, if someone comes in with a proposal for financing an enterprise and proposes to conduct his operations within an unusual range of previous technological performance, he is appropriately, from an economic standpoint, looked at, to some extent, askance. This is more in the realm of what might or might not happen. There are unknown things that develop at this stage of intensification. Thus, proposals to transport electricity at unusually high voltages fall within the same class of behavior.

Direct Examination Resumed by Mr. Morgan.

From the investors' standpoint, the technological phenomena, of course, are primary, but they are not appropriately viewed as final or determinative. The important fact from the investors' standpoint is what the economic result of such technological pioneering would be. The economic uncertainties involved include all the technological uncertainties and independent economic uncertainties as well. Economic uncertainties are concerned primarily with whether or not the difference between the revenue receivable and the cost necessarily incurred will leave a margin constituting an attractive return from the investment that has been hazarded in that enterprise. These economic uncertainties, therefore, express themselves in terms rather parallel to the technological uncertainties. It becomes for economics not a question, can gas be transported from Texas to Chicago; but, can gas be economically transported from Texas to Chicago? At what investment cost can it be transported? What will the operating cost be? More important possibly even that these questions in a final determination as to whether such an undertaking is economical or not is the question as to the size and character of the market required to make it possible to transport gas economically over such a distance.

The question as to whether a market is in size and in demand characteristics adequate is not easily answered. 1160 It is very frequently a question which is answered only by actual trial which may turn out to be error as well. Finally, the question becomes one as to whether the potential market which is assumed to be there and which may be there can actually be captured in a short enough period of time to make the undertaking profitable. If an effort of this sort had to go through a 5-year or 10-year period of inadequate utilization of the investment before an adequate market was finally developed, the income foregone during that period might be so large that the price which the customers in the future would be willing to pay would never adequately compensate the investment. Thus the time factor involved becomes economically important. The market must be appraised in terms of size, the nature of demand behavior, and how long it would take to be able actually to obtain the market which appears potentially available.

I have read the contract between these parties and Chicago District Pipeline Company. The negotiation of and entering into such a contract would not in my opinion overcome the hazard under discussion. While the existence of a contractual arrangement would in all probability stabilize or establish the limits of the experience or rather establish the nature of the experience within said limits, yet ultimately the security behind the investment in a transportation facility of this sort is the security behind the readily available ultimate market. A contract for the delivery of gas on the basis of an amount which the market would not absorb would undoubtedly be subject to revision or compromise by failure of one of the contracting parties to be able, or to see fit, to continue to assume the burdens of such a contract out of proportion to the possibilities of the market. (Objection by commission counsel to above testimony overruled.)

I am talking about a situation where there is a divorce between the enterprises engaging in various stages of production and marketing of a product, and if there is an intervention of a contractual relationship between these two separate enterprises whose interests are not in common in the matter, there still remains a grave economic hazard, namely, that if the terms of that contract turn out to be other than what is bearable under the economic conditions disclosed, that such a contract is not construed to be very much of an economic protection, and it is very likely to be modified to conform to the economic possibilities of the situation.

The fact that under the law, the annual value of the money employed would during the development period be carried into the capital as interest during construction would not as I see it alleviate the hazard under discussion, because, merely capitalizing an expenditure does not give you a return on that expenditure, or return the expenditure to you. Capitalizing an investment is merely recording it in a systematic way so that for appropriate purposes the facts may be drawn off and given the consideration which they deserve. Accounting does not give you a return on your capital, neither do accounting transactions return your capital to you.

The capitalization of that item would operate to increase the amount on which a return will have to be earned if the use of that money be compensated. I did not mean to imply that the interest during the development period of an enterprise is not an appropriate capital item. I answered that question in the exact form in which it came, namely, that capitalizing did not do anything about a return on or of your capital and having it on the books does not do
1161 anything about it. Only if it is recognized that you are to earn a return on it, does anything develop which is of economic consequence.

If recognition be given in the rate base in the form of an allowance for going concern value in an amount sufficient to cover the cost of carrying these facilities which are provided in advance of the loading of the line to its normal capacity, such an allowance does not alleviate the risk and hazard I have been talking about. Merely allowing it in the rate base does not change the fact that a project that is constructed under these conditions and circumstances involves hazards on account of the size, the magnitude, the time elapsed during construction and the other factors. Putting it in the rate base merely establishes the presumption that a return will be earned on it; but if the hazard involved in that kind of an investment is not recognized, then there is no appropriate recognition of the hazard element involved in the development of an enterprise under those circumstances.

1162 Ultimately the security of the investment is dependent on the reliability and the certainty of the income available to pay what we have called the wages of capital. This income or wages of capital we have defined as the difference between revenue and cost, consequently the amount and security of that difference between revenue and cost is dependent upon all of the factors which would influence the revenues of an enterprise or the costs which it would incur. You can think of revenue and costs as blades of a shears or pincers, and the differential which the investor is able to maintain between the two measures the return which he will be able to obtain. Thus his income would be larger if revenues rose and costs remained constant. Thus his income would be larger if revenue remained the same and costs decreased. On the other hand his income might be less even though revenues rose, in case costs rose more than revenue; and his income might be decreased, even though costs decreased, if the revenues decreased more than the costs decreased. There are a great number of relationships there all arising out of the possibility that the cost phenomena may well be independent of the revenue phenomena and vice versa.

To the economic analyst, cost behavior in a pipeline transportation project appears to be highly unpredictable and uncertain with respect to a large number of the aspects of the operation. It would appear for example in the first instance that the cost of an adequate supply of gas is not predictable; that it does not appeal to the economic analyst as being predictable with the assurance that he would like to see; and of course what I mean here is the supply of gas, not the physical supply, but the economic supply that is provided. The cost of a supply of gas adequate to fully economically utilize the pipeline transportation facilities seems to be a highly uncertain matter for the future in an enterprise of that sort.

I do not believe that any economic analyst having any acquaintance with the field of industrial economics would make the assumption that because Texoma owns three trillion cubic feet of gas in a field from which there are hundreds of others producing natural gas that Texoma will ultimately produce that much gas from the field, and through its pipeline transport that much gas to market. In fact I am very certain that he would be disposed and forewarned to consider the question of the cost of an adequate supply or of a reserve as not readily determinable. The rate of economic depletion of such a reserve is apparently not very predictable. I appreciate that the geologist may express confident opinions as to what the physical supply is and what the rate of physical exhaustion may be; but in my opinion that is a long way from giving reasonable assurance as to what the available economic supply will be at a given time. How much of a physical supply will be economically recoverable, I think is a more imporcetant question than the geological opinion as to how much physical supply happens to be there. It involves more uncertainty, in my opinion, than the estimate of the physical supply because it has in it all of the uncertainties of the estimate of physical supply, and in addition the uncertainty as to the cost at which such a supply can be made available, which cost of course limits the economic supply to a fraction of the physical supply.

You cannot get the answer to the question from the production engineer. I would like to add that there are many circumstances where it is probably inappropriate for him to attempt to give the answer. I would say that when
the engineer starts dealing with costs, he is entering
1163 a field which involves considerations for which his
primary engineering training at least does not necessarily as such qualify him. More loosely one might say that he becomes something of a practicing economist when he moves from the field of technology into the field of costs.

I believe that a competent engineer can offer reasonably reliable estimates as to the efficiency at which various volumes and amounts of gas can be withdrawn from natural supply sources. He can, ~~and if experienced,~~ with a degree of assurance, go further and estimate what ~~the~~ costs of production under any given assumptions of efficiency would likely be. But when he adds the assumption of cost to the assumption underlying technological efficiency, he has introduced a second set of hazards and uncertainties; and the experienced engineer will tread with even less assurance when it comes to assuming what the costs will be than when he is dealing with technological and efficiency factors, which are more strictly in the domain of his own profession. Thus, I say that the economic supply, in my opinion, is far less predictable than the physical supply.

An economic analyst in analyzing this kind of an industry is impressed with the fact that property rights in natural resources on the surface do not coincide with property rights beneath the surface. On the surface those rights are defined in terms of area by reference to latitude and longitude; but below the surface there appears to have developed a type of communal ownership where property lines no longer confine and segregate the portions assignable to the defined property areas on the surface. Consequently, the subsurface resources are held in what is in effect a common ownership of all those who have rights to the surface of the earth. This leads to all of the usual economic results of common ownership, namely, an indisposition to conserve or protect the whole in which you have only minor or undefined actual interest. This the economist has recognized for a long time to underly the problem of conservation, and is one of the reasons for the wasting of natural resources, whose boundaries are not definable as the legal boundaries of property ownership on the surface.

(The following testimony from transcript page 5750 to page 5758 was admitted over objections by counsel to the two commissions.)

I had occasion to read the Federal Trade Commission record on the natural gas industry. I recall the discussions of the Government investigators with respect to the wasting of resources down there and the reasons for it. Some months ago I read a fairly elaborate record of the vacillating conservation policies in the State of Texas, and the efforts at legislative modification of legal relationships arising out of this particular situation, and I beg to say that I am not unaware of the considerations falling within the field of what we call resource economics. I went that far back in trying to form the ground work for an opinion. I gave consideration to this specific question in arriving at my judgment as to what was a proper rate of return. I was quite alarmed about threats to impose a common purchaser status on the pipeline industry arising out of the disgruntled condition of many of the owners of those natural resources. I think it is something that cannot be overlooked. It is well understood that the owners of rights in communal property are not impressed with the same considerations of conservation, with doing the most economical thing with those resources, as if there were individual and exclusive ownership. It is only the natural working out of the most fundamental economic instincts and behavior, the effort to get what you can for yourself. There certainly

is no inducement for any one or even a part of the owners to conserve, while others are getting more, to
1164 their economic disadvantage. There is every economic motivation to get yours while the getting is good. When faced with a threat of that kind of a realignment or readjustment in the legal relationship, the economic analyst would view it as introducing additional hazards to the enterprise, first in that there is the chance that it would make useless a part of the existing investment which was adapted and adjusted to the source of supply which was envisioned when it was undertaken. On the other hand, the necessity of investing more money in additional facilities would not be viewed favorably, because that would be merely adding to the investment and thus increasing the base under circumstances which are far from attractive from the standpoint of a well conceived, well balanced system, and dictated by considerations of the law rather than considerations of industrial economics.

It may well be that fairly accurate estimates under present assumed conditions could be developed as to the probable minimum cost in the way of capital outlay and operating costs of producing gas and transporting it over a long distance such as that between the Texas Panhandle and Chicago; but all that the economic analyst would be disposed to rely upon in a venture of this sort would be that the nature of the project is one which gives rise apparently to increasing costs. The rate at which these costs will increase involves many uncertainties in that although minimums might be estimated, the possibilities or probabilities of exceeding these minimums are sufficiently great so as to preclude any attempt at forecasting what the future probable cost will actually be.

(October 6, 1939.)

Questions by the Examiner.

I have given the question of depreciation of public utility properties and depreciation behavior a great deal of attention over the last 10 or 12 years. I am not uninformed as to the nature of depreciation of property nor its causes. I have read a great deal on the subject of depreciation behavior in public utility cases, and I am familiar with the physical phenomena which gives rise to depreciation. In my opinion there are fundamental similarities applicable to depreciation of the properties of natural gas companies and the properties of other utilities, and there is one major distinction. I have studied the characteristics of the natural gas industry with a view of determining what peculiarities there are in that industry which would make the phenomena of depreciation other than it might be in a property such as an electric or manufactured gas company property.

The distinction which I would like to make between the natural gas enterprise and the utility enterprise is one which arises out of a relatively simple matter of distinction and observation which I think can be drawn without getting involved in any of the technical details. I accept it as common knowledge and accepted fact that the natural gas industry supplies are exhaustible. That distinction carries through in an important way in its influence on maintenance and depreciation behavior.

Direct Examination by Mr. Morgan Resumed.

It is not expected that the maintenance and depreciation
expense, and by depreciation I mean physical depreciation,
will continue during the later life of physical properties
such as are employed in a natural gas company at
1165 the same level as during the early life. As an eco-
nomic analyst, I would not assume that costs in-
cident to maintenance and depreciation would continue at
the same level during the later life of a property of this
sort as before. I mean a natural gas property, the entire
undertaking because economically it is interdependent.
The transportation facilities are dependent upon the
economic life of the gas field, consequently it would apply
to the entire investment.

I am speaking of the physical properties as distinguished from the natural gas itself, although the exhaustibility of the supply underlies the entire phenomena. The economic and financial analyst is impressed with the fact that the property depreciates more rapidly as it reaches an older average age. This is a commonplace phenomena, in fact something that everyone experiences with respect to the technical behavior of properties and goods that he employs and uses. It clearly seems to be the fact with respect to composite industrial properties.

The distinction with respect to a natural gas property which I wanted to bring out was that in an undertaking of a limited life, the most economical way of taking care of maintenance and depreciation is not the same as the most economical way of taking care of maintenance and depreciation in a property of assumedly unlimited life. The reason for that principle is this, that whether or not it is profitable to make retirements and replacements or to spend large sums for maintenance is determined in part by the length of time over which you expect those retirements and replacements to continue to serve. To put it in simpler language, a house owner does not wisely or economically repaint his house the year before he is going to tear it down, as a normal experience. The expected termination of the enterprise as a whole, therefore, leads to deferring more and more replacement as you approach the final termination of the enterprise as a whole.

As a result of that economic disposition to defer replacements as you approach the termination of the project as a whole, the average age of the composite property of this kind of an enterprise tends to rise, because you do not reach that normal life cycle of replacement which you do in a property of unlimited life. The economical thing to do is to defer or not to engage in retirements as you approach the end. Assume that you reach within 3 or 4 years of the end of the life of the property, and it would be economical to make a replacement of an item of property under normal conditions, but the item of property that you would replace is one in which you would have to buy 15 years of future use. To buy the 15 years of future use for a probable 3-year life is more uneconomical than to suffer with the existing equipment, consequently there is the economic disposition not to engage in the replacement at all and to suffer the higher operating and maintenance expenses during that time rather than add to the capital investment, all of which operates to raise the average age of the property.

Industrial economists usually follow the alternative of suffering with a higher maintenance expense rather than making a retirement and a replacement and incurring higher capital costs. The problem of the industrial economist as a manager is to choose between suffering that higher maintenance expense or the capital expenditure of replacement—whichever is the least expensive for the operation.

1166 In a property of unlimited life you would not hesitate about choosing to make a replacement, because you would expect to be able to use up that replacement over its life, and then it would be economic; but as I pointed out, if you had only 3 years more to go on the whole, you are not going to be disposed to invest in a 15-year life to eke out that 3 years unless you technically have to. You would choose to suffer with the higher cost of using an older depreciated unit of property, not that it is so efficient, but it is more economical than to suffer the waste of capital involved in reinvesting in long life property. That is a fundamental distinction between an industry with a terminable point and an industry in which it is presumed you will go on indefinitely.

A depreciated facility costs more to operate as a normal experience. A depreciated facility will involve you in greater maintenance expense. You experience it with respect to an automobile or with respect to any kind of physical property. When I am reaching the point that I am unable to use an automobile any more I probably would not be disposed to buy a new automobile even if my depreciated vehicle might be using a tremendous amount of gasoline and a lot of oil, and might be requiring a lot more maintenance, because I would well consider that a less wasteful experience than to take on a new car. The automobile illustration cannot be carried too far out, because presumably an automobile has an alternative sales value; but a property of this sort which has a fixed and specialized use, which is specialized for its purpose and which has a physical life in many of its units far in excess of the economic life, and which is immobile, has no such alternative application. This is a factor which I think is unique with respect to this kind of an undertaking, and I took it into consideration in arriving at a rate of return for these companies. The testimony here has been recently concerned with the reasonably anticipated behavior of costs, the character of the probable future cost experience, which is, as I indicated, one of the fundamental factors to be considered in the problem of the probable wages of capital that can be earned in the future. Whether or not an investor would be willing to put his money into a project of this kind on the assumption that taxes would remain level, I would say depends in part on how informed the investor is and to what extent he seeks information. I could appreciate that there are small investors who might be approached by a security salesman who would not have the basis for judging a phenomena of this sort. That is not the kind of an investor that should be interested in investing in a pipe line from Texas to Chicago. I merely wanted to qualify my answer by that understanding in the next instance. The informed analyst would be rather hesitant to accept any estimates based on the assumption that taxes will remain at the present levels. He knows that the trend of tax levels has been rising and continues to rise. He knows that there is not much in the offing to suggest that there is going to be any change in the trend of taxation. On the basis of past behavior and present outlook as an economist, I would be very skeptical of estimates which assumed that taxes are going to remain at present level. (Objection by Commission Counsel overruled.)

The record shows that these pipelines have been operating for the last several years at a very high load factor—for the last three years prior to 1939 at 92 per cent or 93 per cent of the total estimated or rated capacity. From an economic standpoint, any enterprise which has to produce its wages of capital, its income, by an intensification of its utilization factors is considered as being involved in hazards which would not be present if such were not the case. To put it in simpler language, a dollar of income earned as a result of high load factor and intensive use of the plant and facilities is, from an economic standpoint, a dollar earned with much greater risk and uncertainty than one which is the result of merely taking the cream of the market at a higher average margin of profit. Any intensive exploitation of a market leads to hazards which are not present in taking the more readily available and the more certainly retainable portion of the market. The lower rate of utilization by just taking the more desirable classes of customers or the more desirable classes of business does not introduce the hazards of the marginal customers
1167 dropping away from you, and does not introduce the hazards of the marginal business of the customers in general dropping away from you. In the case of depression these marginal customers are likely to be the first to go, and the marginal uses are likely to be the first to be given up.

Markets in which the competitive advantage, for example, is small, are much more vulnerable than markets in which you have a clearer and stronger foothold. The economist analyzes these features and views an undertaking which has to earn its dollars by such intensive marginal efforts as more vulnerable to the impact of changing economic conditions than one which resorted only to trying to get the more reliable portion of the business and which in fact could make the necessary rate of return by only taking the more reliable portion of the business.

That distinction carries through public utilities, in my opinion, very clearly. It s not an uncommon position to take at all to say that a given electric company has a substantial proportion of industrial business, therefore look out for it. It does not have the balance and the certainty of one which confines its efforts largely to the more reliable domestic business, for example. (Motion to strike above answer by Commission Counsel denied.)

A manufactured gas business, for example, which is in a position to earn a satisfactory return from a back log of the manufactured gas business in the range use of gas in the home, in my opinion reflects one type and degree of hazard and economic risk; but if a gas company goes out, for example, and assumes to sell gas for house heating purposes, the income which it obtains from that additional business is an income which must be appraised in an entirely different way than the income earned from the solid and reliable domestic range business.

To revert once more to the electric industry, when the electric industry goes into the range business and starts getting out on its thin ice, so to speak, or in the hot water heating business, it similarly receives from a class of business income which must be valued on a different basis than the income from its most reliable sources.

It has been my opinion for a great many years that a refinement of income valuation is called for on the basis of the character of the business that an enterprise does; and it is no extreme and undue refinement, in my opinion, to recognize such readily distinguishable classes of business as domestic and industrial, and even to divide domestic business into that part of the business which a given type of company has a clear control over and a hold on from those in which it is distinctly in the competitive area. (Motion to strike by Commission Counsel renewed and denied.)

I have elaborated the answer to the question as to whether, in my opinion, there is any recognition to be given from the standpoint of hazard and risk to the fact that a company has to operate at a high load factor and that it has to go and get additional classes of business to operate at a high enough intensity to make the income which it is making.

I have been using "load factor" in the discussion probably as synonymous with "utilization factor." Load factor more narrowly should probably be defined as the ratio of the average demand to the maximum. I was here using utilization factor really more accurately, namely, the ratio
of the average utilization to the plant capacity, which
1168 may be a little different from the peak which it
reaches. (Motion to strike by Commision Counsel
overruled.) The income obtainable from industrial sales is not as reliable and not as certain and not as dependable, and therefore would not be capitalized at the same rate as the income from the more reliable, certain and dependable domestic service.

Cross-Examination Interposed by Mr. Slaff.

There are a number of small manufactured gas companies which probably have an insignificant amount of industrial or even commercial business. Larger gas companies attempt to obtain such business if they can obtain it at compensatory rates. That illustrates perfectly the point that I am trying to make, that when you have a gas company that goes out and gets some additional income from that kind of a source, it is not appropriately viewed as having the same value as income obtainable from other sources. The fact that they do it and try to get what income they can has not necessarily anything to do with it. I think substantially all manufactured gas companies secure some revenue from other than domestic purposes. I have in mind one company—a little gas company at Marshfield, Wisconsin that has no industrial gas business.

I have not had occasion to examine page 2 of Mr. Gilman's exhibit. I do not know his testimony other than the industrial section which I looked at after he gave it. I have not had occasion to look at that exhibit.

Direct Examination by Mr. Morgan Resumed.

I did not mean to imply that there was anything inappropriate about trying to go out and get industrial load or any kind of load which was incrementally compensatory.

I was simply making the basic observation, which is absolutely valid in my understanding of economics, that the source and character of the income is a factor to be considered in the rate at which it is to be capitalized, and that income derived from the more hazardous sources is properly classed in the higher rate than income from safe and secure sources.

Obviously an investor would be impressed with any demonstrated experience such as the falling off of revenues, mostly from industrial load, as between the years 1937 and 1938, of more than three-quarters of a million dollars; but a really qualified analyst would go further than demonstrated experience and attempt to calculate what the probable experiences of an enterprise of a given type of market and engaged in a given type of service would be. I would not consider it adequate to rely merely on the experience of a relatively short period of time. The fluctuations on account of the economic cycle is only one of the factors which would be involved. A business, for example, which falls within the segment of competitive business for alternative uses is subject to decline due to factors other than those arising out of the business cycle. But, a slight change in the technology or the efficiency of appliances for utilization could upset a delicate balance in the competitive area and throw you out of that particular field.

Summing up all of the elements that I have discussed here, it seems to me to be the reasonable economic expectation that higher unit costs of production would result in the future, and that is a circumstance that an investor would consider.

1169 I am not basing that statement upon the assumption that there will be rising prices in the future. I made no assumptions with respect to rising prices at all. I was not relying upon any forecast as to the probability of price behavior. The analysis I made is valid irrespective of a changing price level. That is an entirely different factor. The possibility of rising prices has been a threat for some years now. In my opinion we have engaged in various public and private economic practices which have laid the basis for a tremendous possible rise in prices.

I meant to discuss the probability of rising prices. "Possibility" is always present irrespective of the conditions with respect to a phenomenon such as changing price levels. A great many economic factors have developed in the last six or seven years making for a great probability of a rising price level. That probability of a rising price level has been recognized pretty generally. A tremendous rise in prices has not as yet occurred, and in my opinion probably will wait upon the development of one additional factor. We know that the full utilization of one or the other of the factors of production is probably necessary as a requisite to a rise in the price level. Even though prices seem merely to go up, actually there must be changes in the relationship of the supply and demand before prices are affected. The demand may well be affected by the threat of the supply of money, a threat of inflation or that sort of thing. I did not mean to get involved in all of the factors which might be back of a change in the supply or demand. I simply meant to point out that prices do not just rise. There must be changes in human opinion and willingness to buy and sell. One of the requisites of the development of that kind of a condition is the pressure upon the available supply of some one or more of the major factors of production, and that seems to have been what is primarily lacking during the last seven years.

The outbreak of the War, for instance, furnishes possibly the final remaining circumstances needed to bring the process to fruition for which we have well set the stage, namely such utilization of our industrial production capacity, such demand upon resources as require producing those products which can only be provided at higher costs, and which will bring us to the point where we will actually experience this rise in prices which a great many economists have considered probable for a number of years already.

I consider one of the most important differentiating characteristics between these enterprises and the public utility gas companies to be the lack of the control over the market; and I use the word "control" in a general sense. The fact that the production and transmission company dos not actually exercise what I think of as the business control over its market is an adverse factor. The inability to deal with the ultimate market in a manner which is most advantageous to the production and transportation company puts limitations on what it could do either to work this out to its own best advantage or in case things are going bad, to protect itself as effectively as it might be protected.

I think the situation is clearly comparable to that of a manufacturer who finds that his outlets, his contact with the ultimate consumer, is only through the buffer of a distributor or a limited group of distributors. What they do determines how effective he can be; and the tendency has been in large scale business in this country to try to break through that buffer in order that the producer who is vitally interested in the volume of distribution may actually conduct his business affairs in such a way as to achieve the optimum result.

1170 *Cross-Examination Interposed by Mr. Booth.*

I said I used the word "control" in the business sense. That the producer did not have the discretionary power to control the manner in which the market would be exploited, to determine the shape of the rate curve, to determine to what extent he would engage in the exploitation of a given class of business. Suppose he is of the opinion that the house-heating business could be very well developed in a given market; that in his opinion it would pay to spend a considerable sum of money to develop the househeating business, but those in the control of the market may not think so, and consequently do not put themselves out to develop that particular part of the market. What I meant by lack of control is that a producer is not in a position to force the enterprise in control of the market to go out and develop the market as the producer would like to have it developed.

Direct Examination by Mr. Morgan Resumed.

In my opinion an investor in the securities of defendants would be impressed and should be impressed with the possibility of direct competition by a raiding line, as that term is commonly used, or the discovery of a different source of supply at a shorter distance from the City of Chicago than the Panhandle of Texas. Direct competition would apparently result in either forcing lower prices for the product of the existing facility, or a dividing up of the market possibly; and a division of the market and its effect on the industrial and internal economy of such an enterprise would mean a lower utilization of its facilities, a lower revenue volume, without proportionate reduction in costs, and consequently a lower income. Apparently there are one or two cases already of proposals for building competitive natural gas pipelines in the United States who are attempting to obtain or have actually obtained approval of the Federal Power Commission for the building of such competitive lines. As I understand it, there is one of which there has been approval, the case in which Commissioner Manly dissented, and another case is under consideration where an application has been filed with the Commission.

A threat of direct competition in an industry in which the capital is so specialized and so long-lived and so immobile as in this kind of an industry is viewed as particularly hazardous.

Another factor which must be taken into account is the competition in which natural gas finds itself with such fuels as fuel oil, distillate, coal, and things of that sort. This is certainly true of a company like defendants, 40 per cent of whose volume of gas is sold for industrial purposes. Any change in the relative position of competitive service or competitive fuels ought to be taken into consideration. Any change in the relative position of such competitive fuels would have the same general effect that the introduction of a directly competitive line would have; and that is that a loss of any substantial portion of the business due to the relatively more favorable price of oil or coal would reduce the volume, which is very significant for this particular enterprise.

1171 *In my opinion there is a distinct threat in the aggressive market policies and practices of the electric industry. I have testified before with respect to the future of the gas industry that I consider it distinctly prejudiced by the apparently increasing success of the electric industry in capturing additional portions of its markets. The policies and practices of the electric companies are becoming more of a threat all the time under the pressures under which they are operating in the United States. The pressure, for example, to show a large volume of consumption per customer leads them to seek business which may have a very small margin of profit in it, such as the electric range or the electric water heater, but which builds up the consumption per customer. This also has some direct economic advantage since it puts the customer at a lower point in the rate schedule and thus makes him available for the buying of other services at lower prices in the rate schedule.

The pressure on the part of government to force domestic rates down and to achieve lower average rates in the electric industry, is, in my opinion, prejudicial to the gas industry because it puts an added pressure on the electric companies to seek to invade the common ground between the two services and take a larger proportion of it. In general I am of the opinion that the management of electric companies is more aggressive with respect to fighting for the common market than are the gas companies. I cannot particularize, but this is the general observation for which I have been on record for a great many years. I have made further studies as to the factors that necessarily enter into the arrival at a proper rate of return, that is, the factors that I saw constitute hazards and risks confronting these companies. I believe in building a solid foundation of the most fundamental factors and working from those to the more immediately and directly observable applicable evidences. (Motion by Commission counsel to strike overruled.)

After carefully considering all the fundamental factors, I moved to consider the objective form in which these factors expressed themselves. I studied the market behavior of investment opportunities in general; I have studied the market behavior of investment opportunities in public utility industries; I have studied the market behavior of investment opportunities in the natural gas business; I have informed myself as to the character and conditions and circumstances under which the natural gas industry has been able to bargain for its capital supply.

In connection with my academic work as well as my consulting work I am professionally under obligation to keep informed about the general behavior of the financial markets and the earnings of business in general, as well as those particular lines of endeavor which happen to be represented by those consulting me. I take every occasion and opportunity to do that.

I have examined pages 6 to 15, inclusive, of Exhibit 150, and I believe I understand the character and import of the facts offered there. (Objection by Commission counsel overruled.) I would consider an exhibit of this sort of fundamental value in establishing something of the metes and bounds or in staking out the limits, so to speak, of the earning power of industrial capital. I would not be impressed by the results of any particular classification; neither would I consider that the result of a summation of

this sort necessarily posits a point that is the proper rate of return for the natural gas industry or a particular company in the natural gas industry; but I think it serves a useful purpose. In fact, the device is rather commonly employed for orienting the approach, for giving perspective, and for setting some of the limitations within which judgment would tend to find expression. Without anything of this sort one would be relatively helpless as to any understanding of what the limits really are in industrial enterprise. I have attempted to make an
1172 appraisal of that evidence as I would appraise it.

Having access to pages 6 to 15 I looked it over carefully and have some opinions about its possible validity and the extent of its possibly appropriate employment. I made a few checks on the fundamental statistical validity of such an array. (Objection by Commission counsel overruled.)

I noticed in viewing this array of average returns on invested capital for the period 1934 to 1937, that the array reflected a very considerable extreme of items running from .57% up to 37.69%. Any statistical array which affords that kind of an extreme is always worth critical appraisal to determine whether or not an averaging of that kind of an array is an appropriate treatment. My own approach to testing such an array would be to determine the representativeness of various levels. Consequently, within the limited time and energy at my disposal recently, I just arrayed these rates of return from the lowest to the highest in an effort to see whether or not there was any distinguishable mode or representative level which might be more valid and which might either support or cast some doubt on a simple mathematical average.

In the first step of determining a mode on a 2-point interval no clear mode is indicated. In the second step of determining a mode on a 4-point interval no single mode is indicated, but 10 items and 9 items, respectively, fall within two adjacent groups, giving us an adjacent grouping of 19 out of the total number of items available. That range is from 6.16% to and including 13.98%. That seems to be the dominant group within the array. Just to deal with keeping an even number of items on each side, because 13.98 appears twice, I have taken the central 17 items of this array, which leaves 10 on either extreme and is more representative possibly. In other words, excluding the extremes on both ends, a very common statistical testing device, I found that a simple average of a more homogeneous segment works out at something over 10% in the average, which is fairly close to the 11.04% obtained by taking the series as a whole.

The second point of appraisal appropriately made of such an exhibit, I think, is with respect to the period 1934 to 1937. I do not consider the period 1934 to 1937 representative of the full earning power of industrial capital in general. It is a matter of common knowledge that the industrial earnings in the period 1934 to 1937 were relatively low and unsatisfactory to business.

Cross-Examination Interposed by Mr. Slaff.

It is understood that we have been in a depression during this period, and if depression means anything, it means a low level of industrial earnings and industrial activity. The output of the industries, the profits of the industries, the employment of labor, all bear evidence to the economic conditions maintaining since 1930, and the period of 1934 to 1937 still includes too large a proportion of the years in which those unsatisfactory economic conditions prevailed to reflect representative earning power. It is pretty difficult to estimate whether this four-year period would be representative of the decade from 1930 down to the present. 1938 is not in there, and 1939 is not in either, which were years which represented some considerable improvement, in many lines at least. If this could have been extended to 1938 and 1939 I believe that the ratio shown here would be higher than it is with including merely 1934 to 1937. I do not think it is representative of the nine or ten years from
1173 1930 through 1939. This decade is not comparable
to the period 1923 to 1933. (Motion to strike above testimony by Commission Counsel denied.)

By the term "normal" I meant it in no other sense than it is commonly employed in the literature of prosperity and depression. Our references are always, of course, to some past period. We do not think of normalcy with respect to the future. It refers to what has been a representative expected earning power in the past within the memory of the people who are now evaluating the present and looking into the future. Thus, with respect to indices of price levels or with respect to purchasing power and that sort of thing, it is common always to look back. In the Bureau of Labor Statistics, indices are based on 1926 in the name of normalcy. This is not a term of such definite and specific meaning that it would apply to earnings experienced in any particular period of the world's history.

I am using it in the same sense in which it is ordinarily used, and I appreciate that that is the way the term "normal" is used. We are prone in this period to think of much that happened to us from the late war to 1930 as normal. That would give you one norm. Then you could go back and speak in terms of a 20-year period, and you would have a longer normal period. I meant essentially the pre-depression experience. And for a larger period than the past-war pre-depression decade of say, 12 years. And for our earlier comparison the four years here are not normal, as they reflect the continued depression period from 1930 through 1939.

Direct Examination by Mr. Morgan Resumed.

I would like clearly to go on record that thoretically the use of an investment base is for rate of return determinations invalid in that an investment figure is by definition always a past figure, and the valuations which are of final importance in this kind of an undertaking are present value figures. I have testified to that on other occasions, and I believe that is the correct way to do it. That would certainly be a disqualifying fact if we were concerned here with one company. If this were one company and without any indication as to when it had made its investment, and under what conception of accounting records it had recorded this investment, and on what principles it was continuing to place certain reliance on past figures drawn from books of account, for any one company that would invalidate any comparison with the past. But it is to be noted here that we have not one company or just a number of companies, but what purports to be a cross-section of American industry. Consequently, it should be observed that what is known as the year of inception of American industry is not some one year, but that the date of inception of a cross section of American industry undoubtedly spreads itself over the period of development of American history; so we get a synthesis of all sorts of different periods, high periods and low periods, of original investment which are undoubtedly reflected in the investment figures carried by this cross section of American industry; in some of the last ten years there was relatively large investment reflected in those figures. There would not relatively be as much investment in the last ten years as during the higher priced periods which preceded it.

1174 The year of inception would be spread over all price level history, including not only the highs and the lows, but the years of expansion, so that the incremental investment of these enterprises may safely be presumed to be spread over such a substantial period and vary sufficiently to substantially negative the probability that this investment reflected here was all at the bottom of the pit or at the top. In fact, the behavior of investment figures and cost new figures with respect to many industries appeared to come to a kind of stalemate about 1931. That is, the public utilities—electric companies in particular—which were fairly early in the history and which developed in growing communities, found that by 1931 the question as to whether investment cost or present cost was used became almost a matter of indifference. That is, a coincidence appeared to be developing at that time which was something of a consideration in connection with rate matters and others.

(At this point preliminary cross-examination by Mr. Booth of the witness to determine the competency of the witness' statement) "That the question of whether investment values are on the average still high, I think could be resolved to a fairly safe estimate that yield on the present value of the investment of these enterprises would show a higher percentage." (The following testimony appeared: The witness also stated that he had not studied the cost records and investment value of any particular company but that he had studied the cost records and investment value of many companies; that he is acquainted with the volume of those right-downs and the industries in which they have occurred and that he has a basis of comparing the extent of right-ups and right-downs in industrial businesses with the extent of such right-ups and right-downs in the public utility business; that he had spent two years studying in particular the capital revaluations of public utilities.)

Preliminary Cross-Examination by Mr. Booth.

On page 6 of Exhibit 150 the first classification of corporations is Automobile Parts and Accessory Manufacturers and that is composed of 40 corporations shown on page 7. The name of the first corporation is Ainsworth Manufacturing Corporation. I don't know where its business is located. I have never seen its property. I do not know what its property consists of. I do not know what buildings comprise the Ainsworth Manufacturing Corporation. Nor do I know the present condition of its property.

The next one is the Aluminum Industries, Inc. I don't know where its business is located; I have never seen its property; I have never made a valuation of its property; I have never talked to anybody that has made such a valuation; nor have I ever talked to anyone who talked to anyone else who has made a valuation of its property. (Objection by counsel for the company.)

I do not know the total capital investment in the Aluminum Industries, Inc. nor do I know when the investment in that corporation was made.

The next company, the Backstay Welt Company, is another company with which I am not familiar with its property. I do not know where its property is located; what its properties consist of; what the total capitalization of that company is; when the capital was invested; nor do I know the present condition of its property.

My answers would be the same with respect to each and every one of these corporations on pages 7 to 15 of Exhibit 150, with the exception that I cannot say that there are not some that I may not have examined. (On motion by counsel for the two commissions, the sentence first above was stricken.)

(At this point counsel handed the Examiner a document entitled "Natural Gas Pipeline Company and Texoma Natural Gas Company Data Concerning Rate of Return—Witness H. B. Dorau" with the request that it be marked for identification. At the Examiner's direction the document was marked Exhibit 152 for identification.)

Exhibit 152 was compiled and prepared by myself or by my assistants under my direction. The chart on page 1 reflects the changing yield to maturity at market prices of Moody's 40 Public Utility Bonds, which are divided into four series of ten selected bonds each by rating classification. This chart is composed of yields reported by Moody's Statistical Service for the Aaa, Aa, A, and Baa classifications. It should be understood that each of these series includes at each time ten bonds. It should also be understood that Moody's chooses to change the content of the series from time to time as they feel it necessary to maintain comparability or because securities drop out. In this chart the vertical axis measures the yield to maturity at the market price in per cent per annum. The horizontal axis expresses the years by months in the period 1919 to 1939.

The legends Aaa, Aa, A, and Baa are the identifications which Moody has developed to indicate its highest grade bonds, its second highest grade bonds, and its third and fourth grade bonds. The Aaa bonds are the highest grade of bonds.

In my opinion a chart of this sort affords a background for an understanding of the changing yields of selected public utilty bonds. Thus it affords a basis for comparison, a point of departure, so to speak, for coming to a conclusion as to the relative position of securities of natural gas companies.

I would like to observe that this is the kind of chart which is often used as a point of departure in a study of necessary supply price of capital and that I employ it only as such a point of departure. I do not mean inappropriately to propose to rely on this to reflect the necessary rate of return as such, because a chart of this sort does not give the full range of risk classifications, and of course, as is obvious from the title, this is a chart of public utility bonds. Obviously the risk element in the preferred stocks or common stocks are not intended to be reflected.

1175 *Cross-Examination Interposed by Mr. Booth.*

By the term "point of departure" I mean a beginning point, a starting point. I do not mean a leaving point. This is the beginning and not the end. This is the taking-off place from which we start.

Direct Examination by Mr. Morgan Resumed.

The curves in that chart give a background picture of the changing levels of the yield return on the four different classifications of securities of different risk characteristics. It is readily noted that the levels of yields of securities of these classifications have changed markedly from period to period. There is the post-war rise in 1920 and 1921, followed by a period of declining yields on all classes, reaching a low point in 1928, followed by a gradual rise to 1931 and a marked rise in the security classes representing the larger degree of risk through the years 1932 and 1933, after which the returns declined again to the levels indicated at the last point about the middle of 1939. It is significant that the two higher classes of bonds seem to show less reaction to certain temporary conditions than the other two classes, particularly in the periods 1920 and 1921, and 1931, 1932, and 1933, and about the first of 1938. That is a characteristic of the behavior of the yields on these classes of bonds of different risk characteristics which is worthy of note. I attempted to direct particular attention to that aspect on the revision of the chart at page 5.

The figures shown on pages 2, 3, and 4 are merely the supporting data which is incorporated in the chart on page 1.

Passing on to the chart on page 5, it will be readily observed that that chart is the same as the one on page 1 with the addition of a fifth curve. This fifth curve, which is found in the dotted line and running generally toward the bottom of the chart, measures the difference at each point between the yields on the Aaa bonds, the highest grade, and the Baa bonds, the lowest grade shown. This I consider significant because we are dealing here with four classes of bonds of different risk characteristics; and the changing amount of risk differential which develops throughout a period such as is recorded from 1919 to 1939 I believe is significant.

It will be noted that the difference between the yields of the Aaa and the Baa bonds rises during the period of uncertainty in 1920 and 1921 and declines to a low point, in 1928, then rises substantially to 1931 and sharply through 1932 and 1933 as the level of bond yields rose during that period. Since 1933 the difference in yields between the class of highest risk and the class of lowest risk declined to a fairly low level; and this occurred again in 1936, from which, however, it jumped up rather quickly to a fairly high level in the early part of 1938. In fact, in the early part of 1938 it reached a higher level than at any time in the series except for the middle of the depression period of 1932 and 1933. Since the forepart of 1938 that differential index has again declined to a point which is still higher than the low point reached in 1936, and it is interesting, and I believe significant, that the differential in 1938 remained higher than it was throughout the period, say 1924 well into 1930.

1176 I think the changing differentials here are clearly indicative of the greater sensitivity of the series representing the higher risk securities to the uncertainties and the fact that those differentials still maintain the relatively high levels compared to the period of which we choose to think as the normal prosperity of the Twenties. The figures on page 6 support the differential curve which was added to chart 5.

The chart on page 7 represents another variation of the chart on page 1. With the exception of the fifth curve at the bottom it is identical with the chart on page 1, except that in comparing here the absolute difference between the yield on the securities of the highest grade and of the Baa grade it seemed only appropriate to determine what the relative significance of that difference was. I was perfectly aware that the absolute difference would fluctuate merely by virtue of the changing level itself, namely, the mere magnitude of the numbers here contained would result in an increase in the absolute differential as the level of the four curves moved up from 4% to 6% or higher. It seemed only appropriate that we make a determination as to whether the relative significance of the differential changed in harmony with the absolute change; in other words, whether the absolute change was more or less than proportionate to the level at which these securities were selling.

The curve labeled "Ratio Baa to Aaa" at the bottom of page 7 is a recording of that ratio. The method of determination of the ratio is simply to impose the yield at each point of the Baa classification over the yield of the bonds on the Aaa classification and determine the ratio. Thus, when it reaches a level of 2, it is two times as much. This curve shows a different character than the absolute difference curve in that in the period 1920-

to 1921, when we had a fairly substantial rise in the absolute difference, there is now no great rise in relative difference, indicating that the rise at that time in the absolute difference was probably only proportionate to that rise in the level of yields itself, thus disclosing what I consider one of the limitations on an absolute difference measure as an index of this circumstance.

Thus the curve holds fairly steady all the way down through 1929, begins to rise at the end of 1930, and then indicates that the increase in the absolute difference was more than proportionate to the rise in the level of the bond yields as a group. Some recovery took place following 1933, through 1934, and the new low point was reached in 1936; that is a low following the depression years of 1932 and 1933, with a rise in 1937 and some recovery in 1938. But it is interesting now to use this relative measure of the risk differential to note that even though there was a recovery following the years 1932 and 1933, and even though there was some recovery following the rise of 1937 and the forepart of 1938, that the level at which this differential holds since the depression continues to be well above the level which it held before the year 1932. In other words, the relative significance of the risk differentials since 1932 and 1933 has not declined to the levels prevailing during the period 1919 to 1931.

I interpret this as evidence that investors are placing a relatively higher significance on the risk differentials that exist than they did during the period 1919 to 1931.

1177 There is a great deal more that can be said in the interpretation of a chart of this sort. I would like to make it perfectly clear that this curve is the ratio curve, and that any ratio curve is of course influenced by both of the factors used to develop a ratio. Thus, the behavior of both the Aaa bonds and the Baa bonds enter to influence the ratio result. It can be looked at either way, that the Baa bonds have done it or that the behavior of the Aaa bonds have made the ratio what it is. I think that is perfectly clear to anyone who understands the ratio relationship.

If we wanted to carry this analysis further, we could measure that differential as between every one of the classes and the Aa bonds, for example. From observation, it probably can be seen that in general a similar result, although not as magnified of course, would be portrayable.

It simply means that if it were disclosed by such a refinement that the relative differences were maintaining a similarly or proportionately high level that the valuation of the the risk between A and Aa or between A and Aaa would represent a relatively larger consideration in the investor's appraisal of those securities at that time than it did at the earlier period with which we are comparing it.

The figures on page 8 represent the ratios of Baa to the Aaa.

The chart on page 9 is but the superimposition of the preceding curves of the absolute difference and ratio difference on one chart to facilitate ready comparison of the behavior of an absolute difference curve and a relative difference curve. It is merely a combination of the other three charts. And for visual purposes, this makes it easier for anyone to compare the behavior of the absolute difference and that of the relative difference. It shows that the relative importance of the differential yields does not fluctuate as widely as the absolute difference, thus indicating the effect, in my opinion, of eliminating the influence of mere magnitude of numbers on such a measuring device.

Passing on to the next chart, appearing on page 10, the vertical scale is again the yield percent to maturity as before, but the horizontal scale is only intended to indicate year-end points for this purpose instead of the monthly points as in the more elaborate preceding charts. Thus, the prices and yields for the securities developed on page 10 are based upon year-end or nearest to year-end prices. The reason for doing that was simply a reduction of the tremendous amount of labor involved in the calculations of this sort; and I think for purposes intended by this chart, a single point is probably adequate. I took the year-end or nearest to the year-end, probably never going out of the month of December or the nearest price available in the year.

It is a pretty well understood fact that the Moody Series which I used in the preceding charts and which are so commonly used as a point of departure or beginning, represents a highly selected bond series group. The 1178 standards of selection are fairly rigorous, I understand, and I rather doubt whether they are representative of the levels at which securities of these classes in general are sold; so in order to take a step in the direction of greater reality and representativeness, a number of series were developed here just to see how far we would depart from the traditional levels which are so often referred to.

The first series on chart 10 reflect the yield at the year-end or the last available price of 55 gas and electric company bonds. I might say that one additional feature employed in this chart is the effort to maintain continuity of the bond in a series, actually to attempt to keep the same group together and see what happens to it. Some analysts have some doubt about the changing content of a series like Moody's series, so a great effort was made to obtain a continuous series. A great effort was also made to develop as large a continuous series as was possible; and I want to say that that involved a matter of great difficulty in that bonds have a habit of inappropriately dropping out and disappearing and spoiling a series, making necessary recalculation backwards to maintain a uniform base.

The heavy solid line represents therefore the yields as indicated for 55 identical gas and electric company bonds. These are shown on pages 15, 16 and 17.

The heavy dashed line represents the bonds of 18 manufactured gas companies, and the same identical bonds throughout the series. The light solid line represents the changing yield on 24 public utility preferred stocks; and the light dashed line represents 22 of those 24 public utility preferred stocks. The reason for encumbering the chart with that fourth curve was because two of those preferred stocks that were in the 24 so dominate the picture that it seemed only good and fair statistical procedure to show what the curve would be like with those two eliminated. I probably failed to mention that these are weighted average curves; and that is why the 22 and 24 stocks series are developed, because of the weight of the two preferred stocks in size so dominating the picture. The two preferred stocks referred to are those of the Pacific Gas and Electric 6 percent cumulative 1st preferred, and the Consolidated Gas $5 cumulative. They were in volume so large that we wanted to be sure that the character of the curve was not the character of those two preferred stocks.

The fifth line is introduced again for the purpose of base comparison. To depart from the exclusive use of Moody's series, I took recourse to the Standard Statistics Index of Yields on their highest grade bonds, and recorded that at the bottom of the chart to establish something of a point of reference, a base line from which to judge the comparative level of these indices, representing different classes and different risk characteristics. I don't know how many bonds are represented in the Standard Statistics group. The Standard Statistics does not publish the content of their A-1 plus series and refuse to take on the task of giving it. I want to say for the record that I tried to get it. I have tried before and failed before. I would like to say this about it, however, for your information, that it is a larger series than Moody's 10 Aaa. They are willing to say that they include a large number of bonds falling into that classification, but they won't tell us how many or which ones.

1179 *Cross-Examination Interposed by Mr. Slaff.*

This is all the same series. It is not weighted. In case you are confused on it, I will have to make the record clearer on it. Their series is not weighted, and it is the same identical series. There is not much point of weighting in that, because it represents a large number of bonds, and the probability of any one series or bonds overweighting the thing is remote. I think the difference in the curve on page 10 and that on page 11 is due to a shift in the plotting.

Direct Examination by Mr. Morgan Resumed.

Still referring to the chart shown on page 10, I do not know whether I stated that the purpose of this chart was to establish the levels of public utility security yields when identical securities are maintained in a series throughout a perod of time. The purpose is to establish a more representative level of security yields than is obtained from the charts which reflect the changing yield of a selected series, such as the Moody series, and to determine the relative position of gas company securities by the use of a manufactured gas index, because so few gas company bonds ever find their way into the series that are commonly used. Thus the Moody's series of 40 public utility bonds has only a few manufactured gas company bonds in it; and even that series of 40 is largely influenced by electric companies, composite gas and electric companies and telephone companies. So the third purpose of this approach is to see how manufactured gas companies place in a range of this sort. Then, in the fourth place, it is to get some picture of the levels for preferred stock yields as evidence of the price of capital for a grade and level of security different than bonds, one that is nearer to the greatest risk margin of the whole capital structure.

The chart on page 10 is that kind of a chart. Now I think I should like to add, for clarification purposes, that the average yield of Standard Statistics A-1 plus bonds that is used here is the average as Standard Statistics published it—that is not a weighted average and ought to be worded that way; and I think we were a little bit derelict in not clarifying it, but I thought people rather knew what the Standard Statistics Index was. The Standard Statistics Index of A-1 plus bonds on chart 10 is an index based on December 20th prices, which unfortunately I did not see fit to record in a table, but which I would be glad to furnish if there is any interest in the December 20th prices as such.

The chart on page 10 shows markedly different levels of security yields for these larger and more diversified groups. The difference, for example, between the Standard Statistics Index of bond yields on A-1 plus bonds is marked throughout the period ranging from approximately 1½ to 3 percent in amount. It is particularly to be noted that the difference between the Standard Statistics Index of yields on A-1 plus bonds is generally becoming greater. There is a fairly reasonable and close approximation in 1930, with wider differences in 1932, 1933, and 1934, some recovering and narrowing of the difference in 1935 and 1936, but an increasing disparity apparent again in 1937 and 1938. Now, with respect to the 18 manufactured gas company bonds, they hold a relatively favorable position in the public utility index down to 1934, after which they seem to fall into a certain amount of disfavor, crossing both the curves for the 55 gas-electric company bonds and the average yield on 24 public utility stocks. The peculiar behavior of that series I analyze in more detail in connection with the chart on page 11.

1180 The figures on page 12 support both the charts on pages 10 and 11 respectively. The supporting figures are all there except those underlying the Standard Statistics monthly data, which I have already explained. These appear on page 18.

The yields on the 24 public utility preferred stocks rose from a level of about 5.43 percent in 1930 to 8.39 percent in 1933, declined to a low yield of 5.08 in 1936, and rose to yield 6.24 at the end of 1937, and 5.65 at the end of 1938, reflecting a considerable disparity between the yield level of this risk security as compared with the bond yield levels.

I think I indicated earlier in the discussion that included in the series of 24 public utility preferred stocks there are two overwhelmingly large issues of high grade preferred selling at very low yields. In order to note the effect of the exclusion of these two dominant preferred stocks in a weighted average, the same calculations were made for the remaining 22 preferred stocks, and charted as a light dash line. The remaining 22 preferred stocks were available at an average yield of 5.84 at the end of 1930, rose to yield 10.98 for 1933, declined to a low of 5.59 in 1936, but rose again to yield 6.8 at the end of 1938. Viewing the resulting picture as a whole, it is clearly indicated that from this more representative picture of 97 public utility securities over the perod 1930 to 1939 the yield has been distinctly on the upper side of 6 percent.

I am addressing myself to the chart on page 11. Statistically it is always a question whether a simple average or a weighted average should be employed. Actually no categorical answer can be given. It depends on the character of the data and to some extent on what is desired to be shown. Thus, for example, in connection with new financing, the volume of new financing can be reflected as an average yield per issue or an average yield per dollar of capital raised. Now, if attention is to be directed to the dollar of capital that was raised, the appropriate thing is to weight the issue by its size and get a figure that is the average yield per dollar of capital; whereas, if you are interested in the representative level of security issues as such, the simple average would be the appropriate one to employ. In general, the important thing is to understand what is being obtained. Actually, there is probably never such a thing as a weighted average. A weighted average immediately becomes an average of something else, that is, it is an average per dollar instead of an average per issue, that is all.

Thus, the transposition from simple to weighted average, or the reverse, should be carefully made. In order to avoid any question of the sort, as to which is more appropriately employed where there seems to be some argument on either side, I have represented some of the figures which support the chart on page 10 in the chart on page 11, on a simple average basis. In this chart the same 55 gas and electric company bonds are employed to develop a simple yield index based upon prices in December of each year. These 55 gas and electric company bonds were available at a simple yield of 5.18 at the end of 1930. The yield on this identical list of bonds rose to 7.60 at the end of 1933, declined to a yield of 4.19 in 1936, and returned to yield 4.48 in the end of 1938. So that that series, I believe speaking from memory, runs a bit lower than the weighted series, indicating that the effect of sheer volume was in the direction of those which yielded a slightly higher yield.

1181 The index for manufactured gas company bonds is broken into two series here in order to more clearly display the true facts with respect to these securities, one including the same 18 bonds used in the chart on page 10, and one using only 14 bonds. It was discovered that during the last two years of the series two of the continuously employed bonds were starting to act up very unsatisfactorily, declining in price which resulted in abnormally high yields; so in order to eliminate the effect of the two that were distinctly non-representative from the rest of the series, those two were eliminated. In order not to cause too great a distortion on account of that, the two lowest bonds for simple average purposes were also eliminated. In other words, the series of 14 is a selection of 14 from the middle of the 18, to avoid the effect of the extremes and get a more representative behavior.

I can not determine from that page which were the two highest and which were the two lowest. My memory is that the two highest ones eliminated were the bonds of the Laclede Gas Light Company. I do not recall which the two low ones were, but the two highest and two lowest were eliminated. Relative volume has no influence here. It is a simple average.

It can be noticed here, as the result of that purification in effect, as to that statistical series, that both series plotted in the dash lines follow very closely together, display a fair degree of homogeneity, until the end of 1938 when a marked disparity between the two series develops; and it is the suggestion that the seeking for a more homogeneous sample is the justifiable statistical procedure. I believe that the index of the 14 bonds is consequently, over the whole period, more representative, but there is not any violent difference until we get into 1938.

Now, it will be noted again on the simple average basis both the 18 and the 14 manufactured gas bond series held below the average yield on the 55 gas and electric company bonds down to the end of 1934, at which time, as we noted in the weighted average yield analysis, they seem to have fallen into increasing disfavor and were available at distinctly higher yields than gas and electric company bonds.

The index of 24 gas and electric company preferred stocks on a simple average basis, now freed from the influence of the generally lower yields on the large issues of large companies holds at somewhat higher levels than the weighted average as reflected on the chart on page 10, holds a somewhat higher level than does the same curve on a weighted average basis. The yield on the series never falls far below 6 percent on a simple average basis reaches its high at substantially 12 percent at the end of 1933, declines to 9.93 percent at the end of 1934, and to 6.04 at the end of 1936, to rise again to yield an average of 8.10 at the end of 1937 and 7.10 at the end of 1938.

I think, from all of the trends indicated up to this point, it is rather clearly indicated that there have been, in the period since 1930, such marked fluctuations in the yields on securities that to have taken any one particular point there and said that that is representative would soon
1182 have proved you wrong in either direction and in
both directions at one time or another. Consequently, I think, from an evaluation standpoint, some perspective in terms of where these levels do come from and how they have changed, is useful, and is something of a discipline to jumping at conclusions with respect to the level at which they happened to be at any particular moment.

The index of manufactured gas company bond yields has probably more in common with the natural gas position than any other group of bonds so far analyzed and traced. The degree of protection afforded bonds of a series of this character in terms of times interest coverage is, in my opinion, needed to throw light on the significance of these relative yields.

In my opinion yields studied independently of coverage and yield levels without reference to the protective income available for the securities in any bond included in such a series, are relatively meaningless for a definitive and final judgment. Thus any bond series, for example, may be showing a declining yield on account of the improved position of the constituent bonds; not that bond yields are going down, but that the yield on a given series whose quality is improving may be a factor in causing it to decline.

The simple yield on these 18 manufactured gas company bonds as of March, 1939, was 5.51 percent. Now I have computed the coverage on that series of bonds just to give illustration to the point which I tried to make. The simple yield of 5.51 percent on 18 manufactured gas company bonds showed requirements earned of about 3.74 times. That means that these bonds, the prior obligations, had their requirements covered 3.74 times, on the average.

That was in March, 1939. I hasten to add also that the March, 1939 ratios are calculated by reference to 1938 income. I believe I heard a witness here earlier adopt the same technique, and I think it is an appropriate one to use.

In connection with bonds I do not think it is necessary to make the complicated adjustment, because bondholders look at the annual report of the past year more than stockholders, trying to anticipate the future. So I have done it on a simpler basis, simply using prices as of March, 1939 against 1938 reported income.

For the purpose of establishing some basis of appraising these average yields in terms of coverage it may be noted what the average coverage on the middle six items in Moody's average of Aa bonds was for the year 1938. Now the reason for taking the middle six is again the statistical reason for avoiding the influence of an occasionally unusual ratio which might be two or three times as high as some low one and completely distort the picture.

Taking the six middle items of Moody's Aa bonds for the year 1938, the coverage was 3.31. This is substantially less coverage than found for the manufactured gas bonds on either a weighted or a simple average basis.
1183 Whereas, the average yield of Moody's Aa bonds for March, 1939, the comparable date for the gas companies, was 2.99 percent; the yield for March, 1939 was 5.51 percent on the gas series. Thus, the coverage actually available there on the average is not so different, but the average yield for these securities is markedly different.

The times interest earned for the 18 bonds was 3.74. Thus, the yield on Moody's Aa bonds, which is the classification in terms of coverage which most nearly approximates the coverage on these gas bonds, at 2.99 is substantially below the simple yield of 5.51 percent of the 18 manufactured gas company bonds.

Now, coming down to the bottom of the chart, the Standard Statistics curve employed on this chart is a simple average of the four quarters that are reported in the table; and of course the four quarters are the average of the respective months involved in the quarter. Thus, the curve is not at every point entirely identical with the other curve on page 10 because of the difference in the base of calculation. The principal differences develop in the point for 1931 and 1932, and there is a slight difference in 1934.

So far as that line is concerned, the caption ought to be amplified, that the Standard Statistics' index is the simple average of the four quarters for the year instead of the year-end figure. In other words, the average on page 10 is the average of December 20 yields and that on page 11 is the simple average monthly as reflected by quarters on page 18.

I would like to comment on the data shown on pages 13 to 17, inclusive. As of March, 1939, the weighted yield on the 18 manufactured gas company bonds was 6.14 percent, and the weighted times requirement earned, which is probably the legitimate and appropriate comparison to make if you are going to use a weighted yield, the weighted times requirement earned was 3.60. Thus, 6.14, the weighted yield as of March, 1939, and 3.60, the weighted coverage on the basis of 1938 income available, are in contrast to the yields which I previously quoted, the simple yield of 5.51 percent for the 18 gas company bonds as of March, 1939, and the simple times requirements earned of 3.74.

The 18 gas company bonds on page 12, for March, 1939, show a weighted yield of 6.14 and a weighted times requirement earned of 3.60. That is offered to contrast with and to complete the previous statement that the simple yield on these 18 manufactured gas company bonds as of March, 1939, was 5.51 and the simple times requirements earned 3.74.

Now, my being of the opinion that a period of this sort, with such rather markedly fluctuating yield levels, makes it dangerous to place too great a reliance upon any spot in the times series, I considered it worthwhile to establish the average or representative levels over this period of time for these various series. Thus, for the simple
average yield—I am speaking from the table on page
1184 12—for the simple average yield of 24 preferred
stocks, carrying it through from 1930 to 1938, accord-

ing to my figures the average is 7.98. Taking the 22 preferred stocks on a simple average yield basis—this is after eliminating the large low yielding issues—the average is 8.20. The 55 gas and electric company bonds on a simple average basis over this hectic period 1930 to 1938 average out at 5.46, whereas the simple average of the 18 manufactured gas company bonds gives me a figure of 5.72 over the period.

Now, in the light of what I believe with respect to the unfortunate influence of two of those bonds in the series of 18, I think we ought to add the average on the 14, which I do not believe is tabulated anywhere. The yield at the year end for the 14 manufactured gas company bonds for 1930 was 5 percent; for 1931, it was 5.98; for 1932, it was 5.79; for 1933, it was 6.86; for 1934, it was 5.48; for 1935, it was 4.66; for 1936, it was 4.24; for 1937, it was 5.68; and for 1938, it was 5.42, which averages for the period, to get a comparable figure for the more homogeneous 14 gas company bonds, 5.45 percent.

Pages 13 to 17, I believe, represent the listing of the issues included in the indexes that were discussed in the preceding charts. Found on page 13 are the issues included in the index of 18 manufactured gas company bonds. They record the bonds that were used in these series. These bond yields were always to maturity and preferred stock yields were straight yields.

The chart on page 19 and the two following charts are directed towards getting a closer view of the natural gas company position. I think possibly it will make it clearer as to what was done in each of them if I speak in respect to that whole effort. First, before addressing myself to that chart in particular, the first step in the development of the data on which this and the following two charts are based was to identify all the natural gas companies included in Moody's Public Utility Manual. After these had been identified the companies which had bonds outstanding were identified, that is, convertible debentures and any other security not a bond were excluded from the consideration of this particular study. All the companies having bonds outstanding then were checked in the Bank Quotation Record of the Commercial Financial Chronicle for prices on any Exchange, or in the public utility bond section. High and low prices were obtained whenever possible for each month. The problem, I may say parenthetically, with respect to a natural gas study is, I found, the same as expressed by some preceding witness; namely, the poverty of material to work with to get a really adequate and representative sample. That is the reason for starting out to take everything that is in Moody's and eliminate only what you had to give up, the effort all the time being to try to keep as large a mass of data as would conform to the necessary standards.

If only bid prices could be found the bid price was used instead of a sale. It, of course, is common knowledge that the bid would be lower than the asking price and is construed to be on the conservative side. It was in many instances, in a number of instances at least, the best that could be found.

The high and low prices for the month were found, were averaged, and the yield to maturity determined from 1185 standard bond yield tables. The yields for the three months in each quarter were then averaged to develop a quarterly yield. In cases where, for infrequent intervals, prices were available for only two out of the three months in the quarter, in order not to eliminate such bonds from an unfortunately narrow base anyhow, they were employed. Thus, upon occasion the average for a quarter is based upon two rather than upon three prices, in order to maintain the scope and breadth of the sample. In a very few cases where only one price could be obtained for a quarter, the yield on this bond was used in order to secure continuity of the series. However, there were very few cases where this was necessary, it it did not, in my opinion, affect the composite mass result at all. Bonds were excluded, of course, where no prices could be found.

Secondly, where the security became short term, it was eliminated. That is another difficulty with respect to natural gas security studies. Natural gas bonds are not usually issued for very long terms to begin with and then they soon hit the margins of a short term security and disqualify themselves because of the difference in the values of a short term security under these money market conditions. A default in interest payment of course excluded the bond before the default occurred. When and as soon as the security was called, the security was eliminated from the series.

By "short term" bonds, I mean maturities within five years. I think that is the standard accepted term, five years.

I think I can proceed with the rest of the explanation of the method used by reference now to the chart on page 19. The purpose of the graphical representation in the chart on page 19 and the chart on page 22, as well as on page 28, is to determine to what extent the experience with natural gas securities was comparable to the experience of the classes of enterprise previously analyzed. The purpose is to determine the range and representativeness and historical change of the yields on natural gas interest-bearing applications.

The vertical scale on chart 19 is the per cent yield to maturity, and the horizontal scale the years by quarters, and it will be seen that the quarterly yield was built up by averaging the monthly data.

Five curves are plotted on the field of the chart on page 19. The dash line identified as No. 5 records the changing weighted average yield of the total par value of natural gas company securities for which prices could be found and which conform to the conditions previously stated.

For fear of being misunderstood, I want to make one other limitation that I have made earlier, and that is there have always been excluded in these studies from natural gas averages any public utility company that was merely found to be distributing natural gas.

1186 The other four curves on page 19 are respectively, (1) the average weighted yield for the lowest one-quarter of the total par value. Now, this is a device which is a bit different and seemed to be made necessary by the range and variety of the security yields that one runs into in this kind of an analysis. So what was done was to take the total par values on which prices could be found in each quarter and array it from the lowest yield to the highest, then to measure from the lowest yield security up to a point representing one-fourth of the total volume thus reflected. Thus at each point throughout this series we are selecting the best one-quarter as evidenced by yield, which is a rather stringent and strong-armed way of separating a mass of this sort into representative quarters, in my opinion, however, the results are more representative than any mechanical division by characteristics other than the yield itself.

So the four curves, other than No. 5, on the chart on page 19, record respectively, (1) the average weighted yield for the lowest one-quarter of the total par value for which prices were obtainable in each quarter year, and (2) the average yield on the second lowest one-quarter of the total par value for which prices could be obtained for each quarter year. Similarly, curve 3 reflects the weighted average yield for the third quarter volume, and No. 4 the fourth quarter of the volume selling to yield the highest return.

In the middle of 1939 the lowest quarter was selling to yield an average of something under 4 percent, whereas the highest quarter was selling to yield in excess of 12 percent. The very range of the yields in data of this sort is what I consider makes necessary this kind of a breakdown, to show how representative an average curve, or how unrepresentative, for that part, an average curve might turn out to be.

The average in the second quarter of 1939 is 6.34 percent, but the range of yields which make up that average runs all the way from 3.58 percent to 12.29 percent.

I think it also would be helpful if I made this perfectly clear, that as a result of this method the same bond is not necessarily found in the same quarter continuously. Here we just admit to a membership in the quadruple class, the natural gas bonds if they merit it by being in one of the quarters at each time.

Obviously, you might hit $5,000,000, for example, and the quarter dividing the part would hit in the middle of it, in which case half of the $5,000,000 issue came in the lowest quarter and the other half went into the next quarter, since it is a division into quarters by the volume and not by the yield instance.

This chart shows that the spread in the average yield among the four quarters of the total volume was relatively small during the years 1928 and 1929. They hung fairly close together in those pre-depression years, surprisingly close for the performance over the rest of the period, but beginning in 1931 the possibilities for speculative fluctuation reflecting the greater degree of risk and uncertainty developing in general and in particular with respect to
1187 this class of investments becomes to be quite evident.

The statistical method employed here would naturally tend to stabilize index No. 1 very much, because it would always be privileged to have the cream of the total array included in it. Thus, we do not get the fluctuations reflected as much in the lowest quarter as in the second quarter, and of course very significantly in the third and fourth quarters.

The average yields for the second, third and fourth quarter volumes reached extremely high levels during the years 1931 to 1934, inclusive. The year 1936 reflected a substantial improvement in the position of these securities. The range in that year being only from four to 10 percent, if one may say "only" with respect to such a range. The relapse in the bond market of 1937, however, threw the curves widely apart again, from which they had recovered somewhat by the middle of 1939.

The yield levels reached by all but the best quarter of the total volume are not comparable with the experience of public utility securities, as far as the level is concerned. In the second quarter of 1939 the lowest quarter of the total par value by yield had an average yield of 3.58 percent, the second quarter of the total volume 3.89 percent, the third quarter 5.59 per cent, and the fourth quarter 12.29 percent, The average for the entire par value for which prices could be found in the second quarter of 1939 was 6.34 percent.

In the light of the hectic behavior of the securities of this class, it is not inappropriate to attempt to envision representative levels over a period of time. Over the entire period the lowest one-quarter of the total volume sold to yield 4.66 percent, the second quarter 6.14 percent, the third 9.29 percent, and the last quarter 14.73 percent. To reduce this to even more concentrated form it may be noted that the overall weighted average yield for the entire volume for the 11½ years was 8.71 percent.

Page 20 and page 21 record in table form the statistics on which the chart on page 19 is based.

1188 The chart on page 22 reflects a dispersion of each one of the yields applied in the preceding analysis. It is an effort at checking the representatives of the spread in the character of data employed. Averages of highly non-homogeneous statistical values are always possibly misrepresentative. In the chart on page 22 each yield used in the preceding analysis to establish four quarter volume indexes is plotted so that the actual range and concentration of yields at which natural gas company bonds sold during the period from 1928 to the middle of 1939.

The vertical scale measures the yields in per cent to maturity and the horizontal scale the years by quarters. Four designations are employed in this chart which should be distinguished. Each yield is indicated by a solid, filled circle, a black dot; the median point is indicated by a diamond; the first quartile point by an inverted pyramid; and the third quartile point by a pyramid.

Non-technically, the median would be the mid point in the array, and the first quartile would be a point one-quarter up in the array. It should be understood that a quartile is a point and not a quarter of a volume, as we used it before. It may be conceived as a quarter median. Median and quartile points afford an opportunity to trace representative levels that one may choose to interest himself in, and to trace the representative levels of yields as affording a contrast to the preceding weighted average yields which would always be influenced by the preponderance and size of certain issues.

The statistical tabulations on pages 23, 24, 25, 26 and 27 offer the supporting statistics on which the chart on page 22 is based.

This chart shows that for the years 1928 and, to some extent, 1929, a relatively compact distribution of yield between 5 and 9 per cent developed. The median for the years 1928 to 1929 ranged from 5.66 per cent to 6.80 per cent. The first quartile point ranged from 5.06 per cent to 5.61 per cent, but since 1929 the dispersion of natural gas company bond yields is obviously wide and irregular. While there was some reconcentration to be noted in 1936, 1937-1938-1939 again disclosed a wide dispersion. Thus in the period 1937-1938-1939 the median ranged from 6.46 per cent to 9.38 per cent, and the first quartile ranged from 4.40 per cent to 4.93 per cent. Again trying to condense a completely representative disclosure of this sort to a more comprehensible figure and to use some of these other measures here indicated, namely, the quartile and median points, I find that the average of the median points for the 46 quarters, that is, the whole period of the array, is 8.68 per cent. The average of the first quartile point was 5.14 per cent and the median 8.68 per cent. I did not assume to average down the list on the third quartile point. It obviously is a very much higher level.

1189 *Question by the Examiner.*

This is an entirely different approach from that reflected by the chart on page 19. On page 22 you have the actual yield by issues. In other words, the chart on page 22 is, in effect, an unweighted and simple representation.

Cross-Examination Interposed by Mr. Myse.

There is no attempt at averaging in the approach reflected by page 22. Every yield found is given its exact position. There is no boiling down. You have all the realism possible on this page, but the average on page 19 is a weighted averege. It gives effect to the size of the issues; and the quarter volumes obviously, in their location, are influenced by the size of these issues; but on page 22, in order to get around any influence of weight or volume, the actual yields in each particular instance are plotted to median and quartile points, merely indicated in order to allow for some following of the changing quartile points. Thus it is a median point to yields and not a mid point of volume. As explained before, this term "quartile" is a halfway point between the median and the top and bottom respectively.

Cross-Examination Interposed by Mr. Slaff.

You cannot always visualize the quartile point because it is sometimes over a dot, you understand. The statistical distinction between a quartile and a quarter of the range is that a quarter of the range has a volume in it. It is the amount from 0 to 3, say, whereas the quartile point might be 3.

Direct Examination by Mr. Morgan Resumed.

In the middle quarter of 1939, the last line on there seems to be 24 or 25 issues. The first 6 are separated from the second 6 by the quartile point. It is a technical statistical term used to mean just that, though I appreciate there is a good deal of confusion among people who do not use those terms.

In order to subject this material to one further test, all of the volume was arrayed by yield class intervals. Thus all the volume that yielded, at any time during the period, from 3 to 3.99 per cent was summarized. All the volume which at any time throughout the period yielded from 4 to 4.99 per cent was similarly summarized, and it was done that way down through the entire scale. This brings this rather widely varying data down to a somewhat more comprehensible basis, and also introduces the principle of evaluating it over the period of time.

Perhaps I can make it clearer if I point out that a given million dollars of bonds may have been sold at any one year to yield between 3 and 3.99, in another year between 7 and 7.99, and at another time between 11 and 11.99. If such a thing were possible it would find itself reflected in each bar in this chart at each interval. In other words, it is a composite of all the yields classified by the yield interval 1190 indicated in the scale, the horizontal scale on the chart.

The chart at the bottom of page 28 is the same material reduced to a percentage basis so we can see quickly the relative significance of the volume which sold at different yields. To summarize it in one sentence, it appears from that lower chart that approximately 23 per cent of the entire volume yielded from 5 to 5.99, and correspondingly the percentage of the total volume that yielded the different percentages set across the bottom of the page there is indicated. Approximately 45 per cent of the total volume over the period is shown to yield 5.99 or less, while 55 per cent of the total volume over the period is shown to yield in excess of 6 per cent.

It is clear that the mode is in the interval from 5 to 5.99 in the top chart and that the volume falling on either side of the mode is rather comparable, thus supporting the statistical position of the mode. I have made some observations with respect to the relationship of times requirements earned and yields with respect to these figures. Thus yields were obtained for the second quarter of 1939 for a par value of $151,779,000. The simple yield on this total par value was 8.69 per cent, for the second quarter of 1939, 8.69 per cent. The interest requirement on this total volume were earned an average of 2.22 times, that is, on the total volume on which the average yield was 8.69 the interest requirements were earned 2.22 times, that is, on this simple average basis. Now on a weighted average basis the yield on this total par value was 6.34 per cent, indicating the influence of the larger size issues for the second quarter of 1939, while the interest requirements on these securities on a weighted basis were earned approximately three times, again showing the influence of the weight of the large issues and the probably better average protection that they had. This is the second quarter of 1939.

Now I also offer figures which I do not believe I offered earlier in connection with the quarters for the total volume: Take the lowest quarter of the total par value—not the quartile point—the lowest quarter volume, which was in the second quarter of 1939, had a weighted yield of 3.58 and a weighted times requirements earned of 4.30. The second quarter volume had a weighted yield of 3.89 and a weighted times requirements earned of 3.66. The third quarter volume had a weighted yield of 5.59 and a weighted times requirements earned of 2.7, while the highest quarter volume yielded 12.29 and had a weighted coverage of 1.24. The weighted average of the total par value then had a weighted yield of 6.34 and a weighted coverage of 2.97. The simple yield for the second quarter of 1939 was 8.69 per cent and the simple times requirements earned of the whole 2.22 per cent. The supporting data for the charts shown on pages 19, 22 and 28 are shown on page 29 and 23 to 27, inclusive.

The charts on page 30 record the yields on public utility bonds of different risk characteristics as shown by Standard Statistics Indices of Public Utility Bonds. The reason for adding this series to the exhibit is that Standard Statistics divides the range into six groups as distinguished from the four groups of Moody's; consequently giving us a little more range. The average yields are recorded
1191 in the upper chart for the years 1924 through the
middle of 1939 for the six classes ranging from the highest grade A1+ down to the B classification.

This affords a check on the absolute differential analysis and the relative differential analysis which was presented based on Moody's statistics. Without taking any more time than necessary I think it would be sufficient to say that the absolute differences, as recorded in the second chart, confirm the result previously obtained. This further refinement, however, is to be noted in that here the differentials are as between and among classes, that is, each class is referred to a base which was something that was not done, you recall, with respect to the Moody's series where it was only the lowest class to the highest class. It confirms our expectation that if that basis were carried out in that page it would show the general trend of a widening absolute differential as you go into classes of securities having high risk characteristics.

Similarly, if you attend the chart at the bottom of page 30 it will be noted that the relative significance calculated on this same basis evidences a behavior very similar to that previously found, with a higher relative level of risk reward significance and with no approach in recent years to the low levels prevailing prior to the depression. The tables on pages 31 and 32 support the chart on page 30. I did not have planographed all the statistics on the absolute differentials and relative differentials which are found in the other charts.

The chart on page 33 records the volume of utility and non-utility domestic corporate long-term debt financing, classified as new and refunding by years. It will be noted that the public utility financing is indicated by the black and white segmented bar, whereas other domestic financing is indicated by the cross-hatched and diagonal designation. From this particular chart will be noted the very low level of any financing in the years 1931 to 1935 and the continued low level of public utility new financing during the period 1935 to date. The relative volume is indicated by the small black portions of the bars, and the point of contrast to which attention is called is the very low volume of new capital attracted compared with what was the fact in the period 1922 to 1931, when new public utility financing represented a very large part of all investment banking activities and when new capital was, as will be noted by the relatively small amount of white bar remaining, the preponderant portion of the financing.

The white portion of the bar reflects, of course, refunding, rebargaining for capital which has already established itself in its earnings power, whereas the new financing is the effort to get more capital into the industry. The table on page 34 supports the chart on page 33. The source of all these tabulations is the monthly report of the Commercial and Financial Chronicle of Corporate Financing.

1192 On page 35 the same basic chart is offered, with the superimposition of a curve showing the yield at offering price on new electric and gas utility bonds, that is, not new financing but new bonds issued, gas and electric utility bond issues. This yield at offering price suggests itself in the first instance as something of an index of the level at which capital bargains are being made by gas and electric utilities. It has, however, in my opinion, certain defects and is subject to misuse or misinterpretation, and I wish to address myself to some of those limitations. In the first place, a weighted average of the yields at offering prices of public utility bonds is influenced by all of the factors which go into that calculation, that is, the volume, the weight, the mere size and magnitude of the issues and the yield at which it enters. Consequently any such curve would not tell the whole story accurately if its qualitative content were changing over a period of time. It might be declining simply because a larger proportion of the kind of bonds which yielded less were included. In order to test that possible deficiency in a curve of that character the material reflected in the chart on page 37 is offered. Before leaving chart 35, however, I will state that the table on page 36 supports the chart on page 35.

In an effort to determine the qualitative character of these new bond issues in order to be able to appraise what kind of capital bargains were successfully made in recent years and at different periods, the financing of gas and electric utilities reported has been classified according to Moody's ratings. What is used is the first rating following the offering.

Now from the chart on page 37 it is seen that the Aaa bonds represented a relatively small and unimportant portion of the total volume before 1930; that even when you include the Aa bonds with the Aaa bonds they are still overwhelmed by the volume of issues of lower rating and classification; that after the year 1930 the Aaa bonds become a fairly important factor in the total volume of financing and when added to the next best class the Aa bonds clearly dominate the total volume of financing. Thus the Baa bonds, which were apparently quite salable in the period 1923 to 1928 and 1929, dropped into an insignificant position after 1930 and the Ba's and lowers practically disappeared from the scene of financing.

In the independent bar to the right of the chart on page 37 the average over the entire period is reflected. It should be understood, of course, that the average shown there for the Aaa bonds is tremendously influenced by the large significance attached to Aaa bonds in the later years, bringing up the very low level of the previous period very substantially. That affords a measuring stick or test of the relative significance. On page 38 the same chart is introduced with a different bar on the right. There is some interest in the question as to what is the distribution of utility bonds, in connection with what kind or class of

bond would be representative of public utility bonds outstanding. Consequently all the public utility operating company bond issues were classified by rating. The whole volume in Moody's was classified by rating, all those
1193 that have been issued during these years and any
that were hangovers during the previous years, in other words, what I would call the characteristics of outstanding public utility debt. We find that of the volume of all public utility debt outstanding, that which is represented by Aaa is slightly in excess of 10 per cent of the total. When reference is made to the yield on Aaa bonds, for example, you are talking about a class and variety which represents about 10 per cent of the total capital outstanding. Similarly, it can be quickly ascertained from the independent bar on this chart as to the relative significance of other risk classifications. The charts on pages 33, 35, 37 and 38 are supported by the tables on pages 39 to 49, inclusive. I would say there is just a slight difference between the volume of public utility gas and electric financing that is not rated and the total volume. It is not large, but there are occasional issues that are not rated. The chart on page 50 represents another effort to check the representativeness of the average yield on newly issued public utility operating company bonds.

The first distinction to be drawn is that between a weighted average and a simple average. We note that the issues of larger companies generally command lower yields; and so we contrast here the weighted yield which is represented by the solid line and the simple average yield which is represented by the dotted line. The middle curve, the sold black line in the middle of the chart, is the total yield on all ratings weighted. This is the same curve as appeared in the previous chart.

To break that down into its components a division was made between the average yield at offering price of securities which Moody's rated as Aaa and Aa, and those which Moody's rated A and lower, and the spread between the two groups of curves indicates the difference in the representative levels of those two classifications. One other thing, however, is to be noted upon more careful examination and that is in the early part of this period the overall average employed carried rather close to Moody's ratings for A class bonds and lower, whereas in the later period the average of all financing came down and was more representative of Aaa and Aa financing, which is the conclusion we suspected from our previous chart analysis. Consequently to a measurable extent the declining average yield of the new financing was influenced by the changing quality of the securities which were involved in the total.

In other words, the financing was confined to desirable issues predominantly. In fact, financing in recent times has been almost wholly restricted to securities which could qualify as the highest grade securities. Thus in the early period the number of issues of A and lower rating was very predominant, that is, 146 to 14 in 1923, for example; whereas, when we get down to the later period not only do the number of issues decline but there is an almost even distribution now between them rather than the overwhelming number which we had in the lower grade issues. The table on page 51 is the stastical data supporting the chart on page 50. In all these charts only the yield to the investor at the price at which the invesment banker, if such served, offered the securities to the investor is reflected.

Now it is quite appropriately observed, and must be before any conclusions are derived from any of these indicated levels, that the cost of capital to an enterprise is
distinctly higher than the yield to the investor. The
1194 highest grade securities in more recent years have
had to allow approximately one-fifth of one per cent,
if my recollection is correct, for the cost of financing as such. Consequently, the cost of capital to a company on the higher grades of financing would have to be increased by approximately one-fifth of one per cent on the average, and of course there is a considerable range in that.

When it comes to lower grade financing, securities that really have to be sold instead of being taken off the hands of bankers, securities not in the Aaa and Aa classifications, the cost of financing rises rather significantly and, in my opinion, would probably, on the average, run at least .4 to .5 of one per cent. When you get into securities of the class of preferred stocks, the cost of financing is even higher than that, so I do not mean to imply that these yields to the investors represented the full cost of capital to an enterprise. To these yields we always have to add the cost of financing to arrive at the cost of capital.

The charts on pages 52, 53, 55, 56, 59, 60, 62, 63, 65, 66, 68 and 69 I would like to treat as a group since they represent the same method of approach, differing only as to the period of time.

I stated in the course of the testimony that the yield as such on a security is little evidence of and by itself as to the capacity of the enterprise issuing that security to command capital, that finally and ultimately it is a question of at what price it can command the capital under given terms of the contract. Thus it is conceivable that the most risky and hazardous of businesses could command a certain amount of debt capital, a very small amount of debt capital, at rates which would compare very favorably with the rates on the highest grade securities of very safe and secure enterprises.

One of the most important and most common measures of the degree of security prevailing with respect to any investment security is the times that its interest requirements and the interest requirements of prior issues are covered. Consequently, in order to establish any kind of comparability, to get any kind of a valid measure of the credit position of an industry, it is necessary to go into a two-dimensional analysis and relate the yield and the times interest coverage of the security.

This method is employed in the charts on page 52 and following ones that were enumerated. On these charts the vertical line represents the yield to maturity at market price of the respective securities. The base line reflects the times interest requirements earned, or, reciprocally, the per cent of available income required for equal and prior issues. In order that it cause you no difficulty in reading it, it is always easy to reestablish equilibrium by noting that two times requirements earned is the equivalent of 50 per cent of available income required for equal and prior issues.

This series of charts is, in substance, identical with the series of charts developed by the Federal Communications Commission study of the rate of return in connection
1195 with the determination of a rate of return for the Long Lines Department of the American Telephone and Telegraph Company, with this addition: In order to test the relative position of the natural gas industry independent determinations along the same lines and following the same principles were employed with respect to representative natural gas securities. They were then plotted on these same charts, or charts redrawn from the same

data, in order to see whether or not natural gas securities conform to the characteristics of public utility securities.

Now in studying these charts the point is not to see whether they reach the same low level or not, but to determine whether, with the same amount of coverage and protection, they reach the same low level. Thus the method for reading these charts is to see whether or not a given class of securities falls above and to the right of issues of other classes. Thus, taking the chart on page 52, for example, which reflects prices for March, 1928, against the income for the year 1927, we find that the natural gas securities which could meet the qualifications and basis of selection employed for the Federal Communications Commission study are plotted, and it is seen that they substantially fall in an area on the chart both above and to the right of the mass of the gas and electric and telephone securities employed on that original chart.

There is added also to the chart on page 52 a line which you will find absent on page 53, a line which records the average yield of the middle six items of each of Moody's four grades of public utility bonds.

The open circle with the (1) in it represents the average yield and coverage of the middle six Aaa bonds; the open circle with the (2) in it the Aa bonds; the open circle with the (3) in it the A bonds; and the fourth one the Baa bonds. It is informative to note how these four grades of Moody's bonds, varying with respect to risk characteristics and coverage, distribute themselves through this field. The line connecting those four representative yields and coverage relationships is markedly below the level occupied by most of the natural gas bonds in this picture. The numbers refer to the supporting table, enabling you to exactly identify each particular plotted bond on any of these charts. Any number that runs up into 600 you will find at the end of the bond section here in a table listing all of the natural gas bonds. This number 649 is on page 71, I believe. It gives you the natural gas company bonds and this company is placed there for reference. The whole thing is coded for ready reference, both for the securities selected for the Federal Communications Commission study and the natural gas securities which were added to the picture.

There is one bond shown here at the 5% level in 1927 and 1928. That is number 649 and is a security of Southern California Gas Company, regarded as a very fine security in the market. It is so classified on account of the general position of the company, its other assets, and all the factors which enter into the classification of the security.

1196 Now the same method of reading these charts is employed with respect to each one. It will be noted that I did not attempt to impose the natural gas relationships on every year that the Federal Communications Commission employed. It did not seem necessary to make the point for each year. I moved from 1927 and 1928, which is a pre-depression relationship, to 1931 and 1932, which is pretty well into the depression relationship. In each instance the natural gas securities fall to the right and above as a group. I do not mean to imply that there are not individual exceptions.

I would not attach any particular importance to the specific location of any particular security in that array. The point to be made is the general placement of the classes of securities.

I would like to refer to the statement of principles and standards of selection for these bonds as reported by the Federal Communications Commission in its study. I have accepted their method of procedure as good and reliable and have employed it here. We have attempted to apply the same standards to the selection of the natural gas bonds.

I point out that on the top of pages 55 and 56 some decanterlike figures appear. It seemed desirable to maintain a field for the plotting of those so that the eye would envision similarity of relationship and placement identically from one chart to another, but in certain years here these natural gas bonds got completely out of hand, at least some of them did, and went off the chart, so instead of destroying the opportunity for a ready visual comparison and keeping the same size field we simply indicated they were 9 per cent and above and let it go at that.

Now the chart on pages 68 and 69 without the Moody index on it is not a chart from the Federal Communications Commission study. That study, as you know, was made before that time. In order to make available the data for more recent periods for this purpose the same technique and procedure was employed to project the Federal Communications study and bring it further up to date. I had access to the Statement of Principles and the methods of selection as a guide to making that as comparable with previous tabulations as it could be made. I still find the natural gas bonds above and to the right. Some of the natural gas bond yields have come down to much lower levels than previously existed; but it is always to be noted that for the same coverage, for the same income protection, natural gas bonds are found to lie higher in the field.

The tabulations following each one of the charts from 52 through 69 are shown for the purpose of supporting the charts.

Cross-Examination Interposed by Mr. Slaff.

In getting the middle six Moody's for each Aaa and Aa it was necessary for the Aaa group to avoid extreme instances because in Moody's 10 bonds they had bonds in there that had 17 times coverage, for example, a few freaks like that; and so the middle six proved to be a more homogeneous, comparable group. But since it was neces-
1197 sary to do that, to get rid of the freaks in the Aaa classification, it seemed desirable to do the same thing for the other classifications even though the freak coverages do not appear in the lower classifications. That was an effort to get closer approximation to homogeneity and representativeness.

Direct Examination by Mr. Morgan Resumed.

On pages 72, 74, 76, 78 and 80 the same technique has been employed with respect to preferred stocks. Again the chart for the last year is designed with the highest regard for the principles and technique employed by the Federal Communications Commission in its study; and in these charts, as in the bond analyses, we find that for yields which are identical the coverage on natural gas preferred stocks is higher. Thus cartographically they are found to the right and above the levels characteristic for gas, electric and telephone securities. The tables accompanying these charts in each case offer the names and the identification numbers.

On page 83 a chart is offered which brings together in one place the relationships of yield and coverage for the Moody's bond classifications previously employed. The curves are for each indicated year; and there is developed also a composite curve representing the 12-year average for the Moody's series showing the relationship of yields to coverage. I refer there to the heavier black line falling in the middle of the field. For a period such as the last 12 years a composite result can be relied upon to eliminate the accidents of the particular year, and what accidents of inclusion or exclusion may have existed.

Thus the shape of that curve and the characteristic relationships there is probably a rather significant overall representation of what is required in the way of protective earnings or protective income at given yields for the class and type of bonds which Moody's used in their series.

The last chart, which unfortunately escaped numbering, which should be 85, imposes an additional curve on this chart for comparison purposes, using the prices for March, 1939, and the income for 1938 in each instance: We have the distribution of the gas and electric bonds as before. We find the natural gas securities plotted to the right and higher in the field. We have the curve reflecting the Moody's times requirements earned for the four risk classes; and in addition the yield and coverage by quarter volume of natural gas bonds that were developed earlier, plotted on here to see where they fall in relation to the public utility distribution which was developed.

I have used Exhibit No. 152 in arriving at my judgment as to what constituted the fair rate of return for defendants.

(At this point EXHIBIT NO. 152 was offered and received in evidence without objection.)

Having made the investigations included in the qualitative and quantitative analyses which I have reviewed here,
taking these analyses and the facts which I have de-
1198 duced and developed therefrom, and taking into ac-
count my knowledge of the natural gas business and the business characteristics and hazards of the particular gas companies involved in this hearing, and also my knowledge from experience and training in the field of economics and financing, my knowledge of the general business conditions of the country, and the earnings or yields which capital invested in business as a whole and in the natural gas business in particular is entitled to earn in order to command the required capital to conduct business and to compensate for the use of that capital, I have an opinion as to the proper rate of return for defendants.

My opinion is on the basis of the material of the qualitative and quantative character presented here, on the basis of past experience, on the basis of all my exposure to the effects of capital bargains that have been made for industries in this country. I have approached the development of a rate of return for the natural gas industry from the standpoint of the public utility industry and by noting the differences and distinctions rather than moving down from the industrial classifications to the natural gas situation. I would like to put my answer in this way, if I might, that if there were an enterprise engaged in the natural gas business having a large, substantial investment in natural gas resources and in specialized transportation facilities, which company had the protected position and status of a public utility, I would consider 8% an adequate return; but I am of the opinion and conviction that Natural Gas Pipeline Company of America and Texoma Company do not qualify economically as a public utility, that the conditions and circumstances of their operation are not comparable to what is found in a public utility, and that those distinguishing economic conditions deserve recognition, in fact, must be recognized, in my opinion, if one is trying to judge what the necessary supply price of capital today would be for an enterprise of that character. Moreover, assuming that there is recognition to be given to the reward of enterprise in an undertaking of this sort, and that there is a desire to compensate and induce enterprise, I feel that 9 per cent is a more appropriate and fair return.

By "public utility" as I use the term here I mean an enterprise engaged in distributing a necessary commodity. I do not mean to attach any significance to whether an industry happens to be labeled a public utility as such or not.

Preliminary Cross-Examination by Mr. Booth.

If fairness is to be construed as including the reward for enterprise, then I say that a fair rate of return for these companies is 9 per cent. I do not say that the reward for enterprise accounts for the difference between 8 per cent and 9 per cent. I think I have put my answer to indicate that there were two considerations which entered into that difference: (1) the absence of the economic characteristics of a public utility undertaking and (2) the offering of some inducement and reward to enterprise. These two elements account for the distinction between the 8 per cent and 9 per cent to which I refer.

I did not attempt quantitatively to measure and express in my mind the difference between 8 and 9 per cent. I do not find that the mental processes of valuation are
1199 subject to that kind of quantitative fractioning. I
think any effort to do so usually is under pressure

and reflects a degree of straining of the processes of judgment. I have not divided the figure representing the difference between 8 and 9 per cent into a specific allowance for the reward for management and the elements which distinguish it from a public utility enterprise. The process of coming to an opinion on the basis of a wide range of facts and material and exposure through a period of time is not subject to a calculating machine type of mental demonstration. I gave consideration to all these factors and came to an opinion. I did not build that up as bricks would build up a wall or assign specific mathematical quantities to each of these items.

Earlier in my testimony I stated that the rate of return must be divided between pure interest, risk premium, allowance for uncertainty, and finally the element of watchfulness, the care of the investment, stating in that connection that these were qualitative factors which should be recognized and considered, that they are generally significant and should be considered. I recognized those factors and gave careful consideration even to the question as to whether or not at this time there was any significant change in the evidence; and purported to show that such a thing as pure interest is not reflected ever in a quantitative expression in the market.

I did not engage in such calculating machine allocations as the assignment of a specific portion of the 8 or 9 per cent to pure interest. I cannot state how much of the 8 or 9 per cent I would allocate to pure interest. I think any effort at such a decimation of a composite figure is straining the processes of judgment. My most elaborate efforts have not disclosed any market indication of the price of pure interest as such; and I do not know any one else who has ever caught a market expression of pure interest as such. I think that it is definitely straining the processes by which one arrives at judgment to attempt specific allowance for pure interest and the other elements which comprise rate of return. I have always been of that opinion. I have sometimes given weight to estimates, approximations, in a retroactive fashion of analyzing back, but with full appreciation and knowledge that the process is a strained one.

I cannot state that in the course of my testimony I have referred to every important factor which I considered in arriving at my judgment as to what constitutes a proper rate of return for these companies because I understand the processes by which the human mind works. There are many considerations which enter into it and leave their impressions in the course of a person's making up his mind. He is not necessarily, at a given moment, aware of all of them. I have not, if this is the answer to your question, offered or presumed to offer in my testimony many factors which undoubtedly have an influence on an individual's final opinion and judgment in a matter of this sort.

I began working on this study some time in April. I do not have in mind the number of days but I can assure you it has been on my mind more days that I have ever had recorded as definitely employed. It has been on my mind while I was traveling and while I was doing other things, as well as the formal time, which was substantial.
1200 I imagine direct and formal application probably runs into two months. I wrote up statements and opinions over the range of the subject matter which I thought were probably appropriate for the purpose in the course of my preparation. I prepared this exhibit and I developed, as I went along, opinions about different aspects of the thing as they developed. I am quite certain there must be important factors which entered my mind in arriving at my judgment as to the proper rate of return for these two companies to which I have not testified here because I could not possibly, in this time, cover all of the considerations which enter into that sort of thing. As to whether or not I have testified to all the important considerations, that word "important" is a relative term. I do not think I could put myself under such a restriction and extemporaneously say that there were no other important considerations which, in the course of coming to such a conclusion, entered into it. I am fairly confident that there were.

I just got through saying I certainly would not want to put myself in a position of having to recall extemporaneously all the things which were given consideration over a period of time like that. I am very confident that there were considerations which I have not mentioned in my testimony. I do not want to give a categorical answer which is not accurate. That is my only hesitancy. I was given a perfectly free hand to develop any material that, in my opinion, had a bearing on the question. I was given no instructions of any sort otherwise and to the best of my knowledge I went ahead and dealt with the evidences that were obtainable and tried to work up the best of them and present them. There are certain things which I consider of importance which I have not testified to. For example, I testified this morning that I think a general observation of the earning power of capital as a whole is something worth taking into consideration. Now I did not do that and I did not directly in my own words testify to that particular thing. I had it in mind but time and energy would not permit special treatment. I, frankly, exhausted myself doing this, in addition to other duties, over that period of time. I just want you to understand that there are things that I would probably do in addition to what I have done if I had the time and opportunity.

I did refer to the earning power of capital over industry as a whole in a secondary manner in discussing a portion of the exhibit prepared by Mr. Gilman. It was opinion evidence on things prepared by another witness. Obviously it was my intention to refer to the matters of consequence, significance and importance, but where importance ends is an open question, and I was simply carrying it from one thing to another. I would like to make this additional statement, which I made privately to Mr. Slaff, or others, that in my appearing in a hearing of this sort from a university position I felt rather impelled to take something of a broad gauge point of view and to attempt to contribute something; and I would like to say in that connection to some extent I rather dodged doing too much of the traditional thing as part of my contribution today.

1201 I do not recall whether I made any direct reference to the changed circumstances of recent weeks, apparent changes in the policies of the Federal Reserve Board, as indicated by the withdrawal of support from government bonds, or to any direct evidence, which is probably significant, of a prolonged conflict. I did not take time to draw parallels between the experience that is evolving now and what developed in the course of the last great war. That may well come up as a fairly important thing. It is developing day by day. I am conscious of it. I am beginning to feel it may prove to be a very important factor. The day government bonds dropped I was very conscious of the significance of that as the possible beginning of the readjustment in money markets in this country. If that is the kind of thing, yes. That was a consideration hardly of the calibre which should be brought in, or hardly unique enough to be woven in with a discussion of the kind I tried to offer, but possibly it would classify as an important consideration. I am perfectly aware and conscious of the fact that there is a threat and impact here which may be of important consequences for the security markets.

I think that probably my testimony did not indicate the degree of significance that properly attached to what experiences of investors in general have been throughout the period of changing economic conditions. It is one of those general things that every one is more or less conscious of and which more or less go without saying, but that does not diminish the significance or importance of this sort of thing in a consideration of this character.

I am not sure whether I called appropriate attention to the fact that the period of time over which the investor is willing to commit his capital to natural gas enterprises is apparently quite short. I found, as an incident to the development of my own studies, that bonds were usually relatively short term. For a considerable number of years 10-year bonds seemed to be the rather standard and traditional period, indicating the unwillingness of the investors to project themselves very far in that respect. Moreover, even in those relatively short term bonds they very commonly carried with them a stringent or strong amortization provision, so that in many instances what looks like a 10-year bond on the record is not in reality a 10-year bond, by virtue of the operation of the amortization requirements on the company's loan. The loan being for 10 years, the term averages only 5 years for the full amount, thus reducing the term by approximately one-half. The fact that investment banking found it difficult to sell securities of natural gas enterprises unless they were protected in that peculiar way I think probably has not been adequately emphasized. I am perfectly conscious of it as a fact.

It indicates the attitude of the investors toward the risk and uncertainty, and risk of the possible termination of the life of an enterprise of this sort.

I think that is one of the evidences of what I have called a major underlying factor, namely, the terminable life,—
not only terminable but terminable over a relatively
1202 short period of time, and a high degree of unpredicta-
bility within that range as to what it is really going
to be. What I referred to was merely to weigh the out-

ward evidences or weigh the market reflections of the investors' reactions towards that condition.

I made no geological determinations as to when the life of the reserves of these defendants would terminate. I think my testimony is perfectly clear on that. I stated that, from an economic point of view, all estimates as to physical life and all attempts at estimating economic life were subject to so many variations as to constitute, in the mind of the investor, a distinct hazard, because of the very uncertainty of any estimate of that sort.

I made no assumptions as to the length of time. I testified as to the amount of insecurity and uncertainty created by the various difficulties of making such estimates. I think this aspect of the terminable life of the enterprise or of an enterprise of this sort is a very fundamental consideration. I have seen the estimates that have been made as to the life of the property of these companies but I do not know as I recall whose estimates are whose. I think there were estimates running, if I recall correctly, 14 years, or something of that sort. These estimates were made presumably to show the life of the field which is being employed for this particular enterprise. I do not think I know the people who made those estimates. I have not said I was familiar with those estimates. I thought I recalled what the range of estimates had been. I have made no estimates as to the life of this project nor did I use any estimates in making my determinations as to the rate of return. I do not remember what the estimates made by other witnesses are. I have exposed myself to them. I read them in the testimony or in something else; but for the moment I would not be sure what my recollection on those is.

To an extent I am familiar with the company's capital structure. It consists of bonds and stocks. I have some recollection that the bonds ranged from $45,000,000 to $47,000,000 and that the amount of stock was nominal in relation to debt capitalization. I do not remember the number of shares. I do not recall if the shares were of a par value or approximately $3,000,000; I would have to look it up. The bonds, if I recall correctly, are 6 per cent coupon bonds, which I think I testified is of little significance under the circumstances. These bonds are held by the participating parties in the enterprise, I understand. Refinancing is a normal experience. Companies issue debt obligations of limited term of life and they naturally have to refinance. There has been that refinancing in recent times. You ask if it is a common practice of public utility and some industrial corporations to refinance their outstanding indebtedness in the past two, three or four years. If you will leave out the word "common" I will answer "Yes", they have been refinancing for the purpose of getting lower money costs, lower interest rates and because of their maturities.

There has been a rather considerable amount of anticipation refinancing,—if you would use that term I would know what you are driving at,—anticipation refinancing on the part of the best utility companies, with respect to the highest grade and class of securities. I attempted to make clear in my testimony that the overwhelming proportion of the financing—and most of it was refinancing—was
1203 of the highest grade. That is the type of bond that you could refinance. Over a substantial number of recent years it was not possible to do any other refinancing.

I did not say that I was employed by a financial organization in about 1929 and 1930. I was an economic consultant during that period in New York; and I did a great deal of work for the old banking firm of August Belmont & Company in those years. This work was done on a semi-independent basis. I had an office up on the tenth floor of the same building. I had dealings with Rollins back in the days of the utility consolidations. That firm is entirely reorganized now; and it is an entirely different organization really, with nothing but the name left. I did a good deal of work for an organization known as James Rorrison which was a purveyor of utility preferred stocks. I did a good deal of work in reorganizations and plans for the firm known as Pomeroy & Salmon during the period of the banking distress. I covered a good deal of the South in that connection. That was a New York firm. I have had individual consulting contacts with various firms on utility matters. It is difficult to remember at this time of the day. I want to make it clear that I had offices of my own primarily during most of this period, either the Cedar Street office in the Life Insurance Building or the Continental Bank Building where I was for a year, I believe, during that two-year period. I had a multiplicity of industrial contacts which I will try to dig up for you which covered a range of a great many different types of industries and businesses. I think a substantial portion of them were in my own interest.

One of these contacts was in the industrial gas field. I had an assignment from one of the partners in Belmont & Company to determine whether or not it was a good idea to take a look at the natural gas business at that time. I think it was in 1930. The paucity of other activities and the difficulty of doing business suggested looking into possibilities, and I recommended an exploratory attitude. They did send out a number of men and retained engineering firms to make an exploratory determination. The net result of it was a decision not to have anything to do with it. I think the engineering firm we retained was Ralph Davis.

In answer to your question as to what seemed of most significance in arriving at my judgment as to what was the proper rate of return for defendants, without presuming to measure in a mathematical fashion and appreciating that I cannot do anything different in a thing like this than the buyer of an automobile can when you ask him "Was it the style or the horsepower that influenced you most, and how much?", I think I can safely say that the risk and the uncertainty elements in the situation stand out when compared with any other one. I think it is a fair statement to make that these two factors are more important than the element of pure interest and the other two factors to which I referred. I thought I testified clearly on what I think is the most important consideration in the factor of risk. I am glad to repeat it. I think my most summary statement on it was that the uncertain life and the behavior of natural resources imposes its uncertainty and risk on the whole investment, since it is 1204 dependent upon that resource situation, but you may recall that that was not by any means the complete statement. Then I divided my answer into two parts dealing with the conditions maintaining at the source of supply and those maintaining at the point of delivery. I analyzed it in terms of the circumstances influencing the certainty, reliability, continuity and cost, and availability of the physical supply on the one hand and the circumstances and characteristics maintaining with respect to the market on the other hand, knowing that a piece of stem pipe line between those two situations is of course helpless to have any determination of its own. It sinks or swims with what happens on the two important ends of the business transaction, the supply of goods or the behavior of the demand for the goods. I consider that the whole combination of circumstances with the conditions prevailing at the source of supply and the conditions prevailing at the other end, and the fact that you have got a substantial investment in a perfectly helpless piece of capital equipment which has no alternative use but to rely upon the continuity of supply or continued availability of a profitable market to constitute a combination of risk uncertainty elements and economic hazard which is, I believe, quite unique

I did not say that this was a single element. It is the combination of all those circumstances running all the way from the source of supply to the circumstances of the market; and you will recall that I have included in the consideration of the circumstances prevailing in the market the divorce from the control over a merchandising policy in the market.

I thought I had done a fairly thorough and complete job on that subject in my direct testimony. I am of the opinion that I expressed myself rather adequately on the range of hazards and uncertainties prevailing all the way from the fields to the market.

I did not hear all of Mr. Delafield's testimony. I heard a great deal of it. I am not sure that I heard Mr. Delafield state his conclusions that not less than 8 per cent would be a proper return for these companies.

I tried to make it clear in connection with another question, the one that Mr. Slaff was having trouble with earlier about pure interest and bond yields, that pure interest might well be higher than an indicated bond yield on a fairly riskless investment. Let us assume for theory purposes a riskless investment. People might be willing to sacrifice, under given conditions waiting for a critical time, pure interest in favor of liquidity, and that is why I could not answer your question earlier in the form in which you put it to me. It is not necessarily true that the pure interest coincides with the yield on a riskless bond.

I do not see how I can go on record as agreeing with Mr. Delafield because I cannot begin with the premise of the measurement of pure interest in that form. As I said later this afternoon there is no objective market expression of the concept of pure interest as such. It is an element of loan interest but it is never sold in the pure form of and by itself; and I definitely testified that I did not 1205 accept the generally loosely accepted proposition that the yield on government bonds represents pure interest.

You ask whether or not approximately two years ago in connection with my testimony before the Illinois Commerce Commission as to the rate of return of Peoples Gas Light and Coke Company I stated the rate of return I had fixed was divided and 3 per cent allocated by me to the element of pure interest. I do not believe that accurately states what I testified to. It is a long time ago and you have looked at the record and I have not; but knowing what I think and how I have always thought, I would be rather doubtful that I put it in that form.

Referring to the language you have read to me which you state to be from pages 9272, 9273 and 9274 of the transcript of the case of the Peoples Gas Light and Coke Company before the Illinois Commerce Commission, reading as follows:

"I think that 3 per cent is a fair per cent to use for pure interest in the make up of the 7 per cent. The portion of the remaining 4 per cent allocable to risk is a matter of opinion. I would be inclined to believe that the return available to capital in an industry of this sort as a whole, and the type of company performing work * * * that the risk and uncertainty at any time over and above pure interest certainly would reach, well, to the 3 per cent level."

part of that quotation sounds familiar and part of it sounds as if somebody wrote it who did not understand his economics too well, to tell you the truth. My recollection of that, Mr. Booth, and this is only my recollection, is that you were asking questions along similar lines, trying to secure a quantitative identification; and my recollection is that I made substantially the same answers indicating that you were invading a field of judgment and that these things were not reducible to quantities in that fashion. Your persistance may finally have won a degree of compliance in the form of saying, "Well, 3 per cent is often thought of as representing that" and if you wanted that, all right; but I knew perfectly well then, as I know now, that there is no objective market reflection of pure interest. That is the best of my recollection at the moment. I have not seen or thought of that record since that day. It may be in my office. I think I got one once but assure you that I did not open it. I would not be sure whether I have what was given or not.

Mr. Delafield in his testimony apparently did combine in his answer two things. If I understand the pertinent paragraph, it is this:

"I said in the direct testimony that a good measure of pure interest at the present time was the rate on the bonds held by all New York savings banks which in 1938 was 2.87. I should think that between 2¾ and 3 per cent of the 8 per cent in that range would be pure interest and the balance risk premium."

That is a combined answer and there is much in there that I cannot agree with. I do not think that the return 1206 on the bonds held by all New York savings banks is a measure of pure interest; and I do not think there is any objective measure of pure interest, as I have stated many times. If there could be a measure I do not agree that this would be the measure because savings banks are practically bomb cellars for capitalists just scared and hiding there. That is not the people's time preference at all. I disagree with it. I cannot follow the line of reasoning that between 2¾ and 3 per cent of the 8 per cent is pure interest. Mr. Delafield did say on page 5175 that his best judgment is that 8 per cent would be divided into approximately 5¼ for the risk premium and 2¾ for pure interest but he adds, "But I would not necessarily have to divide them 3 and 5". I agree with that. I have grave doubts whether that statement is accurate and I think if I have to accept this procedural analysis that I would not be inclined to take that position, taking the position primarily that that is not determinable in that way. A man may have an opinion of that and it might be perfectly legitimate; and he may think of pure interest as Mr. Delafield thinks of it in terms of a riskless investment. I have not any quarrel with that; those are his mental processes by which he arrived at his judgment; but I just cannot do it that way.

Question by the Examiner.

I do not believe that a question of this sort is reducible to that sort of a quantitative breakdown. We have no objective evidence as to what pure interest rate is. We have economic bases of thought and analysis which establish our presumptions and notions as to how that phenomenon is probably behaving under different sets of circumstances or facts; but that is still a long way from saying that in February of this year it is this much and in March of another year it is that much. We know what influences people's saving dispositions, for example, Mr. Examiner. Suppose you are facing a threatened inflation. We know by the study of historical experiences that in the face of threatened inflation people's disposition to save for the future goes all to pieces. That is a common social economic phenomenon.

It enters into my figure of 8 per cent as a factor recognized as making up the measurable phenomena of loan interest. It is one of the elements in the thing which is objectively expressed, namely, loan interest.

Cross-Examination Resumed by Mr. Booth.

If my answer is properly construed I would be willing to go into the question of whether 2¾ per cent was high or low as to the element of pure interest today. My personal opinion is that it is probably low as of present enonomic circumstances. I have probably a conclusion in the direction of opinion that the market value of time preference has gone up. There are a great many factors which enter into that. It would involve an analysis of our whole institutional setup and our social and political organization.

Take for example the psychological effect ultimately of society taking over the responsibilities of old age, the development of comprehensive plans of social security.
1207 That is having a psychological effect on people's dis-
position to save, which I believe is something we are going to have to reckon with. Factors of that sort influence phenomena as fundamental as time preference. The distribution of wealth among a people has been recognized from the beginning of the science as an important factor. You get a concentration, and there is ease of saving and accumulation of capital. You get a more equal distribution and we note the opposite phenomena. Thus for example that would give some basis for believing that we are headed toward a higher pure interest factor and that is not a wholly theoretical consideration. It is observed by such practical financial analysis as Chamberlain in his old edition of Bond Investment as to what influences the interest

rate on bonds, and he notes the distribution of wealth among the people of a community.

A wide range of social economic factors of that sort enter in, and in passing judgment on how the pure interest element is probably going, you may recognize and consider those, but that still is far from getting any market evidence that it is 2¾ or 3⅛. I would put it the way I did put it. I think there are a great many forces operating to advance the pure interest rate to a higher level. I do not know whether 2¾ per cent is higher or lower than the actual figure but whatever it is I would be inclined to believe that it is headed for higher levels.

I have testified that I do not believe the yield on long-term government bonds is acceptable evidence of pure interest. I have testified that I know that there is no objective market evidence of pure interest.

I know that the bonds of defendants are held by the equity holders or stockholders. Since refunding those bonds at a lower rate of interest is entirely almost a transaction of the right hand with the left hand, I do not see that there would thereby be anything involved one way or another as far as the equity holders are concerned. I may be wrong about this observation, but I think that there is an income tax advantage in having a deductible interest charge which is obviously a payment out which you you can save yourself on to some extent; and if I were involved in it I simply would determine as a matter of fact whether or not I am not saving money by having these bonds outstanding.

I do not recall that I ran across any suggestion that defendants had made any effort to refinance their bonds, outside of apparently somewhere in the record I recall reference to a contemplated public financing or contemplated issue of these bonds at some time which apparently was found impracticable under the market conditions and it never transpired. That is the total recollection I have of any reference to financing. I don't believe I ever talked to Mr. Brown about that.

1208 **FLOYD C. BROWN**, a witness for defendants, called temporarily by Mr. Booth, testified as follows:

Cross-Examination by Mr. Booth.

You ask me whether or not the company has made any effort to refinance its securities. What do you mean by "attempt"? As far as I know the company has never considered the situation just expressed by Mr. Dorau, namely there being an income tax advantage to the company in retaining its present capital structure. I do not believe the company at the present time has any definite plan in mind for refinancing its securities. I would not say that we have not had such a plan in mind during the past one or two years. We have discussed from time to time the public financing; but for one reason or another any thought of doing public financing has been dropped. As to whether or not it would make any difference to the position of the present equity holders if the company refinanced its bonds at a lower rate of interest would depend on whether there was any public financing or not. Otherwise I think it would involve a matter of some accounting, probably a matter of analyzing the tax laws and determining whether the deduction for interest as an income tax item was offset by the tax upon undistributed profits or dividends, as to whether the equity holders received their money in dividends or in interest. Those are all matters that would have to be considered. We have not considered those matters in the connection as to whether we should do any refunding or not.

1209 **H. B. DORAU**, a witness for defendants, recalled, testified as follows:

Redirect Examination by Mr. Morgan.

Referring to the language on page 5120 of the record here when Mr. Delafield was asked the question:

"How do you find out what the pure interest is in an investigation of this sort," and he answered—

"Well, it is very difficult to put your finger on the exact 1/100 of 1 per cent determination of what pure interest would be at any given time. There are a great many measures. By applying many measures, you come to a judgment figure. It has been frequently done, it has been done over a long period of years. Ordinarily, you would look to the yield of very high grade securities, as for example, government bonds. Now, you frequently have periods as you have had, in my opinion, in the last seven years when government bonds generally for a multitude of factors, sell at much less than the pure interest rate. There are other factors in there.''

I think that is an infinitely better statement than the one I was offered as a basis of comment. I think I could be in substantial agreement with that.

(October 23, 1939)

(At this point the Examiner announced that the items relating to lands in fee and rights of way in Exhibit 125, temporarily excluded at the time Exhibit 125 was admitted in evidence, would be admitted in evidence. The counsel for each of the two Commissions objected and were allowed exceptions.

(Motion to strike Exhibits 141 and 142 by counsel for the two commissions taken under consideration.)

1210 At this point the following letter written by defendants' witness J. A. Emery to the Examiner was incorporated in the record:

Ford, Bacon & Davis
39 Broadway,
New York.

October 11, 1939.

Mr. E. G. Simpson, Examiner,
Federal Power Commission,
Washington, D. C.

Dear Sir:

As requested by you, I have examined the available data relating to Southern Natural Gas Company, Union Gas of Canada and Lone Star Gas Company to see if any reason is apparent for a lower rate of return on the market appraisal of the securities of the Southern Natural Gas Company than the return on the securities of the other two companies in 1938.

In 1938 the Southern Natural Gas Company increased its compression equipment so that it raised the carrying capacity on the main line from 125,000,000 cubic feet per day to 145,000,000 to meet the requirements of important additions made to the steel manufacturing plants in northern Alabama. This naturally held out the promise of greater earnings and would account for somewhat higher prices and, consequently, lower earnings-price ratios based on the earnings of 1938.

Very truly yours,

(s) J. A. Emery.)

1211 J. A. EMERY, a witness for defendants, recalled for cross-examination, testified:

(October 23, 1939)

I would like to make a couple of corrections in the record, if I may. The record reads that Mr. Hill was president of the Interstate Natural Gas Company. Mr. Von Puhl of our firm was the president, and Mr. Hill was manager. The record reads that Mr. Hill was president of Southern National Gas Corporation. He was vice president and general manager. The record also states that the Interstate line was 22-inch and 18-inch. The main line was 22-inch, and the line from Baton Rouge to New Orleans, owned by Southern Gas and Fuel Company, a subsidiary of the United Gas Company, was 18-inch.

Cross-Examination by Mr. Slaff.

I have gone over most of my testimony on direct. There are some parts that I have rather skipped over. I have had Mr. Timberlake and some others in our office go over it carefully. The corrections which I have just stated, outside of some corrections in English, are the only corrections I have to offer with reference to the transcript.

I should say that I am a professional witness or professional expert. That is to say, an important portion of my work is the supervising and preparing of testimony for rate cases and testifying in rate cases. The majority of my testimony is on behalf of public utility companies, using the term generically. All of my testimony relating to going concern value or rate of return has been for companies of that character, except possibly one case in which the City of New York was interested. That was the Interborough tax case. I testified for the Interborough, and the city was interested on the same side of the case. I was retained in that case by the receiver of Interborough Rapid Transit Company and testified for him.

The case involved the value of the lease by Interborough of the original subway in New York for the purpose of an amortization deduction in their income tax return. I don't remember whether a refund was involved or not.

I am being paid by the defendants in this case. During the year 1938 my firm received $20,000 in fees from this company. All of that was in connection with my services on the subject of rate of return and going concern value. According to my recollection the total amount now is about $32,000 for the two years. I don't know whether all of that has been paid or not. The amount of the last bill, I think, was $4,700. I receive a per diem fee under my contract with defendants. I don't remember what this per diem is. The standard rate for my time is $150 a day. I think that is the rate in this contract, but my recollection fails me. On this case it is my recollection that that per diem applies on any work whether at the office or in attendance at the hearing.

1212 The members of my organization who devoted their time to this work were paid varying amounts. There is no additional charge or loading of the contract for Ford, Bacon and Davis overhead. The bill covers only the salaries and actual out-of-pocket expenses. I prepared the testimony and am testifying here because I was paid for the work.

We own a considerable quantity of stock in the Southern Natural Gas Company, and naturally that stock would be affected by the rate or return allowed in this case. Our firm owns 20,000 shares of the new stock of Southern Natural Gas Company. We formerly owned approximately 40,000 shares of Class A and Class B stock. This stock was called in and new stock was issued. We were among the largest stockholders in Southern Natural Gas Company prior to the reorganization.

If Southern Natural's registration with the S. E. C. shows our company to have been the largest stockholder of the Class B stock, I would accept that statement. Our firm has a representative on the Board of Directors of Southern Natural, namely, Mr. Von Puhl. We no longer have the management of that company but are retained as consulting engineers. That company is subject to the jurisdiction of the Federal Power Commission, I understand.

The rates of earning on settled enterprises are probably somewhat lower now than they have been in the past. I think the rate of return required for what is called "venture money" would be probably higher than in the past. I make a distinction between venture money and money invested in an established business which has a history and is developed. I should say the rate of earnings of business of the latter type are lower. My conception of rate of return depends on the rate of earnings to a large extent, as the exhibit I have presented on that subject shows. I think the rates of return on that type of business are lower at the present time than formerly. According to my recollection they are lower now than they were in 1934.

I am not fully clear yet as to just what you mean by "rate of return." The rate of return as I have used the term in my testimony is lower now than in 1934, in my opinion. It is lower now than it was in 1929 or 1930. I think it is lower now than it was in 1915, 1916, and 1917, but that was a semi-depression period, and I am not completely sure of it. Of the three years last mentioned, 1917 was good, 1916 was medium. The country was in a moderate depression in 1914 and slowly recovered from it. It was well out of that depression by 1917. In 1916, there were as I say medium times, and somebody else might say pretty reasonably good times. I think rates of return today are lower than they were in 1916. According to my recollection they are lower generally now than they were in 1912. I am sure that interest was higher in 1912, but I am not sure that the equity rates were higher in 1912.

I understand that your questions have been directed at properties in the nature of public utilities. Where I refer to the interest rate and the equity rate I cover the annual compensation for the use of the capital. Generally there are some small items in addition, but that is the general explanation. By earnings available for equity money I mean earnings available for dividends. The comparisons I have been making were of established businesses with a history. I was directing my answers to public utilities or properties in the nature of public utilities, such as electric, gas, water, and telephone companies. Gas companies include both artificial and natural gas enterprises.

1213 In a broad sense, railroads, street cars, and buses would be so included, but in the last ten or fifteen years they have been classed as tractions, that is street cars and buses. Railroads are generally stated by themselves. My answers do not include these three types of industry but were directed to public utilities, covering principally electricity and gas. The gas companies include only distributing companies. I consider that a fair rate of return for defendant companies now would be less than I considered a fair rate of return for them to be five years ago. I made specific studies five years ago in respect to a fair rate of return for these companies, and I made specific studies today in preparation for my testimony in this proceeding with respect to a fair rate of return. I testified five years ago concerning a fair rate of return for these companies before a Special Master. In that connection I prepared certain underlying studies and exhibits which were introduced in evidence in that case. I do not understand that the defendants here were parties to that litigation. I did not appear as a witness for these defendants in that case.

I am not influenced by the fact that I am paid by the company in the testimony that I give. My testimony is the same that it would have been no matter who was retaining me on the subject of a fair rate of return for this company. The case in which I testified five years ago was Chicago District Pipeline Company versus Lindheimer and other members of the Illinois commission. I used, as I just stated, certain compilation of data, certain statistics, and arrived at a figure for rate of return by the process described in my testimony in that case. I considered the methods I then used to be the best then available. I thought they were sound, but I think we have better evidence today. I would consider that the methods used in 1934 for my testimony were sound today. I made some attempt to apply them here but not very seriously. I think we followed through with one method completely in the early part of 1938. That was the first method that I presented in the old case where we started with the rate of return on bonds. I do not remember the number of the exhibit we used in that case. We made no attempt to follow that method through in the preparation of our testimony in 1939 in this case.

I have appeared as a witness before the New Jersey Board of Public Utility Commissioners. That was in 1934. I have not appeared before them since then. I think the Chairman is still the same man. I don't know as to the others. I have a conception of the ordinary political meaning of "radical." I have heard that term applied to various regulatory bodies. If you mean by "radical commission" one that has made an effort to beat down public utilities, I do not think the New Jersey Commission is of that type. As I said, I am only familiar with the fact that the present Chairman is the same one that was in office in 1934. I do not know about the other members. The Commission, as it was constituted when I appeared before it in 1934, in my judgment was an emminently fair-minded commission.

I am acquainted with Mr. William Mulligan, Assistant Counsel for the Board of Transportation of New York City. He was counsel for the board before whom I testified in the Interborough Rapid Transit Company matter. That was last year. I consider Mr. Mulligan is a temperate and fair person.

1214 In my direct examination I covered and considered all of the hazards of the natural gas industry that I could discover after careful examination. I considered all of the hazards as I conceived them at the time I testified. In a general way I went into those hazards in my direct testimony. I described all of the bad features of a possible investment in the natural gas industry or in this company. I don't remember that I mentioned any advantages that the natural gas industry has over any other industry or that this company has over any other company or other types of company. This industry has some advantages by comparison with some other industries, and it has some advantages as an investment when compared with some other companies.

(Upon objection by Company counsel the Examiner refuses to allow Commission counsel to question the witness as to his intentions of presenting a complete and fair statement of the subject of rate of return in his direct testimony.)

It is certainly my intention to be fair to all parties concerned when I testify as to a fair rate of return. I so intended at the time I testified on direct examination.

I would like to call attention to the fact that I have not compared this company or this business with other businesses. I simply started with the actual results from 11 companies, representing in my opinion a fair cross section of the natural gas industry as applied particularly to production and transmission. I have testified on the subject of rate of return in other cases. I testified in what is known as the Dayton Case as to going concern value. That is the case that ultimately went to the Supreme Court and is reported in 292 U. S. I did not testify in the Columbus Case. Some testimony offered in that case was prepared generally under my direction. That testimony dealt with going concern value. It did not deal with rate of return.

I testified in the Logan Case before the Ohio Commission, but that was not within the 10-year period covered by the list which I sent in. I don't think I testified concerning rate of return in that case. I have not reviewed lately the cases in which I have testified on rate of return except as to those within the last ten years. I don't have any present recollection of testifying to rate of return in the Logan Case. I remember testifying on the subject of going concern value. I testified in the Chicago District Pipeline Company case on the subject of rate of return. I saw a copy of the Master's tentative or preliminary report, whichever it was, and the rate of return mentioned in that was considerably less than the rate that I testified to as my opinion.

I testified on the subject of going concern value in the Dayton Case, in which I testified that a separate allowance should be made for going concern value. I supervised the preparation of testimony and the presentation of the testimony in the Dayton Case on the subject of rate of return and also in the Columbus Case. In the latter case also the purport of the testimony on going concern value was that a separate allowance should be made for going concern value.

I testified on the subject of going concern value among other subjects in the Public Service of New Jersey case involving the electric rates of the Public Service Electric and Gas Company of New Jersey. The purport of my testimony there was that a separate allowance should be made for going concern value. I testified to the same effect before the New York Commission in the Syracuse Lighting Company case. In the Dayton and Columbus cases no separate allowance was made. I don't know what was the disposition of the Syracuse Case. In the New Jersey
1215 case the decision of the Commission gave a lump sum
covering both tangible and intangible property. The amount they fixed was less than the amount of reproduction cost new less depreciation plus undistributed construction overheads and before the addition of a separate allowance for going concern value. I did not testify to the cost of reproduction new. In that case we took the book figures of the investment in the property and trended them by

general accounts down to the then present time. I do not believe that could be called a reproduction cost new estimate. It produced an answer probably somewhat on the order of what a reproduction cost new estimate would have been. I did not testify to the reproduction cost in the Dayton and Columbus cases in which I testified as to going concern value.

I have not been previously aware of the New York Commission's opinion from which you quote, "No separate allowance will be made for the element of going concern value." I do not remember any statement by me in 1934 that the Northern Natural Gas Company was distinctly inferior as an investment to Natural Gas Pipeline Company of America; but I may very well have said that in 1934. It is my recollection that that distinctly was the case in 1934. I think it went through a reorganization, but I have not the details in mind. I think it is doing very well now. I have not had occasion to look into it, but it is my impression that it is doing about as well as this company. I have had no occasion to change my belief as to its status in 1934. To the best of my recollection the Northern Natural Gas Company was projected without large contracts in Minneapolis and St. Paul which they hoped to get, and the depression came along and left them in the lurch, so to speak. That was in 1933 and 1934, and I think it was reorganized. I cannot be positive about that, though. Since 1934 they have gotten contracts for St. Paul and Minneapolis. I have not made a detailed study of the comparative merits of Northern Natural and these companies as an investment. I don't know of any reason why it is not as good. I do not have the earnings statement in front of me. So far as I know, the Northern Natural is not superior to the defendants as an investment at this time. I cannot think of any reason why the Northern should be inferior to these companies at this time. The line is shorter and is run at conventional pressures of about 430 pounds. It is about 800 miles long, and its principal market is farther removed from the coal and oil fields, so that it is not subject to such a close competitive situation as the Chicago line. Its principal market is in Minneapolis and St. Paul.

It is not necessary for me to consult the document from which Mr. Slaff has read and which he says is a report of the testimony in the Public Service Electric and Gas Company of New Jersey case. I only would like to be sure that it is clear that that was not what is ordinarily called an estimated cost of reproduction new. Qualified as I have stated, it was called an estimate of the reproduction cost new of the property.

A sound capital structure for a natural gas company of the type of these companies would be, say, 50 per cent bonds, 25 per cent preferred stock, and 25 per cent common stock. I think the proportion of preferred stock would be too high if raised to 30 with a reduction of common stock to 20 per cent. It would not be as sound a financial structure as the one first suggested.

I have had no occasion to change my mind in the past year or two as to the propriety of providing a fund for
the amortization of an investment which has a limited
1216 life; and I think the sinking fund basis of computation is the preferable way to do it. I am not conscious of having changed my mind at all as to the method which I deem proper to use in determining what is a proper interest rate to be credited to such a sinking fund. It depends on the circumstances. I do not think I have in the past in my testimony indicated a method of arriving at the proper rate of interest to be credited to a sinking fund built up to amortize a limited life investment. There may have been some question of that kind involved in the Interborough tax case, but I don't remember. In the latter case the question centered around the value of the lease, which was principally represented by the annual earnings for a given period of years, and the problem was properly to discount those earnings. The only question of amortization that arose, as I remember, was the amount that should be deducted from year to year in the statement of income tax. The life of the investment was limited by the life of the contracts to operate the subways. In computing the present value I testified in that case as to the value as of the year 1912 of the contracts awarding the right to operate the subways. I think that was in effect testifying to the present value of a limited life investment. In arriving at that present value I deemed it necessary to provide out of earnings over the life of those contracts for the return of the purchase price at the expiration of the contract, as well as for the annual return. This contract conferred the right to operate the New York subways and covered only the original line.

The amortization to which I was testifying covered the investment which I thought a willing purchaser would make in that property as of 1912 if he had an opportunity to buy it from a willing seller. We were amortizing the investment over the life of the property or providing for its amortization during the continuance of that contract.

I think my testimony was given between two and three years ago. According to my recollection I testified to the language appearing on page 299 in the record of that case as follows: "In computing the present value of the future earnings to be used in the basis of purchase, it is necessary to provide out of the earnings for the return of the purchase price at the expiration of the contract as well as for the annual return thereon. This is computed by setting aside out of the earnings each year the amount that will accumulate with interest to equal the purchase price at the expiration of the contracts. I have estimated the rate of interest at which such fund can be expected to accumulate at 4 per cent per year, based upon the average yield of ten first class railroad bonds at December 31, 1912, which is 4.14 per cent."

I testified to the language you quote from page 5272 of the record in this case as to the experience of my firm in the natural gas business. The question to which that was the answer was not directed to me personally. I have not personally designed or constructed any lines. I have not personally participated in the financing or raising of necessary capital except insofar as consultations in the firm's offices have taken place regarding our participation. Personally I have had a very small part in that. I have joined in the discussion a great many times about it. I have never had any direct responsibility in connection with it. I have not had a great deal to do with the development of the market. I did some work along that line in connection with the Edmonton Company. I have done no actual work in the operation of gas lines and have personally
1217 done no marketing of natural gas. I was the general manager of an artificial gas company for four years.

In my testimony on page 5273 in which I answered: "To obtain the money necessary for the establishment of the enterprise it is necessary to hold out sufficient inducement. First, the safety and facility of conversion of the capital must be provided for, and second, an adequate rate of return," I was discussing in that connection either the rate of return necessary to interest investors in a hypothetical reproduction of the business or that necessary to attract capital from now on for such further financing as the business may find necessary. I make no distinction.

A man confronted with one or the other proposition will take everything into account when considering those propositions. I think that my answer would apply to either situation, and I was making no distinction. A different rate of return would be applied in one instance than in the other. An undeveloped enterprise requires a higher rate of return. As to how much higher, I would have to answer that question by giving a range. The money necessary for a new enterprise would require a rate of return dependent upon the degree of risk, and it might be anywhere from 3 to 10 or 15 per cent higher on the investment than that required for an established company. When I speak of three to ten per cent higher, I am speaking of per cent on investment as distinguished from per cent on the rate base.

I testified on direct that the natural gas industry, particularly when it includes production, is more risky than the average business. By average business in that connection I meant an investment list as you find in Moody's Manual, which list has been presented in the testimony here. In natural gas I was referring to the Public Utility Annual as one of those manuals. The Industrial Volume is another one of those manuals. I would not say that the natural gas industry is more risky than any business that you might find in any of those manuals. The natural gas production business is considered in the nature of an extractive industry. In my answers to the questions on direct, shown at page 5275 and 5276, I had no specific types of business in mind. (Testimony on hazardness of natural gas industry stricken on motion by Commission Counsel.) In my answer quoted from page 5276 in which I said in substance that when compared with an ordinary utility, such as an electric utility or other distributing utility or any type of continuing enterprise, there is more risk involved in the natural gas business, one of the considerations involved in that answer was that the natural gas business is not a continuing enterprise. It is my belief that the natural gas business is not a continuing enterprise.

The Hope Natural Gas Company has been in operation a great many years, since the beginning of this century, that is, it and its predecessor companies have been. Some of the subsidiaries of the Columbia Gas and Electric Company have been in business a great many years. I don't remember just how long the Columbia System as such has existed. That system operates largely in southern

Ohio and that general vicinity. It has a large subsidiary in western Pennsylvania and another one in West Virginia.

The Lone Star Gas Company system goes back as much as 15 or 20 years. I don't know that it goes back 30 years, as you say. The Lone Star Company itself was organized in 1926, and it acquired some gas companies which had been established quite a great many years before that, including the original Lone Star Company established in 1909. The Oklahoma Natural Gas Company goes back to 1933. The predecessor companies go back to about the turn of the century. All of the natural gas systems or enterprises that you have questioned me about in the last few minutes have been continuing along for the last 30 years or more on the average.

1218 I have testified on page 5277 that the pipeline company which owns its gas down in Texas and transports it to distant states like Illinois and sells it to distributing companies is confronted with the same risks as those confronting the distributing companies. If the distributing company has hazards, the pipeline company has them. If it is free from hazards, the pipeline company is free from such hazards. The more stable the distributing company, the more stable will be the pipeline company. A distributing company with a stable business would be more valuable to the pipeline company than an unstable distribution company. A pipeline company is concerned about the stability of the distributing company.

Referring to my testimony on page 5277 concerning the uncertainty of geologists' estimates, it is true, of course, that the error in estimate may be in one direction as well as in another. The geologist may underestimate the life of the field or the amount at the source of supply as well as overestimate. (Objection by Company Counsel overruled.) I think it is correct that the natural tendency of a geologist of a well-managed, conservative producing and transmitting company would be to underestimate rather than to overestimate the amount of supply. The reliable and well trained geologist will always take the conservative side. As a general rule, conservative and sound financing would require underestimating the amount of supply rather than overestimating it. You inquire whether with respect to operating revenues of such a company the same conservative and sound policy would require the underestimation of future revenues. (Objection by Company Counsel overruled.) I do not like to make such a sweeping answer as yes or no to the question. It is often the case that it is just as bad to make an underestimate as an overestimate, and I think in the case of revenues and operating expenses the practice would be to make those neither over nor under. As to the distinction I draw between the geologist and the man figuring operating expenses, I think my answer concerning the geologist was that I think a reliable man would take the conservative side. (Objection by Company Counsel overruled.) The distinction that I would make between the geologist and the revenue experience would be the difference in the quality of the evidence available. The geologist uses the best evidence that is available to him. A witness coming in here on a case like this would want to be sure of his ground, and I think that he would be inclined to overestimate the reserves.

Cross-Examination by Mr. Booth.

I testified in the proceeding known as the Chicago District Pipeline Company versus Lindheimer. I did not testify as to a proper rate of return for Chicago District Pipeline Company but merely as to the proper rate of return for the two pipelines here involved. I think I knew that in that proceeding there was evidence submitted by geologists as to the life of the reserves of Texoma Company in the Panhandle field. I have no definite recollection of it. I did not make any studies or examine estimates of the reserves of the Panhandle field or familiarize myself with such estimates. All I know about it is what I have been informed by the officials of these companies. They informed me merely as to the estimates which have been made in this proceeding. They did not tell me that the same geologists or any of them in the Chicago District Pipeline case testified that the life of the reserves were substantially shorter than they now testify in this proceeding before the Federal Power Commission. I made no inquiry as to whether or not the geologists who have testified in this case had made prior estimates indicating a shorter life than they now estimate.

Cross-Examination Resumed by Mr. Slaff.

The conservative side in making an estimate is sometimes higher and is sometimes less. That is, going before a banker I think the conservative side would be to
1219 underestimate, but for a proceeding like this I think
the conservative side would be to overestimate. You inquire whether I mean to say that a reputable geologist will express one opinion as to reserves to a banker, and a different opinion as to reserves to this Commission in dealing with exactly the same subject matter. (Objection by Company Counsel overruled.) This is a matter that cannot be determined to an exactitude. There is bound to be something of a range. In a case involving any uncertainty I think a geologist in making such an estimate would be apt to state a range. I certainly do not think that he would categorically make one statement in one place and a different statement in another; but I say that in any estimate provided, he would take the conservative side, whatever that might be. I do not think he would go out deliberately and give different answers with an intent to mislead in any way. In one case he might say "Not less than," and in another case he might say "Not more than." With respect to financing and with respect to the testimony in a rate proceeding, my judgment is that the only difference that a reputable geologist might make in the estimates which he would present in either case, referring to the same subject matter, would be to say in one case "There are not more than X number of feet, in my judgment," and in the other case "There are not less than X number of feet, in my judgment." I do not think that the natural tendency for an employee of a company estimating future operating revenues for financing purposes would be to deliberately overestimate or underestimate either. There is a field for judgment as to what the operating revenues will be, say 10 years from now. He cannot be precise at all at the present time in determining what the operating revenues will be 10 years from now. He cannot tell when he is prognosticating 10 years ahead whether he is going over or under. I would say that prognosticating 10 years ahead is more of a guess than if it were for only one year ahead. In a business of this kind I do not think you are in a field of pretty wide speculation when you are attempting to estimate 10 years ahead, if you assume a continuance of

present or known changes in conditions. The only basis on which estimates can be made up is on that of present conditions or known changes. I don't know and I would not predict today that such conditions will exist 5 years from now even. I would not predict as to what conditions will exist 10 years from now or in the range of 5 to 10 years from now. I would not predict today what conditions are going to exist 15 years from now or in the range of 10 to 15 years from now. An estimate respecting revenues 10 years from now is pretty much of a guess insofar as they are affected by changes in fundamental conditions. The same is true of operating expenses insofar as they are subject to change by radical changes in conditions. By radical I mean important changes in conditions.

I don't think a man in trying to estimate revenues and expenses for the future would attempt to prognosticate conditions or make any allowance for changes. (Objection by Company Counsel overruled.) The basis for the estimates of this company is a sound one now. They have had several years of more or less uniform experience behind them, and they know just what to expect under normal conditions. I am speaking about the estimates that might be made for this company; the estimates that Judge Morgan says I don't know about. I have not seen the future estimates for this company. I have seen some of these estimates that have been submitted as exhibits but I have not studied them. I would say that it is absolutely impossible to make in estimates any allowances for possible changes in conditions, and that estimates should always be predicated on a continuance of present conditions or known changes. An example of known changes would be the rise in the unemployment tax. What I have said with reference to present conditions or known changes applies to the operating expense estimates for the future mentioned a little while ago.

1220 I do not know what drafts the Texas Panhandle field is subject to for purposes other than pipeline purposes. I do not know what drafts it is subject to for other pipeline purposes. I do not know what drafts it is subject to for carbon black or gasoline stripping purposes. I don't know enough technically about the manufacture of carbon black to say whether sweet gas or sour gas is used in its manufacture. I don't know enough about the operations in that field to answer as to which type of gas is used for gasoline stripping. I understand that this field is subject to salt water intrusion, and I read Mr. Brown's testimony that it is. I am referring to Mr. Floyd Brown's testimony. All I know about it is what I read in Mr. Brown's testimony and what I have heard other people about the office say. Mr. Hill and Mr. Rhodes of our office are familiar with that field. Mr. Rhodes is one of the vice presidents of our company. The basis of my knowledge depends on my reading of the testimony of Floyd C. Brown and the discussions I have had with Mr. Hill and Mr. Rhodes of our organization.

What I know about the migration of sour gas into the sweet gas areas of the Panhandle is based on the same sources. I cannot name the specific discussion of these subjects; but it is one of the matters that have been talked about at different times in my hearing. I know nothing specifically about the migration of gas from the sour to the sweet areas except what is contained in Mr. Brown's testimony.. I know nothing about whether the intrusion of salt water in the Panhandle is from above or below the gas producing areas. I know nothing about the predictions that have been made with respect to future drafts on the field. I am in no position, therefore, to state whether the company witnesses in this case have underestimated or overestimated drafts for the future. I have made no effort to ascertain what the company's estimates of future drafts have been. I know nothing beyond the estimated future life of the field that has been presented here in the testimony. I do not know what the withdrawals from the field have been in the last five years, the last ten years, or during any given period in the life of that field, or how such withdrawals compare with the withdrawals in any other given period.

I testified as shown on page 5278 of the record that the fact that another pipeline should be built or that other carbon black industries should enter the field and utilize sour gas for the manufacture of carbon black would tend to limit or reduce the amount of gas available for this company. In answer to your question whether that will necessarily follow I cannot say any more than that would intend to. It is a matter of common judgment that if more people use it, it will be exhausted sooner.

I know nothing about the migration of gas from one part of that field to another. I know that gas migrates and that migration in that field is considered to be rather greater than in the average porous field, so I would think that if one man drew gas from one part, the gas from the other part would tend to migrate to it. I mean it would migrate.

I do not know anything about the Texoma Natural Gas Company reserves in the field. I do not know anything about the Texoma Company's requirements for the next five years, except insofar as what the sales are now and the expectation of continuing them for the next five years are concerned. I think the entry of another pipeline into the Panhandle field would shorten the life of these 1221 companies. I cannot say how much. That would depend on the size of it and the amount of the draft, but naturally, if any one else comes in there and takes gas, less gas will be left. There would be a migration from Texoma's reserves. I do not know how Texoma's reserves today compare with Texoma's requirements for the next 15 or 20 years, except that I understand that their resources are estimated to be sufficient to supply them for that period. I have no hesitation in saying categorically that the entry of another pipeline into the field would shorten the life of this company, regardless of the size of the pipeline. Naturally, it might shorten it five minutes or it might shorten it five years, depending on the size. Regardless of the size of the pipeline, the entry of another pipeline into this field in my judgment would shorten the life of this company. I am not speaking generally but specifically. I want to make it clear, however, that a very short time, such as five minutes, would not be worth talking about. Anything I talked about in connection with shortening the life of the field is something worth talking about. When I testified that if another pipeline should be built into the field it would shorten the life of the field, I meant that it would shorten it enough so that it would be noticeable. I assumed to testify categorically on that subject without any more knowledge of the field and the geology of the field than I have indicated.

When I testified as shown at pages 5279 and 5280 in effect that assuming that the market is always available and favorable, or the estimates are made altogether under favorable circumstances, it is almost certain that in a term of years there will be some circumstances not favorable, I meant that the estimates would have to be based on the assumption that no conditions essentially different from those at present or now foreseen would occur. When I testified that the providing of an annual reserve for amortization over the indicated life of the field would not remove the hazard involved in the question of whether or not the capital of these investors will be returned, I assumed that the entire capital investment is to be amortized over the remaining life of the Panhandle field. That would be the estimated period of 16 or 20 years or whatever it was. When I testified as shown by the record at page 5280 that if the funds provided for the return of the capital be distributed over the entire indicated life of the field, an investor would consider that his investment was still subject to hazard, I meant that he could not count definitely on all conditions being favorable.

You asked if he might not consider that the capital would be returned at the end of the period provided for amortization and the business still continue. (Objection by Company Counsel overruled.) That is a contingency that he certainly could not bank on, and it would be a pretty long gamble. He could not bank on the field's going out before the indicated life. He cannot get back funds by banking on any contingency. You cannot bank on any contingency such as the field going out before the indicated life. I was testifying at the top of page 5281 about what an investor would consider. He might consider that the capital he invested would be returned at the end of the period provided for amortization and that the business might still continue. I think that he would be inclined to rule that out as a factor because it is such a long gamble.

With respect to the report of the geologists looking 16 years ahead, I should call that a long gamble. I have not read the reports of any other geologists, and I am basing my judgment on the reports of geologists in this case that have been produced by the company. If an investor considered that the field may last longer than the period provided for amortization and that his capital will be returned at the end of the period provided for amortization, that, in his judgment, would be a favorable circum-
1222 stance insofar as it is a possibility. I think, however, the investor is more inclined to study the unfavorable side because the hazards are on that side. I would say that he studies the favorable side less diligently than the unfavorable side. As to your question of whether he comes to a balanced judgment, in my mind by studying one side of the picture my answer is that it is the customary way to study hazards. In that observation I mean the investor. The foundation of my direct testimony was the investor's

appraisal of natural gas securities as evidenced by the price and earnings. That, I think, is a direct illustration and final answer as to what the investor thinks.

When I was discussing in my testimony the fair rate of return that an investor would demand or want or have to have to be satisfied and to meet all of the conditions of fairness, I did not assume that the investor looked just at the dark side of the picture of the prospective investment. He looks at both sides, but as I said before, I think he gives more thought to the unfavorable circumstances. He tries to take the greatest care possible not to get hurt. He is primarily interested in not getting hurt. I think he gives more consideration to the unfavorable circumstances than to the favorable ones and that these influence him more than the favorable circumstances. It was that type of investor that I had in mind in my direct testimony, and it was that type of investor I had in mind when in answer to the question: "How would that affect the rate of return which he would expect from his investment under those conditions?" I said: "That makes the required rate of return to attract the capital higher," as appears at the top of page 5281. I meant that it would be higher than it would be if there were not such a hazard. If I were asked a question, as you suggest, "In view of the fact that you say that these estimates always are attended by uncertainty, the field might last a year or two longer than 16 instead of playing out or becoming exhausted one or two years short of that period, does that remove the hazard?" I would answer that it does not remove it. It does not minimize the hazard or lessen the hazard because that contingency is always present. I have testified on the direct that the fact that it might last a few years longer would not remove the hazard. I do not think that such possibility would lessen the hazard at all. If there is a possibility that it may last less than 16 years, it does not make any difference if there is a possibility of its lasting 20 years after that, for that does not take away the hazard of its lasting 16 years.

My difficulty in answering comes in trying to evaluate a gamble beyond 16 years. (Objection by Company Counsel overruled.) As to whether the importance of that hazard in the investor's mind is lessened by the fact that the field might last five years more, I believe an investor would say that he has to guard against a hazard and that if the field should run over that length of time it would be just a matter of luck, but that he would not assign any value to that element. If in the light of the circumstances there was a reasonable probability in the inventor's mind that the field would last longer than the period indicated for the amortization of his investment, I still do not think it would lessen the hazard, but the reasonable probability would have some value. If you should match that reasonable probability against the hazard, it would lessen the significance that the hazard played in his own mind.

(October 24, 1939)

An investor investing his money in this company in 1930 is entitled to have his investment amortized over the life of the field. In 1930 I think an investor would expect his investment to be amortized over the life of the field, whatever that might be, not necessarily at the same rate continuously. His investment in 1939 should be
1223 amortized over the remaining life of the field. By his investment in 1939 I mean what he has in it. I mean the present value of the property.

Question by the Examiner.

In appraising risks as of today with respect to any concern that had a past life and which, during that past life, has earned enough to set up an amortization reserve during that past life, in appraising the risk of a going concern like that I do not think in the case of an unregulated industry that I would take into account that its earnings had been favorable in the past, and I did not do so in this case.

Cross-Examination Resumed by Mr. Staff.

In stating that the investor in 1930 should have his investment amortized over the life of the property, whatever that life may be, I meant that he would expect to get his money back when the life of the field expires. If there were no rate inquiry directed against these companies until the year 1949, and if there was geological testimony introduced by company witnesses in that rate proceeding in that year that the life of the field would be exhausted by 1954, I think the Federal Power Commission in setting up rates should provide for the amortization of the value of the property at that time, whatever it is found to be. In answer to your question whether I am distinguishing between "value" and "investment in the property", I think the investment in 1930 was what was put into the property. I think the investment now is represented by its value. (Objection by Company Counsel overruled.)

(The following question was asked the witness by Commission Counsel: Q. Now, assume, Mr. Emory, that there is a rate case in 1949, the first rate case this company is involved in under the Natural Gas Act, which then exists as it exists today and evidence is presented by the company of its investment in the company; evidence is also presented at that time by the company of the reproduction cost of the company as it then envisions it do you say that either the reproduction cost or the investment should be amortized over the period 1949 to 1954 and the fund to provide that amortization should be built up over that period, that 5-year period?) (Objection by Company Counsel overruled.) May I explain as a reason for taking so much time to get the question through my head and for having it read over, that it is such an academic and impossible one that it is difficult to visualize it. If the whole investment were intact in 1949, it would be practically impossible to amortize it. That is, this company is within very strict limits as to the price it can get for its products. I still cannot say anything more than that the value, whatever it is found to be in 1949, would have to be amortized or should be amortized in the succeeding five years. By "if the whole investment were intact in 1949" I meant by investment the value found in 1939. In my view, value and investment would become the same when regulation goes into effect. (Objection by Company Counsel overruled.)

When in response to a question at the top of page 5282 reading, "If it runs longer than expected, the situation must be dealt with according to conditions at that time," I answered in the affirmative, I meant that it must be dealt with by the regulating body. In answer to your question as to whether I meant that if the investment were amortized over the estimated life of the field, and it then turned out that the life of the field still continued, the regulatory body could rule by order that the investor having had his capital returned to him, was no longer entitled to a return on the property or on the value of the property, or on his original investment in the property; my answer is that it is my understanding that the Federal Power Commission or the regulatory body would have power to do anything it saw fit. (Objection by Company

Counsel overruled.) My conception of what it could do under the circumstances I have just stated is that it would find a reasonable return on the fair value at that time, whatever that might be. I do not know that the Federal Power Commission cannot do anything it sees fit to do. I understand that its powers are to impose what it considers a reasonable return on the fair value. In answer to your question as to when at the end of the estimated life of the field the investor has his investment completely returned to him and the business of the company still continues, it is my conception that this Commission should then fix the fair value of the property and allow the company a fair return upon that fair value and that that was what I had in mind in my statement that the regulating body would protect the public if it developed later that there had been an estimation of the life of the field. I would not attempt to say what the Commission should do. The Commission would protect the public by finding what they consider a fair value. I understand that is wherein the public protection exists, in confining the company to a reasonable return on the fair value, and, in company operations, by prescribing the accounting regulations. It would protect the public with respect to the underestimation of the life of the field through its finding of value.
1224 As to how the public at that time would be protected against the underestimation of the life of the field that had been made previously, I think the conditions at that time, and the history after regulation went into effect would control. I had nothing specific in mind except that the Commission would hold the company to a reasonable return on the fair value. If the entire value had been amortized, there would be no further provision for amortization. The investor, once having had the value of the property amortized and returned to him and having received a fair return during that period on the value of that property, would from that point on be entitled to a return upon whatever value might be found in the property then, for the rest of the property's life.

Referring to the question at page 5282 in which I was asked: "Why cannot the Federal Power Commission, if we make it specific, protect the investors in defendants against losing a part of their capital due to the lives being shorter than that indicated by the testimony under the most favorable conditions?" and my answer: "Principally because their business is all highly competitive, and

~~even~~ if they were permitted to charge higher rates, they could not get them," I based the answer on the fact that all of the business of this company has been obtained on the competitive basis by underbidding other people, by underbidding other fuels, and if they raise their rates they will take themselves out of the market.

You ask if that means that they are now charging as rates all the traffic will bear; I certainly would not express it in that way; that is not what it means. (Objection by Company Counsel overruled.) That expression is generally used in connection with a more or less non-competitive business where it is a question between the volume of traffic you can get and the rate. Yes, I have heard that expression used in connection with railroads. I certainly would never express myself in that way, but the meaning and the fact are that there are competitive fuels in the Chicago market. This company to get its business had to bid under them. If it raised its prices and they did not raise theirs, it could not get the business. Practically, I didn't consider that there was any margin wherein the company could raise their rates between I feel that they are charging today as much as they can because of the competitive situation. I do not understand that that expression "all the traffic will bear" would apply to charging what they can under the competitive situation.

In my answer shown on page 5283 of the record, "I should think with this company operating in several states, and also under Federal regulation, it would have to expect more than one," I meant that defendants would probably have more than one rate case on their hands. I was assuming that the rate would be the same at that future time as it now is. I understand that the rates of this company are subject to state regulation. As to whether it is my understanding that the Illinois Commerce Commission can regulate the rates of Natural Gas Pipeline Company of America, I consider it practically the same thing, that is—that they could regulate the rates of the principal user. When I was retained to make a study of the rate of return for these defendants, there was a proceeding before the Illinois Commere Commission. I, of course, know little or nothing about the law in this matter, the interpretation of the law; but my statement in the direct testimony was made with the understanding that the Illinois Commerce Commission did have or claimed to have some regulatory or investigatory authority over defendants. As far as my knowledge goes, the Illinois Commerce Commission has no power to regulate the rates of defendants today. I should suppose under those conditions that there could not be a rate case before the Illinois Commerce Commission covering this company alone. The same would apply to every single state in which the company operates.

Redirect Examination Interposed by Mr. Morgan.

From the standpoint of an investor, I do not see that there would be any difference in a rate case conducted before the Illinois Commerce Commission and one instituted by it before the Federal Power Commission. I see no difference in a proceeding pending before the proper commission in Iowa, Nebraska, Kansas, and the one
1225 which they might separately institute before the
Federal Power Commission. There could be just as many rate cases on the complaint of the various states as if they had jurisdiction themselves.

Cross-Examination Resumed by Mr. Slaff.

In my testimony I was considering the possibility of the rates being raised. I do not understand that the Natural Gas Pipeline Company would have to go to other than the Federal Power Commission to get its rates raised. On page 5283 I testified that there would be a rate case in the Federal Power Commission and every one of our distributors would have to go and get its rate increased in order to meet the increased price which the Federal Power Commission might provide. I do not know much about the earnings of the distributors who purchase gas from these companies, nor do I know anything about the proper fair rate base or the proper operating expenses or the fair rate of return applicable to any of such distributors, except that I know generally about the rate of return that would be required on the average for such companies. I would not state now, nor would I have stated on my direct testimony what was a fair rate of return for any specific distributor of Natural Gas Pipeline Company of America. (Objection by Company Counsel overruled.) I do not know all the specific facts relating to any of these companies, and such information as I have is to the effect that generally gas distributing companies are not making more than a fair return because most gas distributing companies are not making a fair return. The competitive situation has exerted such a pressure on them that they have not been able to meet it. I do not have specific information in respect of whether any of these distributors of Natural Gas Pipeline Company of America is today making more than a fair return, so that it could absorb an increase in rates of Natural Gas Pipeline Company of America, such as I was discussing in my answer at page 5293.

A company does not apply to increase its rates every time its operating expenses go up nor does it apply to decreasing its rates every time its operating expenses go down. Operating expenses might go up or down by a small amount without any adjustment in the rates; but if they go up or down by a very large amount, there would have to be some adjustment in the rates. I do not know what proportion of the operating expenses of any of the distributors of Natural Gas Pipeline Company of America is represented by the amount it pays defendants for gas. If we assume that a distributor must have its rates increased, I do not know of any cases of rate increases without a rate case. I do not personally know of any increase in rates without a rate case since regulation came into effect. I made no attempt to find out about any. I therefore do not know about the number of schedules, if any, embodying increases that may be filed with various commissions during the course of a year. I understand that when the Peoples Gas Light and Coke Company applied for an increased rate in Chicago there was a rate case brought against them. (Motion to strike above testimony by Commission counsel denied.) I used that expression, if I may explain, to cover all cases, whether the commission took action to prevent the company from making such a raise or some outside person or body did so. I did not know the exact circumstances, and that is the reason that I said that I understood the facts to be as stated.

By my testimony shown on page 5284 of the record to the effect that while the company has undertaken to predict the cost of additional wells which they can now foresee and the cost of providing field compression necessary to get the gas from the wells into the main line, and has brought in figures showing the minimum costs incident to the drilling of such wells and the boosting of gas into the line, the figures if incorporated in the rate base would not remove the hazard because if they brought in a minimum estimate of cost it could not be expected that all condi-

tions will be favorable for 16 years, I meant the cost as estimated by the witnesses referred to in the question. By the use of the expression "minimum" in the question asked me at that time, I understood the meaning to be the estimated cost without provision for possible changes in
conditions which would tend to increase the cost.
1226 (Objection by Company Counsel overruled.) I did
not understand that there was any provision made for changes which might tend to decrease the cost. I have seen the figures brought in through these estimates, but I have not memorized them or analyzed them. I have every reason to think they are reasonable estimates, but I do not know what they amount to. I have made no study to determine for my independent judgment whether they are fair or unfair. I do not know whether these figures were increased in the record by an allowance by another witness for contingencies. I do not remember having testified about allowances for contingencies in my original testimony, but I see here that it was mentioned in the record. However, I do not think that the allowance of that 10 per cent would change my answer, because in the course of 16 years I think the contingencies and hazards relating to operating expenses would be more than 10 per cent. I would not attempt to appraise or set a definite figure that I think would make allowance for such contingencies in operating expenses.

I am not intimately familiar with the tentative system of accounts prescribed by the Federal Power Commission for natural gas companies. I do not think that I would say that I am generally familiar with it. I have heard it discussed, but I am not an accountant and know very little about that. I have not looked at it. I am not familiar at all with the system of accounts for natural gas companies recommended by the National Association of Railroad and Public Utility Commissioners. A number of years ago I made a study of a system of accounts proposed to be promulgated by the New York Public Service Commission covering artificial gas companies, and I don't remember just what other authorities I consulted in the course of that study. I know of no system of accounts prescribed by any Federal regulatory body or state regulatory body which does not include maintenance expense as an operating expense. That applies to all types of utilities and regulated companies. I think it is correct to say that in all such prescribed systems of accounts maintenance is included as an operating expense.

Referring to my testimony at page 5288 concerning the pressure and stress at which this line is operated, what I call conventional stressing runs about 12,000 to 15,000 pounds per square inch. I do not know of any major pipeline that has been built to operate at higher pressures than this line. I do not know of any line built to operate at 1500 pounds pressure. I attempt to keep up with developments in the field. I attempted to make an investigation prior to my testimony here as to pressures at which other lines were being operated, higher pressures as well as lower pressures. I consulted the records in our office and consulted with various natural gas engineers in our office and with officials of defendants. We get Gas Age down at our place. I know Thomas R. Weymouth. I don't know his exact title, but he is a high natural gas official of Columbia Gas and Electric Company. He is also chairman of the Natural Gas Section of the American Gas Association. I do not know anything about the line referred to in the January 1939 issue of Gas Age in which Mr. Weymouth described a development in the pipeline industry as follows: "Another development during 1938 has been the testing out of lines of extremely high pressure. One in particular is a 12-inch line built for ultimate operation at 1500 pounds, but which up to this time has been operated only to a pressure of 1300 pounds."

1227 Pipelines are normally subjected to stresses up to in round numbers 40 per cent of the elastic limit. The Southern Natural Gas Company operates at a stress of 15,000 pounds per square inch, which is approximately 40 per cent of the elastic limit of the steel. The Interstate Pipeline Company, the Colorado Interstate, and the Mississippi River Fuel pipelines are all operated in round figures at 35 per cent of the elastic limit.

The final rate of return figure that I presented here of 9 to 10 per cent includes a consideration of the pioneering skill which this company exercised in three particulars, one of which was the operation at these high stresses. Not only the skill and vigilance of the operating organization was considered, but of the designers and the enterprise of the investors in putting up their money on such a basis. Yes, I did mean that my rate of return included an element of compensation for the vigilance and skill on the part of the operating organization to which I referred at page 5288.

Yes, consumers pay the money which provides for the operating expenses. Of course, the company pays the operating expenses. I really don't know how I can answer that any differently or any more clearly. The consumer pays a rate which is supposed to cover the return and the operating expenses, and the company pays the operating expenses. I have no doubt that in the Public Service Electric case in New Jersey in reply to a question shown at page 3221 I said that assuming a period of years when the company does earn a fair return in effect charges to operating expenses are borne and are paid by the consumer. It is a fact that assuming that the company is earning a fair return, charges to operating expenses are in effect borne and paid by the consumers. The consumers, of course, are the source of the funds from which the company makes its payments. In the same way the salaries of officials and employees of a utility company are paid by the consumers under the same assumption that the company is making a fair return. Generally all such charges are charges to operating expenses. The reason I say generally is that sometimes there are stock options or the privilege of subscriptions offered to officials. All salaries or parts of salaries resulting from operations are charged to operations, as far as I know. The reason I say parts of salaries is that there may be some portions of some of the salaries charged to construction account. Such portion goes into the fixed capital accounts as overhead charges. Operating expenses and charges to operating expense are something entirely separate and distinct from the return or from the rate of return.

In my going concern testimony in this case I testified that the operating organization, skilled and trained as it was, added an element of value to the property over and above the value that the property would have without that organization. In my judgment and according to my testimony the company should receive a return on its going concern value as well as on the other elements that I conceived to go into the value of the company. (Objection by Company Counsel overruled.) It is not according to my rate making concept that the investor is entitled, in addition to the capital value placed on a skilled organization and a return on it, to a further increment of return on the entire rate base because of that skilled organization. Generally I do think that a company is entitled to include in the capital value some value for skilled organization

and that it is entitled to receive a return on that element of capital value. I have not said that it is also entitled to include as an increment or element of its fair rate of return, the fact that it has a skilled and vigilant operating organization. That is true only when extraordinary or outstanding developments have been made. I do not
1228 remember that I have ever testified in a rate case in
which I did not testify that the company involved had a skilled operating organization and that that was one of the elements I considered in coming to my conclusion as to the rate of return. I have generally treated the assemblage and training of the organization as an element of value on which the company should be entitled to earn a return, but I have not done so in this case. In this case I did not treat the operating operation and skill as an element of value.

I testified as shown on the record at page 5290 that the possibility of exceeding the elastic limit of the line was a hazard and that the immediate result of exceeding it would be the expense of repairs and the interruption of business, but that if it became necessary to reduce the pressures, it would substantially reduce the earnings. That was one of the hazards I envisioned as being in the investor's mind. This line was designed and intended to operate under the conditions under which it is operating. It was not so intended at the beginning. The operating pressures were raised a few years ago. The design and building of the line was due to the initiative and skill of the originators of the line, the entrepreneurs and their agents. I proposed in my direct testimony that they should be compensated in full for that skill and initiative. If it should develop that the uses to which the line is put so exceed the elastic limits of the line as to cause any failure due to the high stresses, that would not imply any discredit whatever on the builders of the line. This was an entirely new procedure, and they showed great enterprise in going into it. No new thing of this kind can be designed with 100 per cent perfection.

I understood the question on page 5290 to refer to difficulties resulting from high stresses. I would like to add to my answer that the possible deterioration in the pipe and equipment must be considered. In exercising their skill and initiative in the original design and building of this plant, the owners doubtless took into consideration the possible deterioration of the pipe under the pressures at which it was worked. I cannot directly answer your question as to whether, should the contingency occur, to which I referred in my testimony at page 5290, it would turn such great skill and initiative which I say the displayed was perhaps not as I now conceive it to be. The results so far have been satisfactory. You inquired if it should turn out that over the next 15 years the results should not be so satisfactory as they contemplated, whether or not it would not show that their skill in projecting the enterprise as they did was not as I conceive it to be. That is too general a statement for me to subscribe to. I think they showed remarkable skill and enterprise in what they have done. Of course, what they have done is subject to conditions or hazards that may turn up in the future, but whatever they turn out to be does not detract from the initial skill and enterprise. The measure of the value of the skill is in the success of the skill. I cannot subscribe to your suggestion that if what we conceive to be skillful or skillfully done today turns out to be a failure sometime in the future, that such skill would not have the actual value we placed on it. Hazards entirely unlooked for or changes in conditions entirely unlooked for might arise. If it should turn out that say next year pressures would have to be reduced on this line, less gas could be transported; earnings would be less, and I would say that the skill of the enterprisers in this case was less than I had conceived it to be when, in October, 1939, I testified in this case about that skill. I would say that the value of it is less or that the consideration should be given to it is less. (Objection by Company Counsel overruled.)

In connection with my Exhibit 149 and my testimony in connection with it, I included in my rate of return an element in the fact that the earnings of this line, operated at 750 pounds or thereabouts, are greater than the earnings
1229 of the line would be if it were operated at a lower pressure. Among the hazards I considered in connection with a proper rate of return for defendants is the possibility that the earnings of this line may be reduced through a necessity of reducing the operating pressures below those now maintained.

When I spoke at page 5294 of the record of the fact that I had organized and for about six months was in charge of a valuation of the East Ohio Gas Company, Peoples Gas Company, and the Hope Natural Gas Company, I was referring to work I did in a rate case. Those companies are so-called Standard Oil Company affiliates. My firm and I do considerable work for the Standard Oil and its affiliated companies. The Standard Oil of New Jersey is one of the large owners of Natural Gas Pipeline Company of America. That company owns 13.31% of the stock. Our firm is now doing a job in connection with the Colorado Interstate in a rate proceeding. It also is a Standard Oil affiliate or subsidiary. We are also doing a job in connection with a rate investigation involving the Hope Natural Gas Company.

It is true that at page 5295 of the record I stated that for the past twenty years I have been more or less intimately connected with natural gas matters, that this had been one of the activities of the office, and that financing matters are almost always discussed among us. I am somewhat familiar with matters involving the financing of the Southern Natural Gas Company. I know that that company has outstanding a loan of $1,500,000 by a bank. My Exhibit 148 shows it to be $1,489,000 as of December 31, 1938. The interest rate on that loan was 4½ per cent. I do not know that the rate is 4 per cent today. This information was as of December 31, 1938. I don't know what bank holds that loan or where the bank that holds that loan is located. I do not know anything about that loan or its status today. I don't believe I have had any discussion with any one in my firm respecting that loan in the past month or two. I came back from my vacation early in September. No one has discussed the Southern Natural with me during the past six weeks. I have discussed the Southern Natural in the past with Mr. Von Puhl and Mr. Hill. I have stated that Mr. Von Puhl is a member of the Board of Directors of Southern Natural and that he is a member of my firm. He did not inform me that the interest rate on that bank loan had been reduced in July, 1939, from 4½ per cent to 4 per cent. I don't think I said I was intimately connected with the details of financing and financial matters around my firm. I said, "Financing matters are almost always discussed among us." I don't know whether this particular transaction was discussed in the office or not. I was out of the office in July. I am not familiar with this or that Southern Natural has pending before the S. E. C. now an application for a declamation involving a reduction of the interest on this bank loan from 4½ per cent to 4 per cent. I do not know that there is such an application pending. I have not heard of it. I have not heard at all since my return that Southern Natural was before the S. E. C. in connection with anything. I left on my vacation early in July. I had no intimation about my office prior to leaving on vacation that any attempt was being made to procure the lower rate on the Southern Natural's bank loan. There was no such discussion to my recollection.

(At this point counsel produced a letter with the request that it be marked for identification. At the direction of the Examiner it was marked Exhibit 153 for identification.)

1230 I have examined Exhibit 153. I never saw that letter. It is dated July 13. Before coming to the stand on my direct testimony I sought to find out the status of the companies listed in my Exhibit 148 at June 30, 1939. Answering your inquiry if I had a check made with respect to the Southern National Bank loan as of June 30, 1939, I had similar information prepared as far as we could do so as of June 30 of such of these companies as we could get information on. Mr. Timberlake had charge of it. Mr. McKenlon made the study. If there was an intimation to Southern Natural and the members of its Board of Directors at June 30, 1939, that there was a reduction in the interest rate of the bank loan contemplated, I did not know about it. As far as we could ascertain from the public records, this fact was not disclosed. It was our endeavor to get all the information possible. With respect to the status of these companies I don't know whether I instructed Mr. Timberlick to confine his investigations to the published records or whether I told him to get his information from the June 30, 1939. I am somewhat familiar with financing utility companies and business companies and corporations in general. Usually the reductions in interest rates from banks are the subject of negotiation. I do not know that this situation involving the Southern Natural was in any way unusual in that respect.

Referring to my testimony on page 5296 to the effect that in connection with this testimony we consulted with engineers as to the operating characteristics of this pipeline or similar pipelines, and to my testimony a few pages thereafter and your question as to whether all of my information was second-hand or third-hand, I don't know just what you mean by second-hand or third-hand. If you mean that if I had this knowledge myself that would be first-hand, and that if I acquired it from somebody else who had the knowledge it would be second-hand, then it was second-hand. I certainly did not intend to testify right along, before the point was raised, in the record, as though that was first-hand information of mine. I was asked to cite the experience of the firm. I do not understand that in my discussion of the hazards of this pipeline, physical hazards and mechanical hazards, I testified right along as though that was first-hand knowledge of mine with respect to those hazards. I don't believe that I was asked if it was first-hand of my own knowledge. I certainly did not intend to imply in any way, shape, or fashion that it was my personal experience.

(Reference to transcript from another proceeding read into record by Counsel for the Commission for the purpose of impeaching the credibility of the witness struck from record on motion by company counsel. The following questions and answers were also stricken by the Examiner:

By Mr. Slaff:

Q. Now, I ask you whether in the Public Service of New Jersey case when we were discussing—you and I in the cross-examination—hourly wage rates, wage rates for different classes of workers which were obtained by you or your organization through the office of the United Engineers and Constructors, and which you had testified on the direct, whether you were not asked this question and whether you did not make this answer:

"Question (By Commissioner Reardon): According to your testimony, you don't know anything about it?

"Answer: Yes.

"Question: That is the fact, isn't it?

"Answer: Yes, that is right.

"Commissioner Bachrach: You mean the testimony today?

"Commissioner Reardon: Yes."

Do you remember that being asked you and your making those answers?

Mr. Morgan: We object to it.

The Trial Examiner: I will let it stand until I see what counsel is going to do with it. Answer the question.

The Witness: No.

By Mr. Slaff:

Q. You do not deny, of course, that that did occur? All of that colloquy did occur between Commissioner Reardon and yourself?

A. I cannot deny it.

Q. And if it appears in the record of that case, it did occur?

Mr. Culton: That is argumentative and we object to it on that ground.

The Trial Examiner: I will let him proceed.

The Witness: Yes.)

At page 5301 of the record it appears I testified with respect to various hazards, mechanical and physical hazards, of these companies. I think a fair rate of return for this company would be higher than for a telephone company. Telephone companies have some of the same kind of hazards that these companies have. I think their river crossings are more generally on bridges. I do not know how many rivers the Illinois Bell crosses throughout the State of Illinois. I do not know how many river crossings there are for telephone companies between Texas and Chicago. I know nothing specific about the danger of damage to telephone company equipment by floods. They encounter hazard from such things. Electric operating companies encounter hazards from weather conditions. The troubles they have with floods are more largely power houses located in flood districts. Some other public utilities have such hazards. I don't know specifically about the flood hazard of the Louisville Gas and Electric Company in 1937 or about the flood damage to that company in the 1937 floods. I know nothing specifically about the damage to the Cincinnati Gas and Electric in the 1937 flood. I know there was a flood down in the Ohio Valley at Cincinnati and Louisville in 1937. It was a pretty bad flood. I heard a good deal about the damage in Pittsburgh.

1231 The hazard of floods is not unique to natural gas transmission companies but is generally considered to be somewhat greater in degree. I said at page 5301 of the record that this hazard is very important because it entails a good deal of money for repair and loss of business during repair. Yes, insofar as such losses entail additions to fixed capital, those additions are entitled to enter into the rate base; and the company is entitled to a fair return thereon. Insofar as such expense is chargeable to maintenance, it is a proper charge to operating expense over and above which the company is entitled to earn a fair return. I made the statement quoted by you from page 5301 of the record concerning the other hazards applicable to the business of these two companies.

I know Percy S. Young. He is vice president in charge of finance of Public Service Corporation of New Jersey. He holds a similar position with a subsidiary of that company, Public Service Electric and Gas Company of New Jersey. He was formerly president of the American Gas Association. I have considerable confidence in Mr. Young's statements as to facts and his expressions of opinion. (Objection by Company Counsel overruled.) I was not aware of the article by Mr. Young entitled "Investment Attributes of Gas Utility Securities" presented May 15 in San Francisco at the Executive Conference of the American Gas Association, in which he discussed the merits of the modern gas range as follows: "1. Cooking. The modern gas range is a remarkable achievement. It is more efficient, excels and out-performs any of its competitors. Public acceptance has been immediate any enthusiastic. The modern gas range has placed gas in a preeminent position in household economy. During the year 1938, over 1,000,000 new gas ranges were sold." I was aware that there were large sales of gas ranges in the year 1938. I did not know that Mr. Young said that: "2. Water Heating. This field offers one of the greatest opportunities for expansion for a highly desirable log. Lower initial costs and substantial improvements in efficiencies have met customary requirements and public acceptance has followed. Sales of 47,000 water heaters in 1938 exceeded previous year's sales, while the sale of many non-gas-using major home appliances showed more decreases." I was not familiar with the facts thus summarized by Mr. Young. I did not know about the number of gas heaters that were sold in 1938, and I made no effort to find out the number sold or to compare the number sold that year with the number sold in other years. I did not know that Mr. Young in the same address went on with the summarization: "3. Refrigeration. Gas refrigerators continue their extraordinary public acceptance and relative sales results were better than other types of automatic refrigerators during 1938." I was not familiar with the fact that Mr. Young made that summarization. All I can say to that is that gas refrigeration is quite a minor portion of the gas load; and it might very well be that the percentage of increase in gas refrigeration apparatus was higher than the percentage of increase in electric refrigeration apparatus. I don't know that the absolute sales for gas refrigerators exceeded the previous year's sales, but I should think that is reasonable. I did not know that Mr. Young had made the statement that: "4. House Heating. Faced with keen competition, gas house heating has made outstanding gains. Manufactured gas sales for residential house heating increased every year throughout the depression, and throughout 1938 were almost four times the 1929 sales. Gas house heating entrenches the other three services of cooking, water heating, and refrigeration." (Objection by Company Counsel overruled.)

Questions by the Examiner.

I am aware that gas house heating has done pretty well, but it is my opinion that it lags behind the use of oil. It is certainly true that the gas companies are faced with keen competition and that there were outstanding gains. I think it is probably true that manufactured gas sales increased through the depression for residential house heating. It is very likely that it was almost four times as much in 1938 as in 1929, but, as I said with regard to refrigeration, the house heating load was pretty small in 1929.

The principal facts on which I based my conclusion as to rate of return are first, that it is a matter of general knowledge that electric cooking is pressing on gas cooking; second, I see every three months an index of gas and electric sales in the United States, and the gas sales have been increasing very slightly while the electric sales have shown good increases. I have no further information than
1232 that I just stated, namely that the quarterly index of gas sales has increased very slowly.

Cross-Examination by Mr. Slaff Resumed.

I hardly think that the sale of gas for house heating is an item of major importance in the gas industry. It is quite an undesirable load because it comes on the peak of the other load, and that taxes not only the producing or supplying facilities but the capacities of the mains.

Mr. Walter Beckjord is vice president and general manager of Columbia Gas and Electric Company. He is the new president of the American Gas Association. The Columbia Gas and Electric System operates large natural gas properties. I am not specifically aware of the article by Mr. Beckjord in the September 14, 1939, issue of Gas Age from which you have read and in which he states the following: "During the last 10 years the sale of gas for house heating has become an item of major importance to all branches of the industry. Always a large factor in the natural gas branch, special rates and sales activities for promoting house heating were initiated in the manufactured gas branch in 1915. In the beginning, the company growth was slow. In 1929 house heating customers in the manufactured gas branch totalled only 31,000 and consumed less than 4 percent of the total gas sales and contributed about 3 percent of the gross revenue of that branch. Nine years later, during 1938, the number of house heating customers had grown six-fold, to almost 200,000. House heating represented nearly 14 percent of the total gas sales, and house heating revenues were nearly 9 percent of the total revenues, three times the 1929 proportion. The number of customers using gas for house heating increased without exception during every year of the depression, and today more than 2,225,000 house heating customers are on our lines. There can be no question about the present and future importance of house heating to any gas company when it is realized that one-seventh of our customers are now utilizing gas for this purpose." I knew that there had been a substantial increase in house heating. I have the greatest respect for Mr. Beckjord's opinion. I would consider house heating important to the gas industry but not of major importance. As I explained, the load has some undesirable characteristics, and the fact that there was such a large increase in the volume, whereas the total sales increased so slowly would seem to indicate less load or even a loss of cooking load. I do not know that to be the fact. The fact that the companies are apparently going after the business would, up to a certain extent, indicate that it was a desirable part of their load, or that at least the desirable features outweighed in the companies' minds the undesirable features of the load. No, it would not indicate that attitude to the extent that the companies go after the load. It would be desirable to the extent of their capacity.

The house heating load has a very low load factor; and it comes on in the middle of winter when the other load is heavy. The amount that a company can take is limited by its production or supply capacity and the capacity of its system of mains. I do not think a company would go out to get business where the undesirable features outweighed the desirable features of that particular type of business.

If a particular company goes out to get house heating business, that is an indication that in its judgment the desirable features of that house heating business outweigh the undesirable features of that type of business for that company. That would apply to any company which goes out for that character of business.

I was not aware of the statement you quote from Mr. Young's article under the subcaption "Air Conditioning," in which he stated: "Air conditioning—the market for air conditioning is rapidly growing. Air conditioning equipment can be used to good advantage wherever people live, work, or play. The application of gas-operated absorption type direct dehumidification equipment as applied to the air conditioning field is making excellent progress. Air conditioning has been termed the nation's next great business. It carries a great opportunity for the gas industry." To the best of my information air conditioning by gas is insignificant at the present time. People in the public utilities business are now beginning to feel that the air conditioning market was overrated. The only practical type of gas apparatus that has been designed up to this time is something that cannot very well compete with the electric. I should say that the air conditioning market does not present a very attractive market for the future as far as the gas industry is concerned. In the present state of the art it certainly does not; and I know of no contemplated improvements or expected improvements.

1233 I am not aware that the article in the magazine Gas for August, 1939, at page 66, entitled "Gas Air Conditioning Serves Dallas Office Building," contained the statement that economy in operation of air conditioning apparatus may easily under-cost electricity as much as 75 per cent, and that gas-powered air conditioning has given a convincing demonstration of its ability through an installation in the Great National Life Building of Dallas, Texas. I am not familiar with the statement from that article, which you describe as the last statement, which (121) states: "Several other Dallas buildings have been air conditioned with natural gas power, and because of its feasibility, dependability, and economy, this fuel is expected to come into increasing demand."

I have not read the statement you quote from Mr. Young's article under the subcaption "Commercial and Industrial Use," and which was Mr. Young's final summarization as follows: "6—Commercial and Industrial Use. The future of commercial and industrial gas sales is decidedly bright. The steadily increasing demand and acceptance of gas in this field over the past nine years when despite adverse business conditions, sales increased almost 30 per cent, indicates the commanding position attained by the industry." I think that the future of industrial sales for manufactured gas is limited and the future for sales of natural gas is limited by the supply and the price at which it can be brought to the point of sale. I should not say that the future of commercial and industrial gas sales is decidedly bright. I should say it is moderately good. It is somewhat better than it was in the early part of 1938. I would call it an upturn but not an outstanding upturn. I suppose anything in the nature of an upturn is an upturn. I hesitated to use the word definite in my first answer because it appears to imply an outstanding upturn. I think the upturn was of such character as to be significant or indicative of the future, the immediate future; even though, while my recollection is not clear, I think that the weather conditions last January were more favorable for gas sales than January a year ago. I would say that 1938 was below a normal year for the gas business. There has been a definite upturn in the first quarter of 1939; and that upturn continues.

I do not know who Mr. Paul Ryan is. I do not know that he is the chief statistician of the American Gas Association. I have seen some of the statistical bulletins of the American Gas Association, but I cannot quote from them. I doubt if I have seen the copy of one of those bulletins for the year 1938 which you have handed me. That bulletin was published in October, 1939, after I had completed the preparation of my testimony in this case. I am not familiar with the paper entitled "The Natural Gas Industry—An Expanding Service" by Paul Ryan, chief statistician of the American Gas Association, which appeared in the magazine Gas for May, 1939, and which has been reprinted from that.

(At this point counsel for the Commission handed the document just mentioned to the reporter and requested that it be marked for identification. At the direction of the Examiner it was marked Exhibit 154 for identification.)

I cannot see why that would have added to my knowledge on the subject. I know perfectly well that the natural gas industry is expanding. I do not remember the facts about the difference in the temperature in 1938 as compared with the year 1937, but it is my impression that January, 1938, was warmer than January, 1939. According to my recollection the temperature in 1938 was about the same as in 1937. By the term "degree day" as used in the industry is meant one degree for one day below the normal temperature. That is the gas industry's standard measure of weather conditions. When I said January, 1938, was about the same as January, 1937, I was referring to temperatures in New York. I cannot say what the general condition throughout the country was.

1234 I could not have quoted the figure 5.2 per cent as representing the increase of revenues for the manufactured and natural gas utilities in May, 1939, over those of the same month of 1938, but I think that is about right. I think it would be reasonable to expect that the revenues for natural gas were up 8.4 per cent in that month in 1939 over the same month in 1938. The revenues were around 5 per cent less in 1938 than in 1937. I think you are right in stating that the revenues of the natural gas industry for the first six months of the year 1939 amounted to a gain of about 8.3 per cent over revenues for the first six months of the previous year.

Questions by the Examiner.

I said that I thought the gas sales in 1938 were on the order of 5 per cent under the sales in 1937. I had reference to the sales of both manufactured and natural gas.

Cross-Examination by Mr. Slaff Resumed.

In determining how the public appraises securities offered to the public or about to be offered to the public, one of the ways of doing it would be to consider what an investment banker, in whose judgment he has confidence, thinks about such types of securities. I know who the Mellon Securities Corporation are. I cannot say that I am very familiar with them. They are a very large investment house. I do not know who is president. I do not know who Mr. Frank R. Denton is. I never heard the name. If an article appeared in the American Gas Association Monthly for August, 1939, by Frank R. Denton and underneath his name was stated "President, Mellon Securities Corporation, Pittsburgh, Pennsylvania," I would have no doubt that Mr. Denton was president of that corporation. I am not aware of what Mr. Denton said in an article published in the American Gas Association Monthly, July-August, 1939, entitled "A Banker Analyzes Natural Gas Industry—Investment Values." I do not have a copy of that issue before me. I am not familiar with the opinions therein expressed.

It is a fact that the development and growth in use of natural gas has been enormous in the past twenty years. It is true, also, that with the increase of importance of natural gas has come a material change in the attitude of the banking and investment community toward that industry. I think, as stated in that article, that today the natural gas industry can borrow money at less cost than at any time in its history. Without checking the figures, I should think that the statement is true that during the period from 1929 down to the time of the article, July-August, 1939, the yield on bonds of some natural gas companies has been reduced twice as much as the yield on government securities. It is not the fact that the yield on some of the gas industry's securities is very comparable to that of some of the government issues, if the tax-free feature of the government bonds is considered. I must explain that I missed the word "comparable" in the question. I took the expression "very comparable" to mean somewhere near the same amount. My answer still is that the yields are not comparable.

It is true that there are some large blocks of natural gas securities held now by life insurance companies and other investors, whereas there were practically none a few years ago. It is a fact that the obligations of natural gas companies are today held in large blocks by insurance companies and other large investors, in contrast to their small investment in the securities of the natural gas industry a few years ago. That fact gives evidence of the improvement of the general credit rating of natural
1235 gas obligations. I think it is a fact that in spite of all the difficulties of the depression era, either financial or those connected with warm winters or poor business conditions, markets have been obtained by the industry, and the industry has established itself and in the past five years has reached the highest credit standing in its history. I have never read Mr. Denton's article, to which you refer, but I acknowledge his observation that: "We

may ask ourselves what are the principal reasons for the present high credit position of the natural gas industry and what it is that makes the banker and bond buyer so willing to advance funds to this industry. I believe the answer is that, in the first place, the banker, the bond buyer, and the consumer are thoroughly convinced of the value of natural gas as a fuel." I think he is correct also in his statement: "And in the second place, they,—that is, the banker, the bond buyer, and the consumer,—are convinced that adequate gas reserves exist and are available to the companies in which they are interested, and they realize that long distance transmission of gas from these reserves to the large markets is practicable."

1236 W. C. GILMAN, a witness for defendants, recalled for cross-examination, testified as follows:

(October 24, 1939)

Cross-Examination by Mr. Booth.

I have examined my testimony on direct. There is one place in my testimony where I was reading from my note book with reference to the taxes paid by Natural Gas Pipeline Company of America. I read off a subtotal of some $600,000, whereas the actual total was nearer $1,000,000. That is the only correction I wish to make.

I stated that after I left the Massachusetts Institute of Technology, I was employed by the General Electric. I was with that company in Schenectady, New York, where I was really in the illuminating engineering laboratories with the lighting engineering design department of that company. Later I was in the New York office of the company where I was sales engineer responsible for sales of electrical apparatus manufactured by the company to public utilities and industrial corporations. This was largely primarily lighting apparatus. In the later days of my stay with the company, we handled electric apparatus generally, except things like turbines and big pieces of apparatus.

From the employment with General Electric, I went to the Central Hudson Gas & Electric Corporation as manager of a division of the commercial department of that company. I reported to the commercial manager of the company and was in charge of the lighting division. I had a number of men who were responsible for designing lighting installations and sale of lighting installations to the customers of the company. I would not say that I had anything directly to do with the gas operations at that time; but I was on the staff of the commercial manager and attended all the meetings of the commercial department at which their program of sales with reference to both gas and electricity were discussed.

Later I was employed jointly by the Electric Bond & Share Company and the Carolina Power & Light Company in a rather general capacity, primarily in training to go abroad in the public utilities field. I never went abroad but went from that employment to the Equitable. With the latter company, my title was "Engineer, Treasurer's Office." It was my duty to make studies, investigations and reports for that company in connection with investments presently held or investments which we were contemplating making. I was the only man who was doing that kind of work for the Equitable. We had of course a railroad man. I probably had one or two clerks with me.

I could not repeat the figures as to the amounts represented by bonds, the preferred stocks, and common stocks in the total portfolio of the Equitable. I mean they were very large, running into the hundreds of millions of dollars. I can probably break down the public utilities portfolio in round numbers by saying that when I left the total holdings in public utility securities was somewhere around $300,000,000 or more, of which I estimate that the holdings of preferred stock were around $40,000,000. The difference between $40,00,000 and $300,000,000 would represent the bonds. The return earned by the Equitable
1237 on the investments in its public utility securities
varied from year to year. I judge that it was between 4% and 5% the last year I was there. I can not be specific. The return in any one particular year may be influenced by write-offs or write-downs of securities during that particular year; so I think it would have to be explained that the actual return in any one year is not completely indicative of the investment results obtained during that year. If securities in the opinion of the financial committee, the executive committee and the management, were of such a character that due to conditions it was felt that it would be more conservative to write down their value on the books, it was occasionally done. It

might not suffer a capital loss eventually. I know securities for example that were written down while I was with the Equitable that have continued throughout the period to pay their regular interest.

We bought and sold many millions of dollars worth of bonds each year. We may have during the years I was there sold a few millions of bonds at a little less than they were on the books. There was only one public utility mortgage bond that actually defaulted in the interest. That was an obligation of the Seattle Gas Company. There were no debentures in the public utility field that defaulted in interest. There were defaults in bonds and debentures held in other fields, but they were not substantial. Of course there were a number of railroad defaults, as everybody knows, in that period to 1935 when I left the Equitable. We had a number of industrial debentures of which a few defaulted.

The utility investment porfolio included securities of the Associated Gas & Electric Company. Some of these investments were made before I got there and some were made afterwards as results of investigations and studies made by me. I joined in recommending their purchase. It has been a number of years since I looked at the figures, but I think that when I went with the Society they held $1,773,000 of those debentures and later acquired enough additional debentures to bring the total holding up to $5,000,000, that is the best of my recollection at this time. These debentures have never been in default.

The Society each year pays to its policy holders a dividend in varying amounts on different types of policies, retaining other earnings which go to Surplus. This is a policy holders' surplus. It is not the practice to pay out in dividends the entire return earned. It is difficult to say just whether such surplus of an insurance company is reinvested. It is different from an ordinary public utility or industrial corporation. The surplus which belonged to the policy holders mingled with the general funds of the Society and might be in cash or might be invested.

The rate of return is that per cent which applied to the fair value of the property will provide a sufficient amount to attract and induce investors to put up the necessary funds to purchase or construct the enterprise. It is not intended to provide a return of the money invested in the enterprise. I said it applies to the fair value of the property.

In making an investment, the investor feels that he will be able to convert that investment, or get his money back through holding it to the end. A rate of return must be applied to the fair value of the property. Investors realize that.

1238 I do not think a bond salesman who goes out to sell a $1,000 bond to an individual expressly tells the individual that the company is going to get a return on the fair value; but trained investors, professional investors, and institutional investors who study investments and set investment fashion know that. I don't know without making a test as to how many men of the first fifty I met in a walk down Wall Street would own securities in a public utility corporation and who would know that. When such an institution as the Equitable invests money or buys bonds of a public utility corporation, it expects the money represented by the bonds to be paid on the due date of the bonds, and it expects a return upon the principal amount represented by the bonds. The Equitable makes a dollar investment and expects dollars back.

I testified in the Brooklyn Union Gas Case as I have stated. I testified to a rate of return of not less than 7%. I think I said from 7 to 7½%, but not less than 7%. I think I said in my testimony that the capital structure of such a company as the Brooklyn Union Gas would appropriately be 50% or less in bonds and the remainder in stock.

My notion of a proper capital structure for a company such as defendants would be 50% or less in bonds and the remainder in common stock. The original capital liabilities of Natural Gas Pipeline Company of America were about $60,000,000 in bonds and $3,000,000 in stock. The unpaid bonds now amount to $44,000,000 and the remainder is represented by the common stock. Assuming that the total capital liabilities are $60,000,000, with no mention of reserve for depreciation or surplus, I should say that an appropriate capital structure would be approximately $30,000,000 in bonds and $30,000,000 of stock. I do not mean preferred stock. I do not agree with Mr. Emery's statement made yesterday than an appropriate capital structure of a company of this kind would be ½ bonds, ¼ preferred stock, and ¼ common stock.

By proper or appropriate capital structure, I mean the type of capital structure which is soundest and in the long run will provide capital at the lowest over-all cost. Assuming that the capital liabilities are $44,000,000 in bonds and $3,000,000 in stock, I would recommend the same division. I believe that the most appropriate capital structure for an enterprise of this kind is not more and preferably less than 50% in the form of senior bond securities and 50% or more in the form of common stock. Preferably I would say 40%—between 40% and 50% should be in bonds.

In my answer I meant to imply that the form of capital structure might affect the cost of capital to the company. I think that is a financial principle. If you try to finance a public utility with 90% bonds and 10% stock, I think you would find that the cost of the capital would be somewhat different than if you financed it say through 50% bonds and 50% stock. The cost would be somewhat higher if bonds represented 90% of the capital. Understand, I am speaking of financing through sales to the general public of these securities.

The management ordinarily determines what the capital structure of a corporation shall be in the case of a non-regulated corporation. In the case of a regulated corporation, the management and the local regulatory authorities have something to say about it. Perhaps I should also include the Securities and Exchange Commission and the Federal Power Commission.

I believe that cost of capital is one of the things that might well be taken into consideration in determining the rate of return. Certain courts have said that the 1239 cost of capital is one of the elements that might appropriately be considered in determining the proper rate of return. I mean by that the cost of capital to the given company that is under consideration in a rate proceeding as well as the cost of money generally. I think that in giving consideration to the cost of capital of the company under consideration where all of the capital is outstanding in the hands of the public and where arms length bargaining has existed with reference to the placing of that capital, it is appropriate to consider whether or not it is a balanced capital structure. I have never given any thought to that, and I should hate to give any horseback opinion about it. I think the cost under a balanced capital structure should both be given consideration; but I want to make it clear that in an enterprise of this kind where all the bonds are owned by the stockholders, it is obvious that the cost of capital does not mean anything. When I say this company, I mean the defendants.

I would not know without knowing all of the facts of the particular case whether the rate of return in the case of a company which has a higher cost of money because of the failure to have a balanced or sound capital structure should be higher than that of a company with a well balanced capital structure.

I have intended to advise the Federal Power Commission as to the proper factors they should consider in arriving at a fair rate of return for defendants. My testimony represents my considered judgment on the whole problem. Going back to the former question, I think that the company which has sustained a higher cost of capital because of the failure to have a balance or sound capital structure than another company which has a sound capital structure might well be allowed a higher rate of return. I agree with the principle that the cost of capital to a company should be given consideration in arriving at a fair rate of return.

It is impossible to find the cost of money to the defendants. That factor does not mean anything. In the ordinary case of a public utility whose securities are outstanding in the hands of the public, we can find out what debt money costs them through arms length dealing; and we can find out how the public is valuing the earnings of the company. Thus we can get a measure that way of the worth of the common capital, but in an enterprise of this kind where all the bonds are held by the stockholders of the company, it is impossible to do that. We can not make the calculation and we can not find out what the cost of money was.

They have bonds outstanding carrying 6% interest. I decided that because of the fact that the bonds were held by the company's own stockholders that it was necessary for me to ignore that factor in arriving at the rate of return for this company coupled with the fact that all of the common stock is held by certain companies, and it is impossible to get any quotation on the stock, makes it impossible to find out the cost of the equity money; and therefore you can not find the cost of the total money. You can assume 6% as the cost of the bond money, but that does not mean anything here, in my opinion. I did not assume anything as the proper cost of the bond money of these defendants. I have not made calculations as to the cost of money to this company because I can not make them.

Oh, yes, I made computations in my own mind and on paper as to how this company might be financed and considered that in arriving at my conclusion as to what was a fair rate of return. I gave that factor substantial consideration. I think this element would be included in one of the items which I outlined as the things I gave consideration to in my direct testimony. The things that I gave consideration to are scattered through the record here from the time I started to testify until I finished. It is possibly included on page 5503 in line 19. I think it would be reasonable for the Federal Power Commis-
1240 sion to draw the inference from that statement that I gave consideration to what would be a proper cost of money to this company. I think I put my calculations on paper. I have certain working papers here but I do not know whether the calculations are in there. I have as a matter of fact among my working papers a calculation which I made along that line. I have substantially everything that I used, except a lot of heavy prospectuses and things like that which I left in New York and which were difficult to carry.

In my calculation I assumed a capital structure, divided 50% bonds and 50% stock, and I assumed that the bond money could be raised at 4 to 4½%.

Referring to the statement you just read from the testimony of Dr. Dorau, at pages 5552 and 5553, to the effect that in his opinion it does not make any difference as to the rate of return to which an enterprise is entitled whether its securities be in the form of bonds, preferred stocks or common stocks or ordinary interest-bearing indebtedness like that to banks, I agree with that statement from an economic point of view. From a practical point of view, it is difficult to convince people that that is correct. I think from an economic point of view it is correct. In setting up my theoretical capital structure there, I did it in a way which I thought would provide the lowest over-all cost of capital and from that I made some checks and calculations to guide me in forming my opinion as to a proper rate of return for this company.

I think it would be appropriate for a regulatory body in determining rate of return to give consideration to the type of capital structure of a company and whether that influenced the cost of money. I think I ought to make myself clear by saying that it is appropriate for commissions to give consideration to it because the courts have said they must, and therefore they should. From an economic point of view, I agree with Dr. Dorau's statement that it really should not make any difference whether a company is capitalized with 50% bonds and 50% stock or with 100% stock from the standpoint of justice and equity.

I do not think there is an economic definition of "rate of return" that varies from my own in terminology. I do not state that cost of capital is not a proper element to consider in arriving at rate of return.

I have stated that I agree with Dr. Dorau's testimony. I am not an economic analyst. I do not hold myself out to be such. I am an engineer primarily. I can not translate myself to that position. I have to remain in my own suit of clothes. Yes, I think the courts have said that it is appropriate in arriving at rate of return to consider the cost of money as reflected by the form of capital structure. We have to agree with the courts. I think I can agree with the courts in the principles involved in rate cases and also with Dr. Dorau.

I am not considering something which I feel as a practical matter is not a proper element to give consideration to in arriving at a rate of return, nor have I merely considered that because I felt that under the decisions I was bound to give some consideration to it. I am not fully in accord with the idea of arriving at a definite rate of return because of the capital structure. I do not know of any other factors referred to in my testimony and considered in arriving at my judgment as to a proper rate of return in which I have no confidence and which I considered because I thought I was required to consider them under the
1241 decisions.

I do not remember having been advised by counsel for the company as to what the law was on the question of rate of return. I have had conferences with counsel, but there was no discussion as to what the law was on the question of the rate of return.

My testimony dealt with the presentation of an exhibit showing the earnings of utility and industrial corporations, and then I discussed following that a number of factors which affected the risk of the natural gas industry and this company. All investments have risks in greater or less degree. The investor is uncertain of the future, and where he sees possible dangers to an enterprise, he will demand adequate compensation before he will put his money into such an enterprise. He is primarily worried about whether he is going to get his annual return for the use of the capital and whether he is going to get his capital back when he wants it. Both of these elements are of great importance. I do not know whether it is possible to say which is greater without taking actual examples and working them out.

Obviously, if he were investing a million dollars in the bonds of a company which were going to mature 10 years from now, and the bonds were going to carry 4% interest, the total amount of interest involved is only $400,000, whereas the principal at stake is $1,000,000. The principal thing in which I would be interested in that case would be the return of the principal because it is the greater amount. The investor is also afraid that he may not get the 4% throughout the entire 10 years.

I referred, among other factors of risk, to the element of taxes. (Objection by Company Counsel overruled.) I consider that to be a serious risk for the utility industry today. I compared the risk of the natural gas industry with the risk of the electric and manufactured gas industry. I said, generally speaking, that this company has greater risks than the electric companies or other gas companies with distribution facilities. Probably this company is in better position than some electric companies, I think I made that clear in my direct testimony, that I was speaking from a general point of view. I think I very distinctly remember saying in my testimony that, of course, there may be gas pipeline companies, pure pipeline companies, that are better risks than some electric companies. I think, to make it clear, I said you might compare this company with an electric company in receivership. From such a comparison, this company is in a safer situation. That is not the only electric company that I could possibly consider to be in less favorable position than these defendants. I think these companies are in a better and stronger financial position and are perhaps less risky than some of the electric companies in the United States. I should hate to single a company out offhand without making a study.

Among the favorable things about these companies that are obvious to anybody making a study of these companies are their recent financial history, their earnings record in the past few years, particularly the last three years or so, the ability of the companies to reduce their debt, the ability of the management of the companies to build up gas sales and load the line, the fact that the companies serve a large market and connect to the large Texas Panhandle field—these are all factors. Generally speaking, I do not think they are in a more advantageous position than electric companies. I said, generally speaking, I think electric companies are a better risk.

I think I have enumerated the important favorable
1242 facts which would be interesting to an investor in a company such as these defendants. These companies were not particularly set up for comparison alongside electric companies. It is extremely difficult, if not impossible, to do that in the way you ask it; but I simply would list a number of the favorable factors which an investor would look at and would be interested in a situation of this kind. I would have to have for consideration a specific electric company. Certainly there are things about these companies that appeal to me, looking at it from an investor's point of view. I named a number of them.

They serve indirectly Chicago and surrounding areas. Commonwealth Edison Company and subsidiaries serve the same territory with electric energy. The Peoples Gas Light & Coke Company serves the city with gas. The Illinois Bell Telephone Company is the other large utility in the city of Chicago. I know the latter company but I do not know very much about it.

I am quite familiar with the Commonwealth Edison Company and in any study I would make of any situation involving Chicago, it would be in the back of my mind. The Commonwealth Edison Company, of course, is in a very highly favorable position when compared with these companies. There are no factors of importance in its operations in which it is at a disadvantage compared with defendants, although there may be some.

The Illinois Bell Telephone Company is in a highly advantageous position compared to the Natural Gas Pipeline Company of America.

I believe The Peoples Gas Light & Coke Company is in a more advantageous position from an investor's point of view than defendants. I cannot answer a question so indefinite as your inquiry, "Are there any aspects of their operations in which they are in a worse position" than defendants.

I have stated that I considered the effect of regulation as a risk of the company in arriving at my judgment as to the proper rate of return. I do not think I considered it a very serious factor. I thought it was a factor worthy of consideration. Regulation of natural gas pipeline companies is new and unknown and investors are traditionally scary of the uncertain.

I know that the Federal Communications Act was passed a few years ago. I do not understand that the Act gives the Federal Communications Commission a new broad regulatory jurisdiction over the American Telephone and Telegraph Company. I understand it gives the Federal Communications Commission some jurisdiction over interstate telephone rates; but I did not know that it gave the Commission broad regulatory powers over that company. I do not know enough about that Act to make any comparison between its effect on the American Telephone and Telegraph Company as compared with the powers of the Federal Power Commission over the natural gas industry.

I do not know whether or not that Act increased the cost of money to American Telephone and Telegraph Company. I have studied the Federal Communications rate of return study. I know of no rate case under that Act as yet. As I said before, I do not know very much about the Act and I am not qualified to express an opinion as to whether or not it tended to increase the risk or the cost of money to the American Telephone and Telegraph Company.

1243 I know that the American Telephone and Telegraph Company and its associated companies have issued many, many millions of dollars of securities in the last few years at very low interest rates. Of course, the issuance of securities by the associated companies has nothing whatever to do with the Federal Communications Act because they are under State regulation and not under regulation of the federal authorities. The parent company has issued many millions of dollars of securities. I have not given any study to ~~the~~ question of whether or not that Company has been injured by the Federal Communications Act; so I do not feel that I should express any opinion.

I made, in the preparation of this case, what I considered appropriate and sufficient study, but I made no study to determinate the effect of regulatory laws upon the cost of money to utilities.

I do not consider the natural gas industry in a more favorable position than electric companies and the electric industry with respect to the item of taxes. I never attempted to make any comparison or to set my study up that way; but if I did express an opinion, it would be that the companies which are extracting a natural resource from the ground and selling it would probably be in a more unfavorable position from a tax point of view in the future than established electric companies. It is taxation with reference to the future that I referred to. I would give the present or past tax situation the weight which I thought it should be given.

I have watched the taxes upon the natural gas industry; and I have also watched for a number of years attempts by legislators in various states to put taxes on the natural gas industry. Taxes on all the utility companies have shown an upward trend during the past few years. I would say that the burden on the natural gas industry is not substantially different from that on the manufactured gas industry. That is the way I looked at it when I made my study of the rate of return for defendant companies, to which I have testified. I would say it is not greatly different today; but I was trying to look to the future; and in looking to the future, I have a very distinct opinion of the possibility of future taxation on natural gas, and I think it is a hazard which is important.

As I have stated, I do not think the tax burden upon the natural gas industry is greatly different from that upon the electric industry, the telephone industry, and the other utilities. I have not made a calculation other than federal income taxes. They are taxes and, of course, I always include them as taxes.

The total taxes, exclusive of federal income and excess profits and undistributed profits, in the year 1938 for Natural Gas Pipeline Company of America were $325,000. The Texoma taxes were $168,000. The total taxes of both companies were approximately half a million dollars. The total revenues of the companies were around $14,000,000. The taxes were approximately 3% of the total revenues exclusive of Federal income taxes.

I am familiar with Poor's Public Utility Manual. It is recognized as an authoritative statistical source for data concerning the operation of public utilities. Beginning on page 1266, there is a report on the Commonwealth Edison Company. (Objection by Company Counsel overruled.) On page 1276 is shown the consolidated income account for the years ending December 31st of that company. Total operating revenue of that company for 1938 was $139,000,000. The taxes, other than federal income taxes, for the same year amounted to $19,115,442. That is about 14% of the total revenue.

1244 **J. A. EMERY**, a witness for the defendants, recalled for cross-examination, testified as follows:

(October 25, 1939)

Cross-Examination by Mr. Slaff.

I have gone over my Exhibit 148 between the time I testified on direct examination and the time I appeared for cross-examination. I have gone over Exhibit 149 which is the comparison of earnings according to my methods of comparison.

I have found no errors in Exhibit 148. With regard to that exhibit, I testified that it covered all the natural gas companies for which I could get prices on all the securities. I have since found that the Pacific Lighting Company, which is in the neighborhood of Los Angeles, disposed of its electric properties in 1938, so that its business now consists of gas transmission and distribution properties. The average rate of return on that property, computed in the same manner as on the other properties in Exhibit 148, amounted to 7.16%.

With regard to Exhibit 149, I have had a check of the figures made and I have also had made a computation of the cost at the time of construction of those elements of the construction that would vary from the present line if conventional practices had been followed. This is not a correction, but I carried the exhibit further than I originally had it to answer the question which the Examiner propounded to me at the time.

Now, I find an error in the estimate of the operating expenses in the particular of the operating expenses of the Fritch station, so that the total estimated operating expenses becomes instead of $3,501,974, $3,427,597. The net effect of that is to increase the earnings shown on the line at lower pressure, both by that particular and by reducing taxes.

The total increase in earnings of the line operated at lower pressure shown in my Exhibit 149, after taxes, is $61,600, bringing the total earnings of the line operated with lower pressure, according to my exhibit, up to $9,172,828. This reduces the earnings due to higher stresses. I knew about these errors before I got on the stand on Monday. I did not call them to the attention of the Examiner then or to the attention of counsel because I fully expected them to be presented either in redirect testimony or to come out in this testimony.

I did not feel any obligation upon myself to call to the attention of this Commission the fact that there were errors in my exhibits which I knew about at that time or at this time. (References to the testimony of the witness in a proceeding before the New Jersey Commission wherein the witness admitted the errors of 1¼ million dollars in his exhibit which were not called to the attention of the New Jersey Commission until brought out on cross-examination were stated by the witness to be correct).

Every now and then I see the publication of the New York Press Company, called "The Index." I did not see the autumn issue containing an article on the gas industry.

I remember the testimony which you now read from pages 5303 and 5304 of the record in which I stated that it was my view that investors in natural gas securities have taken cognizance of the special risks which I have discussed here as applying to natural gas pipelines in general, and that is reflected in the market prices for natural gas securities.

I think I must have discussed with some of the investors in this company the cognizance that they took of the so-called special hazards confronting this company, but I do not recall it specifically. I had some conversation with 1245 Mr. Gallagher one day about the whole subject; and that may have been brought up. I do not remember that it was. Mr. Gallagher is a high official of the Standard Oil Company of New Jersey, in general charge of their natural gas properties. I am referring to Ralph W. Gallagher.

The conversation I mention took place in the summer of 1934. That is the last time and the only time I can recollect that I have discussed with any of the investors in this company or those responsible for the investment in this company the cognizance, if any, that they took of the so-called special hazards, if we except Mr. Floyd C. Brown as a representative of one of the investors. I do not understand that Mr. Brown was in any way responsible for making the decision to put the money of Cities Service into this investment. Of course he was responsible for presenting the facts of the situation. On the basis of the facts which he presented which had been worked up by him and the staff working under his direction, a decision was reached by the Cities Service organization as to the making of this investment.

I have no knowledge at this time of the cognizance of any of the so-called special hazards confronting this company taken by any of the investors in this company, unless it was the general conversation that I heard about this line at the time of projection.

Our office was trying to obtain a position in the matter; and there was a great deal of talk made from time to time about it in the office.

In the preparation for my testimony in this case, I did not discuss with any representative of the Standard Oil Company of New Jersey responsible for Standard's investment in this company, what cognizance they had taken of the so-called special risks of this company. I talked to Mr. Lerch of that company but not on this subject.

Exhibit 148, which I presented here contained a list of eleven companies. If I were going to prepare a statement now under the same specifications, there would be twelve companies as I have already stated. I do not consider this a narrow list of companies. This is data that was prepared in 1938. It did eliminate the public appraisal of the securities of one type and another of various other natural gas companies. I do not know how many other natural gas companies have securities in the hands of the public. I would say though that it probably would not be much more than this number, of any size. I did not make a study to find out the facts on that point.

I made a study in preparation for my 1938 testimony in an attempt to bring down to date my Exhibit 49 in the Chicago District case. I think in that study, I procured a list of all the natural gas bonds that were outstanding in the hands of the public. This data contained a list of companies engaged in either production or transmission, or both, and there were 19 companies with 30 bond issues. There were 9 companies engaged in transmission and distribution, but I do not have the number of issues involved. I mean I do not have the information available here and I do not remember any effort to determine it.

As I testified before, I endeavored to determine the rate of return that is proper for this company by one of the methods used in 1934. That was the first method, where I determined the average yield on natural gas bonds and applied to that ratios of yield on preferred stock and common stock as determined from public utility com-
1246 panies, and ratios of bonds, preferred stocks, and
common stocks in volumes to the total investment in certain representative public utility companies.

We did not exactly bring the 1934 study down to date in order to prepare this Exhibit 148. We made a study, though, based on that method. By consulting it, I can tell you specifically if it was brought down to date. I started a new study in 1938, and it was not a matter of bringing down to date Exhibit 49 in the Chicago case. We simply employed one of the methods employed in the study of 1934.

I would like to say by way of explanation that the study in question was not brought to a conclusion and not checked in 1938—I mean the computation following as nearly as we could the lines of the 1934 study. The method I used in 1938 is similar to the method embodied in Exhibit 49 in the Chicago District case in 1934.

Going back to Exhibit 148, I did not use the Pennsylvania Gas Company figures for any purpose except as they were included in the figures for National Fuel, of which the Pennsylvania Gas Company is a subsidiary.

Of the ten other companies there shown, none, except the Lone Star Gas Company, has a capital as large as that of this company. Seven of those companies have less than 50% as high a capital. Of these 7, 2 have only about 20% as much capital as defendants. One of these two has a capital of about 10% and the other a capital of about 5% of the capital of defendants.

I do not think it makes a great deal of difference that the capital of the companies contained in this list may be only 5% of that of defendants. Size is of importance in these particulars,—first, there is a difference between a company not large enough to command good talent and a company which is large enough to do so; secondly, when the company's securities are distributed, a larger company is naturally better known, and, other things being equal, has a better market or broader market.

I do not think the same answer would apply to a comparison between this company and a company with any lesser amount of capital than defendants. I think when a company has an investment in the millions it is in position to command good talent, other things being equal.

I think a risk in an investment depends on size only to the extent that I have testified. I think as long as the size of the companies that I have used runs into the millions is sufficient to command good management, size has little, if any, bearing on risk, except as size means more hazards. I should say that a company with 2 or 3 million dollars of capital is in position to command satisfactory talent. I think a company with 2 or 3 million dollars of capital can command the same degree, proportionate to the magnitude of the job, of executive ability and talent in its management that a company with $50,000,000 of capital can. The talent in an absolute sense may be of lesser quality, but it manifestly requires a man of less calibre to operate a small property than a large one, that is, a man of less calibre might be fully as efficient an operator of a small property.

I do not think that an investor, judging the management of two companies and coming to the conclusion that
1247 the management of the company with the smaller
capital has less talent, would consider that as an added risk in the smaller company, unless it were less in proportion to the job. I said that companies under a few million dollars of capitalization cannot command the executive and managerial talent that companies with 50 million dollars of capital can. I am not able to draw an exact line between the size of a company that can command good talent and one which could not command proportionately as good talent. In the case of a company of $2,000,000 capital with no outstanding problems, I think it could command as good talent proportionately as a company with $50,000,000. The same degree of management would apply in proportion to the size of the job, that is, the magnitude of the problems and the quantity of the problems.

Ordinarily, a company with $2,000,000 of capital could not command the same skill and managerial and executive ability as one of $50,000,000 of capital. The larger company can command men of higher calibre than the smaller company. In days past in some industries, there might have been an advantage from an investor's point of view in a larger company due to its ability to pursue research. Now, however, I think that the general research facilities are such that a smaller company can avail itself of them. From that standpoint there would be no present advantage.

My answer, therefore, is that there is no advantage for the reasons I have just stated.

In preparing Exhibit 148, we used only those companies all of whose securities were dealt with in the year 1938. In most instances these dealings were with the public. Our criterion was that where there were records on market prices, we used the company in that exhibit.

On page 3 of the exhibit appears a note with respect to the El Paso Natural Gas Company, that is note B page 3 of Exhibit 148. The note might read "no market quotation; sold privately in 1938 at the price shown." That sale was made privately at the price shown. We tried to find all of the records we could of transactions in these stocks and bonds. We didn't get a market quotation for the El Paso Natural Gas Company for first mortgage bonds for the year 1938. That is a sale and not a market quotation. The same applies, as shown in Exhibit 148 at page 11, to the cumulative preferred stock of Kansas Pipeline and Gas Company except that the note might read: "Offered price as of March 1938, no sales price," instead of "no market quotation."

As explained, with respect to the common stock of that company, we did not get any market quotations. The price was obtained from a Securities and Exchange Commission document—I do not remember whether it was a registration statement or what. I think it was a registration statement. My instructions to my staff were to try to get a market quotation other than that statement from the Securities and Exchange Commission source and I was informed that they made that effort, and therefore had to fall back on this source.

With respect to the bank loans set out in that exhibit, there were of course no market transactions in the sense that that term is ordinarily used.

By the language you quote from page 5305, near the bottom, to the effect, that the fact that a transmission line owns a distributing company and is not one standing on its own bottom is a circumstance which enters into the risks involved in the securities or capital investment and that the ownership of a distribution system which buys from the pipeline insures to the pipeline the control of the market and adds to the total investment a proportion of lower risk property, I meant that all the investment in defendants except such as may be salvaged will be lost when the Texas Panhandle Field has been exhausted unless some new fields are discovered in sufficient proximity to the line. If such new field were discovered in sufficient proximity to the line, that would tend to reduce the hazard and the risk to the investor.

1248 In arriving at my conclusions as to rate of return, I assumed that there was a reasonable possibility that defendants' life would extend beyond the life of the Texas Panhandle field only insofar as I have compared this company with other natural gas production and transmission companies which have similar possibilities. There is the same possibility with respect to any of these companies listed in Exhibit 148.

By my last answer, I meant to imply that I did not give any particular consideration to the possibility that defendants as a going concern might continue operations beyond the date of the exhaustion of the reserves in the Panhandle. If I may summarize, I based my opinion on the actual effect of such a possibility on the securities of these 11 companies; and I did not make any increase based on that comparison for any additional hazard in the case of this company.

In other words, I did not assume that defendants had any less possibility of such a circumstance than those other companies listed in my exhibit. I do not think the consideration of the possible future life of this property entered into my judgment as to what was a fair rate of return except that I satisfied myself that these other companies generally have a longer expectancy than this company. I cannot give any more categorical answer to your question than that I just gave.

I read the testimony of Mr. Floyd C. Brown. I knew it was the opinion of Mr. Brown and some of the other witnesses that the field would be exhausted in 16 years, and I also knew that it was their opinion that they would go out of business when that field was exhausted. (Company counsel object to the question by Commission counsel; "Did you differ from that opinion or do you now differ from that opinion?" whereupon the witness conferred with his assistant, Mr. Timberlake. Commission counsel objected to the witness conferring with his assistant at a time when counsel for the company is making an objection to a question still unanswered. After colloquy of counsel the witness was permitted to state what Mr. Timberlake had told him as follows: "The Witness: He suggested to me that in the case of future field discoveries, there would be additional investment involved." Whereupon Commission counsel stated to the Examiner that in view of the statement the consultation was improper.)

In considering the rate of return, my conclusion was not affected at all by my opinion that the investment might have a certain safeguard due to the fact that the life of the company might extend beyond the date of exhaustion of the Panhandle reserves. It did go through my mind in considering the expectancy of this company with the expectancy of the other companies, but I considered it only to the extent that I have already stated.

I did not take into consideration the possibility that this company might continue in business beyond the time testified to by the company's witnesses, to wit, December 1954.

I have stated in my direct examination that I was testifying on the subject of rate of return on the assumption that from other evidence the Examiner and Commission would arrive at the probable life of the project. If the life of the project were estimated to extend substantially beyond the life of the Panhandle field on a sound basis with due regard, as Mr. Timberlake has just reminded me, to the investment required, and if such a total estimated life exceeded the general expectancy of these other companies, I would have taken it into consideration.

In my testimony, I accepted the expectancy of this company as testified to. Neither my staff nor I made any independent determination or attempted to make any independent determination as to whether the life of this company might extend beyond December, 1954. I think I have made no other studies in connection with my testimony before the Federal Power Commission except that reflected by Exhibit 148, going to the subject of the public appraisal of natural gas company securities. My recollection is quite clear that we did not make any trial studies of any nature involving any different method or any variation of the method shown in Exhibit 148.

We decided to go out and get the companies whose
1249 securities were in the hands of the public or were dealt with publicly, get the results as they might appear from the application of the method contained in Exhibit 148, and that was all we were going to do along that line. We were not making any other studies of public appraisal of securities of natural gas companies in connection with my testimony in this case. Now that I think of it, I think we did prepare some diagrams of comparative yields of

natural gas bonds and other bonds; but they were not embodied in our conclusions. These studies were somewhat similar to the graph contained in Mr. Delafield's Exhibit 147.

I do not consider that the method I employed in Exhibit 148 was taking two days' appraisal by the public. I consider that taking and covering a whole year. We took the highest price and the lowest price paid during the year. We have no data showing the number of days that the lowest price or highest price obtained during the year continued, but we have some information on monthly quotations. The average of the highest price and the lowest price does not represent the weighted average price of all sales for the year, but it represents the high price and the low price from which I have derived the average. The only complete weighting would be the multiplication and averaging of each sale by the price. Prices would naturally be affected by the market conditions and demand and supply.

The market price would take into account the faith that the public has in the management of the company. I have made no attempt to appraise the management of this company in comparison with the management of any other companies set out in my Exhibit 148, except in a general way, such as I could do by the examination of their reported results and discussion with Mr. Hill and Mr. Von Puhl of our office. This company is considered by me to have an excellent management. The other companies in this list have excellent management generally, but I have heard criticisms of some of them. In other words, the hazards of management are less as far as defendants are concerned than they are as to some of the other companies contained in Exhibit 148. On that basis, the wise investor would be willing to pay on a higher basis for the securities of defendants, which means that he would demand a lesser return than in the case of some of those companies.

If a company be over-capitalized with respect to its earnings, that circumstance would affect the public's appraisal of the value of its securities. The general aspects of capitalization would be taken into consideration by the public in appraising the comparative advantages or disadvantages of such companies as investments. If the company has no bonds and nothing but one issue of stock, there would be one condition; if a company has a very large issue of bonds comparatively, that would be another condition.

Before lunch, I agreed with you that the capitalization of a company would have an effect on the evaluation of its securities by the investor. I would say that a soundly capitalized company has less risk attached to an investment in it than an unsoundly capitalized company. There are degrees of soundness of capitalization. If two companies be soundly capitalized, but one is more soundly capitalized than the other, the one with the sounder capitalization presents less of a risk or hazard to the investor than the other, all other factors being equal. I think it follows then that the required rate of return for the company which is more soundly capitalized of the two would be less than the required rate of return for the other company. In a general way, I made a comparison as 1250 to the relative soundness of the capitalization of defendants as compared with the companies set out in Exhibit 148. It seems to me that in effect the capitalization of defendants comes nearer to that of the Interstate Natural Gas Company than any other because the bonds and stocks are owned by practically identical interests and are not distributed. I made this comparison as to the relative soundness of the capital structure of defendants and these other companies: I ascertained the capital structure of each of them; and as I say, I consider that of this company to be more like that of the Interstate Natural Gas Company than any of the others.

I compared the soundness of the capitalization of defendants with the soundness of the capitalization of the El Paso Natural Gas Company. I think the capitalization of the latter is sound. As to whether or not it is sounder than that of defendants, I find difficulty in answering the question in that capitalization of defendants is largely academic. It is practically all held by a few interests. It is not traded in on the market. There is no basis of comparison of the capital structure of the defendants and the companies set out in Exhibit 148 as to degree of soundness. If the capital structure of defendants is sound, I think risk due to the particular capital structure would not make a large difference in the rate of return. There might be some small difference depending upon the difference in volume, the relative volume of debt. If a company were unsound, an investor would require a higher rate of return to put his money into it than if it were sound. I am unable to go any further than that, as to what amount it should be, or what proportion.

I do not understand that rates of return are fixed by commissions with any regard to the capital structure. By that I mean that rate payers are not required to pay different rates because of over-capitalization or under-capitalization, from the standpoint of the securities issued. That was my judgment in determining the fair rate of return for defendants.

I think there might be a slight difference in the rates of return required as between two companies with different degrees of soundness of capitalization. If the differences in capitalization and the risks due thereto were large, the capitalization naturally would be unsound.

I am not able to answer your question as to whether or not there might well be a large difference in the rate of return, which would be required by the investor about to make an investment, based on the difference in the soundness of capitalization, because I do not think the difference in risks could be large as between sound companies. Contrasting a sound company with an unsound company, it would take a higher rate of return on what he pays for the securities to induce an investor to put his money in an unsound company. My estimate of fair rate of return is based primarily on the rate of return that has been demanded by these investors in these companies. In arriving at my final judgment figure of between 9 and 10 per cent, I came to that conclusion based primarily upon my judgment of the return that would be demanded by an investor in this enterprise. I might add to that the reward which I think the company is entitled to for its enterprise.

The general run of investors, I think, satisfy themselves that proper charges are being made for depreciation or amortization purposes. The primary interest of the investor, after that in the soundness of the company, is the earnings; and he will naturally see whether the earnings are stated to be adequate after adequate charges have been made. What actual earnings are depends upon whether 1251 a proper charge has been made for depreciation. In other words, I think if a company makes inadequate provision for depreciation, its earnings or its dividends represent in part capital rather than earnings. The earnings showing would naturally be based on the allowance made for depreciation. If the investor knew that proper allowances for depreciation had not been made, he would naturally pay less for the stock. The skilled investor would make an attempt to determine whether proper or improper provision had been made for depreciation. The making by the company involved of a proper or improper provision for depreciation probably would affect the market price of the security one way or the other, if there were any palpable overcharge or undercharge for depreciation. Whether or not proper provision has been made for depreciation would affect the attitude of the investor. If there were such a palpable over-charge or under-charge for depreciation, it would undoubtedly affect the market price of the security if it were known to the investor. I think it would be known to the skilled investor if there were a palpable overcharge or undercharge in the depreciation account. Such a palpable overcharge or undercharge in the depreciation account would affect the market price of the securities.

I ascertained the charges that were made by Interstate Natural Gas Company for depreciation and looked them over generally to form a general opinion regarding them. That applies also to each of the companies set out in Exhibit 148. I made no specific study of the properties and I arrived at no specific judgment on the proper amount of depreciation to be charged by each company in the year 1938.

If it be assumed that Interstate made an inadequate provision for depreciation to the extent of $1,000,000 last year, the actual earnings of Interstate would have been approximately ½ of what they are shown to be in Exhibit 148, and the return to the investor, under these circumstances, would then have been an average of approximately 5% instead of 10% if he had paid the same price for the stock. That same principle applies to all the companies shown in this exhibit

The price of a specific security might be affected at any given time by the desire or the necessity of a large holder of that security to sell that security rapidly. Such a situation would tend to depress the price of the stock or the security. I made no definite attempt to ascertain what factors, if any, affected the market at the time of the low price or the high price of each security set out in Exhibit 148.

I do not remember that this morning we discussed the possibility of a poor or inefficient management of a company as a hazard. I do not know how to answer that question. An investor contemplating an investment in a company considers the type of management that the company has. If he is considering two companies and he comes to the conclusion that Company A has a better management than Company B, all other factors being equal, there would be less risk in investment in Company A than in Company B.

1252 **W. C. GILMAN**, a witness for defendants, recalled for further cross-examination, testified:

Cross-Examination by Mr. Booth.

(October 25, 1939.)

I have made the calculations concerning Commonwealth Edison Company, Peoples Gas Light and Coke Company, Illinois Bell Telephone Company and American Telephone and Telegraph Company, which you requested at the time I left the stand before. I made them from the figures contained in Moody's Manual, which is considered an equal authority to Poor's. Moody's was the only manual that was available to me. I was able to find the total taxes and the total taxes excluding Federal income taxes.

For the Peoples Gas Light and Coke Company, the gross operating revenues in 1938 were $41,390,178. The total taxes were $4,679,619. The total taxes, excluding Federal income taxes, were $3,913,917, or 9.46 per cent of the total revenues. The gross operating revenues of the Illinois Bell Telephone Company for the same year were $87,186,670. The total taxes, excluding Federal income amounted to $10,283,114, or 11.79 per cent of the gross operating revenue. For the American Telephone and Telegraph Company and subsidiaries consolidated, the gross operating revenue was $1,052,657,832. The total taxes, excluding Federal income taxes, amounted to $111,067,572, or 10.55 per cent of the gross revenues. The figures I gave for Natural Gas Pipeline Company were for all taxes excluding Federal income taxes. These figures contain the social security taxes. From reference to Poor's Manual, I find that the amount stated for Illinois Bell Telephone Company did not include social security taxes. The amount of social security taxes for that company in 1938 was $1,516,991. The total taxes of that company, therefore, exclusive of Federal income taxes, amounted to about $11,800,000, or 13.5 per cent of the total revenues. The taxes of defendants, exclusive of Federal income taxes, I have stated amounted to about 3 per cent of the gross revenues for 1938. They were not greatly different in the years 1936 and 1937.

The Plant and Equipment Account of defendants shows approximately $59,000,000 as the total investment in tangible property. The total taxes paid by defendants in 1938 amounted to approximately .8 of 1 per cent of the amount reflected by the Plant and Equipment Account. The percentage for the years 1936 and 1937 would be approximately the same.

The tangible properties were carried in the Plant Account of Commonwealth Edison Company for 1938 at approximately $380,000,000, and the intangibles at $6,000,000. Excluding Federal income and Federal surtax on undistributed income, the taxes were $13,740,000, or 3.56 per cent of the total property including intangibles reflected by the Plant Account. If the intangibles be excluded, the per cent is 3.62.

From my general knowledge of these publications, they would be reported figures of the company to this statistical organization and would generally correspond to the figures contained in the company's annual reports to its different security holders.

According to Poor's Manual, the investment figure in tangible property for Peoples Gas Light and Coke Company for December 31, 1938, was $115,892,882, with an additional item of $6,195,864 carried as "office building
1253 and other non-utility plants". There is also another item for intangible property amounting to $23,609,442, making a total of $145,000,000. The percentage relationship between the taxes and that total is 2.7 per cent. Natural Gas Pipeline Company of America is apparently not referred to in Poor's Manual. That manual ordinarily includes only those companies whose stocks or securities are held by the general public. I am not sure of that last statement but I know that the statistics and financial statements of the company are included in other public utility manuals.

I made the statement you read from page 5488 of the record to the effect that during the last 10 years or so, the public utility companies as a class, electric and gas utilities, have certainly had to stand their share, or more than their own share, of the special taxation to meet budget deficits. I think that observation applies to natural gas companies, but I do not think it applies to quite the same extent that it does to certain electric and gas companies, particularly as we all know in the metropolitan areas where large special taxes have been put on to the local utility companies to finance unemployment relief. Such special taxes have been levied by the State of Illinois and in Chicago. These

Illinois and Chicago taxes do not apply to the Natural Gas Pipeline Company of America. I am not sure of this statement, but that is my impression. I did not know as to this when I prepared my testimony.

I have said that the statement you read to me does not apply to natural gas pipeline companies to the same degree that it does to the old established gas and electric utilities which operate in the large cities, and also in the smaller cities where the tax burdens have risen and utilities have been forced to assume their share. It does not apply to defendants to the same extent. The record shows that the tax burdens on defendant companies have been increasing, but I do not think they have been increasing to the same extent as say the taxes on the Consolidated Edison for the last ten years. I have not made a direct comparison, but Consolidated Edison is one of the outstanding utility companies in the country. In the past defendants have been in a more fortunate and advantageous position from the standpoint of taxes than have the electric and gas operating companies in the same area.

I did not say last night that the burden of taxes applied equally to both the electric and gas operating and the natural gas industry, as well as defendants. I think in your questioning about the tax burden, you asked me about the tax burden of Natural Gas Pipeline Company of America in comparison with electric and gas utilities and I said it was not greatly different. That is still my opinion.

There are many different ways of calculating taxes. You have asked me to calculate some taxes as a percent of gross operating revenue, of gross property account. Taxes might be calculated as a percent of net income just as properly. I don't think I ever made any calculations other than the mental calculations one would make by looking at the taxes and the income account and looking at those taxes in relation to the whole income account. I cannot remember ever having made any calculations of taxes in relation to the gross operating revenue or total plant and property account, or net income.

The basis of comparing taxes to gross revenues or investments is one way of determining whether or not the burden of taxes is equally heavy on defendants and other large utilities serving the same year. It is just one way of
1254 calculating or getting the relative magnitude of the
taxes when you are comparing a number of enter-

prises. What I am trying to say is, that there is not any one special scheme of doing it that has any particular validity over any other.

I do not agree with you that the risk to the investor, insofar as the element of taxes is concerned, is less in the case of these companies because they are in a more advantageous position than the large operating companies that serve the metropolitan area of Chicago. I would say exactly the reverse is true. These companies that are presently taxed heavily—the investor knows about what these taxes are today. The investor is not particularly disturbed by what he knows. The uncertainty is what worries the investor; and if those companies are starting out with a low tax now, they are perhaps all the more susceptible to taking on an additional burden of taxation. Defendants' past operations indicate that they have been in a distinctly advantageous position with respect to the payment of taxes as compared with the other utilities operating in Chicago and surrounding territory. These companies have paid very considerably less in taxes as a percent of the gross operating revenue or as a percent of the total Plant and Property Account than the utilities we have been discussing. I think you selected the three companies which are outstanding taxpayers. They are three of the large outstanding utilities which serve the same territory as defendants; but it is also true that there are many utility companies, I would say a substantial number of utility companies in the United States who, in 1938, paid less in taxes of the percent of the gross operating revenue than defendants.

I cannot pick companies that are operating in the same territory as defendants because you listed most of them; but among the companies operating in the territory through which defendants' pipeline runs, I know there are a number of companies which pay less proportionately than do defendants. The revenues of defendants are derived very largely from the Chicago metropolitan area.

As I remember it, I gave among the risks that investors would look at, the possibility of increased taxes. The fact that these companies' taxes are low now makes them more susceptible to increased taxes. I never have said the lower the taxes, the higher the risk, or because they had low taxes there was any special risk. I said that the possibility of increased taxes was a very definite risk, and the fact that the taxes were at a low level now made them particularly good prospects for the taxing authorities who were short of money. Yes, I think I will subscribe to the statement that the lower the taxes the higher the risk. And for that particular factor, the higher the taxes the lower the risk.

I don't know whether I can translate that observation you make that defendants should be allowed a higher rate of return than they would be three years from now, if in fact their taxes are increased. I intended my testimony to be applied specifically by the Federal Power Commission in determining the rate of return of defendants. I will say it this way, that of two companies, one of which was now paying 15 percent of gross operating revenues in taxes, and the other was paying .1 of 1 percent of the gross revenues in the form of taxes, the risk that would be facing an investor would be substantially greater in the case of the latter because of the possibility of a large increase in the taxation of that company. I would say that the Federal Power Commission has to, in determining the rate of return, provide what investors demand, otherwise the enterprise will decay.

1255 If the Federal Power Commission were confronted with two companies, one serving the City of Chicago, whose taxes we will say were 10 per cent of gross revenues, and another company serving the City of New York, whose taxes were 1 per cent of gross revenues, all other factors being equal, a higher rate of return should be allowed to the company serving the City of New York because of the greater risk of increased taxes.

I appraised the various risks referred to in my testimony to determine whether or not in fact they appear to be real substantial risks of these companies. I would not have mentioned any risk unless I thought it was real.

Yes, I understand there are taxes under consideration applicable to the Natural Gas Pipeline Company of America. I understand that the Texas Legislature is now being called into session to consider the possibility of putting a tax on natural gas produced in the State of Texas. Texoma has been operating in Texas about 8 years. They have had no substantial taxes of that character placed upon them as yet. Down to the present, no substantial taxes of that character have been placed on Natural Gas Pipeline Company.

I know that the operations of the latter are of interstate character but Texoma is a producing company. I will assume that the State of Illinois could not levy a tax upon the natural gas that defendants sell. I think I know generally as anybody would who has been in the investment field that the natural gas pipeline companies have for many years claimed that they were an interstate proposition and were not subject to local taxation or control. That does not tend to reduce the risk of taxes, as I understand it. These companies are taxed in the states through which they operate. The fact that defendants are engaged in interstate operations tends to reduce the likelihood of gross levy taxes or taxes of that kind; but I do not think it is fair to end it up that way, because this company is paying ad valorem taxes and other taxes in the states in which it operates. They are not paying as much as a comparable utility might, although as I have said there are some utilities who pay less.

I spoke about miner groups who are anxious to see natural gas taxed. These miner groups are not in Texas because there is not much coal mined in Texas. They are in Illinois. I am not sure but what political action in Illinois which might put a tax on natural gas at the point of sale would remove natural gas from the competitive fuel field. I have agreed with you that a gross receipts tax would not apply to defendants, but the gross receipts tax might apply to the Chicago District Pipeline Company. (Motion by Commission Counsel to strike latter portion of answer denied.) I know that the State of Illinois has a public utility tax of 3% or some such amount, an unemployment relief tax applicable to all utilities. I am not sure of the amount. I don't know whether Natural Gas Pipeline Company pays that tax or not.

I have a detailed breakdown of the taxes. There is no special listing for the State of Illinois unemployment tax, so I assume no such tax is paid. There is listed in Illinois only ad valorem tax. I made an investigation of taxes and tax burdens of these companies before testifying in this case. I don't carry all of those things in my mind. Assuming that the unemployment relief tax is 3 per cent of the gross revenues, the amount of that tax would be about $420,000 on 1938 revenues. I do not know that it is not paid by this company. I have here a very detailed breakdown
of taxes which I requested from the company, and
1256 I talked with the company officials about the taxes. I
made no independent investigation other than talking to company officials and requesting detailed breakdowns of taxes paid. I know that in the past years the burden of taxes upon defendants was substantially less than the bur-

dens upon other utilities operating in the same area. I did not refer to it in my testimony. I did not state specifically that one of the substantial risks of defendants was the factor of taxes, but did state that the possibility of increased taxes was a substantial factor. I certainly took into consideration the past taxes and operating expenses of the company; and I gave consideration also to the possibility of increased taxes.

(October 26, 1939.)

(Examiner strikes from the record all references to the impeaching testimony of Mr. Emery from a proceeding before the New Jersey Public Service Commission over objection by Commission counsel. The Examiner refuses Commission counsel opportunity to state his position as to the Examiner's ruling and the Examiner refuses to reconsider his ruling.)

I said certainly that the exhibit which I introduced, or certain parts of the exhibit to a greater or lesser degree, did influence me in forming my opinion as to a proper rate of return for defendants.

The language you have read from the record, beginning at the bottom of page 5461, is my testimony. In that testimony and from that point on to the conclusion of my direct testimony I dealt with the factors of risk as I considered them in arriving at my judgment on the rate of return for these companies.

I think I did attempt to outline the principal risks which I felt were inherent in the situation of defendants, and to which I have given consideration in forming an opinion as to the rate of return. Risks are unfavorable elements from an investor's point of view. I believe this business has some characteristics which are more favorable, from an investor's point of view, than the characteristics of some other businesses. I did not consider only the unfavorable characteristics.

Starting at page 5491, and probably before that—I just turned to that page here—the question presented to me with reference to which I stated the rate of return, was whether I took into account my knowledge of the facts concerning the nature and extent and the character of the investments of these pipelines. Certainly, in that consideration I took into account the pipeline itself, where it ran from, where it ran to, the fact that it sold its gas through contracts, the financial history of the company, and such matters as that.

The matters to which you refer namely, favorable characteristics stated by me in my testimony, are inherent in my testimony. I do not think I have in my direct testimony set out all the facts with respect to revenues and sales of this company. I said I took the company as I found it. I would have to read the record in order to be able to refer specifically to any statement, set forth in my direct testimony, referring to any of the favorable aspects of defendants.

Yes, I testified that, "The natural gas pipeline and production industry is a more risky industry from an investor's point of view than the electric industry." I also testified: "I must speak generally; there may be some small or medium sized or even large sized natural gas pipeline which is in a particular case better than some electric company which happens to be in receivership at the time. I am simply emphasizing that I am speaking generally, and I say that generally the electric industry is a much safer industry from an investor's point of view than the natural gas industry."

1257 I find it very difficult to select one natural gas pipeline company and select the characteristics of that company which are in as favorable a position as the electric industry covering a country like the United States. I suppose there are some things that are common to the electric industry and to companies such as natural gas pipeline companies. Speaking generally, the electric industry has some characteristics which make for investor safety. The facts, generally speaking, are that the electric companies control the distribution, control the sale of the product right down to the customer's meter. Generally speaking, I can not think of any risks of the electric industry which do not also affect the operations of defendants.

I assume I felt the same way at the time I testified on direct examination. I do not remember that particular question. Whether that ran through my mind, I am not sure. You asked me whether or not I know of any risks affecting the electric industry which do not affect these companies. That is a very difficult question to answer. The electric industry covers the whole United States. There are certain portions of the United States adjacent to areas where Federal projects have been built or perhaps are contemplated, where I would have to say, thinking the thing over, that those companies in that area probably did suffer risks, or have risks inherent that a company such as the

Natural Gas Pipeline Company does not have. There may be other local situations that I cannot think of at this moment with a question like this thrown at me.

Yes, I think it is true that the factor of municipal competition affects the electric industry generally and is a factor affecting the risk of the electric industry. I have just said that Federal competition is a risk; and municipal competition is in a similar position, in certain parts of the country. I would say that in other parts of the country municipal competition in the electric field is practically nonexistent. I have never heard of defendants having to face the threat of municipal competition. I have never heard that the companies which they serve directly or indirectly face the threat of municipal competition. The gas business is a business that municipalities, generally speaking, have not been particularly interested in going into. I would say that it is a fair statement that investors in purchasing the securities of defendants would not be concerned with the risk of municipal or any other form of governmental competition. I understood when you used the term "municipal," you were referring to cities and not to actions by either state or Federal agencies.

It is true that electric companies have substantial investments in poles and wires. The ordinary electric company which has distribution has a substantial portion of its investment in poles, wires and fixtures. That is true of transmission companies. The wholesale generating company would have less. It would have the major portion of its investment in its big plant or plants, and usually a much smaller proportion in its transmission lines and sub-stations.

The distributing company which purchases its electric energy would have a substantial investment in long distance high power transmission lines. As to whether these facilities are underground normally depends upon the locality and the particular practice of the company. In many cities practically everything is underground. In rural areas or in smaller cities a great deal of the transmission or
1258 distribution system is overhead, on poles. In the country through which defendants' lines are located, I would say electric companies would have a very large portion of their transmission and distribution system in overhead construction. Such property faces the possibility of damage or injury as the result of sleet or other storms in varying degree.

I don't think the same sort of storms give equal hazards. Defendants' pipeline has been damaged as a result of floods and rain storms. They have not been damaged by sleet storms, to my knowledge. Possibly the telephone line along the pipeline has been damaged by sleet storms, but I know of no damage to this pipeline by a sleet storm. The telephone investment of defendants is relatively small—somewhere between 1 and 2 per cent of the total investment. I agree that electric companies face the possibility of damage to a substantial part of their property as a result of sleet storms. In certain areas in the United States which are in the sleet belt, there have been from time to time storms that have caused damage to the wires of electric companies. Those conditions are not general throughout the United States. I think Illinois and the northern tier of states are more subject to sleet conditions than the southern states. I agree that these companies would not face the possibility of any damage to their property as the result of sleet storms and storms of that character, while an electric company or a telephone company operating in the same territory would face the possibility of damage to its overhead property; but I think it is important to keep in mind the magnitude of this possible damage. Largely all of this company's property is underground. As a general thing, this company does not suffer the same hazards of damage to overhead, over-surface property that electric utilities do, generally speaking throughout the United States.

I testified as appears on page 5465 that, "For a number of years, the gas industry has been suffering in competition and has lost substantial amounts of its domestic business." That statement was intended to apply, as the record says, generally speaking, but it also does apply to the local distributing companies directly or indirectly served by defendants, I think if the analysis is made, it will be shown that the distributing companies are losing domestic business, base load, all the time; but they have been at the same time taking on sufficient new business of a different category to perhaps make the overall showing not so bad.

The principal customer indirectly of defendants is the Peoples Gas Light and Coke Company. I have some statistics which show the number of customers at the end of 1934 to be 814,367. The corresponding figure for December 31, 1938 was 847,000. That is an increase of over 30,000 customers. The average number of customers of Public Service Company of Northern Illinois, in natural gas territory, for 1934 was 13,469. The customers are split into two categories—natural gas territory and mixed gas territory. The mixed gas is a mixture of artificial with natural gas that comes from the lines of defendants. Adding the two figures, I get the average number of gas customers of Public Service Company of Northern Illinois in 1934 to be 141,010. The figures I have with respect to these companies were requested by me from Natural Gas Pipeline Company, and I understand were obtained from the distributing companies or Chicago District Pipeline Company, I am not sure which. The corresponding figure for December 31, 1938 was 156,970, an increase of about 15,000 customers. However, I think it should be said that the revenues of that company have declined in the domestic field. The revenues from the total sales ~~of~~ gas in 1934 by Public Service Company of Northern Illinois amounted to $7,153,102. The corresponding figure for 1938 ~~is~~ $8,527,540, an increase of nearly 20 per cent.

1259 The Western United Gas and Electric Company is another company which uses the natural gas served by defendants. I have the corresponding figures for that company for the Northern Division. The Southern Division, of course, is not connected and is independent. The revenues for 1934 were $3,796,820 and the corresponding figure for 1938 was $4,208,573, an increase of about 10 per cent.

The figures I have read are the total revenues from the sale of gas for the companies mentioned.

The total revenue of Peoples Gas Light and Coke Company for 1934 was $32,696,883, and for 1938, $37,910,773, an increase of approximately $5,200,000, which is around 15 or 16 per cent.

I got the figures I have been reading about June of this year. It is my position that in the determination of the question of rate of return, the Commission should give consideration to the individual facts affecting the operations of defendants. When I stated that the gas industry had lost substantial amounts of its domestic business, I intended that statement to apply to this case. When we talked about domestic business, probably it is apparent that I was speaking generally, but I also say that the distributing companies which we have been discussing have, over a period of years, been losing domestic business—their domestic revenues have been going down. They have more domestic customers than they had 5 or 6 years ago, but revenue is what counts.

Their total revenues are higher than they were five or six years ago, but lower than ten years ago.

The house heating load is a part of the domestic load of a utility, but an insignificant proportion of the average company's load. (Motion to strike by Commission Counsel denied.) In 1938, the total revenue of the Peoples Gas Light and Coke Company from space heating, which includes not only central house heating installation, but also such items as radiant heaters and thinks like that, which are not really proper house heating installations, was $2,500,000, out of a total gross of approximately $38,000,000. The domestic is $22,000,000, of which approximately 11 or 12 per cent is from total space heating. I said an insignificant proportion of the domestic load of the general run of gas utility companies; and I also wish to state that I gave it here as the total space heating, which is the way that I have the figure broken down. This is not an ordinary concept of house heating. Approximately half the space heating customers really have house heating installations—actually 13,400 out of the 23,825 total space heating customers. Breaking the revenue down in the same way will result in the actual house heating revenue of $1,200,000 out of $2,200,000, or 5 per cent of the total domestic revenue. There is a reason why these two items should not be considered together, because really the service and revenues derived therefrom are different in character. One is, I think, more stable and more basic than the other. A person makes the installation of a central house heating job which requires an investment of several hundred dollars, and once it is in, assuming normal economic conditions, it will tend to stay in. The other space heating revenue is from radiant heaters, very small gas appliances. If they had a separate trend from the central system, the statistics might well be kept separately to manifest the trend. It happens that I have the figures only one way; and I wished to make it clear that the way I have them combines both types, because in ordinary nomenclature, house heating is referred to as a central gas fired boiler.

1260 In the reports of utilities such as the Peoples Gas Light and Coke Company no distinction is made between the profit earned from the sale of gas for domestic purposes and the sale of gas for other purposes. The total revenues are lumped together and expenses are deducted from them in arriving at the profits. A trained investor certainly knows the amount received from domestic purposes and the rate received, and the amount received from industrial customers and interruptible customers, and all such things.

Referring to my testimony at page 5469, in which I stated that in my judgment the distributing company which serves natural gas is in a weaker position as to risk than the company which serves manufactured gas, I would have to answer that question now the same way I answered it there. I think you have to look at it from two points of view. From a short-range point of view, a company distributing natural gas is in a better position to meet other competitive fuels than the company which is distributing artificial gas. However, from a long range point of view, with the uncertainties which exist with reference to the future supply of natural gas, it may be that the companies now supplying natural gas will in the future be forced to reconvert their systems back to artificial gas, at which time a great disturbance in business will take place.

I think the Peoples Gas in the light of all the facts I know about that company is in a better position today to meet competition of other fuels than it was prior to the introduction of natural gas. It can meet competition with other fuels by selling fuel in the form of gas at rates which make it advantageous for the consumer to use gas rather than other fuels, such as oil or solid fuel. That is possible because it has a cheaper kind of gas in natural gas as compared with artificial gas.

If the company reduced its rates it would be in better position as to competitive fuel. I think it is a maxim, that as you reduce the rates of your product, you are in a better position to meet competition. However, in making that statement it must be borne in mind that it is not always feasible to lower your rates to get business just for the sake of getting business. A company has certain financial requirements that must be maintained in order to keep it solvent. I think I could illustrate that statement in this way, that if Peoples Gas Light and Coke Company cut its rates in two, it would sell an awful lot more gas in Chicago; but it probably would be in the hands of the receivers within a year or so, or perhaps sooner. That is true because it probably would not earn enough to pay its bondholders. The margin between sales price and the cost of gas, including other operating expenses and taxes, would not be sufficient for it to meet its charges.

There is no direct relationship between fixed charges and rates. Rates, of course, are translated into revenues, and revenues must be sufficient to meet operating expenses, taxes, and fixed charges, or the company will get into trouble. When I said a moment ago that the feasibility of reducing rates was determined in part by the fixed charges of a company, I think I probably should have also said by its operating expenses and taxes and all such other items.

In determining the risk of defendants, consideration should be given to the companies served by these companies. I gave consideration to those companies. I remember distinctly without referring to the testimony that I referred to the contracts that existed. Obviously, one could not consider the contracts without taking into consideration the companies who were really the guarantors on the contracts. I don't think I stated specifically that the only thing I considered in connection with those contracts was the term and the price that was paid for natural gas under those
1261 contracts. I think I said that the principal things that I gave consideration to in those contracts were the terms and the price; but obviously, looking at the price and the terms of those contracts that I was perfectly familiar with, I took into consideration the companies who were buying the gas. (Motion to strike "obviously" by Commission Counsel denied.)

I testified, as shown from the record at page 5534, that I gave consideration to the terms of the contracts under which gas is sold, the length of the contracts, and the price at which it is sold. These, I think, are the principal factors.

I don't think that I specifically in response to Mr. Booth's questioning stated that I had given consideration to the guarantees by the three distributing companies. However, I think it is obvious that I must have because I stated very definitely that I had read the contracts and the amendments thereto. I did give consideration to the guaranties. I could not read the contracts without coming across the guaranty at the end of the contracts. That guaranty is an outstanding feature of the contract. I would not say that it is the principal feature. I believe the principal features of the contracts, as I originally stated, are the obligations to purchase a certain amount of gas extending over a certain period of years at a certain price. It is well known that the contracts were modified at a later date.

It would be perfectly proper for the Federal Power Commission in considering the risks of these companies to give consideration to the guaranty of the Peoples Gas

Light and Coke Company of those contracts. You are not correct in saying that I said I did not consider the guaranty was a factor of any significance affecting the risk of these companies. I testified to the facts you have read from page 5537 of the record. I knew of this guaranty at the time I so testified. I did not so state to the Examiner at that time. I did not and do not now consider it the most important feature of the contract. I think it was of importance and of substantial importance, but I have stated that I thought the two outstanding features of the contracts were the terms and the price.

I don't believe I am able to quote the assets of the Chicago District Pipeline Company. I have not got the figures here. I did not investigate the assets of that company. The Chicago District Pipeline Company is unimportant to me. The real strength of the guaranty comes from the companies who are actually selling and distributing gas—the Peoples Gas Light and Coke Company, the Western United, and the Public Service Company of Northern Illinois. I will accept your statement that the assets of Chicago District Pipeline Company are approximately 3½ million dollars. That company does not serve any domestic consumers, to my knowledge. It may serve some industrial consumers, I am not sure. I think it was originally organized as the Will Cook Construction Company back in 1930. It had no business of any kind prior to that date.

As to the contract entered into between Natural Gas Pipeline Company of America and the Chicago District Pipeline Company, the risk of the former would be substantially higher without the guaranty of the three distributing companies. I think the contract has added strength because of the guaranty by the three distributing companies.

1262 I am familiar with the arrangements under which Chicago District Pipeline Company sells natural gas to the distributing companies. It is obvious that the Natural Gas Pipeline Company enterprise would be riskier if there was no such arrangement or no contracts as guaranteed between that company and the distributing companies. As to whether or not I would recommend the purchase of securities of defendants in the absence of such a contract or arrangement, I should hate to give a horseback opinion. Generally, I would not recommend the purchase of securities without a careful study and a satisfaction to myself that the markets were permanent and real rather than transient. I say permanent and real, at least, semi-permanent. I think that informed investors would feel as I have stated. They probably would not purchase the securities under those circumstances.

I testified as shown in the record at page 5491 from which you have just read. I considered the facts set out in that part of my testimony which you read. In reaching my conclusion, I assumed that this was a pipeline, producing and transmission system with no control over their markets and with no distribution system, and I so stated at the time.

You asked me what investigation of the affairs and the history of defendants I made prior to the time I testified. I think the first thing I did was to study Volume 62 of the Federal Trade Commission investigation of the two companies. I think the next thing I did was to start to assemble in my office certain statistics of natural gas companies, and to get together figures as to investments available in other fields. That last would include study of prospectuses and recent financing of natural gas pipeline companies, utilities, and other companies. I then requested information of a statistical and financial nature from the company officials and received from them in due course a rather large amount of such information. I talked to Mr. Floyd C. Brown and I think he talked to me about the history of this company.

I distinctly remember everything that I did. I went to Chicago and met company officials including Mr. Brown, Judge Morgan, Mr. Hedrick, the treasurer and other people, and inspected the northern end of the line, and the measuring and reducing station at Joliet. I then went to Texas and visited the property of Texoma, conferred with Mr. Dickinson and other officials, and then drove through the acreage, inspected the wells, inspected the Fritch compressor station, went north along the line to Gray, Oklahoma, near where the southern connection of the Natural Gas Pipeline Company line ties on to the Texoma line, and visited the compressor station at that point. I then returned to New York and compiled statistics which I eventually used in the exhibit which I prepared. I think I had one further trip to Chicago to ask additional questions which were not clear to me and to confer with Judge Morgan with respect to the scope of the testimony. During the process, I should say that I requested and received maps and certain other data.

I had a general conversation with Mr. Brown. I cannot remember the details of it. I don't remember ever discussing the circumstance that defendants had no control over the market with Mr. Brown, and I don't think I would depend on him. I would form my own opinion as to that.

The opinion I have expressed here is my own; and I
1263 have so stated. I investigated the history of the project. I read portions of Mr. Brown's testimony. I am not sure I read it all. In answer to your question as to whether I knew when I testified that they were partners in this enterprise, I knew the facts with reference to the ownership of the Natural Gas Pipeline Company of America. (Objection by Company Counsel to use of word partners overruled.) The history of the development is clearly outlined in Volume 62 of the Federal Trade Commission investigation. I am not sure whether I stated or not that that was one of the factors that I considered in arriving at my judgment as to what this company's return would be. Page 1 of my information here shows the ownership of the stock back when the company was started and as it is now, and the ownership of the bonds. I did not put that page 1 into evidence on my direct testimony. I have stated that I assumed that there was no control over the markets by defendants in arriving at my judgment.

I certainly knew that the Natural Gas Investment Company had a substantial interest in the stock of this company and the bonds of this company. I don't remember reading the testimony of Mr. Brown at pages 1944 and 1945, in which he discussed the fact that the Chicago utility companies acquired from Gulf Production Company vast reserves of acreage in the Texas Panhandle, which defendants were anxious to obtain possession of, and that they were the logical marketers of natural gas in the Chicago area. In connection with that testimony he referred to the Chicago utility companies as a partner in the enterprise. I knew of my own knowledge about the investment of Natural Gas Investment Company in this enterprise, and I took that into consideration. It is correct that I testified that as one of the basic factors in arriving at my conclusion that this company was entitled to an 8 per cent return, was that they had no control over their markets. A number of pages in the record after I said that they had "no control of the market" in response to cross examination, I stated clearly my definition of "no control of the market," and that it meant no control of distribution facilities. (Objection by Company Counsel overruled.) I do not agree that it would be obvious that where there was a partnership relationship between the distributing companies and the pipeline company, that that thereby gave the pipeline company control of the market for the sale of the product. I cannot answer it because the question is complicated to me. I would have to know definitely what the partnership is.

I referred to price as an asset of the contract to which I attached some significance in measuring the risk of defendants. I had in mind other risks which to some extent are common as to other public utility companies. In a greater or less degree the risks of lighting costs with fixed contract prices and output as I stated on page 5487. That is what I had in mind when I referred to the price as influencing my judgment as to the risk of this company. I had in mind the particular scheme under which the defendants sell gas under their contracts. They have a demand charge plus a charge for the commodity with reference to the firm supply which is sold to Chicago District Pipeline Company. I referred to the contract price as a factor making for additional risk because of the difficulty of changing the price.

With this enterprise financed and engineered and built under the scheme whereby the revenues and the earnings of defendants were to be derived under contract form, any modifications of operating expenses upward would tend to be troublesome to defendants, because of the difficulty of increasing the contract price. It might be increased by negotiation, I suppose. It is true it has been decreased since the original contract was entered into. I was speaking then of the possibility of increased costs to defendants, with revenues more or less established by contract. Increased cost of operation as to labor and materials and of maintenance, and increased cost of gas in the field would lower the margin of profit.

The present price features of the contract under which defendants sell 120 million or something like that with a
demand rate of $5.25 plus the commodity charge is a
1264 factor which is of substantial importance to defend-
ants; and it tends to give them a stability that they would not have if they sold the gas on a day to day basis. I have known about that phase of the contract for years; long before I ever came into this case. At the Equitable, we were large holders of Peoples Gas Light and Coke Company bonds, and we were quite familiar with the con-

tract when it was originally entered into and when it was modified. The fact that they had a contract under which they sold a large amount of gas with the demand feature and the commodity charge certainly did enter into my judgment of this enterprise. I so indicated in my original testimony. I said I gave consideration to the contracts and the most important things in the contracts were the term and price. In my direct examination, I certainly said I took into consideration the contracts.

The annual amount of these demand charges is approximately 7 or 8 million dollars a year. I can not answer the question as to what other natural gas pipeline company has the same assurances of annual revenues, whether or not it sells one cubic foot of gas, or whether or not one cubic foot of gas is purchased by the distributing company. I don't know. I think you would have to break down that question on the point of magnitude of the enterprise. This company is a large enterprise and does receive, as you say, 6 or 7 or 8 million dollars a year demand charge from the buying company. In speaking earlier of the company selling 120 million that was 120 million cubic feet per day. The demand charge in 1938 paid by Chicago District Pipeline Company was $7,481,859. It also receives demand charges from other sales that it makes, but to a considerably smaller degree. The total demand charge in that year was $7,984,798.

I have a general familiarity with other pipeline companies and their methods of sale of gas. I don't think that I could repeat the details of them here. One other very large one is, of course, the contract under which the Detroit City Gas Company or now the Michigan Consolidated Gas Company buys gas from the extension of the Panhandle line. There is a demand feature in that, but I cannot state the amount in dollars.

(Company Counsel offers now the contracts on file with the Federal Power Commission of all the pipelines taking gas from the Panhandle field; namely, the Colorado Interstate, Cities Service, Panhandle Eastern, Northern Natural, Lone Star, and the Consolidated. Examiner stated that the contracts could be offered later.)

I know something about the price provisions of the contracts of other natural gas pipeline companies. I have read a great many of them, probably all of the important ones, from time to time. I don't remember the figures. I would have to refer to my files, but I could quickly find it. There is a demand feature in the contracts of Northern Natural Gas Company for sales of gas.

I did not specifically investigate the details of those contracts at the time I was determining the risk of defendants; but I had extended previous acquaintance and knowledge of the contracts of Northern Natural Gas Company, due to the fact that I participated as a representative of The Equitable in the purchase of $4,000,000 of bonds of the company in 1935. I am not sure of the exact time when Northern Natural Gas Company entered into contracts for the sale of natural gas to the companies operating in Minneapolis and St. Paul. It was within a year or so of 1935, and it is my belief that it does not sell gas in the City of St. Paul right now. It does sell natural gas to the Minneapolis Gas Company. I don't remember the term of that contract. I am not sure whether the contract had been entered into when the bonds were purchased by the Equitable.

1265 As to the total amount of fixed charges of this company, the bond interest of defendants would be approximately 6 per cent on $45,000,000, about $2,700,000, as of the present. My understanding is that the demand charges are payable simply for the right to take gas whether or not gas is delivered.

I think the Wisconsin Electric Power Company had a similar contract up to a short time ago. The company has recently been merged with the Milwaukee Company. That company has nothing to do with gas. He asked me to name, I thought, any other public utility company that had any such contract under which it would receive, regardless of output, sums in anywhere near the same relationship that defendants did, to its fixed charges, and I gave the first name that I could think of. Answering the question as to whether the contract is any longer in existence, I said the companies had been merged just recently. I should say that a somewhat similar contract would be that between the Mississippi River Power Company and the Union Electric Company of Missouri. I have not the amount of demand charges in my head. I have only a general idea as to the relationship.

I have testified here that a fair rate of return for defendants would be 8 percent. I have stated in the course of my testimony that I have been called upon to advise institutions and others with respect to the investment of funds.

If I were given $50,000,000 today and were asked to invest that money for the purpose of producing a return of 8 percent on that $50,000,000 for the next 15 years, I don't know offhand where I would invest it. I am familiar with the investment business, but one does not give a horseback answer to a question like that. I have some ideas where that money could be invested to produce a return of 8 percent. You ask if I know that they would produce a return of 8 per cent for the next 15 years and still be sure of the principal amount of money invested. I could not qualify for a prophet's role—such as you have outlined to me.

I think the Peoples Gas Light and Coke Company is in a better financial condition than the Brooklyn Union Gas Company. It is now serving a mixed gas in the territory it serves; and to that extent is, in my opinion, in a better position to meet competitive fuel conditions than is the Brooklyn Union Gas Company. The latter serves only artificial gas.

I made some investigation as to the needs of defendants for additions to their property during the next two years. As to the amount, it would just be a guess. I would just guess around a million or a million and a half a year.

I testified that the risk of a pipeline company such as defendants' was substantially greater than that of a gas distributing company. I think there are aspects of the operations of the gas distributing company which contain risks which are not inherent in the operation of a natural gas pipeline company such as defendants'. I should hate to enumerate all of them offhand, but one that comes to my mind immediately is in connection with a manufactured gas company serving an urban area with a large part of its expenses going to labor. It might have labor troubles; and the possibility of labor troubles, perhaps, is a greater hazard in a distribution company where the labor is a greater proportion of the gross than in a pipeline company where it is smaller. I would have to refer to my statistics to give you the proportion of the annual labor cost of this company to its gross revenues. It is substantially smaller than for a city distribution company. It is substantially smaller than the labor cost for an electric or telephone or a gas operating company.

Another risk which a pipeline company does not have in the same degree is the possibility of increased labor 1266 costs if wages go up. The pipelines would have this risk but it would be less proportionately. Inasmuch as the present labor costs of the distributing company are larger in proportion to gross revenues than those of the pipeline company, then with a substantial increase in labor costs, I think the effect would be more detrimental to the distributing company than to the pipeline company. I do not think that I have the proportions of annual labor cost to the gross revenues broken down in this tabulation here. In my breakdown of the operating expenses, labor is not segregated out from the primary accounts. I have some idea of the labor costs in this enterprise, but I would have to go through all of my data here to find out the exact figures. I have stated that defendants have fewer employees per dollar of gross than does a company such as the Peoples Gas Light and Coke Company or the Illinois Bell Telephone Company, or the Commonwealth Edison Company. The defendants have about 600 employees.

I made a careful study of the risks of defendants as compared with the risks of gas distributing companies. Of course, the contemplation of those risks and the weighing of those risks is something that takes place in the processes of the mind. I am not prepared to state at this time any other risks which are inherent in the general type of electric or gas utilities that are not inherent in the Natural Gas Pipeline Company. They are not the same kind of business, and many of the elements of each business are so different in character as to make any such comparison meaningless, in my opinion.

It is not difficult to make a comparison of the risk, Mr. Booth. Anytime that an informed investor buys securities, he knows what the risk is, or at least he has an opinion of the risk at the time that he makes the investment. Because of the difference in the characteristics of the companies, it is difficult to compare the risks of pipelines with those of utilities, but it is possible to do. I have said that I can not generalize in response to your question as to what are the other aspects of their operations in which the operating companies have risks which the pipeline company does not have.

I did not testify that the risks of manufactured gas distributing companies were higher than the risks of a natural gas pipeline company. I said that the risks of distributing companies were less than those of pipeline companies. It is my belief that the risks of a company such as the Natural Gas Pipeline Company are greater than the risks involved in companies which distribute gas, that is generally speaking.

I am able to discuss risks both in general and specifically with reference to companies which I have had occasion to look into in the recent past. (Objection by company counsel.) I can not tell you about the risks of gas operating companies which do not apply to pipeline companies, because the risks of the operating companies are, generally speaking, to some extent present in pipeline companies, but it is a question of degree. I have stated that the distributing companies have a greater risk of labor trouble and of increased labor costs than do pipeline companies. Without getting down to specific companies, I can not tell you whether or not that is the only item in which the gas distributing company has a greater risk than the risk of a pipeline company.

1267 *Questions by the Examiner.*

I have made some specific analysis of distributing companies by way of comparison. I recently appeared in rate cases involving two rather large gas distributing companies in the State of New York: The Rochester Gas and Electric Company and the Brooklyn Union Gas Company.

I think the risks in the distributing companies probably also appear in the business of defendants, but in different degree; and unless you are discussing two particular companies, I do not think that you can generalize about it. You might take the question of materials in a gas distributing company. There the cost of materials takes up a rather large proportion of the operating revenue or operating expenses. Depending upon whether or not the cost of coal goes up, and also depending upon the location of that utility and the transportation charge of the coal, will depend the results of that company. Now, similarly, if the cost of production of natural gas down in Texas goes up, the cost of operation of defendants will increase. On the question of sales, a company which is a distributing company and has control over its markets may, in view of peculiar local or other economic conditions, decide to make a sales campaign or do something to increase its sales of gas in a certain category. A pipeline company which has no control over its markets is not in such a position.

Cross-Examination by Mr. Booth Resumed.

Defendants are handicapped by the fact that they do not determine what shall be done about the sale of natural gas by the companies who sell their natural gas. They have some possibilities of control of the sales of boiler fuel and industrial gas, which is not a large proportion of the revenue; but in respect to the gas sold under firm contracts, they have no such control. I do not say that they are handicapped today. They may be. The result of my investigation showed that they might be. I do not think they have been handicapped in the past. I am not positive that they will be handicapped in the future.

The Peoples Gas Light and Coke Company spent money to promote the sale of natural gas in the City of Chicago. They spent a number of millions of dollars in connection with the change over, and I understand that they have spent additional money in an attempt to promote house heating and other large volume sales of gas. As a matter of fact, the Natural Gas Pipeline Company was in a distinctly advantageous position because it did not have to bear that expense. That is the usual practice. The distributing company usually pays the cost of the change over. It is customary for the company who is actually selling the gas at the point of sale to pay the cost of promoting that sale.

All of those things that I have named have not been factors indicating where the hazards of the gas distributing companies are greater than those of the pipeline companies. I have simply named some of the factors which are hazards of gas distributing companies and where their hazards might be greater or less. I can not think at this moment of any other hazards.

Assuming the accuracy of the testimony of defendants' experts as to the life of their reserves, and assuming also that on their calculations, the investors would have been returned the money that they invested in the property. The companies, at the time of the exhaustion of their supply, would probably be able to cease business. The Peoples Gas Light and Coke Company would probably have to get a

certificate of convenience and necessity in order to terminate their operations at that time. The Peoples Gas Light and Coke Company could not terminate its operations
merely because the supply of natural gas of this com-
1268 pany had been exhausted. As a practical matter, they
would have to try to find some substitute supply. They are now supplying a mixture of artificial and natural gas. They still carry and operate certain of their artificial gas manufacturing plants, and they undoubtedly would continue in the operation of the gas business in the City of Chicago.

I am not able to state what proportion of the investment which defendants made in their pipeline property has already been returned to the investors. Defendants originally started out with a thousand shares of stock. Soon after they got going, they had $61,000,000 of bonds and $3,000,000 of stock. I presume that was intended to represent the investment in that company. The capital structure today is about $44,400,000 in bonds, and $3,000,000 of common stock. The total bonds redeemed to date are $16,600,000. Out of the $64,000,000 representing the investment of bonds and capital stock, the bonds redeemed amount to approximately ¼ of the original capital structure. (Objection by Company counsel overruled.) Offhand, I cannot name a gas or electric distributing company which has retired in the last five years, 25 percent of its debt; but in evaluating the hazards, it is well known that investors because of the extra hazards of the natural gas pipeline companies, require the amortization of their debts over short periods of years, and do not in buying distributing companies' securities require any such sinking funds. That is well known.

The reason generally for the amortization provision is because of the difference in the fundamental character of their business; namely, that the natural gas supply and transmission business is primarily an extractive business which might be limited for a specific period, while the business of an operating and distributing company continues indefinitely. The reason for the investor's demands that pipeline company debt be amortized rather rapidly is because it is an extractive industry, and investors are uncertain of the future of that industry.

It is not my understanding that by debt reduction the capital is being retired. The changes in capitalization are proportionate. The debt is being retired, but at the same time the equity holder's stake in the future is greater. If the equity holder and the bond holder are the same, the total investment remains the same, only it is in different proportions. As the debt is retired, his investment in the bonds becomes smaller and his investment in the common stock becomes larger. The investment by the bond holder represents capital embarked upon the business. These companies are retiring their bonds from the earnings of the companies. By earnings I mean the difference between the operating revenues and expenses, and the bonds are retired from the cash which is in the till of the companies. I could not earmark a dollar like that and say cash exclusive of amortization charges.

I assumed that when you said "amortization", you meant depreciation. The bonds that have been retired by this company have been retired through using the cash available in the treasury of the company. That cash, of course, is derived from the earnings of the enterprise, and the total cash generated in any one year is dependent on the earnings, the amount of money going into construction and the amount of provision for depreciation.

1269 At page 5471 of the record I referred to the fact that the City of Chicago at one time had a supply of natural gas. It came from a very large field in the extent of acreage covering quite a sizeable portion of the State of Indiana. I cannot remember the total acreage of the fields. I have reports and studies of that enterprise in my files. I don't remember the amount of the gas reserves. The period during which natural gas was supplied to the City of Chicago was around the turn of the century. It may have been five years before and possibly a few years after. I don't remember the exact number of years natural gas was supplied. I did not intend to compare the size of the reserves of those fields with the Panhandle field. I simply mentioned that as indicative of what had gone on in the past and as something that investors remembered. I don't know whether the rates were increased in Chicago after the gas company returned to the supply of manufactured gas.

I spoke of the possible failure of supply as a factor in the risk of this company. I consider it an important factor. I cannot say how important, but I think it is of substantial importance. I certainly gave weight to it in arriving at my judgment as to what was a proper rate of return for this company and in forming a judgment on a matter of this kind, it is impossible to say exactly and precisely how much any one risk is involved or how much influence any one risk has in the formation of your final judgment. You ask if I would say it was a major factor. I hesitate to classify such intangibles in such definite categories. I would rather say that it was certainly one of the factors which I considered in evaluating this company and determining what I considered a fair and proper rate of return. In forming an opinion of this kind, it is impossible for me to classify and state the magnitude of all of the various factors of risk which I give consideration to.

It is a judgment matter and my position today is that it is not possible to state that it was one of the principal factors in arriving at my judgment as to what the risks of this company were. I think the best way to say it, and the way I like to say it is that it is a substantial factor to which I gave consideration. I can think of no other factor at this moment of any greater importance.

You asked what investigation I made of the reserves of this company. In the first place, I was, through previous experience in investing, to some extent familiar with the reserves of the Panhandle field. I have studied reports of prominent geologists going back at least 5 or 6 or more years which had been furnished to the Society in connection with the consideration of investments. The geologists' reports which I read included reports made for the United Gas, Public Service, Panhandle Eastern Pipeline Company, Lone Star Gas Corporation, and some others including the Northern Natural Gas Company. The firm who made the most reports that I can remember was Ralph Davis. You ask what he concludes about the life of the field. Those reports were made at varying times and for different companies whose supply was from the Panhandle and other fields. I have no recollection at this time of any specific figures in trillions of feet. I have a range in mind, but I don't remember the exact figures. In addition to that, I of course obtained data from the defendants and studied certain exhibits which have been prepared in this case, and talked to certain people in reference to their exhibits where estimates had been made on the life of the field. I talked to the people that were employed by the company, who had made the studies. I talked to people in my
1270 own organization generally on this matter. I did not make an independent inquiry among other geologists to determine the accuracy of the estimates made by de-

fendants. I did not retain Ralph Davis or anybody like that.

I know that Mr. Claude Brown has testified in this case. I understand he is an employee of the Federal Power Commission. I do not know to what he testified specifically. I believe I heard that he testified that the field had a long life, but I did not specifically get his figures in support of that. I have made the investigation that I considered necessary to form my opinion. It was not necessary in forming my opinion to get an absolute idea as to the length of life of the field. In forming my opinion, I assumed that the field will last at least 15 years. I am assuming that the life of the field will be 15 years, but of course there is the possibility that it will go out before then. I did not say that was the principal factor in evaluating the risk of this company. I said it was a substantial factor, that the hazard of the shortening of the life of the field was a substantial factor, and that I could not think at the moment of any other factor which was of greater importance.

You ask me the following question: "In arriving at your conclusion of 8 per cent, you gave consideration, of course, to the possibility, and as you say that was the most important factor you can think of, of failure of the supply between now and the end of 15 years." I have never said, of course, what is asked in the latter part of your question, and I do not wish to say it. I will repeat again my consideration of this factor. I said it was substantial. I have said that at this moment I cannot think of any factor of hazard which I consider of greater importance than the failure of the supply. The 8 percent does include the consideration of the risk due to the possibility that the supply may fail. In my mind there is a distinction between this phrase "factor of importance" and "principal".

At pages 5485-6 it appears I testified, "In any natural gas pipeline, a company which produces and/or purchases natural gas and transports it through a line for sale, such a company is subject, of course, I think, to the principal hazard of the possibility of failure or shortened life of the supply." I think my recent statements are more accurate.

There have been a number of failures on defendants' line. In my tabulation of failures, I find four failures, one in 1936, and three in 1938. In the first failure, on July 4, 1936, the estimated curtailment of sales was 24 million cubic feet. On February 13, 1938, the estimated curtailment of sales was 468 million cubic feet; August 14, 1938, 17 million cubic feet; and on August 20, 1938, 36 million cubic feet. That would be a very small percentage of the total sales of the company in the 8 years. It appears to be about .2 of 1 percent.

In my investigation of the estimates of the life of the reserves of the Panhandle field, I do not remember examining the estimates of Thompson and Hughes, who testified in this case. I examined Mr. Peterson's figures, and portions of Mr. Dickinson's testimony. The latter were employees of defendants. I saw other figures but I do not recognize the names of Thompson and Hughes. I did not investigate the estimates that they made of the life of the field in 1934. I do not know what life of the Panhandle field these geologists testified to in 1934. I made no effort to find out. Of course, I was not able to compare their estimates with the estimates that were made by defendants' experts in this case.

I don't remember examining the record at all in the Chicago District Pipeline Company versus Lindheimer case. I understand that by "the record" is means a transcript of the testimony, evidence, exhibits, or anything that was submitted in that case. I have collected in my office in recent years all of the information possible in the way of briefs, opinions and things like that on such matters
1271 of this kind. I may have, but I have no distinct recollection of that case. I did not know that there was a great deal of evidence and information there bearing upon the early history of this enterprise; I have no memory of what was in that case. I have stated a number of times that I made inquiry as to the early history of this enterprise. I did not talk to a man by the name of Gallagher. I have heard of him but I do not know him personally. I understand he is an official of the Standard Oil Company with particular responsibility for natural gas operations. I know that he was formerly a director of defendant Natural Gas Pipeline Company. I read very carefully the Federal Trade Commission record which is quite complete on the early history of this enterprise, and I am quite confident that Mr. Gallagher's name was mentioned in there. I made no effort to determine whether the company in its early history made any estimates, or the officials of the companies made any estimates of the profits that they expected to make during the life of this enterprise.

I testified as shown on page 5495 of the record that an investor would demand that the period of amortization under regulation be less than the life of the project as expected at the time he made his investment, in order to provide a factor of safety. If at a later date it is found that the project is going to last longer, the amortization could be changed at that time with no loss to anybody. It is not necessarily true that charges to amortization or depreciation determine the income of the company for rate making purposes. The amount of such charges is a factor that is taken into consideration. It would be a very important factor in this case. I have no particular knowledge at this moment of the amount of amortization, but it would be an important factor. I made no investigation of that.

The amount of amortization or depreciation charge is determined in this sort of enterprise by the estimated life of the field or the life of the reserves or the life of the project; I would think that would be the controlling factor. In my statement that "the amortization could be changed at that time with no loss to anybody," I meant that ordinary prudence would require that an amortization provision would not be set up on the exact life of the field. If a big institution is buying mortgage bonds of a natural gas utility company, and it has reports from the most eminent geologists that the life of the field is 20 years, no institution will buy 20-year bonds, but they will buy 15-year bonds.

I have said, I think, it would be a prudent thing to fix a shorter period than the indicated life as the period of amortization. I have not said that my rate of return depended on any regulatory commission doing that. I have said that my rate of return was 8 percent after proper provision had been made for amortization, whatever that was.

Assuming that the life of the field is taken at 10 years, which means an annual charge to amortization or depreciation for 10 years, and then at the end of 8 years it is discovered that the property in fact will have a life of 20 years, the rate payers will have suffered during that 8 years because they will be paying more charge for amortization than turned out to be necessary. I do not consider that that is inconsistent with the public interest, though. The rate payers from that time out could or might under regulation pay a very small amortization. It might be decided at that time by the regulatory commissions in that way.

Cross-Examination Interposed by Mr. Slaff.

1272 I was not speaking of the consumer at any given time in the statement I just gave. I think I was taking a long range view as opposed to the short range point of view, when I said that I did not think my statement there was inconsistent with the public interest. I do not think, generally speaking, that the present consumers should be burdened with bad practices or losses of the past. I do not think that future consumers should be so burdened; but I do think that regulation must adopt a broad viewpoint and consider the interests of both investors and consumers.

I agree with your statement that in considering the interests of consumers, we mean the public at large over a period of years, rather than the specific consumers at a specific time. I have heard of the case of Bronx Gas and Electric Company against Maltbie, decided on the New York temporary rate law in the New York Court of Appeals. I am not familiar with the language you quoted from that case. I think my views are expressed in the language of Judge Crane in that case, in which he said: "True it is that all the consumers paying the final rate, including the takeup, may not be the same as those who paid the temporary rate. A few consumers may be new customers paying what the old consumer should have paid. Such expenses are of minor importance. The percentage must be very small. We can never work our institutions of government if we refine matters to such an extent that we have to consider all these little details. The Constitution expresses fundamental principles, and if in the main these have been observed, this is all that can be required. Besides, when we speak of the consumer, the customer, we mean the public, not individuals."

Cross-Examination by Mr. Booth, Resumed.

You asked if under my theory it should turn out that the rates are high enough during the next two or three years so as to amortize all the investment during those first two or three years, then after that all the risk would have been eliminated at the end of that period, and from then on the rates could be based on no amortization and a riskless rate of return; my answer is I don't think it would be proper or economic or possible to do it that way. That was not what I was indicating in my testimony. I am trying to give the practical answer and I am being asked to answer a completely impractical and theoretical question.

Your question is based upon an absurd interpretation of what I said. I am simply saying that from a practical point of view, an investor would demand that the period of amortization be "less than." I did not say "one-fifth." I said "be less than." I am taking by analogy the insurance company buyer or the institutional buyer of securities. If he is convinced from geologists' reports that the pipeline has a life of 20 years, he may be willing to buy bonds at 15 years. He wants that safety factor.

I think that the bonds of natural gas pipeline companies of substantial size have been sold to institutions on a 15-year life basis where the reports of geologists available to them indicated that the life of the field was 20 years. I think that perhaps I should add to that and say that perhaps a more common statement by the geologists is that the field would last not less than, or the supply should last not less than, 20 years, in which case the institution would buy on a 15-year basis. That observation was implicit in my earlier statements concerning which I have been asked here on cross-examination.

1273 (October 27, 1939.)

A substantial part of defendants' revenue is from sales of an industrial character where the profit margin is probably less per thousand feet than it is for the sales under the firm contracts. It is not unusual for a gas or electric utility company to sell a substantial portion of its product for industrial purposes. I testified that about 25 per cent of the revenues of defendants was obtained from gas sold for industrial purposes.

I am generally familiar with the operations of the Commonwealth Edison Company but I would not attempt from memory to state the percentages as between sales for domestic and for other purposes. My notion is that with Commonwealth Edison Company approximately 30 per cent of its revenues are derived from sales to residential customers, 20 to 25 per cent from sales to commercial customers, and 30 per cent or so from sales to industrial customers. The usual contracts of electric utility companies with respect to large sales of power under the industrial classification are firm contracts of either 3, 5, or 10 years duration. That, in my opinion, is the situation with respect to the sales of Commonwealth Edison Company. I would not attempt to say what proportion of the industrial load is sold under the two-year, three-year, or five-year contracts. Any man would have to be an encyclopedia to attempt to remember those figures. I certainly know something about that company. I have made many analyses of that company and purchased millions of dollars of bonds of the company extending over a substantial period of years. I know the general nature of its contracts. I cannot remember myriads of statistics such as you are asking for. I have examined a contract between that company and an industrial customer. I don't remember which one. I don't remember whether I examined the contract between the Edison Company and the Illinois Central Railroad.

Questions by the Examiner.

I have made a number of investigations of the Commonwealth Edison Company probably starting in 1929. At the Equitable, we were a large holder of the company's securities, and from year to year we purchased additional amounts of bonds. The examination and checking of contracts would be one little detail in a broad investigation of the company's operations. The fact that an industrial consumer is using electric energy gives the supplier of that energy more of an assurance than if the supplier were a natural gas company, because of the type of equipment the industrial consumer has to install and the difficulties of changing to any other fuel. A company like the Commonwealth Edison Company obtains a contract or makes an arrangement with a company like the Illinois Central Railroad to furnish it energy; and the Illinois Central Railroad would have installed, perhaps, a receiving substation with transformers, and after that maybe hundreds of motors and lights where the energy would eventually be used. A large customer like that, however, could install its own Diesels or something of that kind, of course, but the installation of Diesels is, from the standpoint of capital investment, an expensive proceeding; and from the standpoint of technical operation is difficult. An industrial customer who is to be supplied with gas in most cases already would have equipment where fuel is now being

used to generate heat, in most cases coal-fired boilers. The gas company comes to him with a proposition and says "We would like to sell you gas; it will be simple for you to install a gas jet under your boiler and make
1274 the change-over, and it will be economical for you."

The cost of that change-over is not much. The costs of change-over to and from electric use are much more. You can see that the installation of a Diesel plant for use in the electric field would be much greater in cost than the installation under a boiler of a simple gas burner.

Generally speaking, large industrial concerns do not generate their own electricity. There has been over the last twenty years a gradual decline in the number of separate installations whereby industrial establishments generate their own electrical energies. There have been ups and downs in that movement, depending upon the course of fuel prices and the activity of manufacturers of such equipment; but generally speaking, the number of power installations in industrial establishments has had a downward trend. The electric companies find the industrial load a good load. Gas companies find the industrial load a good load too. Any load is a good load that provides revenue. My only point was that the margin of profit in the industrial business is less in relation to sales price than it is in the firm business.

Cross-Examination by Mr. Booth Resumed.

The Commonwealth Edison Company sells electric energy to transportation companies such as Chicago Rapid Transit Company and the Chicago & Milwaukee Railroad. Some of the companies who purchase energy from Commonwealth Edison Company have been in receivership or Section 77 proceedings. I am not sure that all of the bills have been paid. I have some recollection that the Edison Company was forced to write off losses on account of energy sold to transportation companies now in receivership, but I don't know the exact amount. I don't know that defendants have been forced to do that.

I just cannot take a position on the question of whether, generally speaking, the industrial load of a gas company is substantially smaller than the industrial load of a large electric company. I think I have a fair understanding of the statistics of these industries but I cannot answer that.

The only way to answer that question as to whether the industrial load of these companies constitutes a large or small percentage of the business of large electric companies and large gas companies would be to look at the whole industry. In 1938, the total revenue derived from sales to industrial and commercial customers in the manufactured gas industry in the United States, and that covers companies providing manufactured service and mixed gas service, was $69,000,000. The total revenues in that year were $360,000,000; so something less than 20 per cent of the gross operating revenue of the industry was derived from sales to industrial and commercial customers. I do not have the comparable electric figures here; but I believe that they would show a somewhat higher per cent of total revenue in the electric industry derived from sales to its industrial and commercial customers, I would say 50 to 60 per cent, I believe.

To the extent that we can generalize on a thing of that kind, I would be willing to say that in the last depression, or the depression that started in 1929, the industrial revenues fell off percentage wise at a faster rate than the revenues from domestic service. That is generally true in the course of a depression or decline in business. I would not say that the risk would probably be greater in the case of electric companies than it would in the case of gas companies. The gas sold by these companies under the boiler fuel and interruptible supply contracts is in many if not in most cases sold in competition with other fuels such as coal and oil, where the margin between the respective costs of the two fuels is very, very close; and it may be that a simple question as to the ease of use or a fractional change in the price will decide whether
1275 or not that customer will continue to take gas. With conditions of sales of that character, it seems to me that any change in the industrial conditions or any change in the conditions of cost of supply of other fuels where the margins are so thin, is a substantial factor to take into consideration in looking towards the risks that are inherent in an enterprise of this kind. Of course, as you say, the situation can work both ways. The price of other fuels might comparatively be greater than the price of gas, so as to give the gas an even greater advantage in the competitive market at a particular time.

I don't know whether the present trend of coal prices is likely to be upward. I think I was in Washington when the Coal Commission was created and the coal laws were passed. I read that there are proceedings pending before the Bituminous Coal Division of the Department of the Interior involving the establishment of coal prices for the entire country. It is my understanding that no findings have been handed down and no coal prices have been established yet in the respective areas. It is not my opinion that in the absence of a definite act of the legislative or congressional agencies actually changing the status quo that the possibility of some action is not a factor to be considered in the determination of the risks of defendants. It is true that I have considered as one of the risks of these companies the fact that laws might be enacted increasing the taxes of these companies. As to whether it would be appropriate for me to consider a risk the possibility of the Bituminous Coal Commission's establishing in the very near future prices for coal which will increase the competitive position of the natural gas industry as compared with the coal industry, I have to work from a base which to me is reasonable.

I have stated that in my opinion the risks involved in this enterprise are greater than the risks in a gas distributing company. Such a company is taken as a base, as it is; and the risks are evaluated from that point on. So it is inherent that I have taken the gas industry as I see it and as I view its future. I don't know for sure that the natural gas industry's competitive position with respect to substitute fuels is improving. There are a number of factors which might have opposing tendencies. I did state that one of the factors of risk I took into consideration in my study of rate of return for defendants was the fact that a substantial part of the revenues came from the sale of interruptible or boiler fuel gas. The ability of defendants to retain their revenues from that class of business depends upon the price of coal, the price of oil and the price of gas. It does not depend altogether on the price of coal.

As to the present trend of the price of coal, I will have to examine certain statistics that I have as to the recent trend of the cost of coal. The cost of steam coal to large users in Chicago at wholesale in January, 1937 was $4.05. It moved in May to $4.25; in December to $4.35; in May, 1938 down to $4.05 and in July, 1938 back to $4.30, where it has been since.

It is my understanding that the Bituminous Coal Division is engaged in establishing bituminous coal prices for the entire country. I do not know what the marketing experts have recommended. I do not know whether they have recommended any prices. I try to keep informed about those things. It is not true that I try to keep informed only about those things that would increase the risks of the natural gas business. I did inquire about the possibility of taxes being enacted in the next few years. I did not make any inquiry as to whether or not the Bituminous Coal Division or their marketing experts had recommended prices which were substantially higher than the present prices. I 1276 was interested in determining everything that I thought of importance in finding the rate of return for this company. I don't think it of any great importance what a division of a bureau of a department of government had recommended with reference to coal prices. I do not know whether the proposed prices have been approved generally by the coal industry. I am quite confident the producers of coal would like to see high prices established, and I have no doubt that the district boards which represent the producers would like to see high prices. However, I do not consider it of great importance in coming to my conclusion as to the rate of return for these companies that the coal industry, as we have delineated it for this purpose, had approved generally the tentative recommendations of the experts of the Bituminous Coal Division of the Department of the Interior. I would consider that particular of some importance. I would also consider what the people on the other side of the table were saying about it; the consumers who were probably over there in the position of Mr. Booth saying it is too high now. Between them, I would attach considerable importance to that in my ultimate judgment, I think if prices had been established by a board—I would not say that I did not make any attempt to find out one way or the other what the respective sides were doing about that question. The question of coal prices has been something that I have given some consideration to not only for gas companies but for electric companies since the original laws were passed and then kicked out. I read in the newspapers about the proceedings pending before the Bituminous Coal Division, but beyond reading about it in the newspapers, I did not make any effort to inform myself concerning such proceeding; I did not come down to Washington to discuss it with the Board, nor did I write any letters to the Board.

I don't know when the legislature of Illinois meets in regular session again. I seem to remember they meet every two years out there, but I do not claim to be an expert on that. The legislature has to meet, of course, in order to pass a law taxing the sale of natural gas. I have not made any independent investigations to determine whether the state administration has under consideration taxing the production of oil in the State of Illinois. I have read the Chicago papers and taken them in my office to try to keep informed. I know that the recent large increases in production of oil in Illinois are receiving consideration of the state administration. I don't know of any proposals that have been formulated with respect to it. In connection with my testimony, I was certainly quite familiar with the fact that this flush production of oil in Illinois in recent years was a factor to be considered. It had, as a matter of fact, resulted in depressing the price of oil in the Chicago market, and I think that this company probably lost gas sales because of it. I cannot name any individual cases. I have not collected any statistics here on an individual customer basis except on the utility companies.

I intended to include in the rate of return to which I testified compensation for risk. I named the figure that I thought would attract investors, and investors can only be attracted if they are given compensation for the risks which they undertake. On pages 6314 and 6315 I stated, in discussing the risks considered by the investor, "He is primarily worried about whether he is going to get his annual return for the use of the capital and whether he is going to get his capital back when he wants it." I stand by that answer. Possible failure to receive the annual return is one of the risks considered by me and by investors. That is generally true of all investments. I am testifying now as to the rate of return, which, as I view this enterprise, will be adequate to attract capital from an investor. I am making the best appraisal of the risks that I can in setting the figure at a point which I believe will make it attractive for an investor to put his money in. I may have made a mistake; I may be too low or I may be too high. I have stated that the 8 per cent rate of return I named was a fair and reasonable return; that it was intended to cover the risks due to the possible failure of the investor to receive the annual return in a given year. (Objection by company counsel overruled.)

It covers in my opinion, all the risks involved and is 1277 sufficient to attract capital. I believe that the 8 per cent return will compensate the investor for the risks which he is undertaking. The investor in a regulated enterprise is never sure that he is going to get what he hopes to get. If a rate of 8 per cent is allowed by the Commission in this case, there is no clear guarantee that the company is going to earn that much money; but in my evaluation of risk in stating that 8 per cent will be a proper rate of return, I believe that includes compensation for all of the risks which the investor is taking, as I see the problem today, including the fact that he may not get the full 8 per cent. I think it is a general thing which is inherent in all investments in the regulated field, that when an investor invests in this field he knows that his profits are limited. He perhaps believes the field has more stability and is willing to go into it on a basis that seems attractive to him and compensatory for the risks which he is investing; not the general risk which is inherent in all investments, such as breakdown of economic conditions and things like that. My 8 per cent return is based on amortization which is proper to return the capital over the life of the enterprise, whatever that may be. I don't know what that would be and it seems to me to be a function of this Commission to determine what that is.

If we assume that the amortization is fixed on a 16-year basis, and in fact the enterprise only lasts 10 or 12 years, the investors might lose such part of their capital as was not recovered at the end of 10 or 12 years. I think that question has to be answered in the light of what would result in practice. This enterprise is now subject, as I understand it, to regulation. If rates are established based on facts existing today as shown in the record, and an amortization period is set up, it would certainly appear logical in my opinion that if at any other date there was any change in the facts as to the life of the field, that would certainly be brought to the attention of the Commission and other rate proceedings would be in order and some modification would be made so that justice would be done to all concerned. Under the hypothetical facts submitted, if an investor held securities of this company in the form of serial notes which were to mature on January 1st of each year for 16 years, and the business of defendants ended through exhaustion of its fields or for some other reason at the end of 12 years, the investor would lose a part of his capital. Of course in that question you have assumed that the company is capitalized solely through serial notes, that it has not built up cash sufficient to pay off these notes, and that there is no cash available over the period for that purpose.

When a company that has been serving natural gas has to go back to artificial gas, the probabilities are from past experience that their cost of producing heating units in the form of gas will increase. As to whether that would result in a rate increase, I think the rate of return at that time would have to be determined in the light of the then conditions. You ask would the same rate of return be required, assuming all of the facts to be equal except in the first case it was supplying natural gas, and later it supplies artificial gas. There are so many facts to be considered in each individual case that I would not express any horseback opinion. In the absence of specific facts dealing with the detailed phases of the operations of the company under each situation, it is not possible for me to give an intelligent answer to the type of question you have just addressed to me. It seems to me that you are asking me to state offhand here what might be a proper rate of return for a company now serving manufactured gas, and at the same time to state what I considered a proper rate of return for a company now distributing natural gas. I am not prepared to state without knowing more facts just what the rate of return should be in each case. I have reference to facts about the particular company, where it operates, the character of the territory.

1278 I know that Peoples Gas Light & Coke Company is serving a mixture of natural and artificial gas. If that company should cease serving a mixture of natural and artificial gas and started serving straight artificial gas it is impossible to say whether or not they would be entitled to an increase in rates although I don't believe that the rate of return would be greatly different. I have not given consideration in this case as to what an adequate rate of return for that company would be under present conditions. Far less have I given consideration to what its rate of return would be if it went back to artificial gas. Before responding to that question I would want to give detailed consideration to the facts. It is possible for me to generalize on risks, but it is impossible for me to state what an adequate rate of return for a particular company would be under different conditions. You did not ask me to state the amount of the return; you asked me to give the difference and that means, of course, that I have got to know what one would be in comparison with what the other would be in order to state the difference. I have not said that there would definitely be a difference in the rate of return. There might be.

Cross-Examination by Mr. Slaff.

I have testified as an expert in only a few cases. I have never considered that I am trying to break into the field of expert testimony. Our firm was established in 1937, and since then we have been retained in four or five cases. I would not say that we are trying to build up a status as an expert in this field. If cross-examination in these cases takes as long as in this one I am perhaps inclined to give it up. I am not discouraged with what my testimony turned out to be under cross-examination; but I have been kept away from my business a week in this case and I am afraid it will go to the dogs unless I can stay with it more. I don't think I will be adequately compensated for my time but I think I will be compensated. I have no doubt about it. As to the basis of my compensation, in response to a request of the company as to whether I might be available to testify in this case, I wrote a letter to Mr. Hedrick in which I outlined the things that I would propose to do and the investigation that I would propose to make. In that letter I said that our compensation would be on the basis of $100 a day for each partner or for the partner who worked on the case; and in my opinion based on our past experience, that our fee would be not in excess of $2500. The actual time I have spent in this case is very much more than I expected to be required to do, and I feel that I am limited to $2500, and that is why I said that I did not think I would be adequately compensated. I have sent the defendants no bill yet. I do not mean to say that our bill will not exceed $2500 in this case. I don't think I will bill the company for my full time as set out in my letter to Mr. Hedrick, of $100 a day. I think I have a conscience about that, and I will be substantially influenced in presenting that bill by the fact that I gave them an estimate of $2500. As to whether the company requested me to come down here this week while the other witnesses were testifying, I think we discussed it generally among ourselves, and I am not sure whether the company requested me or Judge Morgan requested me, or whether I took it for granted that I would have to be here for cross-examination. I understand in these cases that the witnesses must be available on call. If Mr. Emery's cross-examination had lasted only half a day, I had to be here Monday noon. I was not advised by the company or its officials that they had been advised that I would not be required here until after Monday.

1279 Since I was in the Brooklyn Rapid Transit Franchise Tax Case and cross-examined in that case I have not testified that I went from the General Electric Company to the Central Hudson Gas and Electric Company in the capacity of an executive of the Commercial Department of that company. I think I was an executive in the Commercial Department of the Central Hudson Gas and Electric Corporation. I was with the General Commercial Manager as the Manager of the Lighting Division of the Commercial Department.

I testified in the Brooklyn Rapid Transit Franchise Tax Case that I went to Central Hudson in the capacity of executive of the Commercial Department of that company. I have never indicated anywhere that I was the General Commercial Manager of the company. I now say that I was one of the executives of the Commercial Department of that company.

The First Boston Corporation is a large investment banking organization with headquarters in New York. They do a large underwriting business. We made an investigation and report for that company in connection with the issuance and sale of a large issue of public utility bonds—those of Gatineau Power Company. I don't remember ever mentioning the First Boston Corporation in connection with an issue of the Gatineau Company in my prior testimony. I think I may have mentioned it in another case and you may have gotten it from there. I testified in some other case that I did a job for the First Boston Corporation in connection with an issue of Gatineau Power. I testified under examination by Mr. Dyckman in the Brooklyn Union case, as quoted by you, to the effect that we had recently made an investigation and report for a large banking group headed by the First Boston Corporation in connection with an issue and sale of $62,500,000 of mortgage bonds of the Gatineau Power Company. (Motion to strike testimony with respect to First Boston Company by Company Counsel denied.) There is nothing secret or hidden about that issue or about the fact that the First Boston Corporation headed the underwriting group except to the extent that our report is a confidential document between that corporation and ourselves. The Gatineau Power Company is a utility company which has properties in the provinces of Ontario, Quebec and New Brunswick in the Dominion of Canada. It is a hydroelectric property and does not operate any gas properties.

My understanding is that Ralph Davis, whom I mentioned yesterday, is a firm, although I have no knowledge whatever of the partners, or really whether there are any partners. The organization of Ralph Davis, Inc., or whatever the title is, is a well-known firm of geologists, or Mr. Davis has a large number of employees who work with him and prepare reports on geological questions, particularly with reference to the natural gas industry. They have prepared reports for the Equitable. In many cases where securities are being sold by a firm to an institutional buyer, the latter will denominate a firm from which it wishes a report on the question of gas supply. In most of those cases the cost of the preparation of the report is borne by the company who is selling the securities, but the report is primarily prepared for the buyer of the securities. Under such circumstances the firm of geologists would have the status in its field of an independent counsel giving an opinion as to the legal validity of the issue. I think Ralph Davis prepared a report which was received by the Equitable when we purchased the $4,000,000 of bonds of the Northern Natural Gas Company.

I think the president of defendants is W. A. Jones. Outside of being president of defendants he is one of the chief executives of the Cities Service Company.

I testified yesterday that I had conferred with Judge Morgan on the scope of my testimony. I did not discuss with him the exhibits that were to be put in by other witnesses. There was no discussion whatever of those exhibits. I did not inquire about the general scope of the exhibits that were to be put in by the witnesses. I was given a free hand in the preparation of my exhibits and my testimony. I was not directed by Judge Morgan as to the type of exhibit that I was to prepare in connection with my testimony. It was a matter of no significance to me that my exhibits might overlap with the exhibits of the other witnesses. I never gave that a thought and it did not occur to me. I would like to make it clear, so that there is no misunderstanding, that a few days, three or four days, before I came down to testify on direct, I conferred with Judge Morgan and showed him the information contained in this document, my ex-
1280 hibit on the rate of return, and showed him those papers at that time. I knew the names of the three other witnesses who were to testify on rate of return. I knew their positions in their respective fields. I knew they all lived in New York. I knew that they too would probably produce exhibits on their testimony though I had no knowledge of that fact and gave no consideration to it. I did not care if my exhibit turned out to be an identical exhibit with that of one of the other witnesses. I feel that in my work in this field my reputation and future depends upon my independence and the character of the work which I produce independently of anybody else. I would not care as to whether my exhibit exactly duplicated somebody else's exhibit.

It is my habit in the office to read the S. E. C. releases. I try to keep up with the holding company releases, particularly those releases containing findings and opinions. An S. E. C. release is a mimeographed release to the general public stating the action of the Commission with respect to the particular application before it, and includes in most cases an opinion and findings and order in the case, or a statement of the hearing proposed to be set down, or a compilation of statistics which are regularly released by the Commission. I think that generally covers the field of releases. I am on the S. E. C. mailing list and its releases come regularly to my office. I try my best to keep up with these releases and I think that the informed investor tries to keep up with them, either himself or through some agent. And I think he would naturally read such releases as affect an investment or a potential investment. If he found anything in the release that he deemed important and wanted further information on, he would go back of the release and into the S. E. C. files and records so far as they are available to the public, if it was of sufficient importance to him. I think I have done that.

I testified with respect to my position at the Equitable, which was Engineer Treasurer's office. The ultimate responsibility for the investment of the funds of the Equitable did not rest on me. It was my duty to make reports and recommendations after investigation. I made my recommendations to the Treasurer and I think to the Finance Committee. I have made reports directly to the Finance Committee other than through the Treasurer. I have made many such reports. Reports to the Finance Committee would usually be verbal reports rather than the formal 50, 60 or 70 page written report which would be prepared for the Treasurer and the files of the Investment Department. When the Treasurer got my formal report he went over it; probably conferred with me about it; then added whatever he had to say, if anything, to it, and passed it on to the Finance Committee. He would recommend separately or he would adopt my recommendation, and we might purchase a couple of million dollars worth of bonds on that recommendation. The Finance Committee would consider it and if they wanted any more information from me or advice from me they would call me in. It was the Finance Committee which decided whether the investment was to be made or not. The law puts that responsibility upon them.

I have said that I went on field trips from time to time. I have many times been out on field trips investigating three or four companies where I have been away from New York thirty or sixty days. Yes, I would be riding the circuit, as it were, on a 30 or 60-day trip. We would go down and look at one company for a couple of days, three or four days, and then go to the next and repeat the process until returning to New York. The trip itself would be of relatively short duration, three or four or five or six or seven days would usually suffice for the
1281 ordinary company, during which time I would view the physical property, visit the particular communi-

ties served, discuss with local people whatever I wanted to discuss, collect statistics or order the statistics which I wished, and then I would come back to New York and spend one or two or three or four weeks in writing up the results of my investigation. I think those three or four days or so that I would spend out in the field with a particular company are called horseback appraisals.

(Commission Counsel calls the Examiner's attention to the fact that upon request of members of the Commission's staff Mr. F. C. Hamilton, a witness in this proceeding, refused to permit photostating of the working papers by the Federal Power Commission for use in cross-examination on Exhibit No. 125 and the testimony of Mr. Willard in connection with that exhibit. The working papers were subsequently furnished by the Company.)

Referring to your illustration, I could go out and buy a building personally as an investment. There might be a variety of reasons why I would not want to do that. Because of my personal obligations in connection with other business, that particular building might be subjected to such liabilities by my creditors. Also, the creditors arising out of my ownership of the building might satisfy my obligation to them out of other property. To meet that situation I might organize a corporation and have it purchase the building. Under such circumstances I could advance all of the money necessary for the purchase of the building to the corporation, receive from that corporation all of the stock that it issues, and have the corporation use the money and buy the building. I might have the corporation issue to me 50 per cent of my advances in the form of bonds and receive stock for the remaining 50 per cent. That would not be less risky to me than the first method. I do not see that there is any particular difference in that set of facts than if I issued stock for all of it, because I own all of its securities. If there were other creditors there might be some advantage in issuing a part of the securities in the form of bonds secured by a first mortgage on the building, but we are getting into an involved calculation here. Creditors are of all kinds, and if we had this building organized in that way with the company owning it, it all depends on what kind of creditors they are. You might have creditors whose position was secured by the assignment of a certain percentage of the rents. My position would be safer so far as any creditors of the corporation were concerned, if I have a mortgage on the building representing 50 per cent of my investment and only the balance represented by stock than it would be if I had no mortgage on the building. Also, I could have the corporation issue 100 per cent of my advances in the form of bonds secured by mortgage and receive in addition one share of stock of a nominal value. My position in that case would be the most secure of all the situations that have been mentioned here. I would be entitled to first call on the earnings of that enterprise to the extent of the interest on the bonds and additional trade creditors would have to follow after the payment on the bonds; but of course it must be remembered that in the practical world I am not so sure that that would work, because I would not as the owner of that enterprise fail to see that the creditors were paid because they might put the building into receivership. The investor's first concern is about his own investment and not somebody else's investment, but when we talk about things like that, we talk about clear-cut situations where bonds are not put out to the extent of 100 per cent of the property in the ordinary course. They cannot generally be sold to the public on those terms. In the third situation, where I have a mortgage for 100 per cent of my advances to the corporation, I would have first call on the earnings of the building. I also have a first lien on the proceeds of the sale of the building ahead of all of the creditors.

I stated in my direct testimony that a substantial hazard in the investor's mind in connection with these companies was the possibility of a failure of supply, and at this time I cannot think of one which is of greater importance. I said that I assumed that the field would last at least 15 years. I did not give any particular concern to whether it would last longer than 15 years. I was satisfied, or at least I assumed, that the field would last at least 15 years. I did not assume that it would last longer than that. I have made no independent
1282 check of the probable future life of that field. I
have made the same kind of a check in this instance that I would have made had I been with the Equitable Life Assurance Society and responsible for the recommendation for the purchase of bonds. Yes, an informed

investor about to make an investment would make every feasible check with respect to the probable future life of the source of supply of a company such as defendants'. Investment bankers would, for example, hire the Ralph Davis firm that you spoke of in order to get an opinion which would be made available to investors. That would also be done by an informed investor such as the Equitable Life Assurance Society. That would be done by an informed investor and I have made such an investigation. I testified this morning that such an investor would make that kind of an investigation and that it has been done by Equitable and by other investors.

I hesitate to denominate individual things that an individual investor would do. I, myself, would read all the pertinent S. E. C. releases that I could find. I look at everything that I think of that would be pertinent, and an informed investor would either do it himself or through someone else. If he found anything in a release by the S. E. C. of sufficient importance to justify it, I assume he might proceed further with his investigation. As a matter of fact, one of the chief functions of that Commission is to make available to investors information concerning those about to offer issues of securities for sale to the public.

I am aware of the fact that the Public Service of Colorado has been before the S. E. C. recently. A big issue is involved there. That company's declaration was allowed by the S. E. C. to become effective subject, however, to final decision on the price and terms of sale. I would not say that was a normal route pursued in most orders. I think you know that in most declarations the price is known at the time; but in this particular one it was unusual to allow it to become effective subject to the final approval of the price and terms. Ordinarily, these declarations would become effective under certain terms. The procedure to which you refer is a two-part thing. Usually it is a one part thing. I kept up with this financing of the Public Service of Colorado to the extent that was possible. I read the Commission release or opinion from cover to cover. (Objection by Company Counsel overruled.) It includes some fifty pages or more. I undoubtedly read in that release the statement you have just read therefrom to the effect—"The gas property is a coal gas manufacturing plant. Declarant is presently serving natural gas supplied by the Amarillo field with estimated requirements to last for the next 25 years on the basis of 1937 withdrawals." An informed investor contemplating an investment in this company might well read that statement if it were available to him before he made his investment. He might or he might not normally attempt to seek from the S. E. C. the information on which the Commission based that statement. This issue has been before the S. E. C. for a long time but I think you might say that it has nothing whatever to do with the gas reserves.

Yes, the question of financing by the Public Service of Colorado has been before the S. E. C. since the beginning of 1939 or earlier. The questions involved before the S. E. C., as I understand it, were not these general problems, but the questions as to the relative proportion of the bonds, debentures, and common stock of the financing, rather than anything to do with any investigation or study of the gas reserves. An A-2 statement is a registration statement filed under the Securities Act of 1933 where the securities are being distributed and sold to the general public. The declaration and the accompanying A-2 statement under the 1933 Act contained a letter opinion by Mr. Davis with respect to the gas available to the Public Service Company of Colorado. I don't remember all of the details of the letter, but since the Public Service of Colorado purchases its gas from Colorado Interstate Gas Company, my memory is that Mr. Davis had to go back to the latter and its gas supply, which is from the Canadian River Gas Company. The last named company in turn had substantial acreage in the Panhandle field.

1283 Prior to 1928, the Public Service Company of Colorado operated an artificial gas system in the City of Denver. Some time shortly after that, a natural gas line was extended to Denver and the company's system was converted from an artificial gas system to a natural gas system.

(Company Counsel stated: "Ralph Davis does not work for defendants. We retained him in a special manner last year, but he does not work for the Company. We never have had him in Court for the purpose of computing any estimates of reserves in the Panhandle field. If they want his statement here, we ask them to bring him here as a witness and in fairness we ask that all testimony concerning what he said be excluded until they do that.")

Before I could answer your question as to whether or not an informed investor, seeking the reference to the Ralph Davis report in that release, would make an effort to find out what was in back of that estimate or that statement respecting the life of the field, I would have to have that statement before me and read Ralph Davis' statement. If I were making up my mind about an investment in a natural gas company producing and transmitting out of the Panhandle field, upon reading this statement from the release, I would want more information. I might have obtained the report of Ralph Davis and found out whether there was anything of interest in there that might be of value to me in making up my mind as to the investment that I was going to make. No, it would not have been a difficult job to get that report of Ralph Davis. I could have written down to the S. E. C. and had them send me a photostatic copy or I could have gotten it out of the A-2 filed by the company. The A-2 is the registration statement.

(At this point the counsel for the Federal Power Commission produced a two-page photostat which he described as a photostatic copy of pages 5 and 6 of the registration statement of the Public Service Company of Colorado filed with the S. E. C. and asked that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit 155 for identification. EXHIBIT 155 was offered in evidence and company counsel made no point of the fact that the document was not authenticated. Company Counsel object to document on the ground it was hearsay and incompleted.)

I have no reason to doubt that that document is a copy of an authentic statement of the Davis organization. I do not know whether the statement is authentic or not. I will certainly say that it is my belief that that is a statement of the Ralph Davis organization.

The Ralph Davis organization is a firm of engineers who, according to my understanding, have specialized in petroleum and gas work. I do not think I have ever testified—in fact I am sure that I have never testified—that they were the outstanding or an outstanding firm. They are sufficiently outstanding that the Equitable employs them to get their judgment as to the reserves of a gas field. The Equitable does not accept their statements and amortize their bonds over the estimated life as brought in by Mr. Davis as a general proposition. Davis' statement was satisfactory in certain cases to us at the Equitable.

It appears on page 57 of the A-2 which you here show me, that Mr. Alton Jones was a director and vice president of the Public Service Company of Colorado during the period from September 30, 1938 up to July 13, 1939. A note shows that he resigned as director and officer on July 13, 1939. I do not have any doubt that that document is the Public Service of Colorado A-2.

The form of the document submitted to me is in accordance with the usual form of these A-2 statements and prospectuses. I have received A-2 statements from the S. E. C in the regular course of my business, but I cannot say that any A-2 I have received is the same as this A-2. These documents are tentative. There are all kinds of blanks in the prospectus. They don't become effective until the blanks are filled in. (Examiner refuses to permit testimony to proceed over objections of counsel for the two commissions based upon documents from the S. E. C. which are not duly certified by the S. E. C.)

Redirect Examination by Mr. Morgan.

I have stated here that in making my study and in arriving at my judgment of the proper rate of return, I assumed a life of at least 15 years. I have assumed that the gas supply available to this company will
1284 last at least 15 years. I have made no assumptions
that it would last any longer. The assumption that I have made is that the supply will be available for at least 15 years. If it turns out that the supply lasts 20 years, my opinion at this time as to the proper rate for this company would not be different than the 8 per cent to which I testified. If the Commission finds that the life is longer than 20 years, that finding would not change my opinion as to the proper rate of return.

1285 **ROBERT H. DELAFIELD**, a witness for defendants, called for cross-examination, testified:

(October 28, 1939.)

Cross-Examination by Mr. Booth.

I was not advised by counsel for the company to bring such working papers as I had used in connection with the study I had made on the subject of rate of return for defendants. Mr. Slaff asked me to bring the working papers on one subject. I will be glad to supply the others; but I happen to have no other working papers except the pencil figures from which the exhibit was copied. You are welcome to anything I have. My Exhibit 147 is in three parts. I did not understand that you wanted pencil sheets from which it was taken. I will be very glad to supply photostats of those. You are correct in your statement that my working papers in this case consist of working papers underlying the computations shown in Exhibit 147. You see, for this exhibit there are in reality no working papers except pencil sheets which I will be glad to give you, but they are identical with the exhibit itself. If you wish those I will bring them. There is one working paper of which I have a photostat here which is in reality the detail of the makeup of the capitalization study which I understood Mr. Slaff to ask me for. I brought it in typewritten form, and again, if you wish the penciled paper, I will be glad to furnish it. This is all there is. Of course there are notes made on pieces of paper and computations and things of that sort which are destroyed. I am embarrassed that through some slip I only brought one copy of this photostat; and I ought to have those photostated and as many more copies as you want can be readily made.

As shown by the record at page 5116, I testified that I had studied the profits of businesses in other countries. I would say that that constituted an important part of the study that I made on the subject of rate of return in this case; I don't know that I would say the major part. This study of the earnings of businesses in other countries is just some of the general knowledge that we accumulate from time to time in connection with our business. No special study was made of the earnings of businesses in other countries in connection with the study we made on the subject of rate of return in this case. If you were to ask me to tell you what the earnings of public utility corporations were in half a dozen European countries in 1938, I would not be able to answer, nor would I be able to answer should you ask similar questions with respect to the earnings of industrial corporations in any of the European countries at any time.

You are not quite right in stating that at page 5118 I compared the natural gas industry with the grocery industry. I mentioned the grocery store to show that if you do not permit amortization in an extractive industry it is the same thing as telling the owner of the grocery store that when he finally closes up he cannot have the benefit of the price of the stock of the store. That was the purpose of that example. It was not my intent to compare the risk of defendants with that of the grocery business. I do not now suggest that their risks are similar to those of the grocery business. I do not intend to compare them on the basis of risk. As just stated, the sole purpose of mentioning the grocery store was to show the inequity of omitting consideration of amortization from a gas company operation. To my knowledge there have been no suggestions
made that in determining the rates of the companies
1286 under consideration no provision for amortization of
investment should be made. I know that the question of amortization is in this case. I do not know what defendants have set up on their books annually as amounts for amortization. I am not familiar with the provisions for amortization which have been made by the defendants in the exhibits which have been submitted in this case so far as future operations are concerned. Prior to the time I testified on direct examination, I did not read the testimony of Mr. Floyd Brown or the testimony of Mr. Claude Brown, or the testimony of the company's witnesses on the life of the reserves. I did not read any of the testimony. I have seen some of the exhibits but they made little or no impression on me and I think I am safe in saying that I made no study of any of them.

I stated on direct examination that the rate of return was made up of two elements, pure interest and risk premium. Later on cross-examination my testimony, I think, was to the effect that you cannot fix pure interest based on the measures I have used. It might well be between—I think I said 2.75 and 3 per cent, in which case the risk premium would be 5 per cent in my calculation. I have my testimony on direct here before me. There are no material changes I wish to make in that testimony. There are a few very peculiar and somewhat amusing instances of a confusion of words which I corrected and which I will return to the reporter or give to you. I do not think there is anything which will confuse the cross-examination except on one page, and I cannot locate it now. I have marked it with a pencil.

I testified as appears on page 5175 of the record that I would not necessarily have to divide the pure interest and risk premium 3 and 5, although these are approximately the figures that I did have in mind in coming to my conclusion as to the proper rate of return, 2¾ and 5¼ roughly. I would like to amplify that statement at this point. The difficulty that I am under is that the form of your questions indicate that I fixed a figure, and I think that from the testimony leading up to my statement it is very clear, particularly that with reference to pure interest, that it is impossible to make these figures exactly definite. I do not want the questioning now to make them any more definite than I made them in my direct testimony. I stated there that in my conclusion I did not specifically allocate 2¾ or 3 per cent as pure interest and the rest remaining as risk premium. I still stand by the testimony that I gave on page 5175 of the record. It would not alter my conclusions in any way if it appeared that Professor Dorau disagreed with the conclusion stated on page 5175. I would not change my testimony merely because he might not agree with me.

In my direct testimony, I indicated that in arriving at the amount that I thought might be allocated to pure interest, a pretty good index of that was the return on the total bond investments of the savings banks in New York in 1938. I stated the amount invested there was approximately $2,350,000,000, but it would be impossible to state what bonds made up those investments. That data is available but there are probably thousands of issues. The purpose of using that figure is that in New York State there is one of the most rigid laws governing the investments of savings banks; and the Savings Banks Association, also the New York State Banking Association, annually report the amount of bonds held by all of the savings banks and the return or yield on those bonds. This is taken from one or the other of these reports. The sole purpose is to show the yield on a huge diversified fund in conservative securities. The information as to what bonds make up that investment is available. It is a printed book as large as the

one I am holding up here. It is available and must be here
in Washington. There are two of these reports. This par-
ticular figure was taken from the report issued by the New
York State Banking Association, and that I can and
1287 will gladly furnish. That is a small printed docu-
ment. The book that I had in mind is the annual re-
port of the savings banks operations for the particular
year.

The law in New York which makes bonds legal investments for savings banks, stated in the broadest way, includes, among those eligible, United States Government bonds, bonds, I think, of all of the States in the Union—there may be an exception set forth in a proviso in the law that if there has been a default within a certain period, that bonds of the defaulting State are excluded—the bonds of municipalities within the United States with certain qualifications as to default, and so forth. The bonds of certain railways are included but are qualified, though I don't remember all of the qualifications at the moment. Also included are the bonds of certain utility companies. Until recent years, there was a provision that disbarred natural gas bonds. I think at the last session of the Legislature that was modified. Formerly they had to be bonds of electric utilities or artificial gas utilities. I think the law was modified so that a company distributing natural gas which it did not produce could have bonds which were legal. In the old days, no bonds of a company in any way in the natural gas business were admissible. Real estate bonds are included with, I think, the proviso that a savings bank cannot own part of a mortgage; they must own the entire issue. That again may have been changed in recent years. That covers the field in general. The $2,350,000,000 invested in securities by all of the savings banks of New York would not include any real estate bonds. It would include substantial quantities of Government, municipal, utility and railroad bonds. I think the amount of railroad and utility bonds would be substantial. I cannot state the per cent. As to the natural gas securities, if I did not make it clear, I think the production companies were excluded.

In my direct testimony in referring to the S. E. C. as an agency for giving the public information respecting utilities, I testified that the whole purpose of the Act creating that Commission is to inform the public as to investments and prevent them from looking only at one thing and being uninformed. Before the passage of the Securities Act of

1933, the information available to investors in general was the so-called circular, a one or two or maybe six-page document describing the business and the securities. Under the Securities Act, issuing companies file with the S. E. C. a registration statement such as that discussed yesterday, with a large number of exhibits all of which are prescribed by law and regulation; and in addition to that, a company has to make available to all purchasers of securities a prospectus which in the case of many companies is a document of anywhere from 25 to 150 pages of information about the issuing company. That is what I meant specifically that might be available through that agency. That is intended to give the investors substantial, accurate, reliable information bearing upon the securities about to be issued by a given company. I am familiar with the preparation of these statements. The issuer has a serious obligation to provide accurate and reliable data.

As appears on page 5152 of the record, I was questioned about the natural gas industry as compared with other industries and as to whether or not it is in the formative period or otherwise. In some respects the natural gas industry is a very old industry. There were references to natural gas that I can think of over 2,000 years ago. However, there are elements in the natural gas industry that have only developed within the past 15 years, very important phases that have changed it materially. I would not say unqualifiedly that the natural gas industry is a well developed and well established industry at the pres-
1288 ent time. There have been some unusual developments in the past five years. The thing that flashes first into my mind is the transmission of gas under very high pressures. I believe the highest pressure line was built within the past two years. The pressures I had in mind are 1500 to 1800 pounds. That is a line that belongs to, I believe, a subsidiary of the Standard Oil Company of New Jersey, and runs north and south between the fields in southern New York and northern central New Jersey. It is a new line. I am under the impression that it is an 18-inch line. I am not absolutely positive. It is about 120 miles long.

There is another high pressure line that also has been built within the last year or two, if my recollection serves me right, and that is a line built by a Standard Oil subsidiary from a point near Charleston, West Virginia to a point south of Pittsburgh. That is a high pressure line which I think is a smaller line in diameter, and is constructed to operate at 1,000 or 1,200 pounds. I am afraid that my memory of those figures may not be absolutely exact. That line is about 100 miles long.

There has been a great deal of technical improvement, particularly from an industrial standpoint in gas combustion in the development of high heat furnaces. There has also been improvement both from an appearance standpoint and an efficiency standpoint in household appliances. One of the most important developments that occurred in the five-year period under discussion is the development of air cooled gas refrigerators. The last two mentioned improvements tend to assist natural gas distributing companies or artificial gas distributing companies to sell their product.

The only other development in the matter of transmission is the improvement in compressor engines, which would naturally go with the higher pressures. The transmission business is fundamentally a question of pipe and engines, and you are pretty much restricted to that field for changes. Your question as to whether or not the natural gas transmission and production industry has reached a well developed or well established stage involves too broad a field for me to answer it categorically. The natural gas production and transmission industry has been in commercial operation for about 40 years. Those small wells up east of Cleveland between Cleveland and Buffalo, some of them were connected to pipelines in the 80's. The first natural gas plant in this country that I know of was very small and started in the 60's or about that time. In some respects this industry has shown very remarkable developments in the past 40 years; but if you compare it with, for example, the electric industry it would be my opinion that it has lagged.

The total annual revenues from the sale of natural gas would approximate several hundred million dollars. I should say that there are several hundred companies engaged in that business. Natural gas is produced or sold in approximately 29 states in the Union. I think that is a correct statement. The production or sale may not be substantial in some states but I think it is approximately correct. A great many of these states, however, have been reached within the last ten years in the pipeline development of that period. There has been a period of great pipeline development since 1928. Natural gas is sold in many

of the principal cities of the country. Natural or mixed gas is sold and used at Chicago, Minneapolis, St. Louis, Detroit, San Francisco, Atlanta, Memphis, Dallas, Fort Worth; I can mention also Fort Wayne, Indiana; there are others. I do not know approximately the investment in the industry but it would run into many hundreds of
1289 millions of dollars. It is not a new industry but it has been characterized by tremendous growth in the past ten years, and I am a little afraid to emphasize its stability in view particularly of the early history of that 10-year period. I hope it may show further development in the next few years. I don't want to pick on words, but I do not think that in the light of the facts we have been discussing here that it can be said without qualification that the natural gas business is a well developed, well established industry. I do not consider the aviation industry as yet well established. I cannot feel that the natural gas industry is well established although it covers a large territory and is of service to an enormous number of people. Its history, particularly within the past 15 years, especially from a financial standpoint, indicates anything but stability and anything but establishment.

I testified on direct examination that the pipeline industry "is consequently at the mercy of the seller of gas who is only interested in this company as a means of getting that material. It is in a very weak position where it can not set up a type of rate, for example a retail rate, which might encourage the type of business which this company may need at a given time. That is a great risk." I considered that as one of the risks in arriving at the rate of return for these companies. In applying that observation, I had a particular thing in mind. The househeating rate in Chicago seems to me to be not necessarily for that situation high, but relatively high to attract a large volume of househeating business, and the househeating business comes in comparatively large volumes at given rates. I am not in position to say what rate. The rate in Chicago I believe is 7 cents a therm or 70 cents a thousand, rated on the B.t.u. of gas, or in that range. The rates over the country for similar service may be nearer to 50 cents. Sometimes the 50-cent-per-thousand rate which does not specify the B.t.u. content, might compare with a different rate at a lower B.t.u. content.

The question is not one of the rates of the pipeline company because the rates and volume of sales in the language of the industry depend on the kinds of gas. The "kind of gas" does not mean the different gases chemically but means different uses for the same gas. Gas is more valuable for cooking than it is for boiler fuel; and if a company can increase the use of the most valuable kind of gas that it sells, it should work to the benefit of that company and its supplier. It may not be in any sense a question of the rate between the supplier and the ultimate distributor. I think the price which Peoples Gas Light & Coke Company, for instance, pays for natural gas is a very important element in its operating expenses. It might, but it does not necessarily, follow that a change in the gate rate would enable the distributing company to change its househeating rate. It may not be necessary to change the price paid by the distributor to enable it to change its househeating rate.

If I said that defendants are "at the mercy of the seller of gas who is only interested in this company as a means of getting that material", I made a very careless choice of words. I know, of course, and knew at that time, that the Peoples Gas Light & Coke Company has an investment in this company. I would not say their investment in this company is substantial in relation to their investment in distribution property. The three distributing companies own a little more than 26 per cent of the stock of defendants. That is a substantial interest in these companies, but the question is not the substantial amount of this investment but the relation of this investment to the investment in their own property. That is the important thing. I think my former testimony would more nearly express what I intended to say had I used the word "principal" instead of "only".

Very roughly, taking the three distributing companies, I should say that their investment was over $200,000,000. I would like to be corrected if this is not right; and I should say that their investment in this project was approximately 15 or 18 or maybe 20 million dollars; so you are comparing the risk on the $200,000,000 with the risk on about $20,000,000, and there is no question of the importance to that management as to which end of the business makes money. I presume, of course, they hope to have their investment in defendants profitable. The three distributing companies are Peoples Gas Light & Coke Company, Western United Gas Company, and Public Service Company of Northern Illinois. It is those three companies which together own this 26 per cent plus of defendants securities.

Cross-Examination by Mr. Booth Resumed.

I testified on direct examination that "there has been a drop per customer of consumption from 78,000 feet per annum to about 58,000 feet per annum", in the Columbia system. That was over a period from 1929 to the end of 1938. That is a big system and it may be that there were some minor changes in the thermal content, but there were no changes, I am sure, that would affect the consumption to any degree. These are residential customers I was talking about. There has been a substantial increase in the total number of customers in the system and of the residential customers too. The statistics I mentioned awhile ago had to do with sales to residential customers including space heating and all other sales to such customers.

Question by the Examiner.

There is a great difference of opinion in the industry as to why this falling off of customer consumption occurs. We have made extensive studies. The principal causes apparently are the change in the mode of life—less cooking—improvement in appliances or more efficient use of the fuel during a larger part of the period, and rigid personal individual economy where fuel in any luxury use would be cut out. Also, there has been encroachment of electric cooking, but personally I do not believe that is a major factor in the per customer use of gas.

Cross-Examination by Mr. Booth Resumed.

There was a big increase in the volume of industrial sales in 1937 when industry was active, but a tremendous contraction in 1938 when industry was bad. Industrial sales load, speaking only of the system with which I am most familiar, almost exactly follows the index of business activity. It has increased sharply in 1939. What I meant to say is that in the Columbia Gas and Electric system the industrial consumption usually follows a curve parallel to the general industrial production curve such as the Ayres Index, the New York Times index or the Federal Reserve Board index. I am sure I have seen "The Index" published by the New York Trust Company but I would not say that I am familiar with it. I do not know that I have seen the August, 1939 issue.

I am familiar with a study made by the American Gas Association in connection with domestic and other sales of gas, but I don't know whether that is the one you have in mind. I am familiar with the efforts of that association and the leaders of the industry to reverse the decline
1291 in sales per domestic customer. I am familiar with the disclosure that while between 1910 and 1920 the number of American families increased by about 20 per cent, the number of restaurant keepers during the same period increased by more than 50 per cent, the volume of business of commercial laundries advanced about 55 per cent, and the number of servants employed in homes and domestic establishments decreased by about 14 per cent. It is true that the gas industries have made up some of the load which they have lost in the domestic field, but you see what has happened. The principal reason, I think, that the industry is worried about this situation is that we had a sharp decrease in the most valuable and highest priced section of our load; and it is very difficult to make up the net earnings lost from that by sales of less valuable gas, even in enormous quantities.

Questions by the Examiner.

I am generally familiar with the character of industrial business of the companies supplied by defendants. Before I could answer your question as to whether their industrial load fluctuates as does the industrial load of our system—the Columbia—according to the general industrial index, I would have to make a further study. I think in general the industrial gas load of the nation and the country—there are always exceptions—follows any good index of the industrial activity very closely. The reason is that gas is used very largely in heat treating processes, and that the heat treating processes in turn are used in the industries that make up a huge proportion of the country's total industrial activity—automobile parts, tools, steel, glass, ceramics—that type of industry follows right along with the index of national business activity. As the nation goes so the industrial gas business goes, as a generality.

Cross-Examination by Mr. Booth Resumed.

I testified under direct examination to the effect that there is a further competitive element even under the new Natural Gas Act in that the pipelines are in direct competition with other gas pipeline companies, and that where they simply supply a market and do not have the distribution system, the competitor can lay a line to the edge of that market and does not have to replace a distribution system. I considered that one of the serious risks of defendants in arriving at my conclusion as to the rate of return for these companies.

I stated that I had read the contract between Chicago District Pipeline Company and Natural Gas Pipeline Company and that I was generally familiar with it. I don't think I could recall what provisions I stated I had considered. I think my testimony was that the element of importance was the existence of the contract and not any specific provisions of the contract. I do not know at what price the distributing companies would have to be able to purchase natural gas to make it economically feasible for them to maintain their obligations under that contract. I have made no study of that problem. I have made several investigations of the relationship between the Chicago District Pipeline Company, the Peoples Gas Light & Coke Company and Natural Gas Pipeline Company. This is an operation with which I have been familiar ever since its inception. I do not mean to imply that I have made a study of that relationship within the past year.

I don't remember stating that there have been some new developments of oil in the State of Illinois, but there have been. So far I think the extent of the natural gas development in that area has been negligible. There has been some drilling but I think the results of the drilling have been disappointing to the drillers. Some wells have
1292 been brought in but they are not important. I testified on direct examination in substance that I had considered the risk of this property being reduced in value and use by possible discovery of gas nearer the markets, and that was one of the considerations to which I gave weight in arriving at my judgment of a rate of return. I would like to qualify that by saying, of course, that Illinois

is not the only place where gas could be found near the market. I used that as an example in my answer. It could be found in western Kentucky or eastern Kentucky. Kentucky is one of the largest gas producing states in the Union. The big developments in Kentucky—there were prior developments—took place around 1929 and 1930, the development of the shale formation.

I don't know how much it would cost to build a line from Kentucky to Chicago. The cost is an important factor, of course, but Kentucky is nearer to Chicago than Texas. I don't know how much it would cost approximately. A large volume of gas would have to be available in order for people to put their money into a line from Kentucky to Chicago. At least 150,000,000 cubic feet a day would have to be available. I don't know if that is available in Kentucky now. I think our system could take 150,000,000 cubic feet a day out of Kentucky with our present facilities. I don't think our company would consider building a line to Chicago. We have never considered it that I know of. We have markets of our own but just recently, as an example, a line has been projected from Kentucky to Indianapolis; and I am not sure whether this Commission issued a certificate of convenience and necessity for that purpose. I am not positive of that. Suffice it to say that the line has been projected. If it could be projected to Indianapolis, it could be projected to Chicago, naturally. To the best of my knowledge natural gas is not now sold and used in Indianapolis.

In general, I know what the obligations of the distributing companies are under their contract with defendants, but I am not talking about that. That is not the risk. That is not the question I considered in my determination of the rate of return.

Cross-Examination by Mr. Slaff.

I do not know of any bonds of natural gas transmission companies which are legal in the State of New York. There may be some, but I don't know of any. I don't think that is a legal type of investment. There is more than just the statute; the Banking Department has to pass on the bonds too. I don't know about the Banking Law. You have handed me subsection 13 of section 235 of the Banking Law of the State of New York. This subsection says "bonds of any corporation which at the time of such investment is incorporated under the laws of the United States or any state thereof or the District of Columbia and transacting the business of supplying electrical energy or artificial gas or natural gas purchased from another corporation and supplied in substitution for or in mixture with artificial gas for light, heat, power and other purposes, or transacting any or all of such business provided at least 75 per cent of the gross operating revenues of any such corporation are derived from such business and not more than 15 per cent of the gross operating expenses are derived from any one kind of business other than supplying electricity or gas or electricity and gas, and provided such corporation is subject to regulation by a public service commission or a public utility commission or other similar regulatory body duly established by the laws of the United States or the states in any of which such corporation operates, subject to the following conditions." The conditions set out are the times earned and lack of defaults, and so forth. Section 235 begins essentially: "The investments legal for savings banks in the State of New York are ...." The Natural Gas Pipeline Company of America purchases its natural gas from another corporation.

1293 Qualifying my answer again with the fact that I am not a lawyer and therefore incompetent to interpret the law, I do not see anything in that section that would disqualify the bonds of Natural Gas Pipeline Company of America; but I do not think that is the way it works. What happens is that if you wish to have a bond ruled legal, I think in the early paragraphs of the law you will see that you submit it to the Banking Department, and these are the standards set up for their judgment. I am discussing now the statutory standards, and according to the statutory standards the bonds of Natural Gas Pipeline Company of America would qualify as a legal investment, assuming that they meet the following qualifications that we have not discussed in detail. I understand that by "following," is meant that which follows in subsection 13. The provision with reference to the corporation being subject to regulation indicates that the legislature felt that regulation added an element of stability to the securities of such corporation. I am quite sure there are no pipeline company bonds that have ever been admitted to savings bank investments under that law. I think that the natural gas paragraphs were added at the last session of the

Legislature. The inference might be drawn that the legislature felt that the industry has reached a stability where it satisfies these very rigid requirements of the State of New York permitting the entrance of natural gas securities into the field of legal investments for investments for savings banks.

Referring to my statement on cross-examination concerning the increase in efficiency of compressor engines which has taken place in the last five years as one of the outstanding developments in the industry, but, as before, not qualifying as an engineer, I may add that the modern engines are much smaller, more compact and capable of developing, as I am advised, higher pressures and holding to greater efficiency in fuel consumption, and so on. I have seen engines that have been in operation 30 or 35 years, and they do not even look like the new modern, I would call, vertical engines. It is my understanding, not as an engineer, that these new type engines operate at higher pressures and more efficiency; and that they are capable of producing the higher pressures is the big point with me. You ask if they can do a better job today cheaper than they could five years ago. It is more a different job. They can pump gas to these very high pressures. That is the point I had in mind when I mentioned it. I presume they must be more efficient. I think it must be that there has been an advance in the art as far as compressor engines are concerned. I don't know of my own knowledge. I cannot say there has been a substantial advance in the art except in relation to the higher pressures.

I am a proponent of the retirement theory, consequently I think obsolescence takes place when the machine comes out. I do not know of any other answer I can make to your question as to how I measure the degree of obsolescence which exists in any industry. I recognize obsolescence as an economic factor and I recognize that any machinery advances toward ultimate, complete obsolescence with time, and when it gets to the point of complete obsolescence it should be retired. The advance of obsolescence or the particular extent to which the machinery has become obsolescent must be measured by comparison with more advanced technology.

I have stated that I hoped the natural gas industry would grow in the the next few years, but as a matter of fact I am seriously worried about some phases of the natural gas business. I cannot say I am counting on it growing in the future. The best is a hope. I am not very bullish on the natural gas business.

Our system is planning to do some refinancing when and if the S.E.C. approves the plan we have submitted under section 11 of the Holding Company Act, but that is refinancing, not putting new money into it. Naturally somebody is going to have to put up the money for the refunding operation, and it is not going to be the same investors necessarily who now hold the obligations of our sys-
1294 tem. As to whether or not that indicates that we
anticipate for the future a continued growth for the natural gas industry, I am going to answer that question very fully to be frank. I handle a great many funds as an individual and trustee and investor. I am so pessimistic on the outlook of the entire utility industry including the natural gas business that to the best of my knowledge, except with one or two funds where there is particular reason for it, I do not own or control a single utility security. Fortunately, I do not have to advise investors on Columbia securities. I do not want to be fractious, but does not the Security Act of 1933 practically forbid me from giving any advice on these securities? I just give the S.E.C. the facts and let them judge. I might very well refund an existing issue of $100,000,000 with a new issue of $100,000,000 and feel perfectly confident that that issue would be repaid at maturity and that the investor would receive his interest throughout, and still not look forward to a brilliant or very bright or expanding future for that business. Certainly, I approved the plans that Columbia is making for its refunding operations. Before such plans are put into final effect they have my complete approval, and before the issue goes on the market I will approve putting that issue on the market. Nevertheless, I cannot say that I more than hope that the natural gas business will show growth and development in the future. It is sufficient of a hope at least so that it does not deter me or my Company from issuing or planning to issue in the near future approximately $100,000,000 of securities, which are in a large part dependent upon revenues from the sale of natural gas.

I have said that the sales of natural gas for industrial purposes followed generally the general business curve. I did not include commercial sales. I think the same situation holds generally true in the electric industry too. That is, the power sales follow the general business curve.

I have testified in various rate cases for our system companies, affiliates and other companies. The Columbia Gas & Electric Corporation system is an integrated public utility system. I think I testified in the Cumberland and Allegheny Gas Company case before the Public Service Commission of West Virginia in December, 1938. I testified in substance that "the minimum return required which would preserve the credit of the Cumberland and Allegheny Gas Company and make it possible for that company to advance in competition with other companies and with unregulated companies would be 8 per cent." The Cumberland and Allegheny Company is a part of this integrated public utility system which is the Columbia system.

I believe I testified in March, 1934 in the Cincinnati rate case before the Public Service Commission of Ohio. I believe that was a gas rate case. The Cincinnati Gas & Electric Company which was involved in that case is one of the Columbia which was involved in that case is one of the Columbia system companies, integrated public utility system. I testified in that case in March, 1934, that in my opinion a rate of return of 10 per cent would be necessary. My testimony in that respect was "Yes, sir, we have made such a study of this gas distribution property, and in my opinion a rate of return of 10 per cent would be necessary. That rate of return is the minimum which I believe would be sufficient to support the company's credit and to enable it to compete in the capital markets for the necessary funds to enable it to perform its duties."

I testified also in October, 1937 before the Public Utilities Commission of Ohio in the matter of the Columbus Gas and Fuel Company. That company was a member of the Columbia system; it is now combined with another company, the Ohio Fuel Gas Company. In October, 1937, I testified in that case that a rate of 8 per cent was the least that a company in this type of business should have in order to be able to finance itself in competition with other companies operating in more or less the same territory and operating businesses which all have similar risks. I may have testified earlier, in January, 1937, in the same case. The record you have before you is in the Federal Gas & Fuel Company case. The City of Columbus was

served some years ago by two companies, the Colum-
1295 bus Gas and Fuel and the Federal Gas and Fuel,
both wholly owned subsidiaries of Columbia Gas and
Electric Corporation, and both since consolidated in the
Ohio Fuel Gas Company. I testified to an 8 per cent rate
of return for both of those companies.

I testified in the matter of the Natural Gas Company of West Virginia, the City of Wheeling, before the Public Service Commission of West Virginia, some time in the year 1932. That was a Columbia system company. I believe I testified to a 9½ to 10 per cent rate of return for that company. I originally testified to the 9½ to 10 per cent on my direct testimony in March, 1932 and the cross was the following December.

I, of course, assist generally in the supervision and preparation of testimony in connection with our system when rate cases develop. My testimony is confined to certain subjects such as rate of return. I have very little to do with the valuations. That is an engineering subject, but I ultimately familiarize myself with it and get a general idea. I should say that I always know pretty well in advance of going to the hearing what our staff and myself and all of our officers have decided on as a fair rate base for the company involved. It is extremely difficult to answer your question as to whether or not in any case the fair value at which we have arrived has been less than the plant and property account of the company as stated on the company's books, because in so many of the cases only a segment of the company will come in. My answer must be no, I do not know of any such case; but I am not at all sure that there are not many of them. I could not testify, as a general statement, that the fair value which we have testified to as the best judgment or estimate of the fair value has always or uniformly at least equaled the book figures of the property involved.

In the States of Ohio and West Virginia, which are the only states in which we have had rate cases that I can think of, the general theory is that reproduction cost new less depreciation is the rate base. Under that theory you would be quite apt to come out at less than the book figures. By book figures I mean the net plant and property account. The only fair statement I can make is that there is no relation between the books and the rate base. You can not tie them together. Each one of these cases has the date certain as of which the value is fixed.

The property is then appraised as of that date and the appraisal is supposed to develop the reproduction cost new less the depreciation of the property at that date. I could not say that as a rule the final figure was higher or lower than the book figures. Sometimes it is higher, sometimes it is lower. I think in general it would be apt to be higher; and it would always be apt to be higher in producing companies. The working capital, as a specific item, might be picked out of several places in the books and may not be included in the plant and property account in the books. We, of course, add a separate amount for going concern value. I thought you were only talking about the property account. If everything that we put into the rate base be included, I think that in almost every case it would be higher than the property account on the books would show, because the rate base would include things that are not on the books. I think that the total rate base has always been higher than the amounts reflected by the plant and property account on the books. It always ought to be, in fact. I would expect the rate base to be higher than the plant and property account. I cannot say that it always has been but I would certainly expect it to be. I am not sure as to the relation of the claimed rate base to the gross 1296 plant and property account. I would expect it to be higher, but I am including the whole rate base, the property, working capital, going concern value, cost of financing if we put it in, overhead and everything. It ought to be higher than the gross book value of the property and I would expect it to be. As I said, I am not positive that it always has been.

The rate of return to which I testified in this case was 8 per cent, to be applied to the entire rate base regardless of what the latter was ultimately fixed to be. In other words, there should be, in my opinion, a minimum 8 per cent return on the rate base. Of course I am assuming that the rate base would be fixed at a proper level and not arbitrarily fixed in some other way. I assumed that the Commission would come out with a fair rate and a just rate base. My testimony in all of the cases in which I have testified on the rate of return has been to the same effect. That is true with reference to the Cumberland and Allegheny Gas Company and the other companies. I assume the rate base I believed to be fair in the Cumberland and Allegheny Company rate case was that to which our people testified in that case, and that observation applies to the other cases in which I testified on rate of return.

1297 Columbia Gas and Electric Corporation has pending before the Securities and Exchange Commission an application that the issuance of certain securities be held to be in conformity with Section 11 of the Public Utility Holding Company Act. This application was heard in April of the current year, argued before the Commission in June and the decision of the Commission is pending. One of the purposes of Columbia in filing that application as it did under Section 11 and at the time it did was to get a decision from the Securities and Exchange Commission so that it might thereafter be in a position to go ahead with the refunding operation of which I spoke this morning.

We have been and are currently making plans with respect to that refunding operation. Approximately $90,000,000 is involved, that much of the securities will be issued. I have already testified in other hearings and I have no objection to testifying here that we hope to obtain a substantial reduction in the existing interest rate which is 5 per cent, through a change in the form of the securities. The existing securities mature in large sums at only two dates and we have discussed serial maturities and heavy sinking funds which will entirely change the character of the credit with a substantial resultant saving to the corporation. We expect that if these securities are issued they will be purchased by the public. I hope that at the proper time the credit position of the Columbia system will be such that the necessary capital involved in that refunding operation will be forthcoming from the public.

With the qualifications stated at the time, I testified that in my judgment in each of the rate cases we have had in which system companies have been involved, the rate base was at least equal to or greater than the gross plant and property account. I think in the instance of many Columbia system companies the rate base should properly be higher than the book figure for the gross plant and property account of each such company as we have discussed it. There is a particular reason for that. The reason is that many of these companies have been in the natural gas business for practically the entire life of the natural gas industry. Their gas-producing lands in some instances are on their books at figures which are entirely unrelated to their developed value. They were undeveloped lands bought for $1.00 per acre; and the development and exploration that has taken place in the past 25 or 30 years has entirely changed that value. In some instances, because no development cost was charged into the plant account on the books, revaluations have been made; but in almost all instances those revaluations are separate and I do not include those when I think of the book figures.

I am thinking of the book costs when I say the book figures. When I speak of book figures I mean the plant and property account. I couldn't say that in all cases the rate base for rate making purposes should be at least equal to the book figures in our system. I do not know specifically of any cases in which I say the rate base for rate making purposes should be less than the book figures for the plant and property account for the company. I can't just pick an exception out of the air. I have not considered that problem with reference to nearly all the companies from time to time. I have considered with reference to all of our companies the return we would have to have in order to attract capital and one of the important features in that determination is the rate of return on the base. I have said that in some cases of companies in which I have not testified the rate base should be higher than the book figures for plant and property account.

1298 If you total all the property accounts of all the operating subsidiaries, then I would think that the rate base for the system should be higher than that figure. I just can't be sure. As to some companies in which we haven't had rate cases I don't know. I have no way of knowing the answer to the question you are asking whether it isn't a fair statement of my present judgment that a rate for the system as a whole is equal to the sum of the gross plant and property account of all the utility companies in the System, but I will say this, if it will satisfy the inquiry, that if we could get a fair rate of return under regulation upon the book value of our property, I think we would be very happy and satisfied.

In the case of some companies in our system I think the book costs of plant and property are excessive. An excellent example is the electric property of the Cincinnati Gas and Electric Company. We have never made any claim for a rate base anywhere near the book cost shown by the plant and property account of that company so far as I know. I am not sufficiently familiar with the gas properties of that company to make a statement. I haven't the figures at my tongue's end.

Using very rough figures I would say that the electric property of that company was on its books at between $110,000,000 and $115,000,000. There are two items of intangibles in there, one of $8,000,000, a revaluation, and one of $15,000,000, which is a questionable value. If you take 23 off 115 you get, I think, $92,000,000; but I think that in discussions with the city the highest figure I have ever heard mentioned for a rate base was in the neighborhood of $85,000,000. I think it was nearer $82,000,000 but I would like to say $85,000,000 because I don't remember definitely.

As to whether there are other companies, I think the same situation is true of the United Fuel Gas Company. I have never testified as to the rate base in any of these cases. Other people in our company testified as to the rate base. In one item alone which they testified to in the United Fuel case there is a difference of approximately $20,000,000 in the value of production property as between the book cost and the figures presented in the rate base testimony. In other words, the rate base claimed was that amount less than the figures reflected by the books.

As to the situation in the system as a whole, I just don't know. I can't remember all those figures. I don't know whether it would be a fair statement to say that these rate bases less than gross plant and property account would be compensated for by rate bases which we consider fair and proper at figures above gross plant and property account. It would be a terrific calculation to try to work that out.

No, sir, I have not testified that in every case in which I have testified as to rate of return the rate base was at least equal to or more than the gross plant and property account. I have pointed out the case of the United Fuel where the rate base claimed was not as high as the gross plant and property account. No, it isn't true as to all other cases. It wasn't true in the Cincinnati case. I am not sure that I can say that it is true in all other cases. At the time Columbus Gas and Fuel Company was merged with the Ohio Fuel Gas Company we voluntarily wrote
$5,000,000 off the books. It is off the books now. I as-
1299 sume what you want me to do is to relate the book
figures of plant and property to the proper rate base.
I am just not capable of doing it. I don't believe anybody

in the world could do it. Yes, I am the chief financial officer of this company and of this system, but many of these companies haven't been appraised. I have a very firmly fixed idea as to the rate of return these companies would require on a fair rate base. That is true of each of the companies belonging to our system, but I don't know the fair rate base. Certainly I know that as to some of them the rate base should be higher than the book figures of gross plant and property account.

In a general way I am familiar with the balance sheets and the income statements of Columbia and the various companies making up the Columbia system. You have handed me two documents, the first of which is a printed consolidated balance sheets as of December 31, 1938, which does not give effect to various transactions entered on the books subsequent to December 31, 1938, but which covers transactions as of that date and earlier dates. It contains a reference to note "A" This is the consolidated balance sheet which I believe appears as Exhibit D-A 5 to Columbia Gas & Electric Corporation subsidiaries' U-5-S report. That report covers the bonds registered by the utility companies as required under the 1935 Act.

The second document appears to be a photostatic copy of Exhibit D-B in the same report, which is a consolidated income account for the year ended December 31, 1938. I haven't any doubt that this is a true copy of Exhibit D-B attached to the Columbia U-5-S. I believe I signed the basic papers upon which that Exhibit is based; I would in the ordinary course. I am familiar with these documents.

Referring to the balance sheet, the Amere Gas Utilities Company is a small distribution company in West Virginia with a very small amount of production. The plant account is $858;207.16 and the net operating revenue as of the close of the year ending December 31, 1938 was $21,305. The percent relationship between the net operating revenue and the gross plant and property account is 2.48%.

The Atlantic Seaboard Corporation is a holding company, owning the stocks of three subsidiaries. It also operates a pipeline. Two of the subsidiaries are distribution companies, one is a transmission company and one is the Amere Gas Company. The total gross plant, property and equipment account at the end of 1938 was $8,205,751. The net operating revenues for the same year were $181,644,—a return of approximately 2.21% on the gross plant, property and equipment account.

The Big Marsh Oil Company is really an inactive company, a land holding company. It has some sixty-odd thousands of fixed capital and shows operations at a loss.

The Binghamton Gas Works is a distributing company located at Binghamton, New York, with a gross plant and property account of $3,975,559.84 and net operating revenues of $206,678.03, which is about 5.20 per cent on the gross plant and property account.

1300 The Bracken County Gas Company is a distribution company. It has about $3,600 worth of fixed capital.

The Bridge Gas Company is a very small company owning a river crossing which we lease to outside interests who, unfortunately, have never paid the rent. It has a gross plant and property account of $29,000.

The Central Kentucky Natural Gas Company is a distributing company at Lexington, Kentucky. Its gross plant, property and equipment account for the year 1938 was $2,425,254.32 and its net operating revenue for the same year was $62,973.45, a return of about 2.60% on the gross plant account.

Purely in the interest of saving time, you realize I can't agree to this calculation for it is a dishonest calculation. You are taking gross property, but revenue after depreciation. I don't think that is fair. You either ought to take the net property or the revenue before depreciation. I don't want to tell you how to do it. The fair return, is after provision for depreciation and operating expenses. In saying that this is a dishonest calculation, I mean you are making an improper comparison on the books. The return of an operating utility, which related to rate base gives you the return on rate base for the year, that is after all operating expenses and charges made for depreciation and depletion.

While it is perfectly true that I have testified here today twice that in my opinion many of our bases should be and perhaps some of them would be higher than the book, I want to call particular attention in the interest of saving your time that I have very carefully stated that in my opinion rate base and the book figures are not necessarily related. I am a little at a loss as to the purpose of this.

The Cincinnati Gas and Electric Company is a combination gas and electric company producing electricity and distributing both gas and electricity in and around Cincinnati, Ohio. Its gross plant and property account was

$127,838,314.42 and its net operating revenues for the year 1938 were $5,646,588.87, a return of about 4.42 per cent on the gross plant.

The Cincinnati Gas Transportation Company is a pipeline company bringing gas to Cincinnati from the fields in West Virginia and Kansas. Its plant account is $10,411,301.48 and its net operating revenue for the year 1938, $47,400.75. I am afraid that figure is not indicative, however, because the company has been leased to another company and this figure covers operations for only part of the year, I think. It is only income for the period it operated and I haven't got my facts quite straight.

The Cincinnati, Newport and Covington Railway Company is a street railway operating in towns south of the Ohio River, adjacent to and suburban to Cincinnati. The plant, property and equipment account is $5,212,673.71. It has a net operating revenue of $69,115.67.

The Columbia Engineering Corporation is a subsidiary service company and operates without profit.

The Cumberland and Allegheny Gas Company is a production, transmission and distribution company with a gross plant account of $5,668,758.92, a net operating revenue of $131,862.52, or a return of 2.33 per cent on the gross.

No, it would not be a fair assumption that the plant,
1301 property and equipment account of any one of these
companies that we have gone over, or that we may go over in the rest of the balance sheet, for the entire year 1938 is substantially the same as it was as of December 31, 1938. Some of them have had a great deal of construction during the year. You realize in a great many of these companies a lot of the property in the plant account isn't included in your total utility property and isn't in the rate base at all. It is not related to rates or the utility business. In other words, you get inflated figures some times up here in the plant account. That is one of my difficulties in trying to answer your questions honestly and accurately. I can't relate the two items. In answer to your question as to what I could relate that would give you an idea of earnings on property, may I pick out one that I have testified about? Will you go back to the Cincinnati Gas and Electric Company? I think I said that the highest figure I had heard mentioned as an electric rate base was $85,000,000. It also has, figuring roughly, $17,000,000 in gas properties.

Now, relate that to $5,689,000 and we get 5½ per cent. In getting that percentage, I added $17,000,000 to the $85,000,000.

The Dayton Power and Light is a combination electric producing and distributing company and it distributes gas but does not produce gas. The plant account was $49,216,655.10 and the net operating revenue was $3,416,937.22, or a return of about 6.94%.

The Eastern Pipe Line Company owns a small section of the pipeline which it leases and I am not sure it doesn't lease it for taxes. I don't think it makes any money.

Fayette County Gas Company is a small producer and distributor of natural gas. The plant account was $2,332,776. The operating revenue was $155,597, a net percentage relationship of 6.67 per cent.

Gettysburg Gas Corporation is a distributing company with a fixed capital of $586,331.63, net operating revenues of $14,859.95, or a percentage relationship of 2.53 per cent.

Greensboro Gas Company is a producing and distributing company with some small transmission facilities. The property account was $13,097,522.67. Here there is a substantial amount of revaluation which you have to consider in the rate base. I don't remember the amount but it is a good many millions of dollars. The net revenue was $203,842.68 and the net return 1.56 per cent on the plant and property account. I think the plant and property account should be cut approximately in half, which would double the rate. Our rate of return at this rate would be approximately 3.12.

Hamilton Service Company is an electric company and it does not distribute gas. I think it is purely electric. Its plant and property account was $870,554.55 and it operated at a loss. There was a municipal plant in Hamilton, 1302 Ohio, competing with this plant. Municipal competition is a risk that transmission companies do not have. There are lots of municipal gas plants, distributing gas, lots of them through Ohio. You ask whether defendants have that sort of competition. I have a very strong recollection of a line which was projected by the Secretary of Interior from the Texas fields to northern Ohio within the last year or so. That is the worst kind of competition. It hasn't been built but the threat is there and it is the threat that makes the risk.

This Hamilton Company operated at a loss in 1938 of about $26,000.

Harrison Electric and Water Company is an electric company essentially, with a small water business. Its plant account was $178,744.29, its revenue $18,499.02,—a return of 10.35 per cent. That may be a company where the rate base is higher than the book figures.

The Home Gas Company is a transmission company carrying gas along the southern counties of New York State. Its fixed capital was $2,247,858.73 and its net operating revenue, $218,371.66, a relationship return of 9.7 per cent. We bought that line to lift and use the old pipe at a scrap price and then subsequently used it as a utility. The reproduction value is higher than the book figure, and I think the rate base should be higher. That would be my guess.

Huntington Development and Gas Company produces some gas but it is essentially a gas land-holding company. It could hardly be said to operate in any substantial way. Its property account is $10,308,745.79. I think it would be entirely proper to skip this company at this point.

Indiana Gas Distribution Corporation is a small distributing company with a plant account of $170,570.57, net operating revenues of $23,820.93 and a return relationship of about 13.97 per cent. In that particular case I don't think the rate base should be higher than the book figures.

Keystone Gas Company is a gas distributing company with gross plant figures of $763,041.40, net revenue of $43,215.31 and a return of approximately 5.66 per cent on the gross plant.

Loveland Light and Water Company is an electric company with a plant and property account of $208,311, net operating revenues of $19,166 and a return relationship of 9.20 per cent.

Manufacturers' Gas Company is a producing and distributing natural gas company with a plant and property account of $4,806,255.04, net operating revenue of $100,788.30, and a return on plant and property account of about 2.10 per cent.

Manufacturers' Light and Heat Company is a producing, transmitting and distributing company with a plant and property account of $57,980,865.80, net operating revenue of $822,963.26 and a return relationship of 1.42 per cent of the formal figure. That is a natural gas company.

1303 Miami Development Company is only a real estate company holding real estate for electric operations, with no earnings.

Miami Power Corporation is an electric transmission line, operating under a lease, I think, though I am not positive. Their operations are not indicative.

Michigan Gas Transmission Corporation has gross property figures of $9,260,046.57, operating revenue of $609,105.20 and a relationship return of 6.58 per cent on the plant and property account. That company is engaged in the transmission of natural gas.

Natural Gas Company of West Virginia is a producing, transmitting and distributing company with a plant and property account of $7,934,593.94 and net operating revenue of $67,741.82, or about .85 per cent of the former figure.

Northwestern Ohio Natural Gas Company is a distributing company with a plant account of $4,461,134.97, operating at a loss of $174,000 last year.

The Ohio Fuel Gas Company is a production, transmission and distribution company with a plant account of $107,368,062.94, net operating revenue of $4,569,359.73 and a per cent return of about 4.26.

Pennsylvania Fuel Supply Company is a producing and distributing company which has some minor transmission facilities. It has a plant and property account of $2,788,667, net operating revenue of $35,784, or a return of about 1.28 per cent on the former figure.

Point Pleasant Natural Gas Company is a small natural gas distributing company.

Union Light, Heat and Power Company is an electric distribution company that distributes natural gas also. Its fixed capital was $8,031,235 and its net operating revenue $433,485, which comes to a return of about 5.40 per cent.

United Fuel Gas Company is a producing, transmitting and distributing company with a property account stated on the books of $90,137,451.54. In the case of that company I have said that I think the rate base should be some $20,000,000 or $30,000,000 lower than the gross plant and property account. Let's say $20,000,000. Its net operating revenue was $3,583,991, or a return of about 3.98 per cent on the former figure. If the $20,000,000 be taken off it looks like the return would be about 5.1 per cent.

Virginia Gas Distribution Corporation is a distributing company with a plant and property account of $1,184,485, net operating revenue of $21,503, or a return of about 1.82 per cent on the former figure.

Virginia Gas Transmission Corporation is a transmission company with a gross plant and property figure of $4,556,210, net operating revenue of $95,143, and a return of about 2.09 per cent.

1304 Warfield Natural Gas Company is a producing company with some transmission facilities. The gross plant and property figures were $13,397,793, the net operating revenues $651,273, or a return of about 4.86 per cent on the former figure.

In each instance where I have stated the gross plant and property figures, those were the amounts as of December 31, 1938, and where I have stated the operating revenues those were the revenues for the year 1938.

For the whole system, the fixed capital plant, property and equipment account aggregates $559,166,379, the total net operating revenues $19,655,196, or a return on the former figure of approximately 3.52 per cent.

The figures for 1937 for the system companies that we have gone over and for the system as a whole were somewhat better than for 1938. The year 1938 was a very bad year. I can't remember the exact difference. It was some millions of dollars. From the 1937 balance sheet which you have handed me, it appears that the consolidated net operating revenue for 1937 was $22,375,000-odd, as against $19,655,000 for 1938. That was the gross corporate income. The balance sheet caption changed between the two years and I can't make a direct comparison to the figures available to me here but I do not think the property change would have been substantial, in any event not substantial enough to affect the relationship and the percentage I will give you. The difference in net operating revenue between the years 1937 and 1938 was approximately $1,272,000, so 1938 net operating revenue was 5.8 per cent less than net operating revenue in 1937. The property and plant account for the two years was substantially the same, or at least sufficiently near the same so that the figures would not be distorted. Applying the increased revenue for 1937, it appears that instead of 3.52 per cent, the approximate overall figure for 1938, the percentage in 1937 would be approximately 3.78.

I have Exhibit 147 before me. I testified at or about page 5134 that "Each one of these average rates, when you come out at the end, may be either cast up from the mean or cast down from the mean. In this instance, it is cast down very heavily, because there is one very large industry, the packing industry, which has not been particularly prosperous in recent years. That is a large capital industry and consequently if it fell below the middle it would tend to draw the whole average down. On page 3 of this exhibit, you will notice that Armour & Company, with a capital of almost $300,000,000, had an average return of only 3.63 per cent during that period. That would tend to draw the whole average down." That would be offset substantially by the investment in Sears, Roebuck & Company and Montgomery Ward whose capital investments are $238,000,000 and $175,000,000 respectively and who had returns of 11.85 per cent and 10.64 per cent respectively.

I stated in my testimony that defendants would be in competition for capital with the companies represented on this list.

The investors in defendants are: The three distributing companies through the Natural Gas Investment Company; the Standard Oil Company of New Jersey; The Texas Corporation; the Cities Service Company; the Southwestern Development Company, and Columbian Carbon Company. I think that is all. I think you are right in saying that the Southwestern Development Company is owned approximately half and half by Mission Oil and Consolidated Oil.

1305 I don't think I have ever heard of the Cities Service system, The Texas Corporation or the Standard Oil Company of New Jersey investing in the radio receiving sets business, nor have I ever heard of the Southwestern Development Co., the Natural Gas Investment Company, representing the three distributing companies or the Columbian Carbon Company investing in that business. I have never heard of any of these companies investing in the business of making auto body ornaments or the business of making glass blowing machinery. I think you could go through the entire Exhibit 147 and my answer would be pretty uniformly the same. I never heard of any of these companies investing in the candy business or the hair tonic business. I think one of them had quite a substantial investment in the candy business at one time. It was not the purpose of this exhibit to show that the owners of this company were investing in the enterprises listed in this exhibit. I couldn't expect them to and I didn't submit the exhibit for that purpose at all or with that in mind.

It is quite possible that among the companies listed on this exhibit only 9 companies had as much or more invested capital than have defendants. I don't know what those 9 companies earned. You asked me what the average rate of return was for these companies which in the year 1938 earned more than the average for the whole period of 7.32 per cent. The answer is 8.6 per cent. You asked another question which I have answered with these figures I have submitted on paper to you. I find on going over my figures that I have made an erroneous explanation of an exhibit when I said that two natural gas companies were removed because the figures were not available. As a matter of fact they were removed because they were financed during the years when the figures weren't in any way comparable and two others were substituted.

In connection with another matter I made a calculation of the returns of the 12 largest companies listed on my Exhibit 147 but unfortunately I haven't the result with me. I have not checked your statement that only 3 companies listed on this exhibit have invested capital coming within a range of 33⅓ per cent either way of the invested capital of defendants, but I could readily imagine that such might be the case. I have never made any comparison of the returns of those 3 companies with the returns of defendants for the purposes of this hearing. We have made a great many calculations and we have based them on size and character of business, etc. Of course that is not the purpose of this exhibit. I didn't consider that at all when I put this exhibit in.

The purpose of using an exhibit like this is to show by as broad a field as possible what the returns on that broad field of business are which investors expect to receive and against which they measure the returns on regulated industry. No investor like Cities Service Company is investing in a $368,000 business making radio receiving sets.

My explanation of the reason these companies are investors in defendants, and this explanation is borne out by the history of the ownership of defendants, is that practically speaking these people who are in the oil business are forced into the gas business which is in a sense a
1306 by-product of the oil business. The reason for that
I attribute to the great risk of the natural gas business. You will notice that there are very few natural gas stocks in the hands of the public. Very few have ever been sold to the public.

No, I never heard of Cities Service or any of these other investors in defendants investing their money in a $700,000 corporation making overalls. I do not know how many of the companies listed in Exhibit 147 have 10 per cent or less of the capital of defendants. I can perhaps put that in reverse by saying that in one calculation I have here, 24 of the companies, including some of the smallest, represent 78.2 per cent of the capital, that is, the 12 largest, 6 medium sized, and 6 of the very small. These 24 companies represent 78.2 per cent of the entire capitalization of the companies listed on the exhibit, which total aggregated $1,984,000,000 in 1936. I haven't determined how many of these companies have 10 per cent or less of the capital investment of defendants. The figures are here, however, and that fact could be determined by inspection.

In the course of my preparation, I have used several combinations of companies and earnings. I looked particularly at companies where I thought there was a close comparison or corresponding nature of risk as, for example, oil pipe line companies, gasoline pipe line companies. After studying those returns, I thought that a broader field gave a better example. I have not, in preparation for this case, combined any of the companies shown in that exhibit, their invested capital, and their earnings, to determine the relationship in any other categories than as an overall category. I have made other examinations and put this one in as being the fairest. This is a weighted average at which I arrived that is, my ultimate figures for each of the years and for the overall period. It is the total capitalization, divided into the total income to get the final figure. That gives you the fairest average of the return on the invested capital.

Yes, I testified that life insurance companies are the largest segment of the institutional market and that unless you know in advance today that the large life insurance companies will buy an issue of this type, your sales problem becomes extremely difficult and almost impossible. The chief interests of life insurance companies and trust funds in making their investments, is the high degree of safety of the investment. I also testified, in comparing a natural gas enterprise with a copper mine or some other mine, that you have a market at one end, the price of which is controlled in the first place, and which you cannot stop serving in the second place. Yes, that is true of any utility industry. I was differentiating between the regulated utility and unregulated industry. This is a hazard of regulated companies.

You must get the full significance of that testimony. I am comparing an industry which has a mining risk at one end and the public utility risk at the other end of the line. Yes, it is true of all regulated industries, that the price of their market is controlled and that they cannot stop serving it. I have so stated. That is equally true of all other regulated utility companies, but when you combine that risk with a mining risk it takes on an entirely different complexion. That was my point.

I testified at page 5149 that the large institutions have never before been buyers of natural gas bonds but that they stepped into the market and created for the period I was talking about a peculiar demand for these securities. That doesn't indicate that their belief today is that the natural gas industry does not face the same degree of hazard and risk that it faced in the past. It does not
1307 indicate that institutional buyers today representing insurance companies as exemplified by insurance company trust funds ~~have~~ any belief that an investment in natural gas securities is not as hazardous as it might have been ten years ago. There is a peculiar circumstance there that has nothing to do with that interpretation. I testified at page 5152 that before the middle 20's the public, outside of those interested in the oil business, would not put any large volume of money into the natural gas business. In the present case, I should say it wasn't desirable to ask the public other than the public or the companies interested in and intimate with the oil business to put money into defendants because of the difficulty and cost and expense of doing it.

At page 5153, I testified that of the nine companies shown in the chart on page 4 of Exhibit 147, seven were either solely distribution companies or had important distribution facilities. Two of those seven companies, namely, Cities Service Pipeline Company and Panhandle Eastern Pipe Line Company, do not have important distributing facilities. If you will look at that sheet which was among the working papers I gave you, you will notice there an issue, I think, of Cities Service Gas Pipe Line Company bonds. In my testimony before the S. E. C. I said that Cities Service Gas Pipe Line 6's, due in 1943, were on a 5.43 basis at recent prices and yields. Those bonds, however, are out of the chart on page 4 of Exhibit 147 after December, 1938. The Panhandle Eastern Pipe Line figures are on that sheet. The yield basis on those bonds was

3.52 when that sheet was made up. The date is right at the top of it. The working sheet shows the issues included at the end of the line as drawn on that sheet, and the markets at that time, which was October, 1939, as you will note from the date on the sheet right across the top.

The only issue of Southern California Gas Company bonds included in the graph are the 4½'s, due in 1961. Those now show a yield as of the present of 4.07 per cent. Southern California Gas Company has outstanding also an issue of 4% bonds due in 1965. The amount is $15,000,000 as compared to $12,500,000 in amount of the 4½ issue which is used. The yield on those bonds is 3.47. I don't know without looking what the call price on the 4½'s due in '61 is. Without looking I don't know whether they are callable. On examining my notes, I find they are callable at 1.04 at the present time. That fact is one of the factors that, to a degree, is keeping the price down and the yield up on those 4½'s. They are under the same mortgage as the 4's. I believe both issues have the same lien on the property. I think the yield on the 4's, to wit, the yield of 3.47 percent, may be a little fairer indication than that on the 4½'s, of the yield on mortgage bonds of that company with that risk. In justice to the exhibit, I want to explain that the 4½ bonds which I think were issued earlier went in in 1931. The 4's were issued in 1935 and we would be inclined not to put in two bonds of one company if we could avoid it. We were carrying on down the same bonds, but I think the 4's at '65 instead of the 4½'s at '61 might be a better index, and if we were starting this exhibit all over again we would certainly try to use that better index. It would change the chart somewhat to make that sub-
1308 stitution. The chart reaches a final result of 4.41 per cent. The substitution would make the yield a little lower. It would cast it down. It would not take away the validity of the exhibit, however.

Questions by the Examiner.

The size of the issues is disclosed on the working sheet I brought in today. It gives all the information. I brought three copies of this work sheet. I will be glad to furnish any number you want. I had only three with me.

Cross-Examination by Mr. Booth Interposed.

I don't know what the actual investment in the natural gas production and transmission industry in this country totals at the present time. I haven't any idea what it is. I would rather not venture an estimate. There are figures, I think, from which official estimates can be gotten. I don't recall ever seeing such a figure but I may have. I know that it is a great deal more than a hundred million dollars but I don't know what it is. I don't know the annual revenues received by all the natural gas transmission and production companies for the year 1938. I haven't the faintest idea what the figures are. I am familiar with Poor's Public Utility Manual. I think it is a reliable source of information. On a figure like that which may well appear there, I would be glad to accept Poor's figure. I would like to go back to the source, which is probably the American Gas Association. Some times there is such a figure in the manual.

Poor's Manual of Public Utilities is an annual publication. There is a section titled "Survey of Electric Power and Gas Utilities". There may also be included a paragraph bearing upon the natural gas industry, but I haven't that paragraph in mind. I don't think that I would necessarily agree with the conclusions of Poor's as to this or that in the industry. I might accept their factual statements and figures as authoritative and reliable. I could not agree whole-heartedly with the statement you read from page 164 of Poor's Manual for 1939 to the effect that "vast new sources of supply with long-lived reserves have been developed in the Southwest and in California within the last decade, allaying fears as to the Industry's life". I think the next statement to the effect that "extensive new pipe line transportation systems have been built to carry this gas to the large population centers, notably those of the middle west and Great Lakes regions", and that "this has opened immense new markets for future exploitation" is an accurate statement of fact. "Exploitation" I would interpret to mean a proper opportunity for more and more business.

I do not agree with the statement you are reading to the effect that "natural gas is clean and has a higher heat value than manufactured gas. Moreover it can be successfully mixed with manufactured gas." That is a broad

generalization. I think you can manufacture gas with just about any heat content you want to. Of course we all admit that it does have a higher heat value than the manufactured gas commercially served and used; but the statement you have read is a loose statement of the very type that made me say that I would not accept the conclusions of the manual. It is true that natural gas had and
1309 does have a higher heat value than the manufactured
gas which has been supplied, but that is not the way the statement you read from Poor's reads. There wouldn't be any question about the accuracy of that statement if it were properly worded.

You have read me a statement from the same source to the effect that in "most localities natural gas is cheaper so that it can compete successfully with coal and oil as industrial fuel", and that "even in the heart of the coal and oil producing regions natural gas is being sought on a price basis. Moreover as costs and prices generally advance with industrial recovery or for inflations, the cost of natural gas should be among the least affected." I think in fairness I should say that natural gas in most instances is chaper from a rate standpoint than any other industrial fuel and probably will continue to be, so long as it is regulated to a point where there is a pressing down of the rate of return and the profit that draws capital and increases the business, which results in such figures as I read for Columbia companies today for Mr. Slaff. All of Columbia's ultimate markets, with some exceptions, are regulated. Those figures and this statement bear out the pessimism that I expressed for the industry earlier this afternoon.

I have given a great deal of attention to the price tendencies of bituminous coal. I haven't definitely arrived at the conclusion that the price is going up; but let's assume for the purpose of your question that it is. When you restrict natural gas to industrial purposes and the price of coal is raised, you place the natural gas pipelines in a more favorable competitive position. But I speak now of our own system and I think that is indicative of the whole industry. The principal competitor with natural gas on a fuel basis is oil, and natural gas as an industrial fuel is valuable because of qualities that neither oil nor coal have in reality. In very fine heat treating, price is not the objective.

Cross-Examination by Mr. Slaff Resumed.

I have before me a copy of my Exhibit 147. You state that one of the copies furnished you showed the total invested capital for the year 1936 to be $1,784,733,843 and ask me if the first 7 should not be a 9. The copy I have here shows a 9 and I can't imagine a sheet with 7 on it. You state that the same copy shows a rate of return of 10.34 per cent and the other copy shows 9.30 per cent. I think the 9.3 is correct. You state also that one of the exhibits shows net earnings before interest in 1937 at $174,030,335, and in another copy $174,128,719. The former figure is correct, I think, and 8.37 is the correct figure for the rate of return for the year 1937. The three-year average rate of return of 7.32 is the correct one. I can't account for these differences in copies. I don't know how it occurred.

1310 H. B. DORAU, a witness for defendants, called for cross-examination, testified:

(October 30, 1939.)

I have a couple of corrections I wish to make. With respect to Exhibit 152, pages 37 and 38 and the supporting tables running to page 49, I would like to make it clear that in the analysis of the quality of financing tractions, railroads and telephone companies as such were excluded, that is, it refers to gas and electric companies and any services which gas and electric companies may in a composite manner be rendering. I think I failed in my description of it to make that clear. In other words, the effort was to eliminate pure or dominantly tractions, railroads and telephone and water utilities. If a gas company is rendering a water service it is in.

Secondly, there is one figure I would like to correct on page 12 of the exhibit. There was an incorrect calculation of the weighted yield of the 18 manufactured gas company bonds for 1933 in which an inappropriate treatment of the third decimal point occurred. It ought to be 7.31 instead of 7.32.

Cross-Examination by Mr. Booth.

My recollection at the time I was testifying about the percentage of public utilities which had not earned taxable income was that such statistics, which I had occasion to refer to seven or eight years ago related to 1930. I was speaking from memory at the time. The reference was to 1930, I am quite certain. That happened to be the year to which I was referring in an entirely independent connection. I was speaking wholly from memory. I am referring to my testimony on page 5624. It is true that taxable income as reported to the government may be zero, despite the fact that a company may actually report substantial net earnings to stockholders.

I have been present here practically every day this week. I took one or two extra leaves but I think I heard substantially everything. I was here for a substantial part of the cross-examination of Messrs. Emery, Delafield and Gilman. I was asked to come down here for a conference on Monday morning and then it was rather expressed as desirable that I stay on. I don't know whether that suggestion came from Judge Morgan; it came out of a group discussion. I would not want to assign it to any particular person; I don't remember.

I cannot say as to how other people felt about my answers on cross-examination if I had not been present here to hear the other witnesses. I have no concern of that sort with respect to the scope of my own direct testimony.

If I understand your question, I divided up my conception of rate of return into certain specific elements. I attempted to envision the total rate of return in terms of the elements which are today recognized in such a total rate of return. Those all appear in my subsidiary classifications.

In connection with my conception of pure interest, I recall that in preliminary cross-examination you
1311 asked me whether or not I had allocated a specific portion of the amount to which I had testified as a fair rate of return to the element of pure interest. I thought my answer to you at that time was fully informative. I recall that you did cross-examine me about that. I recall that you called my attention to an abstract of the testimony in the proceedings before a Master involving the rates of Peoples Gas Light and Coke Company that

had been prepared, but in which you did not have available the questions and the answers. I do not have before me the record made before Master Swisler beginning with page 9272 from which you read a question and my answer as follows: "Then 3 per cent strikes you as being or constituting that part of the 7 per cent which would represent interest?" Answer: "I think it is probably a fair per cent to use for pure interest." I am willing to accept your indication that I did make the answer quoted to the question, although I do not know whether you read all I testified to in that connection.

That was a very extended cross-examination. I might say possibly in amplification of Mr. Booth's remarks that I thought the major part of my own effort was in response to cross-examination and not in direct testimony before the Commission. I remember it was something like a half day of direct testimony and four days of cross-examination. I assume that the question and answer you have read are from the record made before Master Swisler.

At page 5726 of the record in the present case appear questions and answers you have read to me here. Those answers appear to be accurate statements of what I testified. I was not referring to geologists in the singular or a collection of singulars. I was reflecting my impression of geological opinion in general as I see it reflected in the literature dealing with this subject. I have from time to time read the statements of geologists in connection with security issues, some of which I am quite sure, speaking from memory, had to do with the Panhandle field and adjacent fields.

I think I read a prospectus on the Panhandle Eastern Pipeline Company, one I received possibly in July or August of this year. I would like to refresh my memory as to which geologist expressed the opinion contained in that prospectus. It may have been Ralph Davis, I am not sure. (Objection by Company counsel overruled.) I do not believe I could quote the approximate amount of recoverable natural gas that he estimated to be in the Panhandle Field.

I do not believe it is wholly correct to say that before an investor can appraise the risk and uncertainty, he must know the allowed amortization period and the probable life of the field. A great many investors are not in position to ascertain anything of the sort and in my opinion they do not do it. I think the large number of investors probably do more of this sort of thing, namely, they have an impression that there is a degree of uncertainty involved in this situation which they are not competent to deal with, and they just class it as a security having that kind of an element in it. I do not believe that it is necessary to know or have some specific notion as to the probable allowed amortization period and as to the probable life of the field in considering the uncertainty of the exhaustion of the field either from a physical or an economic standpoint.

I think I recall accurately the testimony of some witness that the informed large-scale investor would be disposed to introduce a margin of safety in the life of the bonds against the—I think he said probably the most conservative geologist's estimate that would be offered to
1312 Lim. The phrase "the most conservative geologist's estimate" was not used. I am recalling my impression of the testimony. I cannot point to any place where that phrase was used. I have not read the testimony. I am speaking from memory.

I do not know that it is the practice of the natural gas industry and the principal companies in the industry to employ experts who would testify to a longer life in connection with proposed issues of securities, and a shorter life in proceedings of this character and I hope that is not the case.

I do not believe I read all of the Panhandle Eastern Pipeline Company's prospectus. There is much in those things that does not concern or interest me. I look at most of those things as they come along. A prospectus is a statement under the requirements of the present Security Law which the underwriters have to have available to offer the prospective buyer or purchaser of the security or issue. They are very voluminous. That is the reason why I do not presume to say that I read all that is in such a document.

You asked me whether, if the prospective life of the field is 20 years and the investors are allowed to amortize the investment over a period of 15 years, the risk to the investor is not reduced more than if the amortization period is taken at 20 years. That is a pretty big question. You state that you are not talking about value but the cash that has been put into the enterprise. I could not agree with you in the light of that statement.

I believe that any reduction in the period over which an investor expects to get his investment back, whether present investment or past investment, reduces the risk of an undertaking in which you will get your capital returned to you in the normal course of business in one year, which is a different sort of an investment than the investment in hydro-electric property. I looked at the prospectus of the Panhandle Eastern in the ordinary course of examination of those prospectuses. I attempt to keep a file and look at most of them that come along because it is a subject in which I am expected to be normally informed in the course of my regular duties. I do not recall whether or not there was a statement in the prospectus to the effect that the recoverable amount of natural gas in the Panhandle or Amarillo field was not less than 18 trillion cubic feet as of May 1, 1939. I do not recall whether the figure was 10 trillion cubic feet but I would be surprised if it were. I do not recall seeing a figure as low as that in any of the literature which from time to time I have looked at. I do not want to be misunderstood here. I have relied upon and used no particular estimate of the reserves in the Panhandle field. If you will examine my testimony and the questions preceding the ones you were asking, you will see that the discussion did not depend on any such thing. I do not believe there were any particular figures in my mind when I answered the question. I do not have any particular figure in mind today. I think it would be quite inappropriate for me to assume to estimate. I would not want to say that I remember that none of the literature which I have examined as to the probable amount of recoverable reserves in the Panhandle, contained a figure as low as 10 trillion cubic feet as of either January or May, 1939. I do not presume to remember what the comparative figures are for the identical dates either May, 1939, or January, 1939.

I think if a single investor or a group of investors were contemplating an investment of such a huge sum of money as $50,000,000, it is entirely reasonable that they would try to inform themselves both as to the fundamental geological factors and their possible significance in the economic outworking of such an investment. I believe it would be entirely inadequate for them to come to a conclusion as 1313 to the proper amortization period on the basis of geological estimates.

After arriving at an opinion as to the probable life of the field, the investors should not then arrive at a judgment of the amortization period over which they would expect to amortize the investment. Assuming that prospective investors have arrived at a judgment as to both the economic and physical life of the field and the business, I think they would then be in a position to make an estimate of the proper period for amortization of the investment.

On page 5726, it appears that I stated that I accepted the opinion of geologists and technologists that there were great hazards with respect to the probable physical supply of gas. I think I made that statement. I was speaking collectively on my impression of what the consensus of geological opinion is about the physical predictability of supply in this industry. I have looked at a great many sources from time to time bearing on this. I can not isolate what I did in the period of a couple of months from what I have done since 1917.

I read in the Federal Trade Commission's report about the exhaustion of gas supply and wastage of gas. I do not know whether they quote particular geologists. I think in fact they quote from a report of a committee of a professional. I don't remember the names of those on the committee of that professional geological society. I cannot recall whether I examined or made an effort to obtain any statements that may have been made by the investors or the representatives of the investors as to the probable life of the field at the time they put their money into this enterprise.

I examined a great deal of material and it seems to me that there were articles from professional societies that dated back to about that time. I do not know what the people who put their money into this enterprise did about such estimates. I know who George F. Mitchell is. He is an executive of one of the Chicago companies interested in this project indirectly. I don't know whether he is president of the Peoples Gas Light & Coke Company. He may be president and Mr. Ranney may be chairman of the board, I don't recall which is which. I recall seeing Mr. Mitchell's name in connection with the discussions bearing upon the building of this project. I don't remember what particular aspects he was concerned with. I did not examine any testimony that he may have given before the Illinois Commerce Commission as to the opinion of the investors on how long this project would last. I do not know what his opinion was or is. I did not read the testimony of the geologists employed by Chicago District Pipeline

Company in the case of that company versus Lindheimer as to the probable life of the Panhandle field in 1934. I do not know what their estimates were. I do not believe I read the testimony of the geologists in the present case. I have not read the testimony of Mr. Claude C. Brown. I hope to read it but I have not had the opportunity to do so. I hope to read a great deal more of the testimony than I have had time to read. I have been working under considerable pressure these last few months. Given time, I should carry all of my research a great deal further.

All of the testimony that I have given in this proceeding was considered by me as basic to both companies here involved. I testified at page 5741 to the effect that if there is an intervention of a contractual relationship between those engaged in producing and those engaged in marketing a product whose interests are not common in the matter, there still remains a grave economic hazard, namely, that if the terms of that contract turn out to be other than what is bearable under the economic condiions disclosed, it is very likely to be modified to conform to the economic possibilities of the situation.

I do not understand that the Natural Gas Pipeline
1314 Company of America and The Peoples Gas Light &
Coke Company have a financial interest in common. They have some interests in common. They are commonly interested in the market in Chicago, obviously. When I used the words "interest in common" I meant financial interests. The Peoples Gas Light and Coke Company have more than a financial interest in the success of defendants herein. The Peoples Gas Light & Coke Company, through an intermediary company, has a substantial investment in defendants.

I am not suggesting that the investors in defendants had no economic protection through the contract with Chicago District Pipeline Company. I testified in recognition of a degree of the opposite. I have testified that I considered that it introduced a degree of stability into the relationship. It introduced a very significant amount of economic protection. It would be hardly conceivable that such an arrangement would be entered into, unless there was identity of ownership, without a stabilizing relationship such as a contract.

Questions by the Examiner.

The expression "in common" as it was used here has a particular meaning. You and I have a common interest in something that the two of us are interested in. If you had a mortgage on me, we would not necessarily have a common financial interest in any third party situation. It is the distinction between the loose use of the term "partners" that developed here in the cross-examination and an ownership, for example. If I have an ownership interest in your business, I do not construe that as a partnership arrangement, but if you and I have a common interest in a third party, then we might loosely be construed to be partners in an enterprise even though it is a corporate form of arrangement.

Cross-Examination by Mr. Booth Resumed.

I testified to the effect that the economic and financial analyst is impressed with the fact that the property depreciates more rapidly as it reaches an older average age. I have made no detailed study of the depreciation of these properties. I have looked at their reports which indicate the amounts being charged for depreciation. I think there is such a charge on the reports that I have examined. This answer did not refer to any such study. It was a general statement. I have not made any investigation of the depreciation of the property. I have never done such studies on the properties of any natural gas company. If I may explain that, I am not an appraisal engineer, and I do not make physical life studies, but I have made studies of the results of engineering and other data. I can refer to no specific instance of having done that with reference to a natural gas company.

As I have used the term, "depreciation" means loss in service value. The definition you quote to the effect that "depreciation is the loss not restored by current maintenance which is due to all the factors causing the ultimate retirement of the property" and that "these factors embrace wear and tear, decay, inadequacy, and obsolescence", while good as far as it goes is not adequate in my opinion. The newer classifications of accounts in putting in those terms include the depreciation on account of legal requirements and I think that has got to be recognized.

By "legal requirements", I mean rules and regulations which might prevent property from being used even though it might technically or economically qualify. The definition you have read sounds quite familiar, I may have read it or I may even have written it. I am not suggesting that Chief Justice Hughes copied my definition of the term "depreciation" but we have perhaps thought the same thoughts and read the same literature.

1315 My definition of the term "service value" is economic value in the employment to which the unit of property is put. I do not think that definition is a serious departure from the usual definitions of the term as contained in the uniform system of accounts pretty generally. I think I have in mind one or two things which have not as yet been recognized, or well established. For example, the valuation of depreciation involved in standby equipment which is technologically obsolete but which may nevertheless have significant service value in a composite plant. The Federal Power Commission's system of accounts for public utilities and licensees uses the term "service value" ~~as~~ being the "difference between original cost and net salvage value of an electric plant." That starts with the presumption of original cost which I do not start with at all. Otherwise, I think our ideas are fundamentally the same.

If I may say just a few words to elaborate my position, I would like to add that from a strictly economic standpoint the basis for such calculation is the present value of the property. I appreciate that for accounting purposes that might not be appropriate. The purpose of the system of accounts prescribed by this Commission and other regulatory commissions is to assist the commission in the regulation of the utility; and I would have great respect for that approach because of its administratability, but considerations of administratability and economics are quite different at times.

I used the term "present value" in a relatively simple meaning and in contrast to original cost. The present worth of the property as distinguished from its worth at the time of acquisition. The principal difference there would be the reflection of the present level of values. There may be an actual change in the value of the unit of property such as a piece of real estate. There might be a rise in the price level that would be reflected in the present value. When I say a change in the present value of a piece of machinery or a piece of real estate, I mean something besides change in price level. There may be an actual change in the value as well. The value of the piece of real estate might relatively actually be higher and the price level itself might have moved up.

That might be true in the case of machinery when you have substantial changes. It might also work in the other direction of course. All value is finally relative. I have overheard discussions here and I think some other discussions of determination of cost of replacement of property. I know nothing about that. I never examined them and paid no attention to them. Present value as I have used that term is not the same as replacement cost and as reproduction cost. I am under the impression that defendants have made some estimates in this case as of some date near the present. I have not looked into the matter. I do not know how far they extend into the future. I cannot say it would be unreasonable for them to run over two or three years in the future for the purpose of determining the companies' income. They might go a considerable number of years into the future. It has been done.

If I understand the law of the land correctly, you are under obligation reasonably to project values into the future under the decisions of the United States Supreme Court. I have come to no conclusion as to what I would deem to be the reasonably immediate future, I have stated that I have not examined the estimates that were made by the company as to the cost of replacing or the cost of maintaining this property in the future. Since I do not know what the estimates are, I cannot say whethey there are any costs that are not included in the estimates.

I do not have in mind the figure as to the part of defendants' total investment covered by its investment in the 24-inch pipe line. If I recall correctly, the invest-
ment in the natural gas resources is not an over-
1316 whelming proportion of the whole, consequently the
investment in the pipeline or transmission facilities would represent the major part of the total investment. The investment in the gas reserves and resources as distinguished from the transportation facility would probably amount to between a quarter and a third of the

whole investment and from two-thirds to three-quarters, if I remember correctly, in its pipeline. I do not know how much the company has estimated it will have to spend for replacement or repair of this line.

I have seen the figure showing the amount the company has expended in replacing and repairing the line during the last 8 years but I do not recall it. I would not want to guess at it. I have told you that I do not remember the amounts. I don't know the relationship of those costs to the investment. I saw them as a part of a revenue and expense analysis that I examined. They were given to me in the form of a historical analysis of revenue and expense. My impression is, as I expressed it in the general testimony, that the proportion of the total investment represented by repairs and replacements would probably be smaller in the initial years and rise to higher levels as the property matured. I do not know what the figure for maintaining and repairing the entire line would be, or whether it would be 2% or 5% or 20% of the total investment. I haven't any notion as to that at this moment. My answer applies equally to the company's action operations in the past and to its estimates of cost in the future. I profess no knowledge of the estimates of the future. I have seen the figures as to the past expenditures but I don't know them.

In a broad way, the question of whether or not it is economical to replace any item is a matter of comparative costs. I should add that it becomes a question of cost over a period of time, not cost at the moment. I don't mean that the answer lies in a comparison of the present values of the alternate costs. What I meant by taking into account a period of time was the question of what time you had to get the benefit of any possible relacement. Such a prospective period of time might well influence the question of present value. I have made no engineering examination of any single item of property or of all of the property of defendants, and have made no inquiry to determine whether it would be more desirable for defendants to use depreciated facilities or to replace them. I mean I have made no such investigation in connection with my study in this case.

1317 I testified on direct examination in substance that from an economic standpoint any enterprise which has to produce its wages of capital, its income, by an intensification of its utilization factors is considered as being involved in hazard which would not be present otherwise. That, like the other factors to which I have testified, influenced my judgment in arriving at a rate of return for defendants. I did not mean to imply that the pipeline company had intensively exploited the ultimate market. That testimony definitely applies to defendants. The intensification in the utilization of facilities of the pipeline company may be viewed independently of the intensification of the retail company's distribution. I believe that a company of this sort would be entitled to a lower rate of return if it were earning its wages of capital without engaging in intensive use of its facilities or its investment.

You do not accurately state the idea when you say that if the company were regularly selling 50% of its capacity instead of 90% it would be proper to allow it a lower rate of return. I think that the statement was made in my testimony that a concern which reserved its efforts to taking the cream of the market was, in my opinion, not entitled to the same consideration as one which attempted to exploit the market to its limits, using the term "market" very generally.

I have made some comparisons as to the sales of natural gas pipeline companies to determine the character or the classes of business and classes of sales which each pipeline company has; but I did not want to say that I had looked at all of them to determine that this one is less vulnerable than any of them. A part of the picture is presented by my statement in my direct testimony that one of the risks of this business is that 25% of its total revenue is obtained under interruptible contracts. I do not mean to imply that the interruptible gas is not sold at compensatory rates or anything of the sort. I made no investigation on that point. I do not know what proportion of the total business of the Detroit City Gas Company is represented by industrial gas. That is true also of the Brooklyn Union Gas Company.

I have those figures here as to Peoples Gas Light & Coke Company and the other distributing companies which market the gas sold by defendants for the Chicago area. The statistics are all broken down between residential, general and other consumers, and the interruptible supply and sales to other utilities, which three classes are in the proportion of just about one-third of the total load. These statistics are in therms. I think I have comparative figures in dollars but I do not seem to be able to put my hands on that at the moment. I don't know how the maximum coincidental daily demand of the Peoples Gas Light and Coke Company, Public Service Company of Northern Illinois, and Western United Gas and Fuel Corporation compare with the maximum demand on Natural Gas Pipeline Company at Joliet on the same day. I have no idea.

I recall that I was questioned concerning the falling off in revenues during 1938 as compared with 1937. I do not believe I have a report covering 1939. Yes, I
have an idea as to whether or not they have in-
1318 creased. I would expect that they will be better
than they were in 1938. I do not know how much
better. We have only a part of the year. I did not make a compilation of the comparative figures for 1939 with the figures for the same period in 1937. There are seasonal factors involved. I do not know how the actual figures compared with the company's estimates of revenue and income in 1939. They did not tell me what their estimates were. I do not know what those estimates were. I cannot say that I know that the company made any estimates of revenue for the period 1939 to 1954. I do not know whether they made estimates of net income for that period. I have examined no such estimates. I have made no estimates of my own as to what the company's revenue or income would be for 1939 nor any other period for any class of service. I was not in position to make such estimates.

I testified on direct in substance that it seemed to me that it sums up to the reasonable economic expectation that higher unit costs of production would result in the future. No, I did not examine the company's estimates. That statement was not based on any examination of the company's estimates. I did not testify as to how much higher they would be. I don't know how much higher they would be over the life or the probable expectancy of the life of the operation. I do not know how much higher they will be 5 years from now.

I could not give you the figures on the unit cost as to how much higher the costs of production are today than they were eight years ago. I don't know what they are.

I have seen figures on unit costs resulting from statistical analysis but I never made them.

I testified heretofore in substance that I think the situation is clearly comparable to that of a manufacturer who finds that his outlets, his contact with the ultimate consumer, is only through the buffer of a distributor or a limited group of distributors. That was another factor that I considered, the isolation of the pipeline from the market. I think the word "clearly" might be stricken if the record bears that much change. I think the word is probably a little strong for the illustration I used. (Counsel for the Illinois Commerce Commission states that that is one correction which he will not agree to.)

I do not know the exact sum which the three utilities which distribute gas purchased from defendants have spent for developing new business since the introduction of natural gas by defendants. I am under the impression that the Peoples Gas Light & Coke Company, at least, spent a considerable sum in an effort to develop the market. I do not have the exact figure in mind. I have the impression that the introduction of natural gas gave rise to additional expenditures. Obviously it was more than $10 but I would not want to estimate whether it was half a million, $2,000,000 or $10,000,000. I recall that incident to the change-over, there were probably in excess of a million dollars of expenditure experienced. I did not attempt to ascertain such figure. I made no calculation to determine how much the income of defendants would have been reduced had they borne the expenditures which were paid by the distributing companies for the development of new business and other expenses incident thereto. I think it would have been a figure worth giving attention to.

I have not the figure as to what Peoples Gas spends annually in its advertising and selling expenses. I would not want to guess at the amount.

I cannot answer your question as to whether the management of the Peoples Gas Light & Coke Company is poor or able—with those alternatives. (Objection by Company Counsel overruled.) I don't consider it poor. I think it has competent management.

1319 As to whether it is agressive, that is a relative term. I don't think I could go with you as to that in my understanding of the word "agressive." It is a relative term and in the comparisons I am thinking of, I would say no. I mean in comparison to the Commonwealth Edison

Company of Chicago for example. It is difficult to appraise whether or not it is better than the management of other gas companies. I believe it is better than a great many gas company managements. I think that it is fair to say that this management is outstanding among gas companies. I am not certain that the word "outstanding" should be followed by your expression "as to all aspects." I have the impression that from an operating point of view, it is quite competent although it is in a field I am not competent to judge. I think it is in the field of merchandising and promotion that I would have some reservations.

I have not made a study of the sales effort of the Detroit City Gas Company, the Laclede Gas Company of St. Louis, or any large artificial gas company following the introduction of natural gas.

I do not mean to say that there is no inducement for the management of Peoples Gas Light & Coke Company to develop the market within the city of Chicago for the sale of natural gas or mixed gas. As to whether or not the local distributing companies in the Chicago area are required by their relationship with defendants to develop the market and territory which they serve, the fact that the Peoples Gas Light & Coke Company has an investment in this market is an urge to do what it can with it. The fact that they have a contract to buy gas which contains features which have a tendency to put a bigger pressure on them is a factor. I could not say that the fact that they have an investment in this company is a factor—there is a certain conflict there which probably would have to resolve itself if there were any choice in one direction or the other.

I do not know what dividends the local distributing companies in Chicago have received from defendants, but I doubt very much whether they refused to take any that were made available.

I am not familiar with the dividends the Natural Gas Pipeline Company of America has paid within the last few years. I do not consider that very pertinent. The matter of their paying dividends seems to be motivated by other considerations.

I have testified that in my opinion, an investor in the securities of these companies would be impressed, and should be impressed, with any possibility of direct competition of natural gas from a different source of supply at a shorter distance from the city of Chicago than the 950 miles between that point and the Texas Panhandle field.

I gave consideration to that factor and to the fact that defendants do not have an exclusive franchise. I did not predict where the raiding line would be built from. It is not a question of where there is an adequate source of supply necessarily it is a question of where there might develop an adequate source of supply.

I gathered from my studies that natural gas is being found in increasing quantities in southern Illinois. I understand natural gas has been found in western and southern Michigan—western I believe; that there are substantial supplies of natural gas in Kentucky. I believe other natural gas pipelines run within distances not too remote to make possible at least the building of spur lines in the direction of the Chicago market. I think that is true of Panhandle Eastern which comes within 100 or 120 1320 miles. It is physically possible to build a pipeline anywhere. I meant economically, of course. I do not know what the developments in southern Illinois so far indicate as to the probable supply down there. I am not sure that anyone knows yet. I have not contacted the Bureau of Mines to determine what natural gas is available or has been discovered so far in southern Illinois. I have not contacted the State Geoglogical Survey of Illinois formally. I did not know that there was anything formal in the way of a survey by the State of Illinois. I knew that the State of Illinois has a geological division. I did not know as a fact that that division makes constant studies of oil and gas reserves. I have a recollection of some reports as to the studies, but I don't remember whether they were oral expressions of opinion or whether I read them somewhere. I have read about various people being interested in the fields down there and I know that Pure Oil Company is interested in an important way. I do not know of other companies by name. I do not know whether their rights are confined to oil or what they own.

My understanding is that up to this time the expected reserves in Michigan are not what might be called large. I am under the impression that they are not large enough to supply the city of Chicago. My impression is that they are not large enough for that purpose as yet.

I would not want to say that there is no possibility of the development of a source of supply from southern Illinois or for that matter from Michigan, if things change. Only a short time ago, they had no notion at all of there being any significant supply in Michigan or in that territory.

I do not know how much it would cost to build a pipeline from southern Illinois to Chicago. I am not an estimating contractor. I would not want to express an opinion about that. It is 300 or 400 miles from those oil fields to the city of Chicago. I do not know what it would cost to build a pipeline 300 or 400 miles. I have a feeling that it would depend a great deal upon the kind of a line, the particular circumstances encountered in that territory, and so forth.

Assuming that it is a line like the line of the Natural Gas Pipeline Company of America, I think it would cost more than one or two million dollars. $25,000,000 is probably a bit too high. I do not know what the cost of defendants line was. I don't know what total investment would be required for a line to supply the city of Chicago from southern Illinois. That would be the sheerest speculation.

I do not know what it would cost to build a line from western Kentucky to the city of Chicago. I would not be in a position to make an estimate. I do not know whether the natural gas would have to be obtained from western Kentucky.

I do not know at what price natural gas would have to be made available in order to make it economically feasible for Peoples Gas Light & Coke Company to purchase natural gas from a competing company. I have not had access to the figures that would be necessary to make such a calculation. I do not know what it would be. I have read the contract between Natural Gas Pipeline Company of America and Chicago District Pipeline Company. I would hesitate very much to say that I am familiar with a legal document of that character. I have read it. I have not looked at it since I testified on direct.

I believe I heard Messrs. Gilman, Delafield and Judge
Morgan discuss it since then, but I have made no effort
1321 to check whether the answers were accurate or not. I
was not particularly concerned. (Objection by Company Counsel overruled.) A great many statements that were made here were made with the very careful addition of the observation that they were from knowledge or from estimates and so on, and I would not be in a position to judge.

I have stated that I gave consideration, as one of the elements influencing my judgment, to the possibility of the construction of a raiding or competing line, and I think it is an appropriate element for consideration.

I do not know at approximately what particular price natural gas would have to be bought by people like Peoples Gas Light & Coke Company before it would be economically feasible to buy gas from a competing company in view of the contracts which the distributing companies have with Chicago District Pipeline Company. I am not sure that I could make such a calculation. I presume that gas sold in the city of Chicago would have to be sold through the Peoples Gas Light & Coke Company and the other two distributing companies who obtain their gas from defendants.

People have been known to invest their money in a competing line for the nuisance value of the line. I do not believe anybody would make the investment without the expectation of making 8%, considering the risks and hazards involved.

I cannot say that I know what the investors in this enterprise estimated that they would make as the result of the construction of a single line to Chicago. I seem to recall some early papers indicating the earning possibility of such a line; but they did not express the expectation of the enterprisers in this particular. They indicated what the possibilities might be, as I remember, under different kinds of circumstances.

I know something generally of the early history of the line; but I do not recall that any record disclosed the expectations of the investors. I made no effort to examine the records on file with the Illinois Commerce Commission dealing with the early history of this line. I have heard in the testimony that Mr. Ralph W. Gallagher was an executive of one of the companies interested. I do not know which one. It did not seem to me to be particularly significant as to which one of these companies he was with. I do not know him. Gallagher's name may have been stated in the Federal Trade Commission report which I read. There is a great deal of material there.

You ask whether I know of anyone who would put up money to build a competing line. Mr. Ickes might. He likes the city of Chicago. Mr. Ickes would get the money from the Government. I do not know just what the present status is as to who has charge of federal loans going into projects of that kind. In changes too rapidly for me to keep up with it. I did note in the Federal Power Commission Opinion No. 39, that there are two contemplated gas lines which are looking to the R.F.C. for financing. Those lines have not been built and probably won't be unless they get the money from the R.F.C.

Defendants started their operations about the beginning of 1932. There have been no raiding lines built to Chicago as yet. It has been a bad 8 years. I am not able to state any present source of supply where the reserves are adequate to supply another line to the city of Chicago. I do not know of anybody who would put up the money to build a line to the city of Chicago even if the reserves were adequate. I do not know how much it would cost to build such a line. A line 300 or 400 miles in length would cost several million dollars. I testified that I do not know at what price the Peoples Gas Light & Coke Company would have to buy natural gas in order to make it economically feasible for it to purchase natural gas from such a source. From an investor's standpoint, it is the possibility of such things
1322 happening that must be given consideration. That is an appropriate investment consideration. I do not know what you mean by "particularly threatening." In my meaning of those words, I would not say it is particularly threatening; but it is an appropriate consideration on the part of the would-be investor that defendants are not legally protected in their market. An investor would give consideration to that fact. I think undoubtedly he would give consideration to the practical considerations which envision the supply of natural gas to the Chicago District Pipeline Company and from the Chicago District to the distributing companies. It is an appropriate economic concern of the investor as to whether such a thing could happen.

When I used the expression at page 5788 of the record "particularly threatening and hazardous", I was referring to the particular threat and hazard of direct competition in an industry of this sort. That is what I had in mind. What I said was that "a threat of direct competition is considered particularly threatening". I think this applies to these companies.

I testified that the competition which natural gas finds itself in with such fuels as fuel oil and distillate and coal and things of that sort, is a factor to be taken into account with a company 40% of whose volume is sold for industrial purposes. I considered that as one of the factors in determining the rate of return.

The State of Illinois produces coal. I do not know how much. It is an important bituminous coal producer. I do not know how important. I have not the figures at hand. I do not know how it ranks among the bituminous coal producing states. I consider it quite important. I do not know whether it rates second, third, eighth, or tenth, but my impression is it would rank up with the first four or five on the list. I do not know what the approximate production of bituminous coal in Illinois is. I do not have the figures in mind. I do not know whether it is 25,000 or 150,000 tons. I have no estimate. I believe coal was being produced in the State of Illinois in large quantities in 1930 and 1931 when this line was built. I do not know as to whether the production was as large as it is today. There was some abandonment and some reduction of production in some sections, but I do not know what the over-all result was. I have no opinion as to the total relative production in the two years.

There are uses in which coal is technically acceptable and where its generally lower price would give it a place in the market. There are other uses in which natural gas has clearly technical superiority in application, and there is an area in between those two extremes in which it is a question latgely of alternative cost. The existing facilities for distribution of gas were available before this line was built; and there were industrial customers in Chicago using gas before natural gas was brought to Chicago, demonstrating that there were technical applications for gas, and obviously then for natural gas. My impression is that the use of gas for industrial purposes in the Chicago area in 1938 to 1939 is larger than the use of gas in 1930 to 1931. There has been a substantial increase in my opinion. In a general sort of sense, defendants have done pretty well in building up their business. Calculated on the original capaciay of the line, the load factor the last three or four years has exceeded 100%. Re-calculatel on the new capacity, I think it has been running 89% or
1323 90% and possibly a higher per cent. I believe, on the new capacity it has reached higher levels than 90%. In terms of utilization, I would call that doing very well. It represents very intensive utilization of the line. I was just going to say that I know some that are doing worse.

Some lines have not been as successful in building up the market as have defendants.

I don't believe I have said that one of the factors in determining rate of return is what the investors would expect to make at the time they put their money into the enterprise. I do not understand that it is appropriate to consider the expectations at some past period in a rate of return examination as of the present time. It is appropriate to consider in determining what will attract capital for an enterprise, the expectations as of the present time.

1930 and 1931 was such a hectic economic period that I would hesitate to make an over-all comparison between returns in those years and as of today. The period 1929 and 1930 was one of such substantial liquidation and reorganization of holdings that we consider the returns during those years as of rather doubtful evidence. But the point I hope to make clear is that the thing I think is relevant is the present necessary supply price of capital. What the people who put their money into this enterprise expected when they put their money into it 8 years ago, is not necessarily one of the factors that might be considered here. They might have had expectations which are entirely different from present necessities. The money that went into this enterprise was originally spent over the period 1930 and 1931. Construction started along about August, 1930, and arrangements and agreements with respect to funds must have been previous to that. I think it is a fair statement that the obligations of the investors really arose in 1930.

(At this point, counsel for complainant produced a document described as a certified copy of Exhibit Nos. 2 and 2A offered before the Illinois Commerce Commission in the case designated Docket No. 21170 and requested that it be marked for identification. At the direction of the Examiner the document was marked Exhibit No. 156 for identification.

Counsel for complainant then produced a document described as a sworn copy of a part of the testimony of Ralph W. Gallagher taken before the Illinois Commerce Commission in the case designated Docket No. 21170 explaining Exhibit No. 2 in that case, with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit No. 157 for identification. Objection by company Counsel to questioning from documents marked Exhibits 156 and 157 overruled.)

I understand that Standard Oil Company of New Jersey owns a substantial interest in Natural Gas Pipeline Company of America. I do not know the exact extent of their interest but I understand they are one of the principal investors. Of my own knowledge, I don't know that Mr. Ralph W. Gallagher was designated as representative of the Standard Oil Company of New Jersey. I read a good deal of the reports, but I had no reason for paying any particular attention to that point. I have read Volume 62 of the Federal Trade Commission Report. That report says here that Ralph W. Gallagher represented the Standard Oil Company of New Jersey on the board of Natural Gas Pipeline Company of America, but I paid no particular attention to his name.

1324 The other men on the board were Reid L. Carr of Columbian Carbon Company, H. O. Caster, Cities Service Company, George F. Mitchell, Natural Gas Investment Company, N. K. Moody, Southwestern Development Company, Rodolfo Ogarrio, The Texas Company, and H. P. Sedwick, Natural Gas Investment Company.

In the proceedings before the Federal Trade Commission, the name of Floyd C. Brown of Chicago appears among the appearances.

(At this point, Floyd C. Brown stated for the record that Mr. Gallagher at one time was a vice president and a director of Natural Gas Pipeline Company of America; that he was not certain whether or not Mr. Gallagher was a vice president at the time he appeared as a witness in the Chicago District Pipeline Company case.)

It is not unusual for men before they embark on an enterprise of this character to make estimates as to the investment which will be necessary for the proposed project and probable earnings. Assuming that such estimates were made by defendants, I don't think I should have made an effort to investigate the estimates which they made to determine the return they expected when the money was invested in the enterprise in 1930 and 1931.

I don't say that it would have been better to read Professor Lagerquist. I am not certain that I examined all of the volumes written by various professors and others which deal with the general question of investments. I made an effort to examine a number of them. I prepared an exhibit with quotations from those publications.

Your statement that I made no effort at all to determine whether or not any estimates were made by the investors at the time they put their money into this enterprise is not quite accurate. If it be assumed that representatives of the investors who put their money into this enterprise made calculations and estimates as to the probable investment and earnings of the enterprise during its life, I don't think that such estimates would have any evidentiary significance for the determination of the present necessary supply price of capital. The price at which people were willing to go into it at that time would at that time have been evidence in my opinion. Before I would agree that it is good evidence, I would want to test the nature of the expression of that evidence. If those were the conditions under which it was offered, for example, I would want to assure myself if that was the true expectation. I do not know that Dr. Lagerquist expressed any opinion as to the necessary supply price of capital.

(EXHIBITS NOS. 156 and 157 for identification were offered in evidence.)

I don't know where the price of bituminous coal is going. I am aware of some of the factors there, but I could not forecast the price of bituminous coal. I do not know whether or not the prices recommended by the marketing experts of the Bituminous Coal Division of the Department of the Interior propose increases for the price of bituminous coal. I presume they do. There would not be any point in their activity if they were not trying to get higher prices. I made no investigation of that.

(October 31, 1939.)

I have had no opportunity or occasion to make any
1325 study as to the price at which Peoples Gas Light &
Coke Company would have to purchase natural gas
from another pipeline and still make it economically
feasible for it to comply with the provisions of the contract between Chicago District Pipeline Company and the
Natural Gas Pipeline Company of America. Assuming it
would not be economically feasible for the Peoples Gas
to purchase natural gas from a competitive line unless it
could buy the gas at less than 15¢ per thousand cubic feet,
I am not in a position to judge whether it would be possible for a competitive line to be built. There is gas
which is being sold for certain uses in the city of Chicago
for less than 15¢. I don't know that natural gas is being

sold in large quantities to distributing companies serving in and around the territory in which Chicago is located for less than 15 cents a thousand cubic feet. I don't know whether it would be feasible for a competitive line to be constructed into the city of Chicago if it be assumed that it would not be economically feasible for Peoples Gas to purchase natural gas from a competitive line unless the natural gas could be produced at less than 10¢ per thousand cubic feet. I have no basis for an opinion on that matter. The possibility of such a thing happening is what led me to raise the question; and I think that possibility would raise the question in any investor's mind.

I do not regard such a raiding line as a probability. I think it falls approximately into the realm of what was possible, what might happen. I don't think it is comparable to the possibility of an earthquake; one is a matter of change in human relations and choices of men, and the other is apparently wholly outside the realm of human volition.

The difference is in the basis of such a possibility. I do not think that is the same thing as saying that the two possibilities differ only in degree. In appraising this element, the investor would consider the possibility of a raiding line. I don't think I could interpret the location of the line between possibility and probability in the investor's mind. I do not think there are any places where you can delimit absolutely the line between possibility and probability, but to my own satisfaction there are such places. I think that is implicit in the testimony.

I have testified that I have read the contract between Natural Gas Pipeline Company of America and Chicago District Pipeline Company. I think I should know something about it after one reading. I know that the rate is set up to recognize both the demand and the commodity responsibility. With the demand charge running between seven and eight million dollars of the total charge of approximately fourteen million dollars, the commodity charge ought to be about half the total. I believe the commodity price is about 5 to 6¢ per thousand cubic feet. (Objection by Company Counsel overruled.) My recollection is that the contract provision calls for the payment of a demand charge on 120 million cubic feet of gas. (Objection by Company Counsel overruled.) Assuming that the Peoples Gas Light & Coke Company would have to be able to buy for less than the commodity charge, since it was obligated to pay the demand charge under any circumstances if it bought natural gas from some other source, I don't think it ridiculous at all to suggest that a competitive or raiding line is possible, and this statement is not changed by the circumstances that I have testified that a natural gas pipeline would demand an 8% return before it could get money to build the line.

1326 I don't know whether Natural Gas Pipeline Company makes most of its profit from its interruptible business or not because I don't know where the margin of profits are. I have made no cost analysis. I have testified that the interruptible business is incremental business.

In my testimony, beginning at page 5728, I referred to technical factors as they might influence an economic opinion. In that connection, I mentioned such problems as continuity of service, cost of transporting this gas, technological pioneering of high pressure, size of pipes, freeze-up, operating costs, size and character of the market; problems of technical efficiency, absence of conservation and others. I stated that these were factors which an investor would be concerned about and therefore I was concerned about them. These were factors to which I gave consideration in arriving at my judgment as to the rate of return for these defendants. I believe they influenced my judgment. I think undoubtedly they were given some weight. If I understand your question correctly, I would answer that the considerations there were viewed as those that might be faced by an investor in an industry having these characteristics. I believe probably most of those problems confronted defendants in 1930 and 1931. There may be one or two exceptions as to that, as far as the date is concerned; but I believe they generally reflect the conditions the company faced. I considered them to be evidences of technical problems which an investor would face in that kind of industry. I am not certain that I considered them as problems that would confront a new line rather than one already in operation. I recognized them as being those which were faced at the time this project was started and as more or less present at the present time. I think there is an element of accumulating experience, but I was not impressed with the fact that this line had matured to the point where a very satisfactory experience basis had been established. I believe I have testified in this record that the only thing that should be considered in the determination of rate of return is present day conditions. I believe that is accurate and true as a general principle. In my testimony here I have arrived at conclusions based upon present-day problems, financial, operating and other risk problems, but I gave some consideration to the problems of risk that confronted this company in 1931. I gave a great deal of consideration to these that existed then and continue to exist at the present time.

I testified at page 5728 in substance that the investor who faced the opportunity, if opportunity it be, to invest in this kind of a venture would naturally be concerned with the question as to whether it was technologically feasible to transport gas that distance. He would be concerned as to whether continuity of service could be maintained with sufficient certainty to make the enterprise profitable. He would be concerned about the fact that no one else had previously attempted to transport gas at such high pressures over such distances. I considered that circumstance in arriving at my conclusions. Some of those conditions do not prevail today.

Beginning on the same page, I testified in substance that the major question remaining for the investor would be whether or not the cost of transporting gas such distances, the very length of the haul, would not eat up the advantage of bringing the product to a market as far away as Chicago. Certainly in the absence of any well certified past experience as to what costs are likely to be, not only immediately but over a period of time in which his investment is helpless and fixed, he would most logically put it down as an investment involving such wide uncertainties as to be beyond calculation as to the appropriate degree of risk to be assigned to it. I considered that element. To a very considerable extent it prevails today. The investor probably knows today's cost as determined of transporting gas to the City of Chicago. The investor probably knows the cost for the past eight years more or less accurately. He may know what has been put into the record as to what the cost will be for the next 15 years, but I am not sure he will know what the cost is going to be. (Objection by Company Counsel overruled.)

1327 At page 5731, I testified in substance that I attempted to acquaint myself with the experiences during the period of construction and operation. I recalled as particularly interesting the freeze-ups which developed by virtue of the sudden expansion of certain gases that were ingredients in the gas transported due to the high pressures utilized. That problem confronted defendants in 1931 and I do not understand that the problem of those freeze-ups is considered as solved. They have faced those problems during the past 8 years. I cannot say that they consider that they have successfully handled them. I understand that considerable progress has been made in handling the situation about which relatively little was known at the time. I do not know Mr. Hammerschmidt. I never heard his name. I have not read his testimony. I testified at page 5732; "Thus the effort of reaching high pressures brought with it the thing I referred to as the formation of a type of ice." I don't know that the company has completely solved that problem. I understand they have made progress in solving that problem about which little was understood at the time the enterprise was initiated. I am not an engineer, but I do not admit that I have made no independent study of any of these things to determine how they were handled. I have made no independent study of these technical factors.

At page 5735, I testified in substance that it becomes for economics not a question of whether gas can be transported from Texas to Chicago, but whether it can be economically transported; at what investment cost can it be transported; what will the operating cost be. The problem of investment cost faced the company in 1931. Defendants do not face the problem of the investment cost of the line in existence, today. They might be concerned about the cost of additional investment if they had to make additional investment to salvage the existing investment. I think they will be concerned with that problem some day. It is not a practical concern at present. I have not read the testimony concerning the salvage of the property as a whole.

I testified that "Finally the question becomes also one as to whether the potential market, which is assumed to be there and which may be there, can actually be captured in a short enough period of time to make the undertaking profitable. If an effort of this sort had to go through a five or ten year period of inadequate utilization of the investment before an adequate market was finally developed, the income foregone during that period might be so large that the price which the customers in the future would be willing to pay would never adequately compensate the investment. Thus the time factor involved becomes economically important. The market must be appraised in terms of size, the nature of demand behavior, and how long it would take to be able actually to obtain the market which appears potentially available." That is definitely a problem which confronted the company at the time of the inception of the enterprise and is not of as great concern today. My recollection is that the company was not assured of its market at the time the line was built. The line had been substantially projected before arrangements were made for the market. Defendants knew that the line was built to serve the city of Chicago. The Chicago interests were financially interested in this enterprise.

At page 5737, I testified: "While the existence of a contractual arrangement would in all probability stabilize or establish the limits of the experience, or rather establish the nature of the experience with certain limits, yet ultimately the security behind the investment in a transportation facility of this sort is the security behind the
1328 readily available ultimate market. A contract for the delivery of gas on the basis of an amount which the market will not absorb would undoubtedly be subject to revision or compromise by failure of one of the contracting parties to be able, or to see fit, to continue to assume the burdens of such a contract out of proportion to the possibilities of the market." In making that statement I intended to imply that the contract has been a considerable protection to the investors in defendants. It is the general expectation, that when costs of production fall, producers must offer products at a lower price, or some other producer will enter the field and undersell them.

I recall discussing the wages of capital management as one of the elements of loan interest. I considered that element in my studies in this case. I used as an illustration or example the investor in a real estate mortgage, and in that connection stated that such investor would have to look into the property to see that the taxes were paid, the insurance kept up, and so forth. I think to a greater or less degree, every investor is conscious of the differences among securities in the amount of attention that needs to be given to his investment. I do not think in the case of corporate organization and stock ownership that stockholders ordinarily concern themselves with matters of that kind. I do not know of any case of a stockholder's interesting himself in the payment of taxes and such matters by the General Electric Company. I had occasion some years ago to discuss the number of disgruntled stockholder letters received by the management of a concern. They were wondering whether the management was taking care of all the things that ought to be taken care of. They were worried about their dividends and about saliries, I believe. There were some who were concerned that the salaries to the principal officers might be too high. Investors not infrequently put their securities in the hands of institutions for the performance of these functions. A trustee of a corporate bond issue looks into those things whenever someone urges him to. I believe there has been some complaint with respect to the energy which they have displayed in respect to attending to these matters. I do not say they generally ignore them, but in my opinion they have not been as energetic about enforcing the terms of the bonds as they might have been. I think that is a small hazard.

Cross-Examination by Mr. Slaff.

You ask me if I take full responsibility for the questions that were put to me and the answers that I gave on direct examination. (Objection by Company Counsel overruled.) My answer is I do not believe I could take full responsibility for the questions and answers. I take full responsibility for the answers. I did not read my direct testimony into the record; I used notes. I carefully prepared my direct testimony in advance. Not all of the questions and answers were prepared in typewritten form before I testified; many of them were. I do not believe I can say that the questions were prepared by me. As I recall, I broke up some of the questions into parts. It was suggested that they be broken into parts. I don't recall that I supplied the linking intermediate questions. My answers were rather long. I recollect also that some of the questions had a certain amount of academic and technical language in them. I spent two or three or four days with Judge Morgan in which he asked me questions and I would offer answers. Someone was taking them down as counsel asked them. A company stenographer was there, as far as I know, all the time. There were several occasions when I proposed testimony to Judge Morgan. I think my reactions suggested the lines of inquiry in the shaping of
1329 the examination. I don't remember suggesting that, "It might be a good idea if we explored this field a little further than we had gone," because I do remember Judge Morgan rather clearly indicated or spoke of what

he was interested in. I am quite sure that at such times I did suggest, "That means this to me" or words to that effect. I was given an entirely free hand in the development of my exhibits, but I was not responsible for the scope of the direct testimony.

As to Exhibit 152, I was told to go ahead and explore the field as to the factors which would have, in my opinion, significance as quantative factors in a determination of that sort. I think I had some doubt as to whether I was expected to cover everything. I said that if it was agreeable, I would prefer to put my energies into approaches which were possibly a little different than I had used before in that sort of determination, approaches that would have some by-product value to me, to which there was general assent and agreement given. (Examiner disallows the use of the word "fair" by Counsel for the Commission in questioning the witness.) I accept full responsibility for the preparation of Exhibit 152 and for my testimony about that exhibit. When I turned that exhibit over to Judge Morgan I went over with him very briefly what I wanted to say about the exhibit. I didn't do it comprehensively, I am sorry to say. I felt not the least restrained about anything I wanted to say about this exhibit. I would like to add that at the time I got to that rather substantial exhibit, there was every evidence of pressure against time, and I moved very rapidly and at various points in my testimony interjected that I was trying to save time by short cut explanations which I thought were adequate for an analysis of the exhibit as it stood. I was under that restraint.

I don't recall any questions during my direct testimony bearing on the advantages of the natural gas industry as compared with other industries, or the advantages of this company as compared with other companies from an investor's point of view. Certainly a consideration of the advantages of a given industry or a given company is part of the mental processes of an investor in making up his mind as to the return required by him from a specific industry or a specific company, but he could do that in two ways. On pages 5544-5547 I gave you as complete a list of the books and papers as I had available. I stated, however, that I did not intend it to be necessarily complete.

I am being compensated by the company for the time that I have spent in the preparation of my testimony and in the giving of my testimony and in the conferences and consultations with company people. It would be embarrassing to me in a way that you probably do not think of, to state the nature of my agreement or understanding for compensation; but I am willing to state it if you insist. I do not mean to foreclose it.

At times in my testimony when I have used the term "depreciation," or "provision for depreciation," I have had in mind the same thing that at other times has been referred to here as "amortization" and "provision for amortization." At other times I am not certain that we are talking about the same thing, when I use this other terminology. The term "amortization" is used with respect to the financial affairs of security issues, and I would not want to say that the terms necessarily always mean the same thing. I think an instance of where the two terms are used as having the same meaning is when counsel speaks of amortization of the investment or amortization of the value of the property over the life of
1330 the property, or over a period from now until the
projected end of the property.

I testified at pages 5552 and 5553 that from the standpoint of the economic analyst, it makes no difference as to the rate of return to which an enterprise is entitled whether its securities be in the form of bonds or preferred stock or common stock, or ordinary interest bearing indebtedness like that to the banks. At page 5559 I testified that "I meant to say that the fact to be determined is at what prospective return would capital employ itself if a given enterprise were initiated under present day conditions." In making that statement, I recognize that the investors in one class of securities as compared with the investors in other classes of securities would be influenced by the arrangements under which they make those investments. I merely meant to testify that when you approach the situation from the outside under regulation, that these arrangements that they have made among themselves should not be binding on or a burden on the public. I was viewing the investment as a whole and was speaking of the informed investor.

I cannot categorically answer your question as to whether or not there would be any different return required by the investors if the capital structure of defendants was represented entirely by common stock or by 50 per cent of bonds and the remainder in stock, because in my opinion it would depend very much upon the nature of the financial markets prevailing at the time. The financial markets today seem to preclude the issuance of anything but the highest class bonds. In my testimony on direct I was correlating my general testimony to the economic conditions and markets which exist today. If an investor were today contemplating any investment in a company, I do not believe it would make any difference whether the company were capitalized on all common stock basis, or if it were on a basis of 50 per cent first mortgage bonds and 50 per cent common stock. If defendants were capitalized on a 100 per cent stock basis, I believe the investor would go into this enterprise on an 8 or 9 per cent basis of return. He would offset the extra hazard of being in debt against the added rate of return which he could get from trading on the equity. So far as I know, the overall return ought to be the same. I believe he would go into it just as readily, if conditions were favorable to common stock financing, at the same rate of return as he would otherwise. That whole question turns on what is salable at a given time. There might not be that volume of common stock equity capital available at that time for that kind of an enterprise, and the only way the originator could get it would be to go in debt for part of it. There was no public financing in the case of defendants. Assuming that the business were to be started de novo today with the same investors, my judgment is that they would go into this enterprise on an 8 or 9 per cent basis if the capital structure of the company were represented entirely by stock, unless influenced by the bare possibility that a debt factor in the capitalization might have some tax advantage. Beyond that, with the same people making the investment, it seems to me it is almost a nominal arrangement. They have put all the money in anyhow, and what they label it does not make a lot of difference.

I have been thinking of a couple of other minor exceptions, such as the significance of a debt instrument for collateral purposes under some restrictions, and other minor factors which I do not believe are very important. As a broad over-all statement, if they were willing to go into this thing with a prospect of a 9 per cent return today, I do not see that it would make any difference whether they took part of their investment in bonds and part of it in stock. I think it is straining my testimony a little bit to say that they would be willing to go into it on an 8 or 9 per cent return basis. I said I thought a fair return was

that. Whether they would want to go into it on that
1331 basis is only answerable by them. My conception of
a fair rate of return is the rate at which capital would employ itself if a given enterprise were initiated under present-day conditions. I just wanted to leave the residue of doubt as to whether the 9 per cent actually as a fact would induce this particular group to do it today. I think groups of investors are classifiable. When I was speaking of investors and a fair rate of return of 9 per cent at the conclusion of my testimony, I thought that was a fair and minimum figure to offer as a rate of return. For a group like the owners of defendants, I do not see that it would make any difference whether the enterprise was capitalized entirely on 100 per cent capital stock.

I testified in substance at page 5555 that in my opinion a fair return or reasonable return cannot be ascertained with the same degree of precision as a past return, because the latter is an experienced and the other an expected fact. Since the one involves judgment and imputation for the future, it can never hope to be precise to the same degree that an experienced past fact is. The future rate of return is necessarily a matter of judgment. I would not agree with you that men with equal good judgment and equal integrity, and with an equal desire to be fair and reasonable, can very widely on what is fair rate of return in any given field if they are exposed to the same circumstances and facts. I would be inclined to agree that they might well honestly vary. Men of equal judgment and equal integrity, and with an equal desire to be fair and reasonable, may give different weight to the same factors. One may consider different factors from those others have taken into consideration. Different people are impressed in different degrees by the same factors.

I also testified, beginning on the page last mentioned, that "neither rate base nor rate of return are ultimate ends but on the contrary are but the indispensable means to the important end, namely, the return in the number of dollars." I think it is accurate to say that the return that the investor figures on receiving today when he contemplates an investment is the return on a certain number of dollars which he invests. I am afraid there is a misunderstanding though in the question, either on your part or on my part, namely, I was speaking here of the return to an enterprise, that is, for the enterprise it is a return in a number of dollars. I made that distinction in the beginning of the testimony, that I did not construe the return strictly as going to the investors, but as going to the enterprise, and to that enterprise it is ultimately a number of dollars. Looking at it from the viewpoint of the investor I think it is right, if you envision the investor as being faced with an opportunity to buy an investment at a certain price or leave it, that he determines what return he will be satisfied with when he relates that return to the number of dollars which he invests and weighs out the hazards and uncertainties and favorable aspects of his investment. Then he makes his adjustment with that price as a norm and arrives at the other elements. I agree that the investor I was talking about was the one who had a choice as to whether or not he was going to invest in this project or a project like it, or leave it alone. I merely want to make the distinction between the problem of the return to an industrial unit and the question of an investor's choice along alternative investments. The investor determines the return that he will be satisfied with when he envisions the number of dollars he will get from the enterprise, the hazards, advantages and disadvantages of that type of investment, the number of dollars that he is required to put up in the enterprise.

1332 At page 5557, I testified: "The presumption is that if the return, namely, the number of dollars, which is the vitally important thing, is to be fair or to be arrived at at a figure which would be deemed to be fair, then the two calculations which are necessarily previous to that determination would presumably also have to be fair". I had in mind legitimate processes. Theoretically, you might arrive at a fair return by over-stating the rate base and under-stating the rate of return. The investor has made up his mind as to what he deems to be the necessary return. Inadvertently, I think in the past that has been done. I did not assume that such method was used. To get it down to dollar figures, you state that the investor invests $100 and envisions and is entitled to a $6 return or an $8 return. You suggest we take $6 without prejudice. You ask me if in a regulatory proceeding subsequently thereto, and conditions have remained the same at the time of the regulatory proceedings, the rate base is fixed at $120, whether a rate of return might be fixed at 5 per cent and still return to the investor his fair return. No, I think there is a flaw in that. The $120 may be the present value of the property. I don't know whether that is implicit in your assumption or not. If $100 be the appropriate fair value at the time of the investigation and $120 was inadvertently or purposely conceived, then a lower percentage applied to that $120 would give you the same number of dollars in return as otherwise. The dollars return and not the rate of return is the important thing for the enterprise. I believe the investor might have been misled if such irregular methods were employed. In other words, if the announcement came out that 5 per cent was the rate of return fixed for the natural gas industry, those who read only that far and knew only that much would be horrified, of course, and take a psychological flight from any investment in such an industry. A different situation would obtain if they got all the facts. But the chances are that they usually do not. One who is fully aware of the facts would still be satisfied with the dollars return if they measured up to what he had contemplated as dollars return to begin with, and conditions had not changed. He might well say to himself, "We got this much more in the rate base, and we did not get what we expected in the rate of return; but we came out about even".

My conception of rate of return is that necessary present or annual wages of capital or the present return to capital that would be necessary if the business of this company were to be reproduced, and not that which woull be necessary to attract new capital to the business as that new capital is needed. I think the latter conception is inadequate because it is a matter of my observation and experience that the price at which you can get some new capital in may well be below what a fair rate of return would be. Thus, the owners of the equity might be called upon to make additional sacrifices under pressure for getting more capital in and the enterprise might be able to acquire that at rates which would be quite different. Thus, my conception of the rate of return is the present necessary supply price of capital. My conception of rate of return is the rate that would be necessary if the enterprise were being reproduced or purchased as it stands today in the light of present conditions. I think that either one suffices for practical purposes. My reason for my answer is that I did not mean to imply in this statement that there are theoretical conditions to be superimposed.

If the group of enterprisers were to purchase this business from those who now own it, they collectively would

demand an 8 or 9 per cent return on the value of the
1333 property. If the property did not exist and it were contemplated to reproduce this property, to bring gas from Texas to Chicago as it is now carried, the group of enterprisers who would undertake that business would demand the same 8 or 9 per cent return. That is related to the question of enterprise compensation. I think the two situations would work out the same; and, I believe I have explained that in my discussion of compensation of enterprise.

With respect to my statement that the "experienced past cost of capital of a given enterprise has nothing in particular to do with the present annual value of the capital employed," I was probably trying to recognize what you have in mind with words "in particular." By those words I meant "necessarily as such." I think I stated that if the past cost was known, under substantially similar circumstances, then it would probably be next to the best evidence of a contemporaneous bargain for that purpose, but insofar as it is remote and insofar as the circumstances are different, it fails to be good evidence. There is a distinction between the immediate past and a more remote past, or an immediate past and the present if there has been a violent change of circumstances such as the outbreak of a war, for example.

If this enterprise had offered bonds to the public at the time of its commencement, I rather doubt in the light of the circumstances, whether ~~or not~~ the rate of interest would have been less than the 6 per cent rate which is nominally on the bonds today. The state of the bond market at that time is reviewed in my exhibit and in my testimony in connection with the exhibit. That is why I have rather grave doubts as to whether they could have sold the bonds when they got up to the point of raising capital, and moreover for retrospective valuation like that, it would have to be remembered that it was a construction project actually at the time, and the financing of a construction project in 1931 would probably have involved tremendous difficulties. It was probably a practical matter ~~not~~ to think of public financing at the time.

I have given some thought to the required yield on bonds of this company ~~today~~ if offered to the public. It would largely depend on how much capital the company would choose to raise that way, what coverage they would be able to provide. I considered the coverage that they would be able to provide and the amount they would normally offer if they tried to raise capital in that way. That is a device which one normally employs as a sort of an experimental check to see how the situation might stand. I do not think it would be practical to think of more than a 40 per cent debt ratio; and it seems to me that to offer almost the only kind of a bond which the present market receives very favorably, would probably require a 5 times interest requirements coverage, and therefore, including the cost of financing, that is, reflecting the cost to the company as well as the yield to the investor, that that probably would be 4¼ or 4½ per cent.

I have read the report of the recent Northern Natural Gas Company financing. I do not recall the ratio of the bonds to the total capitalization but I think the coverage was something over 6:9 times. I do not recall the ratio of the debt. I know that the income coverage was very high. The yield, I belive, was about 3.25. The issue was $16,000,000, sold in August, 1939, I think. I do not have in mind what the times earned coverage would be if bonds of Natural Gas Pipeline Company were issued to 40 per cent of the capitalization of the company at 3.25. I did not think it was necessary to make that calculation. I think it advisable to find out whether this company could finance today the issuance of 40 per cent first mortgage bonds and
the coupons that such bonds would have to bear, but
1334 I do not think it necessary to think in terms of the ab-
solute quantities of bonds. I was cognizant of the fact that the Northern Natural was financing today with bonds bearing 3¼ per cent coupon rate and of the coverage required for that coupon rate. I made no attempt to determine what the coverage of Natural Gas Pipeline Company would be if it were today to finance on a basis of 40 per cent of first mortgage bonds carrying that 3.25 coupon rate. I went through a calculation on a 5 times coverage basis. I do not think it pertinent whether we think in terms of $40,000,000 or $60,000,000 situation if we have our yield and our coverage relationships.

The coverage is the income available related to dollars of yield. The dollars yield depends upon the dollars amount of bonds outstanding. You can make that calculation per thousand dollar bond just as well as per hundred thousand or million dollars of bonds. The times earned coverage depends upon the income of the company and the debt that the company might have. They must not be taken alone. The first base is the income and the second base is the amount of debt, and the third base is the interest rate which that debt bears. With those three figures you can determine the times earned coverage, but you can take $100 as the base or $1,000 as the base, and set up 40 per cent from it as your debt. I am giving you an explanation of the principle as to how it could be done without reference to the particular volume of the debt. I did not calculate in my mind as to whether defendants could issue bonds at the rate of the Northern Natural Gas Company bonds. I did not calculate it back to a 3.25 basis. I assumed a 40 per cent debt as a 4¼ to 4½ per cent net cost to the company. On a 9 per cent rate of return, an indebtness of 40 per cent bearing 3¼ per cent interest would result in coverage of 4 to 4½.

On page 5577, I testified that "pure interest would more nearly approach the yield on as near to a riskless loan as one might be able to envision." I am not prepared to say that pure interest is synonomous with the interest on a riskless loan today. I think that is one of the ways for approximation, but as I pointed out in my testimony, you can have riskless loans or approximately riskless loans or what are considered prime loans yielding you less than 1 per cent, and also yielding you close to 3 per cent probably, and to impute to either of these rates pure interest puts you in the dilemma of explaining how you can have two different rates at the same time. While pure interest would more nearly approach the yield of as near to a riskless loan as we may be able to envision, if there are any other factors in it, then obviously the yield on that type of loan would not reflect pure interest.

At page 5579, I testified concerning enterprising capital and the necessary return to the entrepreneur in industry. In the particular instance it seems to me that all of the capital was entrepreneurial and is still so. It was not entrepreneurial capital that purchased the bonds of various natuarl gas companies this summer. I think most of them were placed with life insurance companies. To a limited extent such institutions place their funds in enterprises of that sort which are established and doing business. The entire bond issue of the Northern Natural was taken up by institutions. I do not belive that very generally the funds of savings banks or trust funds could be invested in bonds of natural gas pipelines. I do not know as a matter of fact, but it is my impression that they might have difficulty in qualifying in the leading states as legal investments even as a type.

I am familiar with law of the State of New York as to the type of bonds that are legal investments. I under-
1335 stand there is a department of the State government
that passes on a particular issue. Whether the type of investment is legal depends upon the interpretation of the law by that department. I informed myself as to the requirement of the law in New York because that is an important state. I have a statement I thought was pertinent. It is from McKinney's Consolidated Laws of New York, annotated 1939 cumulative annual pocket part, book 4 of the banking laws, section 235. I will read this paragraph. "Bonds of any corporation which at the time of such investment is incorporated under the laws of the United States or any state thereof, or the District of Columbia, and transacting the business of supplying electrical energy, or artificial gas or natural gas purchased from another corporation and supplied in substitution for, or in mixture with, artificial gas, for light, heat, power and other purposes, or transacting any or all of such business, provided, at least seventy-five per centum of the gross operating revenues of any such corporation are derived from such business, and not more than fifteen per centum of the gross operating revenues are derived from any one kind of business other than supplying electricity or gas or electricity and gas; and provided such corporation is subject to regulation by a public service commission or public utility commission, or other similar regulatory body duly established by the laws of the United States or the states in which such corporation operates, subject to the following conditions:".

I made an effort to come to a conclusion as to whether the bonds of defendants qualified as the tpye of investment under that section. The banking department of New York State will not answer a hypothetical application for qualification, but in the course of the effort to obtain such a predetermination, I did gather the opinion that a natural gas pipeline company as such could not qualify or probably would not qualify under the law. That is my opinion as to whether it would or not. I could not qualify probably as a type of investment which would qualify, because such a company, in my opinion, would not be a corporation supplying artificial or natuarl gas purchased from another corporation and supplied in substitution for or in mixture with artificial gas for light, heat, power and other purposes. Natural Gas Pipeline Company is a corporation organized under the laws of a state of the United States. It transacts the business of supplying natural gas at wholesale. I think I know what the term "the business" means in New York. I have an opinion on that. That company is obviously engaged in the natural gas business and purchases its natural gas from another corporation affiliated very closely as a wholly owned subsidiary, a corporate fiction which might be looked through. The natural gas it supplies is in substitution for or for mixture with artificial gas, and that gas is used for light, heat, power, or other purposes. I think 75 per cent of the gross operating revenues are derived from its business of supplying gas at wholesale and not more than 15 per cent of the gross operating revenue is derived from any one kind of business other than supplying natural gas.

It is presumed that this corporation is subject to regulation by a public regulatory body duly established by the laws of the United States. Still, my opinion is they are not available as a type for legal investment. I made direct inquiry to the Department of Banking of the State of New York on that point. I had my lawyers have conversations with them so that we could talk the lawyer's language
1336 over there. There are no formal opinions, because there are no natural gas pipeline bonds legal in New York State; but I went to great pains to get the opinions of people connected with the legislation which modified the law in New York State, the opinions of lawyers for savings banks who have a great deal to do with these questions, and conferred with two of the men on the staff of the Commission itself, and on the basis of their responses, I formed my opinion.

I testified at page 5583 "I was talking about the amount of care and attention which the owner of the securities had to give to certain types of securities as compared with other types about which he might feel very much freer and certain as to the future." I made no effort to find out how much care and attention the Standard Oil of New Jersey presently gives to its holdings in defendants. My testimony was with respect to the general principle of the ingredients of loan interest for attention and concern. I did not inquire as to what any particular investor had done.

My answer applies with respect to any one of the group of investors in this enterprise.

At page 5590 I testified: "What we have in mind is simply the time and attention, the energy, care and concern which the people who put up the money give to it over and above the attention which is given by hired managers, technicians, specialists, which the enterprise itself may hire." In this instance the people who put up the money would be the artificial persons, the corporations which made the investment. It is true they function through individuals, but those individuals were their own employees and not employees of defendants. That was the burden of my distinction here. I do not know whether the time and attention of any of the individuals given to this enterprise was charged to operating expenses of any public utility company. I made no effort to find that out. I know that none of these companies are public utilities and I let it go at that. Cities Service Company as such is not a public utility. I do not know where the people who worked on this enterprise and who were a part of the Cities Service system were employed at the time they were working on this enterprise. I don't know where their wages were charged, but if they were employees of the Cities Service Company they should have been on that company's payroll. If they were not employees of the Cities Service Company but of some company in the Cities Service system, then they presumably would be employees of the company in the system and would be paid by it unless they went to to the refinement, which perhaps they should have, of dividing the time and making appropriate allocations. I do not know ~~the~~ facts as to those charges. I made no effort to determine the accounting procedure with respect to the salaries of those individuals. I believe the Chicago utilities who were interested in this company had people devoting time to the investment at its inception. I made no effort to determine whether their salaries were charged to operating expenses of operating utilities.

At line 14 of page 5590 I stated in substance that I thought it entirely contrary to the fact to assume that these enterprising capitalists can and do sublet all these functions of giving care and concern to the investment. By "they" I meant the people who directly or indirectly or ultimately had their funds at stake. I had reference not to the corporate intermediary necessarily, but to those people who ultimately had a substantial investment at stake.

I don't know who they were. There is Henry L. Doherty, for example, who is undoubtedly such a final person.

1337 The question asked me by Mr. Morgan at page 5588 I took to be a hypothetical question based on the record in the case. I was applyling the principle that I had been discussing to the record in this case. When I stated that "as a practical matter, if they have confidence in their own opinion and are of that class, they probably cannot find the people in whose decisions they have equal confidence," and so on, I had in mind there as a general group those ultimate investors. I did not feel called upon to specify them by name. I don't know their names. I think I had in mind the people who had a substantial financial interest —an enterpriser's interest—in the companies which either directly or indirectly made the investments in this undertaking. I did not include all of the common stockholders of the Cities Service Company, obviously. I had in mind those who had a substantial interest. By "substantial interest" I mean something in contrast to 10 or 20 shares of the small investors. I don't think I had a definite number of shares in mind. I definitely had more than 20 or 100 in mind; undoubtedly more than 200, or a 1,000; probably more than 5,000, 10,000 or 20,000. I had in mind a substantial amount. I don't recall even about what the number of shares Cities Service was at that time. A change in the number of shares makes it impossible to say 10,000 or 100,000. I had in mind the kind of an interest that Mr. Doherty might have in Cities Service. I don't think I had any individuals specifically in mind outside of Mr. Doherty whose interest in this thing from the beginning evidenced that sort of concern. I don't know that he was putting up somebody else's money. He was putting up money of a corporation in which he had a substantial interest, I belive. I don't know what that interest was. I had the impression that it was substantial in 1929 and 1930. I know it was substantial. I happened to have been involved in undertakings where it was disclosed what his interests were. I don't remember the figures. I'm sorry; that was a number of years ago. I think Henry L. Doherty typifies what I had in mind there. I did not have anyone specifically in mind. I don't know the investment distribution of the large interests in the Standard Oil Company of New Jersey. I had no one particularly in mind with respect to the Texas Company, or the Columbian Carbon Company, or the Southwestern Development Company. In the Natural Gas Investment

Company representing the Illinois utilities, there was Mr. Insull as typifying the enterpriser. I do not know what Mr. Insull's interests were in the Chicago utilities in 1929 and 1930. They were still quite substantial as I remember. I would say very substantial. Those are the only two means that come to my mind. My answer would have been the same if I had known the names of the others and it would not have been different if I had not known those two names.

When I testified at page 5591 that the performance of the function of capital management does not take the form of a transaction, and so on, I was not thinking in terms of particular individuals in your answer to that question. The question was, as you will note at lines 4 and 5, "What is the difference between cost as you have used that term and expense?" I do not believe I had anyone particularly in mind when I made that answer. I do not think the answer implies that. I had no "the individual" in mind. I might have said "an individual" and it would have been just as appropriate. I have no particular individual in mind today. I think the statement applies to most individuals who have an investment, but I did not mean it as to no individual in general.

1338 At page 5592, I testified: "The performance of the functions of capital management to a considerable extent precede the actual commitment of capital, in fact much of the work is done normally prior to an actual commitment." The people I had in mind there were the individuals who were not paid or hired employees of this concern or of the syndicates or groups who preceded it. I don't know the names of any such people. I'm quite confident there were such people. I would very much doubt whether the committees that met and undoubtedly discussed this project accounted for their time against the undertaking. Mr. Gallagher was being paid a salary some place when he was on those committees; his salary affected the net income of the companies in which there were investments by others who were the ultimate common stock entrepreneurs. I don't know whether that salary is or was at that time being charged to operating expenses of a public utility. Mr. Gallagher has been identified as having had something to do with an oil company here. The presumption is that his salary and that ultimately means his time and energy affected the flow of income of the corporate enterprise which was paying him. Directly or indirectly

Standard Oil Company is interested in some natural gas companies. The Hope Natural Gas System is a Standard Oil subsidiary. I would be very much surprised if, as a Standard Oil employee, his salary was charged down to some utility company. As to the Cities Service Company, holding companies in a managerial relationship are a different matter. I did not know that Mr. Gallagher was an executive of a public utility company as stated here by Mr. Booth. My surprise was directed at any circumstance under which an employee of the Standard Oil Company would find his salary charged to a public utility company in which they had an interest. But an employee of a public utility company in which the Standard Oil Company had an interest might well have served as Standard's representative in this early syndicate in the arrangements which preceded this company. Mr. Gallagher might have been an executive of several companies and his salary might have been divided in the light of that and his time appropriately divided. I do not know the facts.

Any given industrial unit in the electric industry, within the range of operations now envisioned, would experience decreasing costs and increasing returns. It was characterized by the possibility of lower costs to the consumers. That observation is not so true of the manufactured gas industry. I could not say how much less true it is. As to the natural gas industry, insofar as there is an element of exhaustible natural resource in it, the principle is not true, and we have more commonly to recognize that as an industry of increasing costs. When you suggest that the natural gas industry was characterized by decreasing costs and increasing returns, you are confusing two types of cost behavior. I don't know what you mean; I don't know what phenomena you refer to. I can explain the two of them to you and then you can see. Externally the natural gas industry is not so characterized. As for the gas industry as a whole, it is not so characterized in any marked degree.

I said four or five years ago that the gas industry was characterized by decreasing costs and increasing returns, and thus the possibility of lower prices to the consumer at a time when I was speaking of internal cost behavior and not external cost. I don't know whether I made that statement flatly and categorically five years ago. You will have to refresh my memory, but I am taking your word for granted. I submitted a statement to the Senate Commit-

tee on Interstate Commerce during the hearings on the Holding Company bill. The document submitted was the reduction of a speech which I allowed them to present. I don't think it is an accurate statement to say that this document was presented through the medium of the Associated Gas & Electric system. I believe Mr. Burroughs, the vice president of the Associated Gas & Electric Company or someone else, submitted my statement in a letter which was sent to the members of the Committee on Interstate Commerce of the United States Senate. I don't know that he did. I think I could have said in that document that "the gas and electric industries are characterized by decreasing costs, increasing returns, and thus the possibility of lower prices to the consumers." I cannot
1339 remember a document of that sort for that length of time.

You have handed me the document and I find that you have accurately stated what I said there. I think I received a fee for preparing that document for publication; I don't remember the amount. It was a paper that I had presented in substance before the Economic Research Round Table that meets at the Bankers Club, and I think some representative of the company was there and heard it. The fee to which I referred was paid by the company. It was a paper which required considerable polishing and fixing up before it was presented as a public document which it was apparently going to be. I think that statement appeared in the original presentation before the Economic Research Round Table. The statement I made was a perfectly valid principle, and I would not dispute that I said it before and would say it again. I am not disputing that principle today. It has to be understood in its context, however. You have to understand the kind of increasing cost you are talking about before it means anything. I think the members of the Senate Committee probably would construe the terms in the sense in which I used them and not in the sense in which the phenomena develops with respect to a natural resource. I don't think I made the distinction in that paper.

At page 5594, I testified that it was my opinion that the wages of capital management did not take the form which would be readily reflected as an expense; that the appropriate way to recognize its compensation is in the return. If, as you suggest, it did take the form which would be reflected as an expense, that would not change my answer. It might be reflected as the expense of one of the corporate enterprises in the case of an employee of such an enterprising corporation, and thus cause a reduction of the net income which that company would otherwise have. If it is reflected as an expense and changed as an expense of this enterprise, it should not be included in the return. I tried to be very careful about that. It is entirely inappropriate to charge it twice. Applying the principle to this company, the analogous period after making the mortage loan in the case used as the illustration, would be the period after the enterprise began. I had no intention of implying that any of the expenses which are normally experienced by a form of enterprise such as the Natural Gas Pipeline Company of America are appropriately to be considered in this other factor,—the added cost of giving continuing concern to the management of the investment. The expenses which would be charged are not involved in the return; it is quite inappropriate to do so, as I say.

At page 5596, I testified that I thought just as soon as the investor had a reasonably substantial interest in considering the possibilities of a given line of employment of his capital, that he would then be conscious of the amount of extra attention, concern and effort that this particular line would impose on him in the light of the return which is probably available, and he would make a comparison between that and the alternatives that would be available to him. That answer was made in reply to a question with respect to the general principle. I do not gather that it has any relationship to this particular enterprise from the part of the record I have been able to look at. I think that was a general observation with respect to a type of return which is applicable here and any other
1340 enterprise.

You ask me as to the identity of "he", referred to in my answer. I think the term "he" is properly interpreted to refer to the corporate or individual enterprisers who were investing in that undertaking. There were no individual enterprisers investing directly in defendants. I mean the corporate enterprisers who invested directly, and the individual enterprisers who invested indirectly. The corporate enterprisers were the six corporate entities who participated in this company. The only individual enterprisers whose names I recall just now are Henry L. Doherty and Sanuel Insull. I do not agree that the two individual indirect investors are all of the individual enterprisers. I can only think of those two individuals.

There must have been others. I do not recall that I thought of others during the preparation of my testimony in this case. If I had not thought of any individuals, my testimony would have been the same.

I believe I testified at page 5605 that: "The first statement I would like to make is that it depends upon whether the enterprising capitalist envisioned the probable gains from taking these pioneering risks, whether they were entirely fortuitous or whether they were part of his inducement as a first and most fundamental consideration," and so forth. In that statement, I was referring to the six enterprising corporations and any individuals secondarily involved irrespective of my memory as to their names. The names of the individuals were not essential to the answer.

I cannot tell you today in relating that generalization to this specific enterprise anyone besides the two individuals in the six corporations who had that position of enterprising capitalist that I spoke of in my general answers. I don't know today what any of these enterprising capitalists in this particular investment or enterprise envisioned with respect to return or additional increment of return that may have been under discussion in my general answer. In the earlier part of the same answer, I stated that the answer to the question that had been asked me could not be given absolutely and categorically; that it involved an amount of economic analysis which is probably to a degree unknown except to those who engage in that sort of refined thinking.

By "those who engage in that sort of refined thinking," I was referring to economists or others who are sufficiently acquainted with it, to use a marginal approach to the analysis. Certainly, I assumed that the Federal Power Commission was capable of the necessary economic analysis or the necessary refined thinking to cope with that problem. They must have specialists capable of dealing in those terms. In fact, I know they have.

At page 5607 I stated: "Of course, assuming that there is no monopoly of the opportunity, that there is an opportunity for this competition of the people who are willing to assume these functions at differeent prices, and that there is every opportunity for free bargaining in every sense to achieve or get hold of this opportunity, the fellow who is willing to work for society at the lowest price in general and on the average gets the opportunity." I believe in general those assumptions apply here, as I understood the circumstances to prevail in 1929.

1341 Yes, the Chicago utility interests became participants in this venture. Their becoming participants in the venture introduced an element of restraint which might be termed a practical monopoly. I merely wanted to note that I was not certain that a pipeline could not have been built to the industrial areas around Chicago without the necessary cooperation of the Insull utilities. As to whether a pipeline could be built into the industrial areas to carry only an industrial load to distribute direct to industries and be profitable and earn a 9 per cent return is a big question I don't know. I merely wanted to protect the previous answer by calling attention to that possibility. I don't think what I said is metaphysical speculation by any means. We are not engaged nor are we trying to be engaged in any kind of a speculation, but we are trying to relate ourselves to reasonable probalities or reasonable possibilities. I think there is a reasonable possibility that someone else would build a pipeline into Chicago notwithstanding those who controlled the retail market were participants in this venture.

My recollection of these proposals at that time was that there were different people considering this kind of an undertaking. I don't know about the dates as to whether they were considering it after the Chicago utility interests became participants; but it is also to be recalled in that connection that this project was undertaken and projected before the Insull interests made themselves a part of it. I think it is reasonable to say that when the Chicago utility interests joined up with this enterprise that the opportunity for someone else to participate with the Insull interests there was probably foreclosed. There could have been competition for the Insull participation. I don't know whether the freedom or the lack of freedom of opportunity was dependent also upon the control of reserves in the Texas Panhandle.

I do not feel that I am competent to judge as to whether or not it could have been done from the Hugoton field in Kansas. I do not know whether the Hugoton field had been proved in at that time.

Assuming that the enterprise was to bring natural gas from the Texas Panhandle field to Chicago, the opportunity depended to a large extent upon control of reserves in the Panhandle field. My understanding is that this particular company controls only about 10 percent of the acreage down there. Certainly, they should have attempted to obtain an adequate amount of reserves to provide adequate reserves for the city of Chicago.

As to whether there was every opportunity for free bargaining in every sense to achieve or get hold of this opportunity in this case, I think it is difficult to state as a fact. I don't know that there was every opportunity. The question there was one dealing with principle. I thought I had given a complete and elaborate answer there so that there would not be any misunderstanding as to what was involved. I purposely put in this observation to make it perfectly clear that this principle would operate under such conditions. To the extent that those conditions may be absent, the principle would not operate as perfectly. The principle could be carried to an extreme so that, in the absence of some of the conditions, it would not apply at all.

I cannot testify to everything that is in the record. I have not read it all. (Objection by Company Counsel overruled). If it could be assumed that there was a monopoly, then the principle of competitive determination of marginal returns would not operate. Of course, if the assumption that I made did not in fact exist, then the compensation for the performance of the function might
be considerably greater than that marginal necessary
1342 compensation, and I believe it is a fact that it might
be more than the socially lowest cost.

In my answer at page 5608, beginning at line 9, and my answer at page 5611, line 15, I was assuming what we might term the free play of competitive forces. So then if there was not that free play of competitive forces present, then, as a pure theoretical concept, you would be doing the entrepreneur no injustice and society no harm by depriving the entrepreneur of that excess above the marginally necessary increment.

I would want to add for a degree of realism that we realize that practically nowhere in economic society does such a perfect state exist; and all practical circumstances are to an extent not representative of this pure conception. I was attempting to state the principle in as simple as possible terms in my direct testimony.

At page 5614 I testified in substance that "if it becomes the understanding of people potentially disposed to be enterprisers that there is to be no allowance of any compensation for the exercise of these functions, they naturally will not be disposed to assume them," and so on. No, I was not discussing that as just a theory or academic concept. I think that is quite related to the practical realities. Continuing, I said that "as a result of that, the progress of our industrinal system would be hampered, the disposition to go into these things would be discouraged, and society would lose the benefit of the improvements; and more than that, I think it would lose the benefits of the efforts to do the things more economically which is another result of the operation of this kind of system."

I feel the railroad industry as a striking illustration of that in the United States. To an extent, I think the electric light and power industry is becoming an illustration; and to a very considerable extent, the enterprise of real estate developers and operators is being influenced in large cities. I was discussing the general principle. In addition to those I named, the urban transportation industry is an example. I think the manufactured gas industry might be included. I was speaking generally in response to a general question of the general principle of inducement. It is all pervasive. It operates in every aspect of economic behavior. The question was one of which I believe one thinks rarely in terms of an abstract principle but relates it to instances.

You are trying to get me to place my mind back at the time I was thinking those things out, which is very difficult. You appreciate it is casting back to the time when I was thinking these things out. I don't remember everything that went through my mind at the time. I did not say that the railroad industry has not attempted to apply new things or new techniques to the industry. From time to time they make a bit of an effort here and there, such as buying a few streamlined passenger trains. As to what I think of the electrification of railroads, I don't think much of it. There is considerable doubt as to whether that is an advance in technique in my judgment. It is my opinion that the railroad industry status today is to a considerable extent the result of discouragement in that industry. It has attempted to apply new things and new technique to the development of new products or new markets.

1343 The electric light and power industry had had a period of very rapid growth and splendid accomplishment. It is continually applying new things and new techniques to the development of new products and new markets; but I believe at a clearly slower rate. To some extent it is still going forward and attempting to apply new things and new techniques to the development of new products and new markets.

I believe that socity has lost the benefit of improvements that might otherwise have been made in the electric light and power industry. In other words, I believe that the development rate has been slowed up through the discouragement of enterprise. I think undoubtedly that in the electric light and power industry there is a disposition not to go as far in capital investment assumed.

At page 5618 I testified: "There are the chances of loss over and above the calculable or approximately calcuable risks which have to be recognized, and those we choose to distinguish as uncertainties," and so on. Of course, there is a chance of the experience basis reflecting either above or below the indicated or calculable, but the probabilities are always pretty much on the above side. I understand that the actuarial calculations with respect to insurance companies are not necessarily based on their own experience, and a good many of them are using primary actuarial calculations which more recent experience has probably disclosed as obsolete. The chance of loss to the specific company might be either greater or less than indicated by the actuarial experience of the others. I just wanted to point out that many companies report a better experience than the actuarial experience, and the reason for that is that a true actuarial basis was probably not initially employed.

At page 5622 I testified: "Despite the imposition of regulation as a legal fact, entrepreneural investors still persisted in the belief that there was a chance for an enterpriser's return in those industries; and as a matter of fact the regulatory process was not imposed with the rigidity which the regulatory formula would imply in all of the States of the United States," and so forth. You ask as to whether the regulatory formula was applied in different states with varying degrees of severity. I do not like the use of the word "severity". I would answer it and say yes, that it was applied in different states at different times and the scope of that regulation was different, and the commissions probably differed in the assiduousness with which they went after the application of the legislation.

I have pointed out that regulation of the electric industry started earlier in some states than in others, and was enforced more vigorously in some states than in others. The statutory provisions in some states were different from the others and bore differently upon the industry in different states. I think I meant to imply that to an extent entrepreneurs gave some consideration to these differences, but it must be recognized that there are many other factors involved as well as this one, which is only one of many considerations which probably operated to determine the comparative development in different states.

1344 There has been a public service commission in New York since 1908. In Kentucky there was no public service commission until 1934. I think that the electric entrepreneur was influenced in evaluating an investment in New York as against one in Kentucky by the fact that New York had state regulation and Kentucky did not. I think the effect of regulation in New York was to discourage investment in New York electric utilities. I do not think it had a determining influence, however. I believe it did have an effect in discouraging investment in electric utilities in New York as against similar investments in Kentucky. I don't believe it was determinative because the states are so noncomparable otherwise. That factor had some insubstantial effect in discouraging investment in electric utilities in New York state as against investment in similar utilities in Kentucky. I think, therefore, the effect was not substantial as between those particular states. I cannot say that I know of any investor who preferred to invest money in Kentucky rather than New York. That circumstance is due to the other factors involved.

I don't know the percentage of the total investment in the electric utility industry throughout the country, which is represented by New York investments in that field. It is a very substantial percentage. It might be 10 per cent or more. Consolidated Edison has big figures of plant of something like seven or eight hundred million dollars.

The observations I have made with reference to the electric industry do not apply significantly to the telephone industry. I do not think the telephone industry has been discouraged or hampered as much as the electric industry by the application of the regulatory process. I am not prepared to say how much it has been hampered. I can not give quantitative expression to a judgment of that sort. The Bell System represents 80 or 90 per cent of the total capital invested in the telephone industry. I think it is a fact that the greatest growth of the Bell System has occurred under regulation. I do not have in mind exactly the number of states that did anything significant about telephone regulation.

Cross-Examination Interposed by Mr. Booth.

It is true that between 1920 and 1930 there was considerable litigation over the rates of telephone companies in this country. There were a great many orders entered by public service commissions and utility commissions in various states in the United States, cutting the rates of telephone companies. I have the impression that it was in a relatively few states in which the activities took place.

I have read the opinion in Lindheimer *vs.* Illinois Bell Telephone Company. I do not remember when the order in that case was entered. It took a long number of years to bring it to a conclusion. I can not say that during the pendency of that proceeding there was any retarding of the growth of the Illinois Bell Telephone Company in the State of Illinois: I have not examined it. I think there was a rather substantial growth of that company during that period. Growth and prosperity of that company was mentioned by the Supreme Court in its final decision in 1934. I am in no position to tell the Federal Power Commission that there was any retarding of the growth of the telephone industry as the result of the rate orders entered by the Illinois and the other commissions during the period 1920 to 1930. I do not know.

1345 *Cross-Examination by Mr. Slaff Resumed.*

I do not know the figure as to the number of stations in the Bell System in 1920, nor do I know the exact figures as of the present time. I have not the figures showing the investment in telephone plants in the year 1920. The figures you have stated here do not indicate any discouragement in entrepreneurial enterprise in the telephone industry. The first indication of discouragement of entrepreneurial enterprise in the telephone industry would come in the attitude of the executives and professional employees in the industry towards the future; their spirit and attitude with respect to their jobs. I think their general spirit is the first reflection.

I think the finest sort of a test as to how an industry is going is the test of the emotional attitude of the people in it that are close enough to these large problems to be responsive to them and not whether the stockholders or security holders are putting up the money in the future. In this test you can not put your finger on it but you can put your ear to it. There is no difference as to the fact in either instance. I tried to make it perfectly clear in my first answer on the telephone business, that I did not consider that as one of the industries where this movement had come to any high point as yet, compared particularly to the electric industry. I think it has come to the point where the managerial factor is feeling a bit discouraged about the future. I think that will be reflected in a gradual departure from the employment of these companies to the more enterprising opportunities.

As to whether Mr. Gifford will leave his job, I think he has reached the age where he probably will not consider a transfer. I do not think they are going to leave the telephone system and get into something like the natural gas system. Those who are disposed to respond and leave in search of the stimuli that come from enterprise and opportunity will, if they are young enough, tend to leave those industries in which that spirit develops; and, on the other hand, those industries cease recruiting the younger people who have that type of disposition. I think the conditions as they have developed in more recent years have started a movement of that sort in the telephone industry.

As to what I think of the prospect of the telephone company for the future, I think there is a disposition on the part of the more enterprising people to leave it if they have alternative opportunities and if they are not too old. The type of individual who is responsive to the circumstances we have been discussing would lay himself open to alternative opportunities. These alternative opportunities would be in some unregulated industry. There is going to be an exodus of young enterprising spirits from the telephone industry to unregulated industry, under the conditions of my previous answers. That is what happened to the railroad industry. In my judgment there will be some exodus of young enterprising spirits from the telephone industry into unregulated industry in the future, but I have not decided how much. I think the impact has already taken place today. It is a factor that is already beginning to operate. I have talked to a great many telephone people and I have gotten the reflections of their feelings. I think the Bell System is being pretty well operated today.

1346 At page 5623 I testified: "It is only in relatively recent times that in still relatively restricted quarters there is the increased warning to the entrepreneurs and investors that this regulatory formula is going to be imposed with increasing rigidity and precision and exactness, and it is that, in my opinion, which is primarily making the investor feel that there is not going to be any chance for an adequately compensatory return." When I made that statement I had in mind the fact that the refinement of the regulatory technique was beginning in certain states, among which I could mention Wisconsin, New York and California. They were imposing regulation at an early date, and are not a good illustration of a recent trend. I think Illinois could also be mentioned. I used that expression merely to refer to it as beginning at certain places. Some people say it began in New York and some say in Wisconsin. I would not argue about that. That is spreading now to other states under the guidance of the Committees of the National Association of Railway and Utility Commissioners; and new legislation is spreading to other states. A large number of them, for example, have adopted the Committees' recommendations with respect to original cost accounting. There are implications which very much concern the informed investors and discourage them. I do not know whether I read the statements about these regulated institutions or businesses withholding their money and not expanding their businesses in the newspapers, financial journals or where, but it is my impression that they were becoming discouraged.

Such public observations as statements at national conventions of the utilities, and so on, whether they are optimistic, sales promotion speeches or other things, I do not place an awful lot of confidence in. I merely called attention to the fact that in a few places it was starting; and it was now under the guidance of the National Association, and to some extent as the result of the introduction of Federal regulation these newer approaches were spreading rather rapidly.

As to what Federal regulation I referred to, the Federal Power Commission is an example. I was thinking specifically of the Federal Power Commission, in relation to the electric industry. The promulgation of a classification of accounts by the Federal Power Commission put commissions in many states in an awkward position unless there was a disposition to make their requirements conform or be identical with the Federal Power Commission's requirements. I have not said that the adoption of a uniform system of accounts is discouraging to the investor. I said that the introduction of Federal regulation and the use of such a device tended to speed up the adoption of similar or identical principles in a great many of the states. It is as discouraging as the principles according to which they are proceeding. The point was merely that that was hastening the process. I think regulation under the Federal Power Commission is one of the things that has implications which are discouraging to investors. As to such regulations as the Securities and Exchange Commission makes, I think some of these regulations operate probably in one direction and some in another.

I think the requirements under the Holding Company Act are probably interfering to a considerable extent with what might otherwise be done. I think there would be considerable willingness to speculate on integrating and organizing the industry if it did not have to go through the process which it appears to have to go through. The regulation of security issues is one of the things I had in mind that probably, on net balance, was contributing something in the way of an advantage to the investor. I am very much in sympathy with the information requirements of the Securities Act. I think that when an investor in-
1347 vests in a utility security which is subject to the
jurisdiction of the S. E. C., he appreciates the circumstances that the security has undergone careful scrutiny by the Commission to see whether it meets the standards prescribed in the statute. Very definite standards are prescribed in the Holding Company Act of 1935 for the protection of investors.

Going back to the problem of state regulation, I spoke of the tendency through the committees of the National

Association to adopt original cost principles, as one of the specific things I had in mind. In addition, I might add the identification of property under the acquisition adjustment accounts. The investor is frightened by that regulation because he does not know what it means. He is worried about it. The imposition or attempted imposition or attempted imposition of straight line depreciation, for instance.

The application of straight line depreciation for the telephone industry has not discouraged investors because they started early and accumulated very substantial reserves. I do not know that you can just relate the fact that that has encouraged the growth of the industry. It has been a practice which has resulted in the collection, from the customers, of substantial reserves which were available for investment in property. If that capital is more readily available than outside capital, that would be true to that extent. It would naturally contribute to the growth of the industry and as far as these funds have been available for that purpose they have contributed to or resulted in growth.

Another factor of discouragement is the more frequent rate revisions, the frequency of rate attention. Yes, I know of the Potomac Electric Company. I am familiar with the plan under which that company operates, known as the Washington plan. That requires regular annual year-by-year rate revision and it is also, allegedly, a profit sharing plan. I have a recollection in general that there have been reductions in rates from time to time since 1924 or 1925, practically every year. I do not know that the top residential rates in Washington have been reduced 30-odd percent since this so-called Washington plan of regulation was put into operation. There have been substantial reductions, both in top rates and average rates. The average rate of course goes down with the volume of consumption at the lower points in the rate schedule. The company has shared some increases in profits. I do not know that it is a fact that year by year there have been increases in profits by Potomac Electric Company, but I believe that is true. The Potomac Electric Company is an entirely different circumstance, a very different situation. I do not know that there has been no discouragement to the investor, but I know the Washington plan has operated reasonably well.

Whether the holding company gets a larger percent of dividends on its stock in the Potomac Electric Company than it gets on any other of its subsidiaries, if true is not conclusive. I do not know whether it is a fact, but the utility is doing very well. It does not necessarily mean anything that the Potomac Electric Power Company paid something like 65% on its common stock last year with relation to dividends. I do not know it is a fact, Mr. Slaff. If you state it is, then I am willing to accept it for the purpose of discussion. I know the percentage has been high. I do not believe in this particular instance that frequent rate revisions and frequent rate reductions have discouraged investment in that utility.

I have testified that approximately one-half of various utility enterprises, including transportation and other public utilities, were not recorded as having any taxable income for the year 1930. I think it was 1930. Yes, there
1348 is a difference between the question as put and the
answer as given, that is to say, between earning enough to pay an income tax and having a taxable income. I had not thought of it and did not, therefore, respond accurately to the question. I recognize that distinction. They might have an income reported or available and still have enough deductions or losses that the Internal Revenue Department would recognize that in that year they would not have to pay anything. An investigation of the Senate Banking Committee disclosed that in 1930 and 1931 various people took such large losses that they did not have to pay any taxes. They had been earning enough to pay income taxes but they had no taxable income because of deductions they could take.

I remember my testimony at page 6550, in which I said in substance that prior to regulation, defendants were industries subject to both large losses and possibly large gains, and that the history of this industry is strewn with cases of loss which make it clearly classifiable as an industry in which many lose and apparently from the records, some can make substantial gains. I was speaking from memory at the time I testified. There were companies that was doing quite well. I do not know that I have any particular company in mind. I have examined the earnings of a great many companies. I would not say that this is just a general observation with no specific application. I took the time and trouble to study the businesses in the industry. I gave particular attention to the failures and cases of receivership. That addition "apparently from the records, some can make substantial gains" was possibly gratuitous, merely to recognize that there were those who were making money, that the other thing was not wholly representative of the industry. I put it in there just for that purpose. I did not want it understood that the whole industry was bankrupt. I merely reflected my opinion that there were instances in the industry of companies that were doing fairly well in contrast to the others. I had no particular companies or systems specifically in mind. Some were obviously doing well compared to the average run of the mill.

I appreciate the fact that you are having some difficulty in trying to understand my general observations. No, I had no specific figure or amount in mind, percentagewise or otherwise, when I used the terms "large gains" and "substantial gains." I had in mind clearly to contrast it with what I found in the portion of the industry which had not done well. I had not come to any conclusion about this particular company. This is so special that it was outside of the range of the industry as a whole.

As to whether or not those companies in the past which have sustained losses did so because they were not provided with adequate reserves, I may say that in the early history I was impressed with the instances of that. In later years, there have been probably other causes. I was not in position to identify the causes. I took the facts of failures into consideration. I made no general classification of causes with respect to my statistical studies. I could not help but think about the possible causes, but I did not have the occasion to investigate. I made no statistical studies on that point. I have enumerated insufficient reserves as one of the causes. There were undoubtedly financial causes; bad capitalization, possibly; probably there were managerial problems in some of them; franchise and market problems; competitive situations. I did not give any
1349 formal attention to these matters. My interest was the extent of the investor's actual experience, and I have more or less realized that the investor does not go too far back. I do not think this exhausts the list of causes. It probably reflects as many as I think of now, not having given any special attention to it.

(November 1, 1939.)

At page 5771 I testified: "On the basis of past behavior and present outlook, as an economist I would be very skeptical of estimates which assumed that taxes are going to remain at the present level;" and at page 5781 I stated: "It seems to me it sums up to the reasonable economic expectation that higher unit costs of production would result in the future." I think those predictions are better than my prediction in June, 1937, as to the future course of the price level. I don't remember exactly what that prediction was. I think it was a very carefully stated analysis of what the factors and influence might be.

I don't remember whether I testified before Master Swisler on June 9, 1937, that in my opinion we were facing a distinctly rising price level in commodity prices in this country. I recall a rather extended discussion of the difficulties of forecasting and the considerations involved, and I do remember stating that I believed that the opinion of those technically trained to do that should be given more weight than the opinion of those who were not so trained. I do recall that statement. (Objection by Company Counsel overruled.)

You have shown me a document which you described as an abstract of the testimony in that case. I cannot say for certain that that is an accurate summarization; but I think if it is taken in connection with the rest of the statement, that it probably can be fairly interpreted so. I have some doubts as to how totally accurate that summary is. I recall that Mr. Booth was present during that discussion and I recall a good deal of the discussion. I have little doubt but that I probably said what is indicated in the record, but I am distinctly not satisfied at taking that one sentence out of all that was said. I have not said that I am not satisfied with my prediction in 1937. I believe it was a reasonable prediction. I am satisfied with a good deal of it. I have no doubt but what I said that among other things in response to those questions then asked me. I am satisfied that it was a reasonable estimate to make at the time. I am not satisfied with the results, no. They are two different things. I do not recall specifically the questions in that connection. I have not read the testimony.

If I read the summary correctly, I was in part skipping over the two years from June, 1937, to the summer of 1939. I made reference to the possibility of a war breaking out in 1939 in that statement. That would be one of the things which turned out to be right. I think that when I testified in June, 1937, I was intending to skip the period 1937 to 1939. If I remember the total of that discussion, I did project my estimates to a period such as 1939 and 1940.

If I recall correctly my expectation was that a price level rise would get under way in substantial proportions within the two or three-year period envisioned there. I would have to check up on my price index chart before I would agree with you that there has been a steady decline since June 1937, the date I testified, down to the summer of 1939. I do not have that chart. I am looking
1350 at a price trend chart for construction costs of items of property that go into public utility and other industrial properties. I do not think a wholesale commodity price index is as pertinent as an index of ingredients of industrial construction. If I speak of commodity prices as an economist and a rise in the level of commodity prices, it might be presumed that I mean the general level; but, if I remember correctly, in that testimony I qualified it. I thought I saw when I quickly examined that summary a reference to construction costs. On examining the abstract, I find right here where I said "I think this applies most distinctly to durable goods". I did not say that it did not apply to goods generally. I said "most distinctly".

The Labor Bureau Index of wholesale commodity prices is generally accepted as a cost of living index. The Supreme Court of the United States, if I remember correctly, has thrown it out as an index of public utility values. I am not qualifying as a legal expert. I have an opinion as to what the legal characteristics of a public utility are. I think I made reference in my direct testimony as to what I thought they were.

I am a professor of economics in the field of public utili~~ties and devote my time to the study of~~ public utilities and what they are and what they do. I have devoted a very small part of my time in testifying on behalf of utilities, except in the last few weeks. A part of my time has been devoted to the preparation of that testimony. My preparation represents a very substantial amount of time in recent months, but over a year it does not represent very much time. I know more about that than I do about West *vs.* Chesapeake and Potomac Telephone Company, decided by the Supreme Court in June, 1939.

I think it is a fact that the Labor Bureau Index of wholesale commodity prices is generally accepted as a general index but it is not accepted as an index of the price levels for construction capital goods. I would have to refresh my memory as to the figures from the time I testified down to September, 1939, shown by the United States Labor Bureau Index of wholesale commodity prices to determine whether there has been a steady decline of wholesale commodity prices during that period. I have no papers with me from which to refresh my memory. I keep up with so many things, I do not memorize them all specifically. I look at that index when I have occasion to. It is not one of the things that comes across my desk regularly. I am an economist; but economics is a big subject, and I cannot keep up with all of the things, and they do not all come across my desk. This specific thing is not regularly routed across my desk. I do not follow the Labor Bureau Index of wholesale commodity prices unless I have occasion to. I think I see it frequently enough to keep up with it. I also keep myself advised generally about where it stands in relation to other periods and other times. I am under the impression that there was a decline in the wholesale commodity price index from June, 1937 down to September, 1939. I do not remember how much. I would not want to estimate it. I can not say whether it was 1 percent, 2 percent or 5 percent.

You have handed me a paper which appears to be the wholesale price level based on 1926 as 100. It stood as an average for the year 1937 at 86.3, and the average for 1938 was 78.6. When I testified in June, 1937, it was 87.2. It went up a fraction of a point in July. Afterwards I think the decline is sufficiently regular to be denominated a steady decline to the last date shown on the index, which
is January, 1939, when it stood at 76.9. This was
1351 lower than the average for the year 1938. (Objection by company Counsel overruled.)

To the best of my recollection, at the conclusion of my testimony yesterday, I set out several possible causes for losses suffered in the past by companies in the industry, among them, insufficient reserves, bad capitalization, managerial problems, franchises and marketing problems and competitive situations. With respect to the possibilities of the factors I was discussing at the conclusion of my testimony yesterday as those causing losses to companies in the industry in the past, operating on any new enterprise in this field today, I agree that there has been some improvement so far as those factors are concerned due to the presence in the regulatory field of the Securities and Exchange Commission and the statutes under which it works, the Federal Power Commission, and the Natural Gas Act under which it works, insofar as bad financial capitalization, for example, was a cause with respect to a company that was publicly financed. I would expect that the present regulations would operate to prevent some of that, insofar as it can be foreseen by the Securities and Exchange Commission. It is necessary to recognize that the capital arrangement would not necessarily be under very much control of the S. E. C. if it were a private venture. If the financing is public in any direct way, I think they would be hampered or curbed as to what they might do. Under the limitations I have mentioned, I think the effect of the factors which we mentioned yesterday and which you have detailed to me today, has been diminished in the last several years through the agency of the S. E. C. and the Federal Power Commission and the statutes under which they work. I am rather dubious about your suggestion that this is true with reference to competitive situations, if my interpretation of the Natural Gas Act is correct. You are right that prior to the enactment of the Natural Gas Act any competing line could come in and compete without the requirement of any Federal certificate of convenience and necessity. If I understand the Act correctly, the Federal Power Commission is under obligation to consider favorably an application for such a certificate if it can be shown that service by a competitive line can be rendered at a lower price. That is my over-all impression of that part of the statute dealing with that subject. It was on the basis of that impression or understanding, plus the opinion of the Commission in the case whose name I have forgotten for the moment, in which Commissioner Manly dissented, that I predicated such testimony as I gave on that subject. It was enlightening to have had that opinion on the point and it could hardly help but influence me in some part.

So far as the Federal law is concerned, there is today a requirement that a certificate of public convenience and necessity be secured from a Federal agency, where prior to the Natural Gas Act that did not exist. I am not clear as to whether the statute provides that in such an inquiry the Federal Power Commission considers the sufficiency of the reserves for the proposed line and proposed service. I do not recall that there is anything in the legislation that bears directly on that. I believe in Opinion No. 39, very recently, dealing with the Kansas line and the North Dakota line, the Commission did indicate that it had gone into the question of reserves for those two proposals.

I do not know that the problem of insufficient reserves and its possible effect would be considerably improved from the investor's standpoint under this new legislation. It depends on how optimistic or how liberal the Commission will be with respect to evidence on reserves. I can well appreciate that there might be some thoroughly wildcat undertaking which had no sanctions of any sort in terms of reserves which would be stopped. In the past, such undertakings were not stopped. I am not implying, however, that they were all of that character. I think there has been an improvement to the extent that this requirement for a certificate of convenience and necessity would keep that marginal type of undertaking out. I rather doubt that that is the most dangerous type of competition. Usually it is on a fairly small scale.

1352 I mentioned the possibility of a blackmail raiding line, just as a possibility. That was one of the possibilities that I considered in determining the hazards involved in this project. I think we settled yesterday or the day before that it was within the realm of possibility. I think we said we did not want to put it well up in the probability and we would leave it down around the possibility classification.

I agree with you that the possibility of a competing line going into the business with obviously insufficient reserves is reduced by the authority conferred upon the Federal Power Commission; but, as far as it applies to that wide range of possible error with respect to reserves, I do not see that the Federal Power Commission has necessarily added much. I refer to such a phenomena as underground reserves of gas and their estimation by fallible human beings.

People use difference methods of estimating reserves which bring apparently quite markedly different results. And there is a good deal of controversy as to which the appropriate method is. I think there is still a wide range with respect to the reserves which probably everyone would consider adequate to support a transportation investment. I am not acquainted with the section of the Federal Power Commission dealing with gas problems. I hope it is set up to be an expert body on this subject.

The point of my answer is that among the apparently accepted experts there is such an apparently wide possible difference that the situation still remains as I stated, and that is not inpugning the integrity or the honesty of anyone. They do seem to get widely different results.

As to the franchise problems, a number of situations could arise. A company may have an exclusive franchise or it might just have a franchise. It may have a short term franchise or it may have an indeterminate permit in effect, or it might have a long term franchise. The instances when these franchises come up for renewals are usually instances of rather sharp rebargaining as to terms. It is a type of hazard which has been unfortunately present. I would not say that it is unique to this industry. I mean it applies generally to the utility industry as a whole; in other words, there were certain things, for example, insufficient reserves, which do not apply to other types of utilities, but this franchise problem is one that applies generally to the utility industry as a whole. I can go along with you on that method of reasoning because I have used it myself. Assuming the common character, and then going into phases which differentiate it.

Referring to the effect of State regulation on this franchise problem I have always considered the substitution of state authority when it went to the extent of giving the state commission authority over the local circumstances, as being an improvement. However, we know quite well that that is not the fact in a great many states, and that state commissions unfortunately do not have as high a degree of control as we might wish them to have in that respect.

My position with respect to control is not so much what is done or the number of things that are done and all that, but is possibly directed almost wholly toward the question of how it is done and what principles are adhered to in the exercise of that authority. In other words,
1353 I do not want to be on this record as against regu-
lation of industries that I know should be regulated, or against the scope of regulation that is appropriate and necessary. Thus, the reference to original cost accounting in our early discussion, the determination of that does not bother me nor is it something that I am necessarily opposed to. What does concern us at times is the possible

use of the authority to carry out certain principles or certain theories of regulation.

My recollection is that for certain utilities in Illinois, the local community has a considerable degree of control or power. I recall franchise disputes in the city of Chicago, in which the city took an active part. My understanding is that the franchises there are not exclusive. That observation applies to the franchise of Peoples Light and Coke Company, as I understand it. I am not familiar with any recent decisions of the Supreme Court of Illinois dealing with the existing authority of municipalities over public utilities where their franchises have expired.

In stating the times earned bond interest by the Northern Natural Gas Company at more than 6 per cent in my testimony yesterday, I think the times interest requirements went to that issue and equal and prior issues.

I testified that I did not know what the times interest coverage of defendants would be if they were financed with bonds to the extent of 50 per cent of their capital. I do not believe that defendants could be financed on the same basis as the Northern Natural Gas Company. I have given consideration to some of the factors of comparison. In the course of covering the general information on Northern Natural which is readily available, I have made mental comparisons and observations with respect to factors which are more or less favorable. I believe the original capitalization of defendants was approximately $60,000,000. 40 per cent of that amount would be $24,000,000. 3¼ per cent interest on $24,000,000 comes to $780,000. I do not have the figures as to the earnings of this company last year that would be available for bond interest. I would not want to estimate those earnings. I would have to look up the income statement and I have not made the calculation. I am not sure that it is in the form to show the amount truly available for the bonds, as it would be in case they filed a prospectus, for example.

I do not have a copy of Exhibit 136. According to this exhibit which you have just handed me for the year 1938 these companies had net earnings of $9,910,000 after taxes and before depreciation, depletion and retirements. Depreciation, depletion and retirements apparently amounted to $3,232,633, leaving net earnings after taxes and before fixed charges of $6,678,029. You have done the calculations, but I will accept your figures.

How many times earned is that on the figure of $780,000? It is 8.55 times. The financing of the Northern Natural which I had in mind was bond financing of $16,000,000. I don't recall, there may have been also an issue of serial notes. There were bank loans in connection with some of this financing, but I don't recall what it was. I don't recall in connection with that financing that there was an issue of unsecured promissory notes due serially in amounts of $500,000 semi-annually, totalling $6,000,000 and bearing 2⅛ percent interest. There were such arrangements in some of these cases. I don't recall that the Chase Bank took that entire $6,000,000 issue of notes with the exception of a $200,000 participating interest to a Baltimore bank. It is my impression that a group of insurance 1354 companies took the $16,000,000 issue. I don't remember what companies they were. They were big companies, among the largest insurance companies in the country. The bond issue was relatively short as to maturity. By "relatively short", I meant to compare it to typical utility financing, which is 25 or 30 years. This issue ran to 1954, which would make it 15 years. I accepted your figures of $60,000,000 and 40 percent as illustrative. I would not presume to say what the value of the property is or what 40 percent of the value of the property would be. I don't know.

I testified at page 5777 with respect to the circumstance that, as stated by Mr. Morgan as shown by this record, 40 percent of the total volume of gas carried by the Natural Gas Pipeline Company of America is sold under interruptible contracts for industrial use, and that 25 percent of the total revenue is derived from that latter source. I have looked at the similar percentages for the industry as a whole and I have them with me. For the natural gas industry, the figure includes gas sold for electrical generation purposes. In 1938, as reported by the American Gas Association on a revenue basis, it is $126,682,000 out of a total of $416,580,000 or just over 30 percent.

In 1938 industrial and electric generation gas sales to customers amounted to 759 million thousand cubic feet out of 1 billion 213 million thousand cubic feet. That is over 60 percent by volume. So, as you put it, the industry must sell over 60 percent of its volume in order to get 30 percent of its revenues, as contrasted with these companies which must sell only approximately 40 percent of their volume in order to get approximately 25 percent of their revenue. That is an accurate statement of the broad facts.

The natural gas industry should not be similar to a gamble in a lottery. I have some reservations, however, since certain aspects of the natural gas industry pretty nearly approach that. It should not be in that status; and the operations as a whole are hardly so designated, but there are aspects of it that seem to fall in that category: It appears to be the developing national policy to take this basic natural resource and basic industry out of the realm of wild speculation. I am not sure to what extent it will accomplish it.

(Objection by Company Counsel overruled)

I testified on direct examination that the naural gas production and transportation industry does not have the legal status of a public utility. I think the definition of a public utility from a legal standpoint is first found in Smythe versus Ames. I think it was pretty well developed in the Wolf Packing Company case, where the court decided that the meat packing industry was not appropriately designated as a public utility. This question was discussed at an early date in the Patterson Gas Light Company case, in the Milwaukee Gas Light Company case, in the Williams case, I think it is—in the effort to place oil distribution in the public utility category in the State of Tennessee—Williams versus the Standard Oil Company if I am correct, and a direct or indirect reference to this subject is given in most of the important cases involving public utility rate determination.

I think my testimony at page 5657 et sec. deals primarily with the economic phases of the legal classification. I think there are only implications there as to what economic characteristics or circumstances the law has more or less regularly recognized.

1355 One of the commonplace requisites stated at page 5657 is "a high degree of the control over the market, more or less casually referred to as a monopoly." That is one of the tests that the courts have usually looked at.

No other natural gas pipeline company has immediate access to the Chicago market. None are occupying it. There is nothing legally to prevent one from doing it. I can not say as a practical matter whether any other natural gas pipeline company has access to the Chicago market. I am not aware that any other company has legal authority from the Illinois Commission which would give it access to the Chicago market. I do not believe any other company has legal sanction from the Federal Power Commission which would give it access to the Chicago market. As a legal matter, no other company has access to the Chicago market at the present time. I think it is more of a practical matter in view of the terms of the question. Actually no other pipeline today has access to the Chicago market. It might be a question of the actualities of today and of the possibilities of the future. I think there is that distinction. As one practical matter, no such line has access. As another practical matter, it might have some future access. At the moment no other line has access; but that is not what I have in mind as concerns the investor, which is the possibility of such a thing happening.

As a practical matter, if the Peoples Gas Light and Coke Company wants natural gas today, it must buy it from the Chicago District Pipeline Company, which in turn must buy it from Natural Gas Pipeline Company of America. I think there is sufficient uncertainty, as to what the future might develop with respect to the possibility of their buying from someone else is a consideration. I have made no calculations as to the price at which the Peoples Gas Light and Coke Company would have to buy gas from somebody else. I am not saying that there is a reasonable probability today that Peoples Gas Light and Coke Company will be able to buy natural gas from any source other than its present source during the terms of the existence of the contract between Chicago District Pipeline Company and Natural Gas Pipeline Company; but there are other considerations which must be brought into that picture before you would come to such a conclusion. I think it is something the investor would be concerned about. I think there is a possibility. I do not think the probability is great. Before I can say whether or not there is a reasonable probability, I must know what "reasonable" means.

I know what I mean when I use it, but I am not so sure that people who hear it have the same meaning that I have, and I am not sure that you have the same one in mind. I would say that it is a possible thing that is appropriately considered as a possibility. As the situation stands at the moment, there is no great probability. The reason I hesitate to use the term "reasonable probability" is that I think it implies a degree of judgment. I do not think the term "great probability" is precise. I am not making any distinction between precise thinking and refined thinking, but this involves factors which are outside of the realm in which refined economic thinking may well go. It involves considerations of technical, engineering and geological matters which I have to face in the same way that an investor would face them. I think if "reasonable" is construed in the sense in which I use it, that there is a reasonable probability that alternate supplies might be provided for the Chicago area.

1356 To be perfectly frank with you, Mr. Slaff, I am not in a position to calculate the technical aspects of a possible extension, for example, from the Panhandle line to the industrial area of Chicago. I think an investor looking at the situation would note that such a thing might happen. The fact that this company does not have an exclusive position and is not, under the Act, necessarily protected in its own position, together with these other observations, creates a relationship or a circumstance which the investor would give consideration to.

I have not made a calculation as to the price at which natural gas would have to be sold by someone else to Peoples Gas Light and Coke Company in order to allow the latter to buy from some other supplier. I have a number of other things in mind, however, that bear on the question, that you have not asked me about.

The contract under which gas is supplied to Chicago District Pipeline Company expires in 1946, but it is extendable at the option of the defendants for five years thereafter. I am speaking of the firm contract. I do not know about the contracts for industrial gas. I don't know whether the 25 percent of the company's revenues deprived from interruptible contracts is all derived under the short term contracts mentioned here or not.

I testified, as appears at page 5657, that: "normally, the practical economic monopoly which follows from the character of the investment is recognized by the law as a legal status in addition to the economic status."

The term "legal status", as I understand it, is one's standing in law consisting of say the balance of rights and duties as a natural or artificial person. The balance or rights and duties as a legal status of defendants has not been too clearly recognized as yet. We look to decisions to tell us what it really means. New law creates uncertainty for some period of time. I think that it is accurate to say that they have attempted to identify the legal status, but they do not call defendants a public utility, if I remember my last reading of the Act.

The point of distinction that I had in mind was that it did not appear from the legislation or what interpretations are now available, that such a legal recognition and status are granted to the units in this industry. Thus, for example, we do not have public utility situations where the legal status is rather well developed. On the contrary, there is a provision that anyone who offers to sell for less must be considered and be allowed to enter the market. There is a specific provision in the law to that effect. I think it is quite fundamental to my way of thinking. It appears to be the law. I think it is fair to say that that conception is fundamental to my thinking on the subject.

Defendants sell all of their production in the Chicago area, I believe, to the intervening company, the Chicago District Pipeline Company. I believe they sell approximately 10 percent of their production to other customers. I have the impression that those customers are along the line previous to reaching the connection with the Chicago District Pipeline Company. I don't know what prices are offered at those earlier points. I did not look into
1357 that. I do not know what the prices are for that 10 percent. I did not attempt to find out. It seemed to be a small proportion of the total.

I stated that the fact a public utility may reasonably discriminate in price among different classes of consumers, is one of the legal characteristics of a public utility. I did not make any attempt to determine whether this company could engage in such reasonable discrimination when I was preparing my testimony on the subject. I considered that 10 percent as relatively unimportant; and as this company is a wholesaler not reaching the various classes of consumers, I did not consider that that matter entered into the question. Chicago District Pipeline Company, as I understand it, purchases 90 percent of defendants' production. I don't know the names of the people who take the other 10 percent. I don't know how many customers there are that take the other 10 percent of the total production.

1358 E. M. SOLOW, a witness for defendants, called for cross-examination, testified:

(November 1, 1939.)

Cross-Examination by Mr. Booth.

It is not quite correct to say that I participated in the preparation of the figures shown in Exhibit 122. I did not prepare any of those figures. I simply suggested the valuations which were used in compiling those figures. The figures of costs and so on were taken from the records of the company by Mr. Davidson and his staff. Using those figures which they furnished us, we determined the salvage value. That was the extent of the figures which I used. I stated that my conclusions were based on the result of many years of experience in connection with the sale and purchase of oil field equipment both new and second-hand of various types.

I am now an officer of the Western Supply Company whose business is that of purchasing and selling oil field equipment. The property as to which I testified concerning its salvage value included pipe forming the casing or lining of gas wells, pipe fittings making up the gathering lines in the gas fields, the steel frame buildings at compressor stations, wooden cottages at compressor stations, water well equipment, cleaning out tools and other tools, tanks and laboratory equipment, booster station equipment, miscellaneous equipment and warehouse stock. I also testified that I agree with Mr. Taubman that the main pipe line would cost more to salvage than it would be worth. That statement applies also to the various river crossings.

I testified that the list of items appearing at pages 4077 to 4082 of the record, which Mr. Davidson stated would be non-salvagable but which were not listed in his Exhibit 122, would not be worth salvaging in my opinion. These estimates as to salvage are set forth in Exhibit 122. As I stated, I examined the exhibit generally and am in general agreement with the salvage values shown in the entire exhibit. I expressed the opinion, I believe, in connection with one or two items, that I might not have given them as much salvage as others did, and as to one or two other items I believe I explained that I had given them some salvage value where other witnesses did not believe they had any; but I believe in the exhibit the highest salvage value that anybody gave these things is always set out.

My estimates of salvage value were based upon 1939 conditions. I tried to put myself in the position of a buyer who was offered this material, at the time I testified, as of approximately June 1, 1939. I made no effort to predict the prices or other conditions with respect to salvage which might exist fifteen or sixteen years from now, except I commented to you then, and it is still true, that in dealing with used material you are always dealing with material of some age. It might be five years old or ten years old or fifteen years old. That is what the used material business is.

1359 I think the fact that this equipment and property might be five years old, eight years old, ten, twelve or fifteen years old, or twenty years old, would have a great deal to do with the value of the property, as would the kind of use that it had—it is just like anything else. Of course you always have to consider your buyer for used property. It is very easy to sell a gas engine that has been used on a well three months and the well goes dry and the man wants to sell it. If you have one that has been used twenty years, that is an entirely different proposition. It is not worth very much. It is just like any mechanical thing. If you were buying an automobile that had been driven a thousand miles, you might consider buying it at a cost of a nice saving over the cost of a new one; but if it had gone a hundred thousand miles, you would not want it at all.

If we assume that the equipment and property had been used eight years as compared with ten or fifteen or twenty years, I think it would make a substantial difference as to what it would bring. As to how much difference, it is hard to answer that question offhand. It would take considerable study to arrive at any proper answer. At this time I would say, if you are talking about the main pipeline system, that it would not make any difference because all of the conditions under which that line is worthless from a salvage point of view are the same whether it is one year old or twenty years old. If you are talking about an electric motor, one with eight years of use is certainly worth more in salvage than if it were twenty years old. If you are talking about all of this property together, I don't see how I could answer that question directly without studying it. In other words, if a thing is not salvageable at all, it is not salvageable whether it has been in the ground five years or fifty years; but if it is salvageable, the age and condition of it certainly make some difference in the value. If you had the mail pipeline salvaged, it would have no salvage value either now or when it is twenty years old. If the line were abandoned and offered for sale today when it is eight years old, it would be worthless just the same as if it were offered for sale when it was ten years old or fifteen years old.

The gathering lines would have a salvage value and we have given them a salvage value here. Pipe that has been in the ground and used for eight years would probably come out of the ground in better condition than if it had been twenty years, and I believe it might have some slightly higher value. The real increase in the value would be in the machinery.

When I testified a few moments ago that the main pipe line would not have any greater value if eight years old than if twenty years old, I meant that it is an item that cannot be salvaged and put back into economic order, so what is the difference how old it is?

There might be some small difference in the value of the casing. You get out about the same amount of it when you pull it out of the well, but if the pipe is only
a few years old it would have a better sale value
1360 than if it were fifteen or twenty years old. When
I say "some small difference"; I think it would be
a reasonable way to explain my meaning to say that I have something like five, ten or fifteen per sent as the difference in salvage in mind. In other words, if we pull pipe from twenty five wells today and the pipe has been in some of those wells five years, if it is pipe that has been made within the last five years and is recognizable as such, and it is the length of pipe that can be used, that is one thing; but if we also pull pipe twenty years old, it is much more difficult to sell that twenty-year-old pipe than the five-year-old pipe.

There would probably be much less variation in the value of steel frame buildings at the compressor stations than pipe which is in the ground where it is being rusted and

and utilized more. A steel building is an entirely different thing than a piece of pipe. A steel building twenty two years old would be worth very close to the same amount that it would if eight years old. The difference would be very small. It might be five per cent. In salvage I consider 5 per cent small, because, after all, if the material, for example, sells new for $80 a ton and sell used at $20 a ton, 5 per cent of that $20 is a pretty small variation.

I don't think it would make very much difference in the value of wooden cottages whether they were eight years old or twenty or twenty two years old because we presume they will have been kept in good order. There would be as little use for them if they were abandoned now as if they were abandoned later, and the little value that was placed on them was placed there because you could not do anything with them after they were abandoned. There would not be any market for them.

In discussing water well equipment, we discussed the motors used in connection with the pumps, and the pumps themselves. Our opinion was that these pumps would have to be left in the bottom of the wells because they were not worth salvaging. That is just as true if they were eight years old as if they were twenty two. The motors, however, would have a slightly better salvage value if they were not twenty two years old but only eight years old.

When I discussed cleaning-out tools, those are tools that are used in the Panhandle in connection with drilling operations, I made the comment that no prudent contractor would use drilling-out tools or cleaning-out tools that were fifteen or twenty years old without knowing that they were in good shape and being assured of it, because the trouble that he would encounter in using them would offset the saving in buying them. Naturally, if those tools were not as old as they might be and apparently they were in better shape than they would be at the end of a long period, they might have some small value beyond that which was given, but it would not be substantial. You might get ten per cent more for an under-reamer that was eight years old as against one that was fifteen years old. That would be about my notion of the difference in the salvage value.

There would also be a small difference in the salvage value of tanks. I think that in analyzing the laboratory equipment we should presume it was being constantly replaced and so always right up to the minute. It is not like a tank that stands there for fifteen years with 1361 the same bottom. When one breaks you put in another one and we give, for that reason, a high value on the laboratory equipment. I do not think there would be any difference at all in the value because actually in practice you would have new material in your laboratory.

There is a good deal in the booster station equipment that had no salvage value at all, as I recall it. I think I discussed page 93 of Exhibit 122 with reference to the Cooper-Bessemer engines listed in detail on that page. At this time only one of these engines is installed. It is the engine that Mr. Wally Smith and I drove out to see in the Panhandle. There would be a difference in the value of booster station equipment as between the ages of eight and fifteen years. Of course the kind of use that it has had during the time would enter into it, because the condition of machinery always has a bearing on its resale value. It may make a great deal of difference. It is just very hard to make a generalization, because one machine may be worth ten per cent of its new price, another may be worth nothing or fifty per cent of it, depending upon a lot of circumstances.

As to the miscellaneous equipment referred to on page 4184, some of this material, like the thermometers and gauges and things of that kind, are just like laboratory equipment. They would be kept up to date. I presume that would be true of this fire-fighting apparatus, and when we value that for salvage we presume that it would be in first-class condition at all times and when the stuff was old it would be replaced by other stuff. As far as any machinery items in that equipment are concerned, it would be subject to my comment that age would cause a variation in the value of it. The difference would not be very great unless there was some reason for its being great.

The warehouse stock would be subject to the explanation that I gave on the different items that compose it. Some of it is pipe, some is fittings and some is pump parts that would have no value at all, and where that is the case it would not make any difference how old they are. If it were an item that in the general stock was improved by youth, that would be true of the item in the warehouse portion of the stock also.

As to the items that Mr. Davidson testified were nonsalvageable it would make no difference whether they were eight or nine years old or twenty or twenty three. Those items would be worthless if salvaged five minutes after they were put in. Take a road marker, for example. If the line were gone, the marker would be worthless. Take the telephone system right of way. If the telephone system were taken away, the easement or right of way would have no value. I think that is the general type of this stuff. It is stuff that you could not even give away when you want to get rid of it. Concrete blow-off pits are just a nuisance. Pipe rack foundations are always covered with oil and you have to clean them up. They are worth nothing. Curb, sidewalk, sewerage system, signs,—such things are no more salvageable the day after they are installed than twenty years after. Age has nothing to do with it. If you build a concrete road out here on the wrong section line, it is just as worthless as if it had not been built. I don't know if my answer is clear. What I meant to say is that once this money is spent and the project is abandoned, whether it is one day or ten years; it doesn't make any difference on that type of item so far as the salvage value is concerned.

1362 *Cross-Examination by Mr. Slaff.*

Yes, I testified that I have been in the business of buying and selling oil field equipment in Texas for about fifteen years. A large part of that time I have been in that business in the Texas Panhandle field. I forget just what year it was, but shortly after the Panhandle oil field was discovered I went out to Pampa and lived there four or five years. First I had a business of my own and then when the Western Supply Company arranged to enter the Panhandle I made arrangements to enter employment with them. They took over my stock of materials and I represented them in the Panhandle in trading in used materials for two or three years.

I have not dealt with Texoma or the Natural Gas Pipeline Company of America. My firm has not dealt with them. It is a remarkable thing, Mr. Slaff, but I believe that Texoma is the only concern in the Panhandle that we have never sold a nickel's worth of merchandise to under any conditions or at any time. We have never purchased any used equipment from them. We have not dealt with them at all. We handle gas equipment as well as oil equipment. The same equipment goes into gas wells that goes into oil wells, except that oil wells are usually tubed and gas wells are not usually tubed unless they make a certain amount of fluid which has to be drawn off with the gas. Otherwise it is the same.

I testified that I had drilled a great many wells in the Texas Panhandle field. I suppose I am interested in about fifty wells in the Panhandle section at the present time. We have abandoned a few wells and drilled others. I think that is about as many as we have ever been interested in out there. These wells were drilled over the last ten years. They are scattered over the field from one end of the Panhandle to the other. About half of them are gas wells and about half are oil wells. We drill all our wells with rotaries, except one lease in Hutchinson County which we drilled with cable tools. As to the procedure we use in drilling in, it depends upon what part of the field we are in. We have generally used new material in our own wells. In drilling our gas wells in Wheeler County where the wells are shallow and where they are set about 1,400 feet apart, I believe we used used material on those shallow wells. In Gray County where we drilled mostly oil wells, we have used mostly new casings. I would say in about 20 per cent of our wells we have probably used used casings. In Hutchinson County I believe we have used new casings in all of our wells for the oil strings, and where we have used other strings, if we had it we used used pipes; otherwise we bought new.

I ought to know the total number of wells that have been drilled in the Panhandle field but I really don't have it in mind. I probably have seen it in print a hundred times but I have never paid any attention to it.

In the early days of the Panhandle before the rotary method was well developed, wells were drilled by the cable tool method exclusively. I was up there in that early time and we used to sell a good deal of stove pipe to put into those wells, because the operators could not get the
1363 other casing in those wells on account of the quicksand. They were expensive to drill. About ten years ago, I guess it was, they started drilling most of the wells by the rotary method and that is now the method generally used in drilling wells out there. Stove pipe is oil well pipe that does not have collars and threads and it is driven into the well with a driver. The reason they use it is that the collar does not bind in the quicksand and the

pipe slides down with the proper pressure. In the first two years in the Panhandle field I sold about 60 cars of this stove pipe. In the last ten years I have not sold, and nobody else has sold, a foot of it. It shows the change-over in the method. The bulk of the drilling of gas wells in the Panhandle field is now done with rotary tools.

According to my data on Texoma's wells, there were 39 cable wells drilled as of June 1, 1939, and 120 rotary wells, making a total of 159 wells. The company prepared for me a list of all of the wells with all of the pipe in them, but I do not find it. I was referring to Exhibit 122, page 50-A.

As appears on page 4163, I based my net salvage value per well for Texoma of wells drilled with cable tools, on 15 wells. In my judgment these 15 wells are representative of all of the Texoma cable-drilled wells. From the list of all the wells I took the first 15 on that list and added up all of their materials. I looked through the whole list carefully and the amount of pipe in those 15 wells was representative of the entire group of wells. When defendants asked me to state the salvage value of those wells, I asked them to make up a list of each of their wells with a list of all of the materials in them, which they did, and as they sent it to me the rotary wells and the cable tool wells were all in one list. I just selected the first 15 cable tool wells which were average wells. I believe I have my original work sheet on that. As stated, I looked over the list and those 15 wells were representative of the list.

On page 4161 I testified that the casing in nearly every cable tool hole is line cut. That detracts from the value of the casing when it is pulled out. I don't think that this line cut detracts from the value of the casing while the well is still producing. There is no loss of value due to that fact so long as the well is producing. The pipe is already in the well and is performing its function. After it has stayed in the well and it is grooved by the whipping of the line, it does not make any difference. It is already there and as long as it is holding out and not leaking, the pipe is doing its job and the well, as long as it produces under those conditions, is just as good as if there were no line cut. But if you pull that pipe out of the well and it has that groove in it, nobody is going to buy it. It is just junk. A pipe is no thicker than the weakest portion of it, and if a pipe has a line in it or the wall has a groove in it, it certainly has not much value for any purpose at all. You never know that it has happened until it is pulled out.

You see, pipe is built to a 700 or 800 or 1000 pound test,
but when two-thirds of the thickness is found at some
1364 place in the pipe where there is a groove in it, the
pipe is not good for that test any more. It is just a
gamble if you want to use it at all, and no company that
has any respect for engineering figures will run a line-cut
pipe in a well.

At page 4169 I testified that I was buying pipe from National Tube and Republic Steel for $45.00 per ton less 10 per cent. I was referring to wholesale purchases made by the Western Supply Company of lining pipe. That is a special order. Those prices of course are at the factory. One reason for the variance in the price is that the size of the pipe makes a difference in the value, and another reason is that during the early part of last summer there was a pretty large stiffening of the line pipe market. It did not seem to reach bottom. There was a lot of competition in dealer sales. Customers were buying pipe on discounts beyond the ordinary resale list.

At page 4172 where I testified with respect to the compressor station buildings, I stated that some of them were too large for other uses. I was talking about the main compressor buildings. I said those buildings were too large to be moved around to other places in the oil fields and put into use again. They are larger than the buildings that are used in any gasoline plants or ordinary construction that goes on and would have to be cut down before being used again for that kind of a building. The smaller buildings that could be moved we gave a 10 per cent valuation, and the larger ones 5 per cent for the reason that they would have to be cut down and refabricated. You can tear the smaller buildings down, move them around and use them to better advantage. In spite of that they would have a value of only 10 per cent.

1365 W. C. GILMAN, recalled for cross-examination, testified:

(November 1, 1939)

Cross-Examination by Mr. Slaff.

Yes, in the course of my direct testimony I testified generally with respect to the comparative risks of different types of utility industry, using the latter term very broadly.

I testified that the electric industry was less risky or offered greater security than the manufactured gas industry. That is my present belief and was my belief, of course, at the time I testified. It was no conclusion I reached shortly before my testimony here. It is of long standing. It is a long standing feeling that I have had.

Yes, I then proceeded to go on to a comparison of manufactured gas distributing company with a natural gas distributing company which latter did not own its own production and transmission facilities, and I observed that the manufactured gas distributing company is safer than the latter. However, I said in that connection that from a short range point of view, the company now distributing natural gas was in a better position to meet competitive markets. Looked at from a long range point of view, you would have to take into consideration the possibility that natural gas might not be available to the company and that the change-back might be necessary.

In forming my opinion as to the rate of return, I formed it on the basis of present day conditions and looking to the future insofar as I can with any degree of certainty. I think you are correct in summing up my statement that in arriving at my judgment of a fair rate of return, I was taking the long range point of view as against the short range point of view as I have explained those two terms here.

Yes, I then went on to testify that a natural gas distribution company was safer and less risky than an integrated natural gas system, the latter being defined as a company or system owning its distribution, transmission, and production facilities. That is my present judgment. That is a conclusion I have long had. However, ones ideas change as time progresses. I do not think I had exactly the same feeling, for example, in comparing the manufactured gas industry with the electric industry in 1929. Things have taken place since that time which have caused me to have an opinion at this time with reference to the relative attractiveness of investments in the two types of business.

Yes, from there, I went on to compare an integrated system, as we have just used that term, with a company owning simply natural gas production and/or pipeline facilities, and stated my conclusion that the integrated system was a safer proposition than the one owning only gas production and/or pipeline facilities.

Yes, I then went one step further and compared natural gas production and transmission systems having a number of sources of supply with one which relied on one source of supply only, however large that source of supply may be, and came to the conclusion that generally the former was a safer investment than the latter.

Generally speaking, my conclusions from the last two comparisons I have held for some length of time. In that line of testimony, I was dealing solely with the inherent differences in risks between the different classes of
1366 business. That is one way to express it. In other words, I was assuming for the companies or systems I was comparing that all factors were equal insofar as they could be equal in comparing really different kinds of business. I was assuming that competency in management was the same; that the skill of the operating organizations was the same; that they were serving the same territory or type of territory, as the electric company in Boston against the manufactured gas company in Boston, for example; and that same generalization applies in my comparisons between manufactured gas distributing companies and natural gas distributing companies, and natural gas distributing companies owning no production and transmission facilities and integrated natural gas companies, insofar as the comparisons were possible or where the comparability could be maintained. That extends right down the line in those comparisons I made.

Some of the other factors included in these might be the same degree of soundness in capitalization; relatively the same franchise terms if a franchise should be required; the same relationship to a holding company if a holding company was in the picture; the same type of regulation; in fact all other factors were assumed to be equal.

In other words, the only difference was in the risk inherent in the different types of industry, coming about primarily because of the uncertainty of the future.

I can not say what percent of the fair rate of return I conceive to be a fair differential on account of the differences in the risk inherent in the type of industry between an electric company and a manufactured gas company without making a study on that point. I would not say what the proper rate for any particular enterprise would be, much less that covering whole industries, without very detailed studies. I can not express the differential in terms of per cent.

We have advised other people with reference to investments. I do not call myself as "investment counselor." As that term is ordinarily used, it implies a person who generally gives advice in the matter of making investments. We do not, generally speaking, hold ourselves out in any such capacity. We are financial consultants, primarily in the public utility field. We advise underwriters and institutions. We advise corporations in the development of plans in connection with the sale to the public of their securities.

I have given a great deal of thought to the difference in risk between the different types of utilities that we have just discussed. I have given thought to the reaction of the investor to these different risks. I have attempted to evaluate the difference in the reaction of an investor to securities of a manufactured gas company as compared to securities in an electric company, and to be specific I think I can point out an example:

I testified in the case of the Brooklyn Union Gas Company, an artificial gas company, that in my opinion the rate of return should be not less than 7%. In the present case, I testified that, in my opinion, not less than 8% was required. There is a concrete example of my evaluation of the risks involved and translated into percent of return which should be required by investors.

1367 I can not answer your question as to the differential in the percent of rate of return between an electric company and a manufactured gas company. That problem has been a matter of continuous thought with me. It is impossible to evaluate it in terms of actual percentage. I do not find it impossible to evaluate the probable overall in terms of percentage for this company or for the Brooklyn Union Gas Company.

I do not think I have ever come to any conclusions in my own mind as to the upper and lower limits of fair rate of return for the electric industry as a whole or for the electric industry on the average. I do not think of rate of return as a thing you can talk of for an industry. It must be considered specifically in each case. I have given consideration to a great many things in forming my opinion. I do not mean I have given consideration to a great many general concepts. I think I gave a great deal of consideration to a great many specific concepts and I came to the conclusion that there was a difference in safety in an investment in the electric industry and in the manufactured gas industry. That is a general concept. I had no difficulty in directing my thoughts along the lines of general concepts, when I particularly said "generally speaking".

No, I can not give you any indication of the differential in rate of return that I conceive to be the fair differential on account of the differences in the risk inherent in the types of industry. I hesitate to express any differential of that character without more careful consideration. Rate of return is something that has been of some significance to me and some study by me since 1928 at least. My own activities in actual rate cases extend over a period of about one year. During that year, I have testified in the Rochester Gas case, the Brooklyn Union Gas case, and this case. My partner testified in the South Carolina Electric and Gas case, which was an electric rate case. My partner testified in the matter of rates for the electric department of the Georgia Power and Light. That makes a total of five cases in which we have participated in the last year.

I have been giving pretty intensive thought in the past year to the problem of rate of return in electric and gas companies. We have a substantial other business though. Yes, I gave that subject considerable thought while I was director of the Public Utilities Division of the Securities and Exchange Commission—more indirectly however. More directly, I gave that matter considerable thought and attention when I was in the treasurer's office of the Equitable Life Assurance Society.

No, I am not prepared, after ten or eleven years of regular thought on the subject to state in terms of percentage the fair differential in the rate of return between an electric company and a manufactured gas company because of the difference in risk inherent in the different types of industry. I have stated that generally the gas company or the manufactured gas company is, in my opinion, a riskier type of business from the investor's point of view than the electric business, but I can not tell you in terms of percent how much riskier it is. I cannot tell you in terms of percent how much more risky the manufactured gas industry is than the electric industry, nor how much more risky the natural gas distribution business is than the manufactured gas distribution business. I cannot tell you in terms other than in terms of percent how much more risky the natural gas distribution business is than the manufactured gas distribution business, except that in my opinion one is riskier than the other. I cannot tell you how much more 1368 risky the one is than the other either in terms of percent or in terms other than percent. I cannot tell you in terms of percent how much more risky the integrated natural gas system is than the natural gas distribution system which does not own its production and transmission facilities, nor can I tell you how much more risky the one is than the other in any other terms. I cannot tell you in terms of percent or in other terms how much more risky the natural gas company owning simply natural gas production and/or pipeline facilities is than the integrated company, as that term has been used here. I cannot tell you in terms of percent or other terms how much more risky the natural gas production and transmission system having but one source of supply is than the natural gas system having several or a number of sources of supply. In reverse English, my answer would be the same if you were to ask me how much safer one of the industries is than the industries with which it was compared.

Questions by the Examiner.

No sir. Those answers cannot be worked out from pages 1 and 2 of my exhibit in any way. The question Mr. Slaff is asking is to state the differential in the rate of return that would apply between two industries, one, say, an electric industry and the other the manufactured gas industry. I testified that there are differences in risks, generally speaking, along broad lines, but in forming my opinion as to rate of return I have to take into consideration one company and the characteristics of that company and evaluate the risks of that company as I see it, not only as compared with these other industries, but with the risks in other industries and other investments which are available to investors. No, I do not think you can take a combination of the data on pages 1 and 2 and work backwards by examining the characteristics of the company, and identifying any degree of risk which would attach to any one of these companies as a differential.

I think I can illustrate that in this way: The common stock of the Oklahoma Natural Gas Company is shown on page 2, having an earnings price ratio of 14.10 based on the price at 9-15-39, and earnings per share for the twelve months ended June 30, 1939 of $2.24. That company is an integrated natural gas system owning a substantial amount of the production and buying gas also from a large number of rather small fields in the State of Oklahoma. It controls distribution facilities in Tulsa and Oklahoma City and many other large communities in Oklahoma. It is one of those companies that I have said was less risky than a natural gas pipeline company which had no distribution.

There are pipeline companies in this list owning no distribution at all whose securities are selling in the markets on a lower yield basis or a lower price earnings ratio, the reason being that there are other factors about these companies, factors such as capitalization, past earning record, the territory served, and things like that which brought down to specific cases indicate, in spite of my general belief that Oklahoma Natural is a less risky company, generally speaking, than the El Paso Company, that investors, however, because of other things which are inherent in the two situations, give them a different rating in the market. In other words, this is only one of the factors that enters into a judgment as to a proper rate of return for a particular company.

Cross-Examination by Mr. Slaff Resumed.

1369 Yes, I testified on direct at considerable length to the fact that the electric industry was safer than the manufactured gas industry, the manufactured gas distribution system was safer than the natural gas distribution system, and so on down the line, but I can not tell you now whether the difference in the rate of return that I conceive to be a fair difference because of that one factor, is one-tenth of 1% or 1% or 2% or what it is, because in specific instances, in spite of the generalization which I have testified to, I might testify that a natural gas pipeline company which had distribution facilities might be entitled to a rate of return of more than 8%, depending on the facts as I found them in that case.

If an investor should come to me and advise me that he is faced with two alternatives, an investment in an electric company and an investment in a manufactured gas company and all other things being equal about the two companies, I would not advise him as to any differential in the rate of return he should require in order to make it a proper investment for him to go into the gas business. I think it should be stated that the investor faced with this problem might take into consideration the fact that the courts and commissions have handed down decisions in the past few years with reference to the rate of return of electric companies, gas companies, telephone companies, and water companies. That might be one indication of the differential, but I cannot state what the differential would be or should be, even if all other things are equal.

I would say that the experience of the past few years has demonstrated that investors are more willing to buy the securities of electric companies than of the manufactured gas companies. It is extremely hard to say whether the experience of the past few years would indicate that investors are more willing to buy the securities of manufactured gas distribution companies than natural gas distribution companies. I have no opinion about that.

I have kept in touch in the last few years with what has gone on in the investment market, particularly in the public utility investment market. As I have said, it is very easy from proper knowledge and experience of what is going on in this country, to take cognizance of refunding and the amount of new securities sold to the public in the last five or ten years. Everybody knows that the electric companies have gone through great refunding programs and that the gas companies have not gone through with refunding programs to anywhere near the same extent. Therefore, it is easy for me to answer whether or not investors have been more willing to buy electric securities than gas securities, but when it comes down to answering the question as to manufactured gas companies versus natural gas distribution systems, it is much more difficult to answer because the latter companies have converted, have gone from one type of gas to the other. I have no way of forming a basis for such a judgment.

I have not given consideration to the latter question in that form. I watch every security issue that comes out. I don't think that knowing the absolute amount of securities sold in recent years in either of those two classifications is of any great importance. As I understood your question, you asked me the relative willingness of investors to buy the securities of manufactured gas companies as compared with companies distributing natural gas in recent years, and I have tried to answer it. There are two unknowns and you are asking me for the differential. To determine the differential, you have to know each of these unknowns. I cannot answer your question as to whether the experience of the past few years as demonstrated by investors is that they are more willing to buy the securities of natural gas companies, distribution, or artificial gas distribution.

Investors bought the securities of the Washington
1370 Gas-Light Company two or three months ago in a
substantial amount, and investors a year ago bought the securities of the Michigan Consolidated Gas. Those, as I remember it, are two of the most important securities gas distribution companies offered in the last couple of years. Both securities were bought by the public. One was bonds and one was common stock. I was familiar with both. I cannot state a differential in the investor's attitude exactly between these two. I cannot answer your questions as to the difference in the attitude of investors toward the securities of these two different types of gas companies in the past two years. I do not believe it is capable of measurement.

My answer to your question as to whether investors are more willing to buy the securities of natural gas distribution companies or of integrated natural gas systems is the same. I cannot say. I don't think you can measure any of these things by the turn-over on the stock exchange, because in the first place a great many of these companies' securities are not listed on the national exchanges. They are traded in over the counter. I do not know whether any statement of the volume would be indicative of the questions that you are asking. There may be a terrific volume at a decline in price.

You asked me if it is not a fact that when I was testifying on behalf of Brooklyn Union Gas Company about a month ago, I testified that the experience in what has gone on in the past few years has demonstrated that investors are more willing to buy securities of natural gas companies than they are of artificial gas companies. What kind of securities was I referring to? I would like to see the context of my statement in that case. I do not remember testifying in those words. I think I testified as indicated by the following questions and answers which you have read to me from the transcript in the Brooklyn Union case for September 18, 1939:

"Q. Would you say that an investment in a natural gas company is a better class than an artificial gas company like the Brooklyn Union or a manufactured gas company?

A. I hate to generalize.

Q. Oh, you have generalized all along.

A. I would say that yes, that in the past few years, experience in what has gone on has demonstrated that investors are more willing to buy the securities of natural gas companies than they are of artificial gas companies."

I think if you read the whole context there, that you will find that we were discussing bonds and the ability of companies to sell bonds. There have been in recent years many million dollars worth of natural gas pipeline bonds sold, particularly to institutional investors. While I was in the Equitable, we bought many million dollars of such bonds of short maturity with heavy sinking funds. At that time, we were not buying the bonds of artificial gas companies. Natural gas pipeline bonds were special types of securities and fitted a special position in the portfolio of the investing institution, and that is what I meant by investors being willing to buy the bonds of natural gas companies. I think that my answer to the question quoted must be read in the light of the previous testimony that I gave in that case. Yes, I knew that any answer I might give you now would be read in the light of my previous testimony. In my original testimony here, I testified to just what I told the Examiner a few moments ago concerning this balancing of securities in the portfolio of institutional investors. I think I recollect that he stated that during the last five years, institutions had bought very large amounts of bonds of natural gas pipeline companies.

1371 The Brooklyn Union Gas Company is an artificial gas company. I have testified in their behalf on the rate of return. I have not received a fee in that case as yet. I have contracted for a fee but have rendered no bill for my services. I have no doubt whatever about receiving my fee from that company. I had no hesitation in testifying in that case that "in the past few years, experience in what has gone on has demonstrated that investors are more willing to buy the securities of natural gas companies than they are of artificial gas companies."

If we add up the amount of securities sold in the last ten years in two columns, one natural gas companies and the other artificial gas companies, I have no doubt that under the column on natural gas companies the amount would be greater, and I have no doubt that investors are more willing to buy the securities of natural gas companies than they are of artificial gas companies. I don't think I had any such doubt ten minutes ago. I did not express an opinion on that. I did express an opinon as to that in the

Brooklyn Union case. I do not think the same question was put to me here.

Yes, on Friday before I left the stand, we were discussing the recent financing of the Public Service Company of Colorado. I remember that discussion. I remember that it was approximately in November, 1938 when that company first filed a declaration with the Securities and Exchange Commission. That declaration was subsequently withdrawn and a new declaration was filed. The second was filed several months ago, I don't remember the exact date. I think the reason for the withdrawal was to reshape the original proposed plan of financing. I have no intimate knowledge of it. The financing now is on a little different basis than it was then.

I assume that after the withdrawal of the first statement and the filing of the second statement or declaration, conferences were held in the usual course of business, as they are in the Securities and Exchange Commission, between the officers of that company and the staff members of the Commission. I think I know from my own knowledge that there were conferences.

An informed investor reading the S. E. C. release on that financing, would observe a statement in there with respect to the life of the Amarillo field. If interested an in investment in the Amarillo field, he might try to procure from the public files of the S. E. C. the data behind that statement in the release. I am not sure that he would. Some might. I happen to know people who were willing to buy the bonds of that company when they came out, and to my knowledge they never requested such information from the S. E. C. Some people might have.

An informed investor of the type I had in mind when I was discussing informed investors in my direct examination might, upon seeing the statement of the S. E. C. to the effect that the life of the field was estimated at 25 years or thereabouts, attempt to find out from the public files of the S. E. C. what was back of that statement. (Objection by Company Counsel overruled.) Not all people think alike. Some people might have gone to the S. E. C. and asked if there were a complete report by the Ralph Davis firm. I think I can probably generalize and say that the man who has more information is the better equipped. But I may say that I believe there are informed investors who would take up their position as to an investment of this kind in a substantial amount without going to the files of the S. E. C. although I think it is right to say that the investor who sought the information more closely approximates the informed investors I have in mind.

I made no effort to find out from the S. E. C. what 1372 was back of that statement which you read to me from the release on the Public Service Company of Colorado's financing. This release came out in August or the beginning of September. Of course, I had seen the prospectus part containing the letter when it was filed in 1938.

(At this point Exhibit No. 155 was withdrawn and a document described by counsel for the Commission as a certified document embodying what was offered in Exhibit No. 155 was produced by counsel, with the request that it be marked for identification. At the direction of the Examiner, the document referred to was marked Exhibit No. 155 for identification. EXHIBIT NO. 155 was received in evidence over the objection of counsel for defendants, who were allowed an exception.)

Questions by the Examiner.

In response to questions you previously asked me, I stated that, in my opinion, an investor in the bonds of Public Service Company of Colorado might well look at the statement in the prospectus and the registration statement and even might go to the Securities and Exchange Commission for additional material. That entire statement was with reference to an investor. As a part of my duty in determining a proper rate of return in this particular case, I satisfied myself that the gas field would last at least fifteen years, and I was not concerned beyond that period. I assumed that the Federal Power Commission or the proper authority will determine the proper amount of amortization and that was my assumption in my testimony as to rate of return.

In assuming a life of at least fifteen years and assuming that the Federal Power Commission establishes amortization, my point is that, even though there is a maximum life, there is a risk that the field might go down before that fifteenth year is met. That is a possible hazard.

(Counsel for the Commission then produced a document which he described as the facing sheet of the same registration statement as contained in Exhibit 155, together with page No. 62 from said registration statement, with the request that it be marked as an exhibit. At the direction of the Examiner, the document was marked Exhibit No. 158 for identification. EXHIBIT NO. 158 was received in evidence over the objection of counsel for defendants, who were allowed an exception.

Counsel for the Commission then produced a document described as the facing sheet contained in the registration statement filed with the Securities and Exchange Commission August 30, 1939, by Public Service Company of Colorado pursuant to the provisions of the Securities Act of 1933 as amended, under file 2/4180, and pages 5 and 6 as contained in said registration statement. At the direction of the Examiner, the document was marked Exhibit No. 159 for identification. EXHIBIT NO. 159 was received in evidence over the objections of counsel for defendants, who were allowed an exception.

Counsel for the Commission then produced a document which he described as a certified copy of the facing sheet of the same registration statement referred to in connection with Exhibit No. 159, together with page 57 of said registration statement. At the direction of the Examiner, the document was marked Exhibit No. 160 for identi-
1373 fication. EXHIBIT NO. 160 was received in evidence
over the objection of counsel for defendants, who were allowed an exception.

At this point, at the direction of the Examiner, the reporter copied in the record the following statement beginning at the bottom of page 4 and continuing on to page 5 of Exhibit No. 155:

"Ralph E. Davis, Inc., oil and gas experts of Pittsburgh, Pennsylvania, have prepared a report, dated November 18, 1938, concerning the natural gas reserves from which the company's supply is obtained. Such report follows:

Ralph E. Davis, Inc.
Engineers

Petroleum and Natural Gas
Pittsburgh

November 18, 1938.

Mr. Guy W. Faller, Vice Pres. & General Mgr.
Public Service Company of Colorado,
Denver, Colorado.

Dear Sir:

In response to your request, you are advised that from time to time we have made examinations of the gas reserves of the Texas Panhandle Field, including studies of the properties of all of the principal companies producing natural gas in that territory, as a result of which we are generally familiar with the operations in and the probable ultimate production of the area.

The Panhandle Field comprises more than 1,400,000 proven acres, including sour gas acreage, and has been recently estimated to contain a reserve of more than 15 trillion cubic feet. At the 1937 rate of withdrawal for all purposes this is equivalent to more than a 25-year supply.

The natural gas now being furnished to Public Service Company of Colorado by Colorado Interstate Gas Company is obtained by the latter from its affiliate the Canadian River Gas Company which holds a leading position in the Panhandle Field. We are generally familiar with the location of the acreage there held by the latter company.

While we have made no specific examination of the property and business of the Colorado Interstate Gas Company and Canadian River Gas Company for your account, we are able to state from our own general knowledge that the acreage and gas reserves of the latter are ample to supply the gas requirements of the Public Service Company of Colorado and its subsidiary, Colorado-Wyoming Gas Company, and insure the continuance of this service for at least 20 years.

Very truly yours,

Ralph E. Davis, Inc.
By Alden W. Foster
Vice President.")

1374 *Cross-Examination by Mr. Slaff Resumed.*

Exhibit 158 indicates that during the 12 months' period ended September 30, 1938, Mr. W. Alton Jones was vice president and director of Public Service Company of Colorado. The footnote indicates his remuneration, and that it came from the Cities Service Company. The Cities Service Company is one of the substantial holders of defendants' securities.

From Exhibit No. 160, it appears that Mr. Jones continued as such director and officer until July 13, 1939. Exhibit No. 159 also contains a letter signed by Ralph E. Davis, Inc. by Alden W. Foster, Vice President.

(At this point an extract from Exhibit No. 159 was inserted in the record by the reporter at the direction of the Examiner. This extract sets forth the same letter bearing date of November 18, 1938, as that copied into the record from Exhibit No. 155 at pages 7268 and 7269.)

Yes, I testified on direct examination that the Equitable Life Assurance Society had purchased bonds of Northern Natural Gas Company while I was with the Equitable. That was an issue of $16,000,000 of which Equitable took $4,000,000. I do not know how many of these bonds were outstanding as of the summer of 1939. There were some additional bonds sold and a sinking fund operated on the bonds. I should judge that the amount outstanding as of this summer was probably more, but I would not think a great deal more.

Some additional bonds were issued after the first private deal was arranged. Those were 4¾s that the Equitable bought. The original contract was for 5%, but when the actual deal was closed, the coupon rate was fixed at 4¾%. I have not kept track of the exact amount of these bonds which were outstanding as of the summer of 1939. They had been refunded by the Northern Natural Gas Company. I do not know the amount of the refunding issue. It was somewhere between $10,000,000 and $20,000,000.

Northern Natural engaged in a financing operation very recently. They sold some short term notes. I do not remember the amount of those notes, but should guess that it was between $5,000,000 and $10,000,000.

I think from memory that the maturity date of the bond issue was 15 or 16 years from the date of issue. The purchasers were a slightly different group than the group that bought the original issue. The Metropolitan was one of the large buyers, Equitable and Prudential were others. There were a number of large life insurance companies involved in the deal. Within certain limits, it is usually the case that under such circumstances, the buyers practically set up the terms of the bonds.

The fact that the bonds were issued for a maturity of 15 or 16 years would indicate very definitely that the purchasing companies expect the Northern Natural Gas Company to be in existence well beyond July 1, 1954. I think it is a fair statement to say that they would
1375 expect it to be in existence at least 5 years beyond
1954. I can say definitely upon my own experience with Equitable that they would not buy the bonds unless they were convinced that the operations would go 5 years beyond the maturity of the bonds. Any other estimate would be speculation on my part. When an institution is convinced in its own mind that an enterprise will last 5 years at least beyond the maturity date of certain obligations, it is fair to say that they might have a reasonable expectation that the enterprise will last more than 5 years beyond that maturity date, but it must be remembered that in this instance they were buying mortgage bonds with a maturity in 1954 and with a very heavy sinking fund.

I cannot say what is in the mind of any one of these institutional buyers with reference as to how long the Northern Natural Gas Company is going to be in business. I am confident that they would believe that it is going to be in business 5 years beyond the maturity date of the bonds. I do not think I have anything to add to what I have already said on that point.

In my direct testimony at page 5394 I spoke of the Northern Natural Gas Company as a pipeline. I added that it owns or controls directly or indirectly some substantial distribution facilities. I also testified that at the time Equitable purchased the bonds this circumstance was considered an element of strength. I am not sure that it owns any distribution facilities directly. I think the distribution facilities are owned indirectly through the ownership of wholly-owned subsidiaries. I do not know how many of such subsidiaries there are. I have known the names of these subsidiaries from time to time, but I do not carry them in my mind.

When I said it had "substantial distribution facilities," I meant it received some substantial revenue from those controlled distribution facilities. I do not mean 50% or 25%. I think I would say 10% or something like that. That is my conception of the term "substantial" as I used it there. I think at one time I knew the relationship between the plant account of the subsidiaries and that of the parent Northern Natural. I do not carry the figure in my mind.

The revenues received from the domestic and commercial service for the 12 months ended June 30, 1939, amounted to $1,600,000, and the revenues from industrial sales to about $2,900,000, or a total of about $4,500,000 compared with a total gross of about $10,000,000. That is the amount of revenue received from direct sales as opposed to other sales which are called "town border sales", amounting in the aggregate to about $6,000,000. From this, I draw the conclusion that the subsidiaries are substantial and that substantial revenues are received directly through those substantial controlled by the company.

The total percentage of gas which Northern Natural sold last year to its subsidiaries would be less than 10%. As a matter of fact, it was about 5%. Of course that gas is sold at a different rate than certain other gas is sold.

I have no doubt but that in connection with my general duty of keeping advised as to matters of interest in the public utility financing field, I, or some member of our organization, read the S. E. C. release on the Northern Natural Gas Company.

(At this point, counsel for the Commission requested that Release No. 1667 of the Securities and Exchange Commission under the Holding Company Act in the mat-
1376 ter of Northern Natural Gas Company, be marked for identification. At the direction of the Examiner, the document was marked Exhibit No. 161 for identification.)

Exhibit No. 161 is a regular release of the S. E. C. under the Holding Company Act, containing the findings and opinion of that Commission in the matter of Northern Natural Gas Company. It is in connection with the recent financing operation we have been discussing. In addition to refinancing the existing indebtedness, they were getting some new money, amounting to approximately $6,000,000.

Yes, it appears from the bottom of page 5 and from page 6 of that release, that an informed investor would have learned of the fact that "the company's depreciation problem is fundamentally related to the probable future life of the gas fields from which its sources of supply originate. For such determination, the company employed Ralph E. Davis, Inc., petroleum and natural gas engineers, to undertake a study of the natural gas supply available to its pipeline system from acreage which is owned or covered by purchase contracts as of May 1, 1939". (Objection by Company Counsel overruled.) The informed investor coming across that statement in this release might be interested in finding out what was back of the Commission's statement. Exactly the same answer I have already given applies in that respect. An informed investor could come to Washington or write down for photostatic copies of such documents as might bear on that statement.

(EXHIBIT NO. 161 was offered and received in evidence over the objections of defendants, to whom the Examiner allowed an exception.

The reporter, at the direction of the Examiner, copied into the record the following extract from Exhibit No. 161:

"The Company's depreciation problem is fundamentally related to the probable future life of the gas fields from which its sources of supply originate. For such determination the Company employed Ralph E. Davis, Inc., petroleum and natural gas engineers, to undertake a study of the natural gas supply available to its pipe line system from acreage which is owned or covered by purchase contracts as of May 1, 1939. The report was based upon data furnished by the Company, as well as upon the general familiarity of the firm with the fields and properties gained during previous studies. The conclusions reached were as follows:

(1) The company's position in the Panhandle and Hugoton Fields is such as to assure it, at reasonable cost, of its natural gas requirements, as indicated by present deliveries and with due consideration of the anticipated expansion of its facilities and increased market requirements for a period of more than 25 years.

(2) The properties wno owned by Northern in the Panhandle and Hugoton Fields, together with gas reserves controlled by virtue of gas purchase contracts in these two fields, are in our judgment capable of furnishing this total gas requirement of the Northern system.

(3) The reserves controlled in the Otis Field, while small in total quantity as compared to the reserves controlled in the Amarillo and Hugoton Fields are of importance from an operating standpoint.

The Company's present depreciation policy, 3½% per year or stated in terms of probable life of its plant, 29 years, compares with the Davis estimate of over 25 years for the life of the gas fields."

1377 Counsel for the Commission then produced another document which the Examiner directed the reporter to mark Exhibit No. 162 for identification.)

An informed investor seeking to acquaint himself with what was back of the statement contained in the S. E. C. opinion, now in evidence as Exhibit 161, would find the document marked Exhibit 162 in the public files of the S. E. C.

(Counsel for the Commission then offered EXHIBIT 162 in evidence. The exhibit was received in evidence over the objections of counsel for the defendants, who were allowed an exception.

At the direction of the Examiner, the reporter then copied into the record from Exhibit 162 the following language:

"Ralph E. Davis, Inc.
New York
Engineers 150 Broadway

Petroleum and Natural Gas
1710 Union Bank Building
Pittsburgh

June 1, 1939

Mr. B. R. Bay, President,
Northern Natural Gas Company
Aquila Court Building
Omaha, Nebraska.

Dear Sir:

In accordance with your request we have made a study of the natural gas supply available to the company's pipe line system from acreage which is owned or covered by purchase contracts as of May 1, 1939. Our study is based upon data which have been furnished to us by the company, as well as upon our general familiarity with the fields and properties gained during previous studies.

The company's gas supply is obtained principally from the Panhandle Field of Texas and the Hugoton and Otis Fields of Kansas, as follows:

1378 Gas Requirements and Sales

*M Cubic Feet

	Requirements					
Year	Panhandle	Hugoton	Otis	Other	Total	Sales
1934........	12,338,444	12,502,638	444,265	1,283,030	26,568,377	25,578,650
1935........	13,470,017	12,766,374	4,672,071	1,199,748	32,108,210	31,189,005
1936........	18,123,922	13,396,452	4,402,651	1,201,774	37,124,799	34,872,065
1937........	20,956,418	13,888,741	3,374,564	1,221,641	39,441,364	37,514,817
1938........	22,365,518	13,570,331	3,043,127	1,035,896	40,014,872	39,838,590

* All quantities stated herein are at a base pressure of 16.4 pounds absolute.

During the past three years approximately 90 per cent of these requirements have been purchased from other operators.

Since 1934, the growth in the company's business has been substantial. With the construction of the contemplated new facilities, a further increase in volume of sales has been estimated by the company, as follows:

1379

Year	Estimated Increase in Sales During Year M Cubic Feet	Cumulative Estimated Increase Over 1938 Sales M Cubic Feet
1939..............	3,360,000	3,360,000
1940..............	2,700,000	6,060,000
1941..............	900,000	6,960,000
1942..............	900,000	7,860,000
1943..............	900,000	8,760,000
1944..............	900,000	9,660,000

In the present study we have estimated the gas reserves of the Panhandle Field as of July 1, 1938, this being the latest date when rock pressure data for the entire field are available. Withdrawals during the 2½ years preceding that date and total accumulated withdrawals have been as follows:

1380 Gas Withdrawals from the Panhandle Field.

M Cubic Feet

	Dry Gas				
	Sweet Gas	Sour Gas	Total Dry Gas	Casinghead	Total
Prior to Jan. 1, 1936 (Accumulated)					5,001,052,133*
Jan. 1, 1936 to July 1, 1936	132,861,838	79,248,891	212,110,729	66,822,102	278,932,831
July 1, 1936 to July 1, 1937	238,315,448	160,330,446	398,645,894	132,884,118	531,530,012
July 1, 1937 to July 1, 1938	240,060,100	215,540,850	455,600,960	109,542,946	565,143,896
					6,376,658,872

* Estimate made in 1936.

1381 The accumulated withdrawals prior to 1936 include excessive wastage which occurred upon completion of wells during the early history of the field and also during the period from 1933 until the early part of 1936 when the unrestricted use of dry gas for "stripping" operations was permitted, hence this figure includes a substantial quantity of estimated production. On the whole, the stated accumulated quantity is believed to be conservative.

The rock pressure of the field which initially was 430 pounds had declined by reason of the above withdrawals to an average of 337 pounds as of July 1, 1938. For a number of years we have from time to time prepared estimates of the gas reserves of this field based upon the withdrawals and decline in rock pressure. Based upon our present study the remaining reserves of the field as of July 1, 1938 are estimated to be in excess of 18 trillion cubic feet, which estimate is in line with our previous conclusions.

Recent annual withdrawals for all purposes are less than 600 billion cubic feet, indicating a future life for the field on the basis of present production of approximately 30 years.

The company obtains its requirements from the Panhandle Field under purchase contract with Phillips Petroleum Company (Independent Natural Gas Company), Hagy, Harrington and Marsh, and J. M. Huber Corporation, supplemented by its own wells and acreage.

The Phillips supply is furnished from the residue of six gasoline plants operating on dry and casinghead gas obtained from wells in Gray and Wheeler Counties. Gas processed in these plants during the last half of 1938 averaged 97 million cubic feet per day. After deducting gas used in plant and lease operations, less than half the remainder was required to fulfill deliveries provided in the contract with Northern Natural Gas Company—32 million cubic feet per day or 11 billion cubic feet per year. The balance of the Phillips residue from these plants is sold for carbon black manufacture. Although under the contract, after February 1940, Phillips has the right to reduce its deliveries to Northern, we are of the opinion it will be to Phillips' advantage to continue to make deliveries to Northern even after the present contract has expired, probably for the remaining life of the Panhandle Field.

The properties of Hagy, Harrington and Marsh and J. M. Huber Corporation covered by purchase contract with Northern, and the principal portion of the company's own acreage in this field are located in western Gray and eastern Carson Counties, as follows:

	Carson County	Gray County	Total Acres
Hagy, Harrington and Marsh	21,663	11,577	33,240
J. M. Huber Corpn.	4,280	....	4,280
Northern Natural Gas Company	12,860	5,729	18,589
Total	38,803	17,306	56,109

The purchase contracts and company leases extend for
the life of the production. With exception of ap-
1382 proximately 2,000 acres of Hagy, Harrington and
Marsh leases and 1,100 acres of company leases, the
above is located within the present proven limits of the field. As such, depending on surrounding development and upon the degree of uniformity of reservoir conditions within the general area, it is subject to the rate of depletion experienced by the whole. In 1938 Northern Natural Gas Company's withdrawals from this field were 22.3 billion cubic feet and we anticipate a gradual increase to possibly 25 to 30 billion cubic feet per year.

The acreage and gas reserves controlled by Northern under its own leases and purchase contracts are sufficient to assure this company of its anticipated requirements from this field for a period of more than 25 years. * * *

Ralph E. Davis, Inc.,
By Ralph E. Davis,
President.")

I read the release of the S. E. C. which you have offered here. I did not go down to the S. E. C. and examine any of the documents you have offered from the files of that Commission.

In my direct testimony, page 5405, I testified in substance that a refusal by the S. E. C. to allow a declaration to become effective or to allow the issuance of securities, is a pretty good indication that the securities are not of a quality which should be sold and made available to the public. As a matter of fact, securities subject to the filing of a declaration cannot be sold until the declaration does become effective. That is the kind of securities I was talking about in that answer, those that are subject to the Holding Company Act. Such securities, as to which the S. E. C. has refused to permit a declaration to become effective, cannot be sold under the laws of the United States.

I have stated that I thought that the fact that such applications were approved by the Commission was of substantial influence in the minds of investors in persuading them that securities may be desirable to purchase.

The defendants are not subject to the Public Utility Holding Company Act of 1935. They are not at this time subsidiaries of a registered holding company. Southwestern Development Company is a registered holding company. When I say that Natural Gas Pipeline Company is not a subsidiary of Southwestern Development Company subject to the terms of the Holding Company Act, I mean that there is an application pending for a declaration by the Commission that it is not a subsidiary of that company and I think of some other companies. By that I mean that they are applying for a declaration that they are not subject to the Act. According to the statutory provisions contained in the 1935 Act, defendants, prima facie, would be subject to it.

As far as I can answer your question offhand, I do not think that the subjecting of the electric industry to the regulation of the S. E. C. under the 1935 Act brought any additional risk to investors. It may affect investors over a period of time. I think that, generally speaking, 1383 the statutes under which the S. E. C. operates tend to make available more information to investors and in that sense they get additional protection. It should be remembered, however, that there are certain sections of the Holding Company Act about which there is a great deal of controversy and many people believe that investors may suffer losses. I have in mind particularly Section 11 of the Act.

The same considerations would apply to the segment of the gas industry which is subject to the Securities Act, both the 1935 Act and the 1933 Act.

You have asked me to point out the operating companies and the holding companies listed on page 1 of Exhibit 150. Arkansas-Louisiana Gas Company is an operating company. Columbia Gas and Electric Corporation is a holding company which owns practically 100 per cent of the securities of the subsidiaries. North Penn Gas Company is, I think, an operating and holding company. Panhandle Eastern Pipe Line Company is an operating company. Southern California Gas Company is an operating company. Southern Counties Gas Company is an operating company, and Southern Natural Gas Company is an operating company and holding company.

Considering both defendants as a single enterprise, such enterprise is an operating company.

I have not made any attempt to determine the average yield of the bonds shown on page one of that exhibit. I may have in my office added them up and divided by 8; but I did not consider it proper to attempt to arrive at an average yield in this instance although I have no particular idea at this time why I felt that way; I just did not. I do not know whether the average weighted yield would be of any more significance than the average yield. They would be different.

I do not think it is necessary to a determination of a fair rate of return to have either the weighted or the simple average of these yields. It is easy enough to do it. If I had thought that it was necessary to do so, I would have done it. At the time I prepared the exhibit, I apparently did not think it necessary and therefore did not do it. I do not think it would be helpful to do so. Everything you do provides more information, but I do not think it is necessarily more informative. There might be a tendency towards misleading conceptions.

I did not make any attempt to determine the average yield for the operating companies alone, nor for the holding companies alone. You have asked me to state the Moody's rating and the call price as of September 15, 1939 for each of the bonds shown on page one of Exhibit 150.

Arkansas-Louisiana Gas Company, Moody's rating "A"; callable, 101½.

Columbia Gas and Electric Corporation, rating "Baa"; callable at 104.

Lone Star Gas Corporation, Moody's rating "A"; callable at 105.

North Penn Gas Company, Moody's rating "A"; callable at 104¼.

Panhandle Eastern Pipe Line Company, Moody's rating "A"; callable at 102½.

1384 Southern California Gas Company, Moody's rating "Aaa"; callable at 104.

Southern Counties Gas Company, Moody's rating "Aa"; callable at 101½.

Southern Natural Gas Company, Moody's rating "Baa"; callable at 105.

I testified earlier that I did not purport to be an investment counselor but that I am a financial consultant. It does not appear to me particularly strange, when you know all the facts, that at the time I prepared this exhibit the "Aaa" Southern California Gas Company bonds were selling at a 4.07 yield against a yield of 3.06% on the Lone Star Gas Corporation's debentures rated "A". It often happens that a particular bond with an "Aaa" rating will sell at a higher yield than an "A" rated bond in view of the maturity of the respective issues. In this particular case, the call price of the Southern California bond is 104, and the bond noted here has a price of 106¼. This bond has a yield of 4.07 against the yield of 3.9 on the "A" rated Arkansas-Louisiana Gas Company bonds and as against 3.73 on the "A" rated Panhandle Eastern bonds.

I think these bonds of Southern California Gas Company are of the same mortgage security as the company's 4% bonds maturing in 1965. I think the price of the 4's of 1965 as of 9-15-39 was approximately the same as that of the other bonds. The yield would be smaller. I cannot remember the calculation. It would be 25 or 30 points smaller in basis, or something like that. I do not have right now available the price at September 15, 1939, of the Southern California Gas Company 4's of 1965. From the Commercial and Financial Chronicle of September 16, 1939, which you have just handed me, it appears that the last sale on Friday of that week ending September 15, was 105¾. That would compare with the price of 106¼ shown on my Exhibit 150 for the Southern California 4½'s of '61.

A 4 per cent bond selling at 105⅜ with a maturity of approximately 26 years shows a yield to maturity of approximately 3.65 per cent. That represents a difference of 42 basis points in yield. We have two bonds of the same company, with the same mortgage security, selling on the same day at considerably different yields. I think the yield on the 4 per cent bonds is probably more indicative of the credit of the company. Nobody can tell. It may well be that a person buying the 4½ per cent bonds may obtain a yield to maturity of 4.07 per cent. It may be that buying that bond above the call price may result in a considerably reduced yield. In other words, it would be a yield on short term money if the bonds were called. It is the possibility of a call that keeps the price down and the yield up. Yes, I think the 4 per cent bond of Southern California Gas Company which I did not use in my Exhibit 150 is more indicative of the company's credit, but I was not particularly interested in the company's credit here.

This exhibit here shows yields which are available to investors in different types of natural gas company bonds. It is true a company's credit position in the investment field at large is one of the determining factors of the yield at which its securities can be sold, but here we have a case of where a bond is selling slightly above its call price and it may be that investors will buy that bond and get that yield on maturity. It is of some significance.

It is true that in the preparation of this Exhibit
1385 150, referring specifically to pages 3, 4, and 5, I used
only one issue of those companies which had more than one issue outstanding and I invariably took the issue with the highest yield. I did this because those pages of the exhibit were set up to show that substantial yields were available to investors in other public utility securities. These pages of the exhibit were not introduced to show what yields were in the industry at large. If you will refer to my original statement, I said that the exhibit showed that substantial yields were available to investors both in bonds and preferred stocks of other utility companies.

Yes, I made a conscious choice in selecting that issue of companies having more than one issue outstanding, which had the higher yield. The note at the bottom of each page shows that only one issue of each is included. I do not think I pointed out in my direct testimony that I picked the issue having the higher yield as between two issues of the same company. I did not specifically mention that. On each of those pages there is a note which says "Only one issue of any company is included." The exhibit would not have been substantially different if I had included a number of other issues of each company's bonds like 4½'s and 4¾'s or 5's. It would have made a much longer exhibit and would not have been greatly different in results.

I know a great many of these companies have other issues. I have not made the mechanical computation to determine whether there would be any consequential difference if I had used either all issues of all the companies shown, or issues with the lowest yields.

The yield of 4.07 on the Southern California 4½'s due in '61, is the true yield to the investor if the bond is held to maturity. "Yield" is a well-known term and true yield goes to the maturity of the bond.

This bond is yielding more than the Southern California 4's of '65, which are yielding 3.65, because it is selling a little above its call price. The reason it is selling for only a little above the call price is because that is all the investors are willing to pay for it. They are influenced by the call price. They know what the call price is. That is the factor that I testified before keeps the price down to 106¼ and its yield up to 4.07. The yield at 4.07 includes a factor which takes into consideration that call price. I am not sure that it is fair to say that the yield includes a "premium" on the gamble, or the possibility, that these bonds will be called at their present call price. Certainly the yield of 4.07 is influenced by the fact that the bonds are selling above their call price. If these bonds had no call feature presently they might be selling at almost the identical yield of the 4's of '65. They might vary a little bit because of the difference in maturity.

One way of saying it would be that the difference in yield of some 42 basic points is due to the influence of the call price, and that this difference may be said to represent the investor's premium against the possibility of call. I suppose that is a fair way of stating it, but I do not think it is the way I would describe it.

In the case of the 4's of '65, there is also a call price, but I think those bonds are selling below their call price. They are rated "Aaa", too.

1386 (November 2, 1939.)

In the course of our discussion yesterday I stated that it was my purpose by the information presented on pages 3, 4, and 5 of Exhibit 150 to show the opportunities for investment open to investors. I question whether you can get a better over-all picture by a weighted average than by a simple average. There are all kinds of refinements that might be entered into. Some of these issues have more bonds outstanding than others; but it is uncertain whether a refinement to that extent is of any more value, in my opinion. It is uncertain for the reason that if a company has $50,000,000 of securities outstanding which would yield an investor 7 per cent, and another company has only $5,000,000 of securities outstanding that would yield 6 per cent, the weighted average of that might work out at something around 6.75 per cent, or something like that. I am not sure for the purpose for which this exhibit was prepared that that is any different than showing simply the yields at which the securities of a particular company are selling. As I stated, the purpose was to show investment opportunities to the public at large. The opportunities for investment at given yields or given returns depend upon the amount of that security outstanding and available for investment, but there are sufficient amounts of these securities outstanding.

No, I do not think it would be a better and truer picture in determining over-all averages for the issues shown on pages 3, 4, and 5 of my exhibit to use weighted averages rather than simple averages, which I show at page 4 and which I stated into the record in connection with page 5. ~~This was~~ not built up to show over-all averages. It was built up to show investment opportunities, and I state again that I do not thing I get a better picture of investment opportunities by showing a weighted average instead of a simple average.

The reason I didn't show the investment opportunities available to an investor on the New York Stock Exchange instead of limiting it to the Curb, is that the latter has a wider representation of utility securities than the former. That is, it is wider in types and number of companies. I think this is true when you take into consideration all of the securities on the Curb Exchange and admitted to unlisted trading purposes. I have never made the calculation as to the amount outstanding. I don't know whether the Curb Exchange is wider in the amount outstanding. I have looked at the list on the Stock Exchange from time to time. I have a general knowledge of the listings of domestic electric and gas utility bonds on the New York Stock Exchange at September 15, 1939. I read the New York Times of that date, and I usually glance at the Stock Exchange tabulations of stocks and bonds.

In preparing my exhibit I did not make any effort to get the bonds of electric and gas companies that were traded on the New York Stock Exchange on September 15, 1939, to give me a list comparable to the list contained on pages 3, and 4 of my Exhibit 150. I made up my mind first that the Curb list was a wider list and more indicative for the purpose, and I used the Curb listings. I made no specific effort to find out how much wider or how much more representative the Curb list was. I relied on my general knowledge for that.

Questions by the Examiner.

In answer to your question as to what are the requirements on the Curb that produce that different kind of a range, the New York Stock Exchange requirements are more difficult from the standpoint of information re-
1387 quired to be furnished. It is more expensive for companies to list securities there than it is with the Curb Exchange. A great many smaller utility companies do not even list their securities on the Stock Exchange. The Curb listing is all-inclusive, bonds, preferreds, and commons. I think the representation on the Curb has always been broader in coverage than the Stock Exchange because of the things that I have mentioned, the rather rigid requirements, the amount of information to be furnished to the New York Stock Exchange, and the expense involved.

Cross-Examination by Mr. Slaff Resumed.

It is rather difficult to say that there is a generally better grade of security on the New York Stock Exchange than on the Curb. I just look at page 3 here, and I find one of the very highest grade securities, like the Consolidated Gas of Baltimore. I hesitate to say that the overall grade of the New York Stock Exchange securities is higher. I think I might say it this way, that the securities listed on the Stock Exchange are of a more seasoned character. That is generally the appellation that is given to distinguish the Stock Exchange from the Curb list. I don't know whether the over-all yields on the Stock Exchange list would show a lower yield than the yields on the Curb list shown on pages 3 and 4 of Exhibit 150.

As I count them there are 60 bonds listed on pages 3 and 4. I do not know the exact number of domestic electric and gas companies which have bonds listed on the New York Stock Exchange. I will accept your statement that there are some 65 such companies having approximately 90 issues listed on the New York Stock Exchange. I do not know how many companies had issues traded in on September 15, 1939, on the Stock Exchange. I have not made a calculation to determine that there were approximately 44 or 45 electric and gas companies which had some 60 issues traded in on the Stock Exchange on September 15, 1939. I have a general knowledge of the securities that are listed on the Stock Exchange.

I have not made a calculation to determine the weighted average yield on the bonds of domestic electric and gas companies sold on the Stock Exchange on the date last mentioned as compared with the average yield on the issues sold on the Curb on that date. You have stated that such yield on the Stock Exchange issues sold that day came to 3.63 per cent, as compared with the average yield of 5.12 for the Curb list. I do not think that this Stock Exchange list would more adequately show the investment opportunities open to the investor at large. I say this taking into consideration the purpose for which this exhibit was prepared. This exhibit was prepared to show investment opportunities to investors and to help in forming a judgment as to what might be a proper rate of return for the Natural Gas Pipeline Company of America. Putting in the yields of bonds of such companies as the Commonwealth Edison Company and other very highest grade bonds is no indication whatever of, nor would it be of substantial help in determining, a rate of return for a company of this type. This list was not put in to show all opportunities available to investors. There are countless opportunities available to investors. It simply was put in, as described when it was put in, as a list of securities of utility companies which were traded in on the New York Curb Exchange, a rather wide list, on a particular day; and it must be remembered that

I made the point very early in my testimony that investors were interested in getting the highest yield they could get commensurate with the safety of the bonds. They
1388 weigh safety or hazard against the potential return.

Yes, pages 6 to 15 of that exhibit show a pretty wide range of companies. I think there would be a few natural gas pipeline bonds listed on the New York Stock Exchange, very few. I think of Southern California Gas Company as a pipeline company, but it is really a distribution company and so considered by investors. It has tremendous distribution facilities. That company is one of the companies shown on page 1 of my Exhibit 150 under the caption "Natural Gas Company Bonds." It has two issues listed on the New York Stock Exchange. Southern Natural Gas Company is listed on the New York Stock Exchange. It is a pipeline company which controls companies owning distribution facilities. The Panhandle Eastern is a pipeline. It is listed on the New York Stock Exchange, if my memory is correct. I am not sure of that. Columbia Gas and Electric Corporation has three issues on the New York Stock Exchange. That company is shown on page 1 of my exhibit under the heading "Natural Gas Company Bonds."

In my tabulation on page 1 of Exhibit 150, I show the Columbia Gas and Electric Corporation debenture 5's of 1961. Columbia also has outstanding debenture 5's due April 15, 1952, and debenture 5's due May 1, 1952. They are all 5 per cent securities. They are all the outstanding issues of Columbia. The price of 5's due May, 1952, was 100¼, that of 5's due April 15, 1952, 100, and the 5's due January 15, 1961, 98¼. The ones I picked for my list are the 5's due in 1961 with the price of 98¼. That represents the issue with the highest yield. It is a fact, then, that I picked for inclusion on page 1 of my Exhibit 150, of the three Columbia Gas and Electric issues, the one with the highest yield. There was a choice that the investor might have made between the one with the higher yield and the ones with the lower. He obviously would have bought the one with a higher yield. They were equal debentures. They were all traded in on that day. Some investors apparently wanted to buy a shorter maturity. An investor with a peculiar requirement might buy shorter term securities. "Special" might be a better word to use instead of "peculiar". In explanation of the fact that three securities of the same company with equal security are selling at different yields to investors, I said that it seems to me that the only possible explanation was that the people were buying the shorter maturity and willing to take a lower yield because they wanted a shorter maturity. I think that is the real explanation. It seems to me clear that their willingness to take a lower yield is because they want a shorter maturity; and I think that could be classed as the special requirement of that particular group of investors.

There may be one or more other natural gas company bonds listed on the New York Stock Exchange. Going over my list on pages 3 and 4 of Exhibit 150 I find three natural gas company bonds listed, those of Arkansas-Louisiana Gas Company, Atlanta Gas Light Company, and Southern Counties Gas Company. Atlanta Gas has a lot of distribution. Arkansas-Louisiana and Southern Counties have substantial distribution.

I have not implied that the Curb list was any more representative so far as natural gas companies were concerned than the Stock Exchange list. I do not now say that it is. I have never said it. That was not the purpose of this exhibit.

Redirect Examination Interposed by Mr. Morgan.

Assuming that the Columbia bonds are natural gas bonds, when those three securities were offered on the Stock Exchange on September 15, there was an opportunity to buy bonds with a yield of 3.14. My ex-
1389 hibit was prepared only for the purpose of demonstrating opportunities for investment. This exhibit does not pretend to portray the credit position of any company, but is prepared to show investment opportunities available.

Cross-Examination by Mr. Slaff Resumed.

The list on pages 1 and 2 was selected by me. Page 3 is a list of all securities. I had nothing whatever to do with their selection. Page 1 shows a list of representative companies which to some extent or other are engaged in natural gas operations in varying degree and character.

Referring to the bonds on page 1, you are correct in stating that some of the bonds of Southern Counties Gas Company were selling above the call price. They were selling about 3⅜ above the call. There are several bonds shown on pages 3 and 4 which were selling at or above the call price. The Carolina Power and Light is one of them. Another is the Erie Lighting, selling 2½ points above the call; and still another is the Jersey Central Power and Light, selling 1½ above the call. The company last named has filed a statement with reference to a refunding operation. I don't know how it is going to go. The Kentucky Utilities is selling at call; Louisiana Power and Light at 1¼ points above call; Northwestern Electric at 2¾ points above call; Philadelphia Electric Power Company at 6 points above call; Potomac Edison at 2 points above call; Southern Counties Gas Company at 3⅜ above call; Southwestern Light and Power at call; Texas Power and Light at 1¾ above call. In each of these cases the fact of the pressure of the call price is one of the factors keeping the yield of those bonds up and the price down. It always should be remembered, however, that those bonds are purchasable, and it is entirely possible that an investor will get that particular yield to maturity. He is taking a chance, though he is not taking a chance in the sense that he is taking a gamble, as you say. If they are called, he will get probably a short term money rate on the bonds.

I have a list in my office of the preferred stocks of electric and gas companies listed on the New York Stock Exchange. I have looked at it from time to time, and I have general ideas as to the number listed. I cannot say that I have never made any attempt to determine the number of these securities listed. I did not actually for the purpose of this case add them up. In my mind I did make a specific evaluation of whether the list of preferred electric and gas company stocks on the New York Stock Exchange were just as representative as the list shown on page 5 of preferred stocks on the Curb. I did not add them up. I used my judgment. I did not get out a list of the preferred stocks on the Exchange and look it over as contrasted with that list on page 5. I look at the list every month. I don't think I looked at the list in specific preparation of this Exhibit. I cannot tell you now how the Stock Exchange list of preferred stocks compares with the Curb list on page 5 of Exhibit 150 as to the number of securities or the number of companies. I cannot tell how they compare in amount. I do not know how that list would compare in over-all yield with my list shown on page 5. I cannot tell you approximately in terms of percent. It would be a guess. Since the list of such preferred stocks on the New York Stock Exchange would include such outstanding companies as the Consolidated Edison, with very large amounts of preferred outstanding of high 1390 quality, and companies like the Public Service Corporation of New Jersey, I should judge that the yield on those preferred stocks on the New York Stock Exchange would be lower than the yields on the preferred stocks which are available to investors on the New York Curb Exchange. I would not attempt to say how much lower.

I had to pick a particular time in order to get prices and calculate the yields, and September 15 was the latest date which I found it possible to use in order to be ready to testify in early October. I made no calculation to determine that that was the day of the highest yields in the last several months. I do not know that that is true. I did have this list done early in June in a similar manner and then brought it down to the latest date because I wanted to have the latest date at the time I testified.

When there was no sale of these preferred stocks, we obtained from sources which we considered reliable the bid and asked price. There were instances in my list of preferred stocks on page 5 where no sales took place on September 15, 1939. It is obvious on the face of the document. For instance, "108—109¾" clearly means 108 bid and 109¾ asked. What I did there was to take the entire list and then get the prices on September 15 or the bid and asked prices on that date.

With respect to the bonds on the Curb, as I have stated, all I took were those actually traded in. That was a wide list and seemed to me adequate. The technique or method differed in the two instances necessarily, because I was anxious to get a representative list. My anxiety to get a representative list did not extend to getting the Stock Exchange list and showing the results of those sales. As I have said before, I had previously made up my mind that I had to have some standard, and I selected the Curb standard as being representative, and I stuck to that.

You are now talking about the Census of American listed corporations when you say that when I got into the field of investment opportunity outside of electric and gas companies, I covered the waterfront completely. With reference to that particular thing, I had been with the S. E. C. when that study was started, and I followed it with interest, and I took the study as I found it. I thought it was of substantial interest. I did not cover there what I conceived to be substantially the entire range of American industry. I took it from the S. E. C. They covered it. I included in my exhibit everything that they had put out.

In preparing this exhibit I have tried honestly and fairly to prepare one which would be helpful in determining a proper rate of return. You can characterize it as you may. I considered it a fair and proper presentation. I consider that the lists of securities which I have prepared here were helpful to me in determining my opinion as to the rate of return proper for this company. I suppose you are correct in saying that the only advantage of anything being helpful to me as far as my testimony in this case is concerned, would be in its being helpful to the Federal Power Commission as well. Everything that I have done in preparing these exhibits I consider proper and helpful in determining a proper rate of return for defendants.

At pages 6 to 15 of my exhibit 150 I show rates of return earned on invested capital in various non-utility industries. These rates of return are computed before the income tax. I show an over-all average return, obtained by adding the return in each industry and
1391 dividing by the number of industries, of 9.46 per cent in 1934; 10.02 per cent in 1935; 12.59 per cent in 1936; 12.05 per cent in 1937; and for the period 1934 to 1937, taking into consideration the notes shown on page 6, 11.04 per cent. This last average was arrived at by adding all of the figures [illegible] that last column on page 6 and dividing by the number of lines. I have not made a calculation to show what the over-all figure would be for the years 1931 to 1937, inclusive. In my judgment, taking into account the fact that industrial earnings were generally at a low ebb in the early years of the depression, I believe that figure would be lower than the figure for the period 1934 to 1937. The returns for the year 1938 were lower than they were generally for the year 1937. While I have had no opportunity to check that, it is well known that earnings

in 1938 were below the earnings in 1937, generally speaking. I don't know whether I can say that they were very well below the 1937 returns because I have no idea of the magnitude. I would say that it was probably more than 10 per cent below, but to give it an actual figure I am not prepared. I would not name a specific figure.

I keep up with that sort of thing in my capacity as a financial consultant. I get Standard Statistics in my office regularly. I think I get the Public Utility Service from that institution. Yes, I think it is important, as a financial consultant, to keep advised of rates of return in American industry at large. I receive all the information which I think will be helpful in my business. I don't take all of the services.

I am sure that the falling off in the rate of return for 1938 as compared with 1937 for the companies listed on pages 6 to 15 of my exhibit amounted to at least 10 per cent. I cannot say the exact amount. I am not sure of any amount beyond 10 per cent, in that connection, because I would have to know the actual over-all return in 1938 in order to answer that. It was impossible to obtain comparable figures to this for 1938. It might have been impossible to obtain standard figures accepted generally in our profession for the return on invested capital for the year 1938 on some bases. These statistical services are of many types and include all kinds of calculations. Some particular service may have made some calculations on earnings in 1937 as compared with 1938. I do not know what Standard Statistics has done along that line. I have never investigated it to find out. I think Standard Statistics is a thoroughly reliable source of financial information. It is a well known service. I think their services are on a par with Moody's, Poor's, and the usual standard services in the field. I have said that the returns for 1938, in my judgment, were lower than the returns in 1937. Yes, the average figure for the years 1934 through 1938 would be lower than the average shown for the period 1934 through 1937. I have not actually made the calculations. I am quite sure it would be. Since the returns for 1938 were below those of 1937, it must of necessity follow on that basis that the average for 1934 through 1938 is lower than the average of 1934 through 1937. Also the average for 1931 through 1938 would be lower than the average shown on my Exhibit 150 for the period 1934 through 1937.

No, I never heard of the Cities Service Company investing in the business of general candy and confectionery stores with fountains, nor did I ever hear of any of the other companies who are participants in this project or enterprise investing in that type of enterprise. Other investors have, of course.

1392 I have never studied or made any attempt to evaluate the comparable hazard of this company which we are considering here and the investment therein with the general over-all hazard or risk of the Cities Service system. Cities Service is one of the large stockholders of this company. It is one of the largest. It has in general interests in oil, gas, and electricity. It also owns real estate, I should say. I made no attempt to evaluate the comparative risk or hazard in this business from the point of view of Cities Service when compared with the hazard or risk of the system as a whole. I have no judgment as to these comparative risks without making a study of the Cities Service system. I am not familiar enough with that system to state my opinion as to the relative hazards of the Cities Service widespread system as compared to the Natural Gas Pipeline Company of America. I am consulted by that company with reference to technical matters of certain types. I would not say that I keep in close touch with the affairs of the Cities Service system. I try to keep informed and up to date on the affairs of the Cities Service system on technical matters. I do not pretend to be an oracle with reference to that system. I do not hold myself out as an oracle on all matters. This is a very large field. I do not hold myself out as an oracle in any matters.

Looking at the Cities Service system as a whole and considering that it has large oil interests as well as large gas and large electric interests, I cannot give you any comparative idea of the hazard or the way Cities Service Company, as informed investors, would look at its investment in this enterprise compared to this Company's system of wide investments outside of this. I think I might be able to do that if I had six months or three months to make a study, but the Cities Service system is a widespread organization covering the United States in all kinds of business. I would not attempt offhand to state my opinion as to the relative risks. I did not attempt to do that specifically in my preparation to testify in this case. I have not studied the Cities Service system. In my preparation for this case, I was attempting to determine what would induce an investor to go into an enterprise of this sort for the rate of return. Yes, I knew that one of the investors in defendants was Cities Service Company. I knew the names of the five other investors.

I made no attempt to determine in my mind what the judgment and reaction of those investors would be toward an investment of this sort because I was primarily interested in determining on what basis investors today might be willing to go into an enterprise of this kind. I don't know whether you would call that a hypothetical investor or not. I think it is real. The present owners of this company are the actual investors in this company. There is no other way to characterize them than as actual investors.

I gave consideration to a proper rate of return which might attract investors of any kind to an enterpirse of this kind. I gave no consideration specifically to the rate of return that would attract these actual investors in this project. I know of no way to find that out, and I do not know whether it would have been of any significance to me even if I had found it out. I said in my testimony that I had been in the investment field and had been responsible for the investment of large sums of money for a great many years.

You ask me whether up to the time I left the Securities and Exchange Commission I had ever had any final responsibility for the investment of large sums of money or any sums of money other than my own personal monies.

I don't know whether I can answer that directly.
1393 At the Equitable Life Assurance Society I made recommendations which were presented to the treasurer and the finance committee of the Equitable Life Assurance Society. As to whether I had any final responsibility, I think it is best to be honest. By law in New York State, as you probably well know, the finance committees of insurance companies are the people who have the final responsibility. Before the finance committee, even as far as the Equitable is concerned, the one who had the final responsibility up to that point was the treasurer. In my employments, preceding employment with the

Equitable, I had the responsibility of working with companies in the purchase of utility properties, and to that extent my recommendations might have had an influence. I am referring now to the Carolina Power and Light Company and the Electric Bond and Share. I had no final responsibility for the investment of any sums of money by the Electric Bond and Share system in utility properties. The final responsibility rested with the board of directors. I did have final responsibility for my recommendations. I did not have any final responsibility or any responsibility for the investment of large sums of money for the Central Hudson. While with the S. E. C. I think my recommendations there were possibly of some influence as to what finally happened with reference to the investment of large sums of money. The S. E. C., of course, did not invest any money. As an officer of the S. E. C. I was not responsible for the investment of any sums of money. Since leaving the S. E. C. I have made recommendations with respect to investments, but naturally I have had no final responsibility for the investment of large sums of money.

In making the statement at page 5449 that I had been in the investment field and been responsible for the investment of large sums of money for a great many years, I think the record is perfectly clear without trying to split words in two. I was the engineer in the treasurer's office at the Equitable and responsible for going out and selecting investments of all kinds and character for them in the public utility and in the industrial field. My recommendations were brought in and presented to the treasurer, and we discussed them. Then we took them to the finance committee. In most cases the finance committee approved our recommendations and went ahead and invested during my time there several hundred millions of dollars. I certainly felt responsible for making those recommendations and I caused that company to invest its money on the strength of those recommendations.

I think that on cross-examination I testified that when I was at the Securities and Exchange Commission and determining returns and earnings of power utilities, I was interest principally in the book figures of the company, write-ups, and so on. The statute, you know, requires consideration of the "earning capacity or earning power of the utility assets and securities." In that connection, while we had no direct concern about rate of return, it was a factor that had to be considered.

In the graph at the end of Exhibit 150 I shows the earnings price ratios of twelve operating utility common stocks. One of those twelve companies is the Brooklyn Union Gas Company. I do not have the earnings price ratio for that stock. I had it in my work papers here but I sent them back. You state you have it as 12.77 per cent for January, 1939, as taken off these work papers. That sounds about right. As stated, I do not have my working papers here. If you say that the earnings price ratio of the Southern California Gas Company stock was 8.82 for that same month and that is next to the highest of those shown on the list, I assume it is correct. If it is not correct, I will correct it in my direct examination. You state that 1394 the lowest earnings price ratio for the month of January, 1939, that appears in my working papers is on the Hartford Electric Light Company stock and is 4.68 per cent. That sound reasonable. I made no attempt to determine what the average for the eleven companies, exclusive of the Brooklyn Union, would be or how that would compare with the average for the twelve companies. The twelve companies selected for this thing are twelve of the best known utility operating companies in the country. They are those that were used in the telephone study in exactly the same kind of chart. I used the same companies.

There wasn't anything peculiar as to why the Brooklyn Union, which operates in the Borough of Brooklyn, should be selling at so high a yield above the others when you know the facts. In order to get the average earnings price ratio, I added the twelve earnings price ratios and divided by twelve. I don't know what would have resulted had I added the twelve price earnings ratios rather than the twelve earnings price ratios, divided the total by twelve; and taken the reciprocal of the average. The price earnings ratio of any particular company at any particular time is the reciprocal of the earnings price ratio. I don't know about any mathematical acrobatics. This calculation was made exactly as the Federal Communications Commission studied it. The averages are the same, and the same companies were used except that I left out the telephone companies. I did not think it advisable to determine whether the average of the earnings price ratios would be the same as the reciprocal of the average of the price earnings ratios. I did not attempt to test the validity of my average prices by that statistical process.

Cross-Examination by Mr. Booth.

I have referred to the Federal Communications Commission study. I do not mean to imply that that was a study that had been approved by the Federal Communications Commission. It was a study prepared by a part of the Commission staff. It is available for general examination by the general public or people interested in the Federal Communications Commission merely because it shows that Commissioner Walker approved the report before planographing. I do not understand that there is anything in the report to indicate that it has been approved by the Commission or by Commissioner Walker.

On cross-examination by Mr. Slaff when I referred to recent issues of securities involving pipeline companies which I had agreed that an investor in securities of companies like defendants would probably be interested in, I think I referred to the Northern Natural Gas issue of securities because that, in my memory, is the latest refunding operation wherein securities have been sold to institutional buyers. I don't think I referred to the Colorado Interstate. Yes, Panhandle Eastern Pipe Line Company is one of the large producing and transmission pipeline companies in the country. I am not familiar with all of the details of that company's recently issued common stock. I know that rights were given recently to the then holders of Panhandle common stock to buy something like 80,000 shares of additional stock. That was a rather recent issue. I think the rights were granted to the stockholders, maturing this summer or fall. The informed investor interested in the purchase of securities of these companies if they were issued at the present time would undoubtedly be interested in the information that was filed by the Panhandle Eastern Pipe Line Company with the S. E. C. in connection with this recent issue. The same answer must go for that as went for the other questions with reference to the Public Service Company of Colorado and the Northern Natural. That would be one of the factors because of the relatively few security issues of pipeline and production companies.

1395 (At this point counsel for complaint produced a document described as a certified copy of two pages taken from the registration statement filed with the S.E.C. by Panhandle Eastern Pipe Line Company and requested that it be marked for identification. At the direction of the Examiner the document was marked Exhibit 163 for identification.)

A potential investor in the securities of Panhandle Eastern might well obtain this data from the files of the S.E.C. in evaluating the investment in that company if he were interested in getting data bearing upon the reserves in the Panhandle field. It does not follow anywhere to the same extent that a potential investor in the securities of other large natural gas producing and pipeline companies, such as defendants, would be interested in this data. Information of the kind in this document is directed primarily toward two fields. This company draws from two fields, and the report is directed toward a study of the gas supply of the company in the two fields. The document contains the opinion of Ralph E. Davis as to the approximate amount of gas reserves in the Panhandle field, and to the extent that it goes into detail about that field, anybody interested in the Panhandle field might well use this information.

Redirect Examination Interposed by Mr. Morgan.

I don't think that any investor would take any report of any one geologist as final. He would weigh it and give it consideration. From my experience with an institution, if the geologist's report said the gas supply would be available for twenty years, he would probably never buy the bond for more than a 15-year life. I think I should state in connection with each one of these geological reports or reports on reserves that is qualified through me, if it is, that in forming my opinion as to the rate of return, I made an investigation and reached the conclusion that the life of the field was at least fifteen years. That was sufficient for the purpose I had in mind, in forming an opinion. If I had been going to buy bonds of the specific maturity of any particular company, then I would have wanted to know exactly, in the best way I could obtain the knowledge, how long the field was going to last; but in testifying as to rate of return, I have stated that my rate of return applies after proper amortization, which I assume will be found by the Federal Power Commission. I just wanted to make that clear because a number of these reports have been placed before me, and each time I have been asked whether an informed investor would look at this information; and perhaps there is the implication that in assuming that the life of the field was at least fifteen years, I did not employ due diligence in making the necessary studies I ought to have made in order to arrive at a proper rate of return. I think I did because, as I say, I assumed the life of the field was at least fifteen years, and I assumed that the Federal Power Commission or other body would find the proper amount of amortization, whatever that might be, and my rate of return applies after that amortization.

Cross-Examination Resumed by Mr. Booth.

I am sure I said somewhere in this record that I assumed the life of the field to be at least fifteen years, because I certainly made up my mind with respect to that thing before I even formed my opinion that 8 per cent was a proper rate of return. I had to do something along that line. I am confident, if my memory serves me, that sometime last 1396 week, if not in the direct testimony, I clearly indicated that I assumed at least fifteen years.

As shown at page 5495 I testified in substance that if the organization is set up under regulation on a 15 or a 16-year basis and actually works out to be only a 10 or 12-year proposition, the investor will lose; that there is therefore a risk, and the investor before he goes into the thing will demand some compensation for that risk. I then added that I had included in my 8 per cent, provision for that risk.

(Exhibit 163 was offered and received in evidence, over the objection of defendants, to whom the Examiner allowed an exception.)

1397 JOHN A. COOKE, a witness for defendants, called for further cross-examination, testified:

(November 2, 1939.)

Cross-Examination by Mr. Booth.

I have read my testimony beginning on page 5233 and continuing to about page 5252 of the record. I have no corrections to suggest. There is no substantial change.

There are one or two places where the wording was not clear, just a word here and there, but nothing material, and I do not think it detracts from or varies the evidence.

I have stated that I am a partner in the firm of Peat, Marwick, Mitchell & Co., a partnership. We have been in practice, I believe, since about 1897 and have done professional accounting work continuously since that time, particularly in this country, and of course abroad; but our headquarters are in this country. We have a number of offices scattered geographically throughout the country. Our clientele includes all kinds of firms, including industrial and public utility concerns. We do skilled and professional accounting work to the point that we will undertake any type of professional accounting service.

"Sinking fund" is a very common occurrence in industrial and financial set-ups. It is not an unusual occurrence as far as the companies which our firm has represented are concerned. You ask for the difference between a sinking fund and a depreciation and depletion fund. A sinking fund is usually to take care of a repayment at the end of a period. A depreciation fund is one set aside to take care of the wear and tear or other factors which may enter into the usefulness of a particular piece of property. Usually a sinking fund is to pay off debt obligations. That is the general description of it. A depreciation and depletion fund is designed to recover the amount of loss due to wear and tear and other factors.

As to the distinction between a sinking fund and a sinking fund reserve, a sinking fund is the actual fund or the payment of the money representing the sinking fund reserve. The fund is the asset, cash and securities. The reserve may not necessarily be set aside out of the business. The reserve is not surplus as the term "surplus" is generally used. The reserve is a segregation or an appropriation from surplus or earnings. I would not say that the sinking fund reserve is normally earmarked surplus. I would not describe a sinking fund reserve as surplus. Surplus indicates what is available for dividends. A reserve fund is a distinct statement of whatever is in that account and is not available for dividends. That is why it is set up as a reserve. It is not available for dividends because you have appropriated it for some other purpose, namely the purpose of the reserve, which is whatever may be described in the resolution, or may have been in the minds of the officers when it was set up or set aside. If it is a sinking fund reserve designed to pay off debt obligations, it is an amount set aside, not in money but on the books, preventing the distribution from surplus of earnings to the extent of the reserve fund. When the sinking fund is used to pay off debt obligations, the reserve goes into the equity for the security holders, naturally, which is the surplus.

1398 You ask for the distinction between a sinking fund reserve and depreciation or depletion reserve. My answer is similar to that already stated. The sinking fund reserve is set up on the books as a reserve against capital or an obligation of repayment of the capital—I am speaking now of the bonds as well as the stock. It may be in one of these preferred stocks or bonds or some other obligation. It is earmarked surplus. To be a reserve, it is earned surplus. A depreciation reserve is similarly surplus earmarked, but it is carried against the particular asset as a reserve for the loss of use, partially or wholly, of the asset as distinct from what I have said is a sinking fund. The general idea of the depreciation and depletion reserve is that it represents the estimated loss of the value of the property. It is not really surplus until it has been found that there is no need for it.

Amortization as applied to property values is merely the accrual over a period of years or over any period by a definite policy of annual amounts that usually in the sinking fund arrangements are the same. Depreciation is something that may fluctuate from year to year according to the use of the equipment or other factors. To answer your question specifically, the cases in which I would recommend amortization rather than depreciation would be where there is a fixed term of life of those assets, and where the assets depend on exhaustible resources, either property or other assets. It may be reserves in this particular case where I presume you have a question of gas or oil reserves.

You ask whether I would recommend setting up an amortization reserve to amortize the plant investment of a company in place of a depreciation and depletion reserve, when by the action of depletion the property would become useless, even though it has many years of physical life left. There are two factors there. You have the one factor that is exhausted and the other factor that is not. Then before we can make a decision, you must consider further whether that which has a life which is not exhaustible can be used after the exhausted life of the other factor, to determine whether or not you must cover the whole of the lesser exhaustible asset in the shorter life of the asset which will be exhausted sooner. Whether you call it amortization or depletion is immaterial from my point of view as long as you set up a reserve to recover your investment by the time that one or the other of the factors have exhausted the usefulness. Such an amortization reserve could never be less than the proper depreciation and depletion reserve if it was to accomplish the same purpose. Whether you call it amortization or depletion, if it has to meet a certain purpose, it must meet that purpose at the end of the term.

The depreciation and depletion reserve is based on the estimated physical life of the property, less any salvage value that there may be at the end. The amortization reserve is not based upon the useful life of the property in that sense. You are amortizing your expenditure for the purchase or building or the acquisition of an asset. To show the difference between them, probably a word of explanation is in order. If you apply the depreciation reserve, and in that allow for a salvage value at the end if it has a salvage value, then your reserve is built up to meet that difference between original cost and salvage. Amortization or depletion presumes that there is not a salvage value in the particular asset and you are spreading all your cost over the useful life of it. I did not make a positive statement that the amortization reserve means that there can be no salvage
value. I did not infer that there is no salvage value
1399 there, but I say that as the term is usually used, it
has for its object recovering a certain fixed amount for one purpose or another at the end of a life or a term of years.

You have asked me to assume that a pipeline which was built in 1931 has a physical life of 35 years, but the field which it serves will be completely exhausted in 1954, and the line must then be dismantled and junked. Then you ask what would be the minimum basis of computing the reserve that I would use in certifying to the balance sheet for December 31, 1938. I do not know that I could answer that question specifically with the minimum number of years. I should say that I would be influenced by the 1954 year, which is the year which you advise me the reserves or the base on which the particular business is built, would be exhausted. I would recommend a base which would take care of the investment in the lesser of the two periods.

As to what weight I would give to an engineering study of observed depreciation of 5 per cent of the book value of the assets having a physical life of 35 years, 8 of which have expired, but which serves a field which will be completely exhausted in 16 more years, I would give considerable weight to any engineering estimate of depreciation, because I am not in a position myself to determine the depreciation rate. Therefore, I must rely on others. I would be influenced by the engineering study of observed depreciation in certifying to the balance sheet of such company, yes, because an engineer is in a better position to know what the depreciation factor is in an industry than any accountant. I am only an accountant. If I assume that the company would possibly go out of business in a lesser period than the 5 per cent permits, then I say that I would probably question the adequacy of a 5 per cent rate. Assuming that at the end of 8 years I am advised by the company that due to exhaustion of reserves that must go out of business in 16 more years, though there is a physical life of 35 years of the property, and further assuming that I had before me this engineering study that the observed depreciation is 5 per cent, I would certainly recommend that the depreciation be such as would wipe out the investment in the remaining 16 years. I would say that if 8 of the 24 years of the company's life have already expired, it would be reasonable to set up a reserve of one-third of the investment by the end of the eighth year, that is, presuming they had started depreciation in the first year.

I would give weight to any information in an examination of the company's accounts. (Objection by Company Counsel overruled.) Naturally it would not be confined to an engineering report if I had any other factors available to me. I would take the whole scope of the information available only for one purpose, not in determining or recommending a depreciation rate or amount—I am not qualified to do that—but merely to see that there had been a recognition of the principle of providing for depreciation.

As to whether I would give recognition, in the light of what we have heretofore discussed, to the fact that one-third of the life of the project has passed, that would only be one of many factors, and even that might not be of any guidance. It may not be the important factor. For instance, a company might start up one year with $100,000 of equipment and depreciate for eight years at say 5 per cent. The reserve would be 40 per cent of what $100,000; but if in the meantime it had spent a year before $1,000,000, your reserve is absolutely out of all proportion to any basis of the

term of years. Even if it be assumed that the property would remain fixed or substantially fixed, and would be the same at the end of the 8-year period as at the beginning, we must bring other factors in. I must know, for instance, to form any opinion at all, whether it is all in one class of investment, whether some of it is an item, as for in-
1400 stance, capital in the form of land, which does not have any depreciation ordinarily on a normal company's books. You may have some intangibles in there.

Assuming that the land and the intangibles constitute a very minor part of the company's investment, if the assets are all of one class and the information is put before me that the company is taking a 5 per cent rate, I am not in position to say it is insufficient, if it appears to me that that is providing a reserve which recognizes the principles of depreciation on that basis. Then I would expect at the end of the eight years to have about one-third of the asset value reserved for, that is one-third of the net asest value after deducting the salvage value.

I recall the question with the assumption of the values and the rates which appears at page 5235 of the record. I recall generally what the answer was. The first assumption contained in the question was that defendants have a maximum life of 16 years. As to whether I assumed that the gas fields were being depleted year by year in this period, I assumed nothing more than the 16-year life. I did not assume any distinction as to year by year, but merely a 16-year period over which I was calculating this fund for return to the equity holders of their value. In a general way I assumed that part of the gas fields was going out each year, but I did not go through any process of assuming it. I merely assumed that at the beginning of 16 years it was there, and at the end of 16 years it was not there. How it went in between I have no knowledge of, nor did I even use any such information in my assumption. I did not take the trouble to make an assumption that the pipeline and other equipment was depreciating year by year during that period, because I was not concerned with the principle of depreciation in my calculation. The assumption given to me was in effect that the pipeline and other equipment would be completely worn out at the end of 16 years. I did not consider the question of the pipeline and other equipment being worth only salvage value at the end of the 16 years because the gas field was exhausted. I assumed merely an investment there that actually covered over the 16 years. The dtail of how it was made up or the basis of annual exhaustion were never even considered or thought of in the assumption on which I based the calculation.

Inasmuch as it had nothing to do with my assumption, I did not give any consideration to what the company was recording on its books for depreciation and depletion expense or whether it was setting up an adequate reserve for the ultimate retirement of the pipeline and other equipment.

The second assumption was that the proper rate base on which these companies are entitled to earn is $75,000,000. I did not go through any process of year by year estimates or assumptions of value, but assumed that over the 16-year period from the beginning to the end the investment was $75,000,000. That was the sum which was required to be restored, the property value that was required to be returned or obtained for the benefit of the security holders. This $75,000,000 rate base was the complete property value. I did not assume that this amount was reduced annually by the amount of depreciation and depletion.

The third assumption was that the proper annual return is 8 per cent of that rate base. I could only assume; I could not say it was proper. I took "return" to mean net
1401 income before depreciation and depletion for the reason that we are dealing with the return on the property value. I understood "return" to be before the deduction of interest for bonds.

Passing to the fourth assumption to the effect that in order to distribute the burden of returning to the investors the capital or the amount of the rate base, a fund is to be set up in equal annual installments over a period of 16 years, I assumed the investors to mean the security holders, being those to whom the property value would be ultimately returned. They include the stockholders and the bondholders, all the security holders. I don't know whether there is a distinction between capital and rate base. That is getting beyond my realm. By the words "in order to distribute the burden of returning to the investors the capital or the amount of the rate base," I was thinking of the property value. Call it capital, or call it whatever you like, it is the value that you set up, and I believe capital was the term that was used in the question which led me to the question of rate base.

You ask me how depreciation reserves should be handled on the books of the company if the rate base is larger than the capital. That would be confusing two items. You are confusing something which is not on the books with something which is on the books? The two things are not the same and, therefore, I cannot answer that. I assumed that the fund to be set up on the books would be a sinking fund, the purpose of which would be to provide the amount of money required at the end of the period to restore to the security holders the value which the Commission may say they are entitled to.

Questions by the Examiner.

Mr. Booth asks me if I think that prudent management would choose to invest such a fund in riskless securities bearing 1.35% interest or to use such a fund to retire outstanding bonds bearing 6% interest which are callable at par if it had such bonds outstanding. That is not the type of question ordinarily asked of me in my line of experience, because I am not an investment counselor and would not presume to advise on investments. I do not necessarily consult investment counselors on such questions as those counsel has been asking me when I arrange or analyze the books of a corporation. The company would be the one making the investment. If they had the money to invest, they would consult the investment counselor. The question directed to me is not the type of question on which I would get information, either from the counselor directly or through the company, any more than any man in the street may be asked his advice on whether one thing is more prudent than another. I hate to claim any ability to advise anybody where they should put their money.

Cross-Examination Resumed by Mr. Booth.

Without claiming to be an authority, or, as is commonly called, an expert on advice of this character, if a corporation can get 6 per cent, whether it is on its own bonds or on others, rather than 1.35, I think it would be well advised to make such investment. If it did that through the retiring of its own bonds, and it had to make up the difference in the sinking fund representing that 6 per cent then it would not have sufficient in the fund at the end to give it both the property value and the earnings. If the reserve or that amount carried to the reserve be used to purchase the company's own bonds, there would not be that fund there in this full amount at the end of the term. I testified before on that, and in making my answer I am assuming that that is being considered. The statement has now been overlooked by Mr. Booth, but I did make that statement before regarding the lack of full fund at the end if it was invested in the company's own bonds at 6 per cent.

I assumed that the return referred to in the question originally asked me on direct examination was before interest. The rate of return as I understand it in a case of this kind is on the property value, such property value representing the property of the security holders, either in whole or in part, of one kind or another, so that if any lesser amount is paid to the one, the difference becomes payable to the other; and therefore, any reduction in interest paid to the bondholders is included in whatever per cent may be left
1402 for the stockholders and is not a saving. It is merely
a transfer. That is why I asked you to determine what you mean by "saving." It may be a saving in interest, in the sense of the word "interest"; but it is not a saving in the amount paid to the security holders pursuant to their rights.

I believe some companies now engaged in an extractive industry pay liquidating dividends on their outstanding common stock out of the depletion reserve. I could not name any companies which have. The very term "liquidating dividends" indicates payment out of reserves rather than out of earnings.

Going to the fifth assumption in Judge Morgan's question to me, to the effect that these companies have bonds outstanding which bear 6 per cent interest, I understand that assumption to mean that the bonds were outstanding against part of the $75,000,000 rate base. I understood that the interest on those bonds was to come out of the 8 per cent return. I had no particular kind of bonds in mind in formulating my answer. I did not assume that the bonds were non-callable or callable only at high premiums. I did not assume that the bonds were callable for sinking fund purposes at par. I merely assumed that there was a value of $75,000,000 to be returned over the period; that the fund was to be built up to the $75,000,000 at the end of the 16 years. I did not go into consideration of where the company is going to get the money to redeem the outstanding bonds which are callable for sinking fund purposes. They might get it from one place or another. If they have not got it in whatever return is allowed, they would have to do some financing of one kind or another, borrow the money to pay it, or go into default. I don't know. I have not gone into that with the idea of determining the policy.

I assumed generally that the $75,000,000 rate base was to prevail during the entire 16-year period. I made that assumption merely for the purpose of making the calculation. If the property is going to terminate or die in 16 years, under normal circumstances I think it would go down in value. It is in very rare cases that it would not. I assumed a $75,000,000 rate base to prevail during the entire 16 years merely because that assumption had been made as the basis of the calculation. I did not make the assumption. The assumption was given to me, I believe, in the question, and on that assumption I made a calculation. No, the question was not so long that before he got to the end of it I forgot the first assumption. The maximum life was assumed to be 16 years, and I figured on 16 years. However, the principle which I was intending to illustrate does not vary whether it is 16 or 14 or 10 or 20.

I did not assume that the mortgage indenture required the bonds to be paid off in specific amounts on specific dates faster than the fund accumulates. I believe in my testimony I said I was assuming that the bonds could be retired as they were needed, that is, that the company or the trustee, from the sinking fund, could make such investments as were required. I would not be in a position to answer your question as to the conditions under which the management invests its sinking fund in securities other than by retiring the debt of the company. If you have a sinking fund trustee, the trustee has the right to determine what investments you shall make. I can't answer your question as to what companies in my experience have invested their sinking
1403 fund in securities instead of paying off their debts. I
do not recall any mortgage or other instrument under which debt obligations are now outstanding which provide for a sinking fund which is not to be used to retire outstanding debts. There might be such indentures, but I do not recall any. Many companies have indentures for the retirement of their bonded or other indebtedness, maybe for preferred stock. That indenture provides for setting aside sums of money determined by various means. In many of those, and I will say a large number of them, the purpose is not to build the fund to the end of the whole term, as in this case, $75,000,000 at the end of 16 years, but is to permit them as they go along to use that money to redeem their indebtedness, in which case the trustee may at

his option use the money to retire that indebtedness, or he could hold the money until such time as the whole obligation matures. That is a sinking fund created for the purpose of paying the debt. That is the usual and ordinary industrial situation. That is the way most businesses hope to pay off their investors. They can pay off the prior obligations and at the earliest possible date get down to the equity left for the common stockholders.

You ask me under what conditions I would expect the management to invest its sinking fund in government bonds with a yield of 1.35 per cent instead of retiring its outstanding bonds, which pay 6 per cent interest and are callable at bar. (Objection by Company Counsel overruled.) I can make an answer, of course, but I don't know whether I am a competent person to make it in an important hearing of this kind. I have not been a trustee under any sinking fund. I have testified on the use made of sinking funds as I have found them or as the accounting profession finds them in the industrial field or in the field of business. I will answer that question in this way: If the company may have a need for cash, the liquidity of government bonds would be a factor that it should recognize, whereas investing the fund in its own bonds would not give it that liquidity which it might need in a moment of emergency. That would apply for whatever purpose it might need its funds and for which it would be permissible to use it. Generally speaking, the sinking fund is used only for the retirement of the debt or investment in the property. I am speaking, of course, of the sinking fund for the retirement of indebtedness of utility companies which comes into question and which we were discussing.

With reference to the $10,000,000 that, it was assumed, will be required for the purpose of additional property, as opposed to replacing property, for use in the operations of the company, I did not assume that that amount was in the rate base because that would bring in a factor wherein I would have to decide a changing rate of accrual. For instance, this is based on 16 years, and I assumed 16 years. I also assumed 8 per cent return and the value of $75,000,000. If I am going to bring $10,000,000 more into the property value, then if it does not come in at the beginning, which would make it $85,000,000 to start with, it would have to come in at some time during the period, and it would stagger the amount that would have to be put in each year as the additions are made. That would increase the amount put into the sinking fund each year and would make a complicated calculation, which I did not think was necessary to introduce for the purpose of the illustration.

I ignored the factor of depreciation because we were not considering depreciation. We were considering the recovery of the total value, regardless of how it was amortized, depreciated, or depleted. I eliminated that $10,000,000 from the question entirely. The $75,000,000 1404 I considered was the property value on which the assumed rate and the assumed rental was based, and I believe I merely used the whole figure as an illustration. The introduction of $10,000,000 additional would not change my illustration materially. It might do it figuratively, but it would not change the principle that I was endeavoring to establish. No, I did not assume that the 8 per cent would return to the investor his capital. I understood and assumed the 8 per cent was a return to which he was entitled on the property value over the period. In fact, I believe that it was distinctly stated there in the evidence that it was assumed that the security holders were entitled to the $75,000,000 plus 8 per cent return on that value for 16 years; and I believe that the figure that would be mentioned would be $96,000,000 as earnings return over the period in addition to the $75,000,000 property value return. I don't think I even recognized the assumption that $10,000,000 would come from the fund Mr. Morgan asked me to assume would be established in my calculation. In continuing corporations the fund might be used for supplying the $10,000,000, but not where a company would have a limited life.

Referring to the seventh assumption that "1.35 per cent is the rate of interest which will be received by an investor in government bonds, which are the most nearly risk-free of any securities available for the investment of a trust fund," you ask me which is more risk-free in returning the money to the security holder or investing it in Government bonds, I think the government bonds are considered to be the most risk-free of all. Let me answer the question this way: If you could return all the money at one time to the investor, then obviously, as far as that investor is concerned, there is no risk any longer. He has got his money back. As to why you have to hold the funds if you have it instead of returning it to the security holders, there are a number of factors involved there. The primary consideration of a return of the money would seem to be that you have got it and therefore there is no further problem about it; but the trustee can hold that money in government securities which have the least fluctuation, and when eventually he has to redeem, he can liquidate them for the purpose of paying the obligation. That is what one has in mind when you speak of investing, although I am not an investment expert, as I told you. If the trustee holds the fund in government securities, at least we will presume that the government securities are good or are going to be good. If everything else fails, that will be the last. If you pay it back to the bondholder, then he is faced with the problem of investing it himself.

Yes, the company's responsibility is concluded when it returns the whole amount to the security holder. If any portion of the whole be returned to the security holder, the company's responsibility is then at an end with respect to that portion, if you can segregate the rights and obligations under a portion. So far as it has turned the money over to the trustee under the terms of the mortgage indenture, the company's responsibility is concluded. Then the trustee, as an individual, is the one who determines or decides what bonds are retired in carrying out those terms of the indenture. What I am trying to bring out is this: Bonds are very, very seldom, if at all, retired 5 per cent for each bondholder. They call certain bonds, and therefore those particular bondholders get their money out. There can be no question as to them when the particular bond is called and paid off. The remaining bondholders, however, do not. They are still outstanding. Then if you work on that basis, assume that at the end, through some catastrophe which might appear during the last two years say, your property or your operating facilities are destroyed and you have no means of restoring earnings or revenue, the remaining bondholders are likely to lose their equity.

Therefore, over all, the situation of this last batch 1405 not getting theirs or any part of theirs because they were the last bonds to be called, gives them a total loss, where as if you had it invested outside by the trustee in government securities or, if there were any, in safer investments than that, then it would be there and would be liquidatable, and they could sell those and with the money they would pay proportionately all the bondholders the percentage which the funds they have bear to the total. Those bondholders, who, by retiring the company's own bonds, might have lost everything, lose only 5 per cent. If you can eliminate the individual bond element, I mean if you have a million dollars worth of bonds in $1,000 bonds and you retire a thousand bonds, all of the particular companies, if you have six, may have had part of their bonds called and paid off. If you have six bondholders and they are paid back year by year in proportion to the amount which they hold, then my answer would not apply. If all the bondholders have been paid off, the only circumstance which could interfere with the payment of liquidating dividends would be the question of availability of cash to do it with. I am not entering into the question whether it is good judgment to do it or anything about that at all, because I am not in a position to so express an opinion. I do not know what I would do. I would wait until I got there and then I would decide.

You ask under what conditions would I say it is proper for a company to accumulate a fund of $75,000,000 over a period of 16 years to pay off the security holders at the end of that period. (Objection by Company Counsel overruled.) I cannot answer the question. I am not in a position to know. I have not given that any consideration. I was not concerned in my calculation whether it would be paid off piecemeal or at the end in one lump sum. The calculation which was made was on the basis of having the sum at the end of 16 years in total, and gives the lowest amount to be put in annually in the way of a sinking fund to build up that figure. If you pay it off every year in the proportionate amount, you are going to have to set aside a larger amount every year. Then you would be disturbing your compound interest factor. If you are going to pay it off, or can pay it off, piecemeal, the question of government bonds does not even come into the picture because you can retire your bonds. So my calculation on the amount at the end of the period, regardless of whether there be any merit at all to it, was in favor of the lower amount of sinking fund sum per year to be recovered at the presumed rate that you wish.

You have asked whether, as far as I am concerned, I am able to state any circumstances under which it would be proper to set up a fund which would accumulate $75,000,000 at the end of 16 years. I can only say as regards that that the only circumstance that could require the accumulation of the fund at the end of that period would be some provision inherent in the agreement or in a decision which the company would be ordered to abide by. There is no general condition which says any fund shall be handled one way or the other. So far as my general accounting theory may be applied, it presumes, in the absence of a method to take care of redeeming the investment earlier, that it will be provided by the end of the period. My previous answer is also an answer to be considered in connection with the one I have just stated. I believe each was a statement of a different situation or an attempt to give a clear answer to the question.

You ask what would be the comparative effect on the stockholder if on the one hand the company invested the sinking fund in government securities at 1.35 per cent, and on the other hand retired from time to time 1406 bonds which carried 6 per cent interest. The difference would be that the sinking fund built on the basis of investment in 1.35 government securities would mean the accrual in the sinking fund of the interest which would be derived from those investments. In that particular case it is also presumed that the bonds remain outstanding, in which case the company goes on paying 6 per cent to the bondholders in accordance with the terms of the bonds.

In answering the second section of that question, if the money is used to retire the bonds, there is no money coming in in the form of interest from outside securities to help build up that sinking fund, and the fund would receive 6 per cent bonds of the company. In that particular case the company would go on paying the bondholders their 6 per cent, and the payments so made would be divided. A portion of it would go under that arrangement into the sinking fund. It would go to the trustee, and the trustee would then pay out the interest on the bonds which had not been retired or brought into the fund, and the interest on the bonds which were in the fund, as they have not been cancelled, would accrue in the fund.

The fund would get the 6 per cent interest under the obligation of the indenture. That 6 per cent would come out of the earnings return, that is, out of the 8 per cent return which we have assumed.

In my testimony shown at page 5241, I stated in substance that taking the assumptions to which we have already referred, provision can be made on an equal installment basis for the amount to be returned, through the accumulation of a sinking fund. I did not mean that provision must be made in that manner. The statement is clear in itself. It can be accumulated through a sinking fund. You ask if there is any other way of doing it. Yes. When I said it can be accumulated through a sinking fund, I meant something that is outside the company's control, so that when the money goes in there the company cannot get it back. The other method is by holding it themselves and making themselves trustee. It can be done that way, but I doubt whether you will find any cases where the bondholders will permit the company to so hold it. That is why I said that it would give the same result. I meant the money is either with the trustee to accumulate, or the other method I had in mind of the company's accumulating it itself.

Under certain circumstances it might be paid off partially and piecemeal by retiring bonds. I hate to add "and stock" as you suggest. After all, it is not the proper thing to do for a company to pay off its stockholders in any form or other until prior obligations have been taken care of. As to whether it could be done after the bondholders are taken care of is an open question, for the simple reason that when you get down to the stockholders, they are the owners of the business. When they come to the time they are paid off, there is no business. There is nobody to operate it, and therefore they will just carry on with the investment until the purpose of their business is terminated for one reason or another. On the basis of the business ending in 16 years, you would take care of the whole thing over that period. I have not gone into the mechanics of how that can be done, but naturally your prior obligations come first.

I do not think the question of what the amount of the bonds is has any bearing on where the interest has
1407 to come from. You ask me under what conditions
must the interest come from outside the company if the company has at the beginning of the period approximately $60,000,000 in bonds bearing 6 per cent interest, callable at par for sinking fund purposes. As-

suming that you mean the interest on the sinking fund, the answer is this: it must come from outside if the company is not to have its return, based on some agreed rate or determined rate, impaired either during one year or any time during the 16 years, or the whole period, I should say. You ask me to assume that the $60,000,000 in bonds were in fact paid off, and then ask whether the bondholders would, under my notion, be entitled to the full 8 per cent on the $75,000,000 which I assumed was the so-called rate base which prevailed throughout the period. The only answer I can give you on that is that I cannot answer what they are entitled to. That was an assumption in my calculation. The very reason for assuming it was that I had no means of knowing what figures or amounts would be ultimately determined.

Going back to the question which Judge Morgan addressed to me and which contained those eight assumptions, if the assumptions were different, to the extent of the difference in the assumptions obviously my answers would be different. If, instead of $75,000,000 over a 16-year period, that assumption were changed to a decreasing amount, then the assumption would be different and the figures that we gave or the conclusions would be different. The principle however, which I set forth would not necessarily change. The mere changing of the value from $75,000,000 to $60,000,000, or up to $100,000,000, would not change the principle I was trying to illustrate. You see, if I may further explain, I was not considering the depreciation factor in my calculation. I was working on the assumption given to me that $75,000,000 was the value that might be established one way or another. It had not been established. That is something that was open to discussion and was to be established by the Commission at a later date. I was not intending to infer from the mere fact that it was $75,000,000 that the principles would be different than if the figure were $60,000,000.

You ask me if I assumed that the return was to go to the security holders and no part of it could be diverted to the sinking fund. Up to the point of your saying "diverted to the sinking fund" I was with you, but that rather confused it, and I am just wondering what bearing that has on the picture. The assumption was that $75,000,000 was to be returned plus the 8 per cent over the 16 years on the $75,000,000, which was $96,000,000. If any part of the earnings went to the sinking fund—by earnings I mean this

$96,000,000—there would be a depletion of that assumed 8 per cent return to the security holders.

You asked me if the sinking fund could earn the return of 8 per cent if it were proper to divert part of this return to the sinking fund by having the sinking fund acquire the securities or bonds of the company. I don't see how even by implication 8 per cent could be paid to the fund if the bonds are 6 per cent. I previously stated that if the bonds go into the fund, then as long as they are outstanding this interest must be paid on them where they are. The bonds earn 6 per cent. The fund does not earn 6 per cent, as there may be other monies in the fund not earning 6 per cent. If the bonds make up the entire fund, then your statement would be correct that the funds, which are the bonds, earn 6 per cent. You ask me if the fund would probably earn more than 6 per cent and probably 8 per cent if the fund acquires a pro rata share of both bonds and 1408 stock. I cannot answer that. It would be rather unusual to find any sinking fund acquiring stock of the corporation which still has bonds outstanding for which the fund is created. I did not stop to tell Judge Morgan that those were not real practical assumptions which confronted me every day in the business world. I accepted the assumptions and worked out the answer. Certainly I was not vouching for the accuracy of any of those assumptions. As to whether or not those assumptions were such as I met in my business experience, that never entered into my consideration.

Going back to your question, I could not answer that without being given the amount of the bonds held and the amount of the stock and the earnings that were available to pay on them. This is what is confusing me in answering: If you have bonds in there and stock which are a part of the securities of the security holders, and in the year you pay 6 per cent on the bonds, then there is only 2 per cent or a fraction thereof, depending upon the excess of earnings over the interest requirements of the bonds, which is available for the stockholders' dividends. It might be less than 6 per cent or it might be more. If it were more, then the average going into the fund would be higher. If it were less, the average would be less than 6 per cent. Naturally, if the sinking fund had a certain amount of dollars available to go into the sinking fund each year, and if those dollars were translated into securities of the company, to-wit bonds and stock in proportion, that fund would then earn 8 per cent, assuming that the company is earning an over-all return of 8 per cent.

(At this point counsel for the Commission produced three documents consisting of excerpts from the testimony of defendant's witness Emery given in a prior case, one described as beginning with a page numbered 2377 and extending to page 2406, another described as a 4-page document beginning with a page numbered 2444, and another a 3-page document beginning with page 3033, and asked that these documents be marked for identification. The three documents above referred to were, at the direction of the Examiner, marked as Exhibits 164, 165, and 166 for identification. The Examiner ruled that Exhibits 164, 165, and 166 were not admissible in evidence and awarded counsel for each of the commissions an exception.)

1409 J. A. EMERY, a witness for defendants, recalled for cross-examination, testified:

(November 3, 1939.)

I would like to offer a correction to my testimony of last week in the cross-examination. I was asked if I had made any calculation of rate of return for this case following the methods that I used in the 1934 testimony. I replied that I had done so by one method or following generally one method. Since that hearing I have come across an attempt to make a calculation by one other method, but it was preliminary and incomplete.

Also I would like to state that in my direct testimony the Examiner questioned me regarding the cost of a conventional pipeline and I was not able to reply. I have since had made under my direction an estimate of the important items of variation between the present line and such a conventional line, and have prepared an addendum or supplement to Exhibit 149 setting that forth, together with my estimate of the increase in earnings due to the unusual load factor or capacity factor at which this company operates.

Also there is at least one correction that I would like to make in my going concern testimony; but I understand that should be made at the time that testimony is taken up. I would like to say that I have not read the cross-examination testimony and may have some corrections that I would like to ask to be made.

Cross-Examination by Mr. Slaff.

I testified in the Chicago District Pipeline case in 1934. I don't remember the date. During the same year I had testified in the Public Service of New Jersey case. I don't remember the date. My testimony in the two cases was not far apart in point. My testimony in the Chicago case involved only the fair rate of return to defendants. I do not remember stating in the Chicago District Pipeline case on July 31, 1934, that I had recently made a study and given testimony as to an estimate on overhead costs involved in a reproduction of the Public Service Electric and Gas Corporation in New Jersey and also as to the going concern value of the electric department of that company, but I probably made such a statement. I had not made a study and given any testimony with respect to any part of the gas system of the company last mentioned. My testimony in the Public Service case had been confined entirely to the electric department or division. So far as I know there were no electric problems involved in the Chicago District Pipeline case.

I would not say that the problem of defendants with respect to lack of efficient management involved any more hazard on account of the difference in degree than the same problem with respect to the 11 companies set out in my Exhibit 148. Another hazard involved in this type of company is lack of sufficient reserves. (Objection by Company Counsel overruled.) I think that there is more danger
1410 of exhaustion of defendants' gas supply than in the case of any of the other companies in my list with the possible exception of the Union of Canada and the National Fuel Company. In the case of those companies, they are large distribution systems and they have coke oven gas available to augment their supply. With respect to the lack of sufficient reserves of natural gas, it is my opinion that defendants face a greater hazard than any of the companies set out in the exhibit last named except the two companies I have just mentioned.

I have not made a study of the reserves of Interstate Natural Gas recently, but I know generally what they are. I made such a study 8 or 10 years ago. I did not go all the way through it. I was in charge of the study for a while, but did not bring it to a conclusion. That company's reserves are in the Monroe field in Louisiana. I think the Odessa or Shreveport field could also be considered a part of this reserve. The Monroe field is not as large as the Texas Panhandle field. I cannot state the comparative extent of the reserves. The Interstate Gas Company's acreage in the Monroe field is 54,000 acres. I do not know their reserves in cubic feet. My own knowledge in that particular case and the general opinion about this company is that it has plenty of gas reserves available, either in the Monroe field or the Odessa field. I don't know the requirements of that company compared to the amount of gas available to it. I know only that it is generally considered to be sufficient to last more than 16 years. I can find the drafts on the Monroe field for pipeline purposes but I have not the information about the drafts on the Odessa field.

The El Paso Natural Gas Company owns comparatively small reserves. It purchases most of its gas. I think that a company which purchases most of its gas is in a better position from the point of view of reserves than a company which owns and controls its own reserves, when there is no more apparent menace to the field than in the case of the fields in Lee County, which is the southeast corner of New Mexico from which the El Paso Company draws its gas. There are estimated reserves in these fields to supply this company at the present rate for 40 years; and there is no apparent danger of any one else coming in. I would say in the case of the El Paso Natural Gas Company that it is in a better position from the point of view of sufficiency of reserves than defendants which own their reserves. I know something about the contract which the El Paso Company has for the purchase of gas. I am not intimately familiar with it. I would not say that I am at all familiar with it. I have never examined these contracts. I think they are for comparatively short terms and that they are renewable on a basis which makes them an acceptable investment hazard. I do not know the basis of their renewal.

The Memphis Natural Gas Company has no reserves. It purchases all its gas in the Monroe field. Its present contract runs to 1944 and it has an option for renewal for 10 years at that time. I don't know anything about the terms of the option. The annual sales of that company are approximately 16,000,000 thousand cubic feet. I think they purchase gas from companies that have the run, so to speak of the Monroe field, and have the same expectancy that there is in the field. I don't know this definitely.

1411 I have said that I could derive the drafts on the Monroe field for pipeline purposes. I don't believe I have the figures in my working papers here. I don't know what the draft is on the Monroe field for carbon black purposes. The Memphis Natural Gas Company gets its gas only under these purchase contracts in the Monroe field. I think the Odessa field can also be considered available to this company, because I understand that gas from the Odessa field has been offered at Monroe.

Considering the probability of the Odessa field being available, I think the Memphis Natural Gas Company is in a better position from the standpoint of reserves than are defendants. To the best of my information I think it is in a better position than these companies without considering the probability of the Odessa field being available. Yes, I have considered the availability of the Hugoton field to defendants.

The Southern Natural Gas Company also purchases gas in the Monroe field. I have no detailed information regarding its contracts. That is the only field in which it has contracts for the purchase of gas. As of this year its sales will be approximately 35,000,000 thousand cubic feet. I don't know the reserves available to them under their purchase contracts except as a general understanding, which is that they are good for more than 16 years. That is the general understanding of myself and those in our office which are more familiar with such things than I am.

The Lone Star Gas Corporation gets its gas from 39 different fields. The corporation is not an operating company. I am speaking of the whole system. Their annual sales are 44 million thousand cubic feet approximately. I think that company produces most of its gas. I don't know that it produces in 39 different fields. I cannot say how their reserves compare with their requirements. I have no information as to the volume of their reserves. There is this observation that may be made about this company, though, and that is that when and if the gas reserves are exhausted, this system consists of such a network that it can be largely used for manufactured gas. In my judgment it would be economic for it to go to manufactured gas when there is no natural gas available. It could be done economically throughout the system generally.

The Mountain Fuel Company gets its supply from three fields in southwestern Wyoming. It produces itself. Its estimated reserves are good for 29 years at the present

rate of draft. I don't know where the information as to the reserves came from originally. I obtained it from a report by Mr. E. D. Warren. I don't know who Mr. Warren is. It was a report made to the Natural Gas Pipeline Company of America some time in 1939. I don't know in what connection that report was made. There is nothing in the report which indicates the purpose unless it was connected with a view of a plan of looping a portion of the line. I don't know whether Mr. Warren is an employee of defendants or not. I don't know in what part of 1939 that report was made. I understand Mr. Warren is an engineer and I should judge so from the report. To the best of my information Mountain Fuel Company is in a better position with respect to sufficiency of reserves than defendants. That conclusion is based on such information as I have. Mr. Warren has not been identified to me. I think there are
no other pipelines taking gas from those three fields.
1412 The Kansas Pipeline Company and the Oklahoma
Natural Gas Company are both transmission and distribution properties companies. I think the Oklahoma Natural Gas Company purchases most of its gas. It purchases 93 per cent of the gas it uses and produces the other 7 per cent. It produces in the Tulsa, Quintum and Chickasaw fields. I am not familiar with the terms of its purchase contracts.

I have assumed that defendants will have their supply of reserves exhausted and be out of business 16 years from January 1, 1939. That is fundamental to my entire testimony. You ask me if the possibility of an inefficient operating organization as contrasted to management is also a hazard. If you mean the possibility of the present management being bad and the investor not knowing it, I would think it is not of enough importance to the investor to warrant his looking into it. If you mean the possibility of the management going bad in the future, that is something that faces every business. If an investor is contemplating an investment in a natural gas company and up to that time, so far as he is aware, there is nothing wrong with the management, I think it wise and prudent on the part of the investor to make some attempt to find out whether the management of the company is good, bad or indifferent, efficient or inefficient. You ask me if there then is not a possibility of hazard with respect to the investment that faces an investor, as to the possible inefficiency of the management. I cannot answer that question any more completely or specifically than I have answered it. If he finds out that the management is not good, he won't invest in it. I suppose it is possible that he might make an investment and then find out that the management is inefficient. Under such circumstances, if management counted with him, he certainly would sell out. That is a possible hazard that exists in every line of business. There might be degrees of that hazard among different companies.

It is not my opinion that there is a greater hazard in that particular respect concerning defendants than there is in the 11 companies mentioned in Exhibit 148. I think it would be very difficult to find a better management than that of defendants. I think the operating organization is a direct function of the management. It is established and trained and the management permeates all through it. When I was discussing management a few questions back, I had in mind the management. One of the tests of a good management is whether the organization is good or not. In fact, that is the chief test. I can disassociate in my mind the management from the rest of the organization when the management is new. When a management and an organization have been working together for some time, I cannot. The matter of using up to date machinery and methods of production to avail one's self of the possible advances in the art which are economically available, are functions of management. I cannot answer your question whether the failure to use up to date machinery, up to date methods of production, and so on, by a company is a possible hazard to an investor in that company. I do not think Texoma is inferior to each company set out in Exhibit 148 so far as the use of up to date machinery and methods of production is concerned. I cannot say that they are better in that respect, but I think that they would equal each of the other companies insofar as those points are concerned. I would not say that both of defendants are inferior to any of the companies shown in my Exhibit 148.

1413 I don't think the possibility of drilling a large number of dry holes is looked on as a hazard by an investor. I do not look at it as such a hazard. I have made no attempt to find out the number of dry holes Texoma has drilled since it went into the business of producing natural gas, and how that number has compared with dry holes drilled by any of the other production companies shown in Exhibit 148. I do not think that the high cost per well of drilling is classed as a hazard. When costs of production are not known there would be some hazard regarding it, but in a settled field those conditions would be pretty well known. I do not consider the Texas Panhandle field a settled field as of 1931. Where there is any doubt about the cost of production, it would be a hazard. I do not know how Texoma's production costs compare with the production costs of the other companies shown in Exhibit 148. I do not know how the average cost of Texoma's wells compares with the average cost of the wells of the other companies in Exhibit 148 which produce their own gas, except that the production costs in that field are lower than in other fields generally.

I don't know what the average open flow of Texoma's wells is and how that compares with the average open flow of the wells of the other companies shown in Exhibit 148.

As to whether a decline in rock pressures would be a hazard facing an investor in a production company, practically all rock pressures decline. In my opinion the degree of decline is not a factor of risk. In other words, I do not think an investor, making an investment in one company whose rock pressures decline twice as rapidly per unit of production as do those of a second company, faces an additional hazard in that connection. I did not attempt to determine the decline in rock pressures per unit of production for the Texoma wells as compared with the rock pressure decline per unit of production for the wells from which the 11 companies shown in Exhibit 148 derive their gas.

You ask me if any of the companies shown in Exhibit 148 have as large a single market as the city of Chicago. I think none of them reaches so large a population and volume of industry. The market depends upon competitive fuels and that is true even as to the domestic market because domestic gas can be manufactured. At the present time domestic gas for Chicago cannot be manufactured more cheaply than natural gas can be brought to Chicago. The purpose of bringing natural gas to Chicago was to supply it more cheaply than gas could be manufactured there. I do not consider the Chicago market as a great advantage to defendants. If it depends upon the market for gas as defined by other fuels, it might be a menace because of competition.

I stated I excluded any advantage of the Chicago market in making up my mind as to the going concern value of defendants. I considered it, but excluded it in reaching my opinion. Regardless of what appears on page 4792 of the record, I think I stated specifically in another place that I would not take any account of that factor. If defendants were serving territory out in Arizona instead of Chicago and all other factors considered in my Exhibit 130 were the same, I would say that they would have a going concern value of 8½ million dollars if they were on their feet and earning as much as now. I might modify the latter part of that answer by saying, earning to the extent of supporting them. The earnings go into the ultimate determination 1414 of the amount of going concern value only to the extent that earnings are supporting the investment. To that extent my answer to your question is in the affirmative. The fact that they serve Chicago is responsible for the earnings which support them. It is a fact that I considered it advantageous to defendants that they are serving a market like the Chicago market insofar as the market supported the investment. If the market for natural gas were greater than defendants can supply and they are now up to their limit, any greater market would invite competition. To the extent that the market produces earnings more than enough to support the investment, that is just as likely to be a menace as an advantage because it will invite competition.

I have never attempted to determine at what price Peoples Gas Light and Coke Company would have to buy natural gas in order to buy it from anyone other than Chicago District Pipeline Company. (Objection by Company Counsel overruled.) I don't think there is any immediate menace of competition facing defendants. There is a potential menace. I would not say that the market of defendants is inferior to the market of any of the companies shown in Exhibit 148 except insofar as it is at the end of a long line. I think the competition from other fuels is somewhat more severe in Chicago than in most of the other places. Viewing the market broadly, I am not prepared to say that defendants' market is inferior to the market of any of the companies shown in Exhibit 148, other than that it is at the end of a longer line.

I do not view as a hazard the possible inability of owners to provide capital if needed in the course of the business. If six investors were going into an enterprise, it would be a less hazardous investment or enterprise to person "A" if the other five were strong financially than if they were weak. If there is the possibility that a substantial amount of capital would be required, it is better to have as associates in an enterprise people who could provide capital if such a contingency should arise. Otherwise the company would be confronted with a hazard of having to go out and pay what the public demanded for that kind of risk.

I don't think that substantial amounts of outside capital are required by defendants from time to time. Their capital requirements can be diverted from the earnings. It is easier to divert capital from earnings when the owners of a business do not have immediate necessity for those earnings or for that portion of the earnings. If the capital requirements are the same proportionately for two companies, the company whose owners are in a position either to put up capital as required or forego earnings so that the company may use a portion of the earnings for capital purposes, is in a stronger position than the company in which those conditions do not obtain.

I would not say that defendants are in a weaker position in that respect than any of the companies shown in Exhibit 148. (Objection by Company Counsel overruled.) I do not think I connected my answer in any respect to hazards. I think an investor would take into account the
1415 fact, if true, that his associates in the business are
not as strong financially as another group of associates that he might have in a business. I took no such hazard as that into account in arriving at my judgment of a fair rate of return for defendants. The companies listed in my Exhibit 148 are all in generally sound condition and that is as far as I went with that consideration. The position of defendants on that point was not taken into consideration in arriving at my ultimate judgment.

I don't know how a high investment per unit of capacity or unit of production would be considered as a hazard. You ask whether an investor looking at two businesses, both of them producing the same product, and observing that one of them has a higher investment per unit of production and a higher investment per unit of capacity, would be inclined to require a higher yield from that company than from the company with the lesser investment per unit of production. I cannot answer that question. I don't understand it. I cannot answer your question as to whether a company with a capacity factor of 20 per cent would be more risky than one which has a capacity factor of 50 per cent, all other things being equal.

I do not see why the possibility of over-capitalization of an enterprise in which an investor is about to invest is a distinct hazard to that investor. (Objection by Company Counsel overruled.) You ask if over-capitalization of Southern Natural Gas Company did not result in a distinct loss to my firm which had an investment in that company. Over-capitalization is a very loose term and I do not know how to answer that question except that on account of the depression coming on, the company was not able to pay interest and sinking fund charges that accrued. It was not able to earn enough to support its capital structure, including the sinking fund and taking account of the extreme depression. I cannot answer whether or not the possibility of that happening to any company is a hazard to an investor in any company. In my judgment defendants are not capitalized at all, in the sense that its securities are distributed. It is more an effective partnership. I do not consider defendants over-capitalized under the present distribution of securities.

In my testimony on direct examination I spoke of river crossings as one of the hazards. I made somewhat of a comparison of that feature of defendants with a similar feature of the operations of the companies set out in Exhibit 148. I compared the situation of defendants on this point with some of the companies listed in that exhibit, including Interstate, Southern Natural, Memphis, El Paso and Mountain Fuel. I have always been fairly well informed as to Interstate, Southern and Memphis. I have gained my information regarding the others some time within the last few weeks. I cannot tell just when. I don't remember whether it was before my direct testimony or not.

I spoke also of the possibility of salt water intrusion into the wells of defendants as a hazard which they faced. I have not compared that possibility with the possibility of salt water intrusion into the wells supplying the companies listed in Exhibit 148.

As to failure to make adequate provision for depreciation and depletion or for amortization, I think the investor would inform himself about it and if he is informed it
1416 would not be a hazard. Inadequate provision by the management for that purpose might happen with one company as much as with another. I suppose such a development might work to the disadvantage of the investor. I cannot see how that would work out. I think an investor

satisfies himself about depreciation and depletion and amortization. Yes, the making of proper and adequate provision for depreciation and depletion and amortization is considered necessary for the protection of an investor in an enterprise of this nature. Yes, there is a possibility that such provision will not be made just as there is a possibility of almost anything happening. There have been cases where public utilities have not provided enough, but I do not think of any cases where they have provided enough until the investor got hooked, so to speak, and then stopped making provision. I do not think in those cases where inadequate provision was made for depreciation the investors were a fixed static body. The personnel of the investors may shift more or less from time to time. The damage in a case where inadequate provision for depreciation had been made would come from a falling off in earnings.

The purpose of making provision for depreciation is primarily to make replacements when necessary. One theory is that it preserves intact the investment. I do not think it is necessary to make the so-called value of the property plus the depreciation reserve equal to the original investment. As I understand the function of reserves they are to provide for replacement and for retirement of property when retirement takes place. Provision is made for depreciation through annual accruals. That is the first step in the process. I don't see why the possibility that the management will fail to make proper annual provision for depreciation, depletion and amortization is a hazard in this business any more than it is in any other line of business. It is an ordinary business hazard, if that is the way you look at it. It is like any other possibility. I don't see how an investor can differentiate in that respect between two companies or two businesses. I do not call the possibility that the company may make inadequate provision for depreciation and depletion a hazard. Certainly it makes a difference to the investor whether or not the company makes proper or improper provision for depreciation and depletion. It is a question of what they are doing at the time. If after the investment is made the company the following year fails to make adequate provision for depreciation and depletion, such circumstance, generally speaking, does not make the investment look as good as it would if the company had earned that depreciation. I don't see how an investor contemplating investments in an array of different types of businesses or different businesses of the same type could take into account the possibility that some one or more of them might make inadequate provision for depreciation and depletion.

(At this point counsel for complainant announced that pursuant to a suggestion of the Examiner he was withdrawing the original Exhibit 156 and was substituting therefor photostatic copies of it. The substitution was permitted by the Examiner.

Counsel for complainant then withdrew Exhibit 157 and produced another document which he described as a certified copy of Mr. Gallagher's testimony before the Illinois Commerce Commission in connection with Exhibits 2 and 2-A, which are incorporated in Exhibit 156. In the proceeding before the Commission last named the testimony covered by the certification began with page 12 and ran through page 99. The counsel for complainant requested that it be marked as an exhibit. At the direction of the Examiner the document referred to was marked for
1417 identification as Exhibit 157.

Exhibits 156 and 157 were offered in evidence. The Examiner withheld his ruling until the following day.)

In my direct testimony I stated that my office receives publications dealing with the gas industry, including the "American Gas Association Monthly" and the magazine "Gas Age". I think we receive the magazine "Gas" which you state has now recently been absorbed into another trade magazine. We use these magazines and similar publications to keep informed of developments in the field. They are standard trade journals. We also keep in our files Moody's Public Utility Manuals and Poor's Public Utility Manuals. We consult those frequently for information with respect to the different utility industries and the different specific utilities.

I think that in my testimony in the summer of 1934 before the Master in the Chicago District Pipeline Company versus Lindheimer case I stated a portion of the method which I myself embodied in Exhibit 49 in that case.

(At this point counsel for the Commission produced a document with the request that it be marked for identification. At the direction of the Examiner the document was marked for identification as Exhibit 167.)

Exhibit 167 is apparently a photostatic copy of my Exhibit 49 put into evidence during my testimony in the case of Chicago District Pipeline Company versus Lindheimer.

Included in Exhibit 167 are the bonds of natural gas companies, principally production and transmission companies. In some cases distribution was involved in addition to production and transmission. I included therein all the issues of such companies from the year 1925 through 1932. I took the market price as of June 30, 1934, of those issues. That was approximately a month before I testified. I took the amount outstanding for each of those issues as of the end of the preceding year. I computed the approximate yield to maturity of those issues and also the current yields. The reason I left out the current yield was because the yield I ultimately used as the basis of my judgment was the yield to maturity.

I got a figure representing the weighted average for the current yield and the yield to maturity of the bonds shown in that exhibit. The approximate yield to maturity was 9.7 per cent. At that time I testified in answer to a question by Mr. Daily as to what yield in my opinion the bonds of Natural Gas Pipeline Company of America would have to show in order to secure capital at that time that I thought it would be reasonable to estimate the rate at 9.7 per cent, based on the current prices for the average of the 41 natural gas bonds which I had considered, not including those on which interest had been defaulted, in connection with Exhibit 49 there and marked Exhibit 167 here. Mr. Daily then asked me this question: "In examining the data as to the 55 natural gas companies which issued the 73 natural gas bond issues shown on Plaintiff's Exhibit 49, did you investigate the question of the data available as to some of the companies with respect to the relation between their outstanding bonds and their preferred and their common stock, that is to say, as to the relative amounts, and, if so, how many companies did you find as to which such data was readily available?" To this question I answered "23". Mr. Daily then asked
1418 me whether I had studied those 23 companies for the purpose of determining the average proportions between the issues of bonds, preferred stock and common stock, and what I found to be the proportions. I answered that I had made such a study and found that bonds on the average constituted 49.7 per cent of the investment and preferred stock 13.9 per cent, leaving for the common stock equity 36.4 per cent. Determining that relationship was a step in the development of the method by which I arrived at my conclusion at that time as to the return,

based on the exhibit which has been marked Exhibit 167 in the present case.

I then proceeded to read or have incorporated into the record the 23 companies in question from which I got those average figures showing the relationship of bonds, preferred and common stock. Then the following questions were asked me by Mr. Daily and were answered by me: "Question: Will you now state again, if you have not already stated, the basis on which you selected those 23 companies? Answer: Well, those were the companies from which I could readily determine the data without too great research and computation being involved. Question: What would you say as to whether or not at the present time if bonds of a natural gas enterprise were to be marketed, it would be good practice to issue more bonds in proportion than those you have indicated? Answer: I think the proportions I have indicated as to bonds would be good practice as of the present time. The proportion of preferred stock is probably somewhat low."

Mr. Daily then asked me whether I had made a further study for the purpose of determining the relation of the yields of bonds and preferred stock and of earnings on common stock for natural gas companies, to which I replied in the affirmative, adding that as in making this study it was necessary to go back for a period of 10 years, I had confined my analysis to 7 natural gas companies. That 10-year period was approximately 1924 to 1933, the 10-year period preceding the year of my testimony, which was in 1934. I then proceeded to name the 7 companies I had used. I was asked to state the proportions which I determined from that study. My answer was that the ratio of the preferred stock yield, that is, the preferred stock dividend rate divided by the average market value of the preferred stock, was 1.1 times the average yield of the bonds to maturity. The earnings of the common stock equity were at the rate of 1.4 times the maturity yield of the bonds.

In answer to another question as to whether those yields were representative of the proportions attained in the better class of companies in that industry I stated that I thought the ratios were comparatively low, that is, that ordinarily it would be expected that the preferred stock yield and the common stock yield would be greater with respect to the bond yield. Mr. Daily then asked me to give the comparative figures as to preferred stock and common

stock that would result if I took the bond yield at 9.7 per cent instead of the 1.00 assumed as the basis of comparison. My answer was that the comparative yield for preferred stock would be 10.7 per cent and for the common stock equity 13.6 per cent. I then answered that if those figures be applied to the proportions between bonds, preferred stock and common stock which I had stated I derived from a study of the 23 companies, the result of the calculation with respect to the return upon the securities as a whole would on a weighted average basis be 11.25 per cent. I explained that the figure last named was
1419 derived by multiplying 9.7 by 50 per cent, the 9.7
being the necessary bond yield which I derived and the 50 per cent being the proportion of bonds to the total investment. For preferred stock I took 14 per cent and multiplied it by 10.7, the necessary preferred stock yield, which gave 1.5. Multiplying 36 per cent by 13.6, the necessary rate of earnings on the common stock, gave a result of 4.9. The sum of the products was 11.25 which represented the average rate of return estimated to be necessary on the whole property at the rates determined. I then testified that, in my opinion, the figure last mentioned fully measured the rate of earnings which would constitute a fair rate of return to a natural gas enterprise of the character and in the position of Natural Gas Pipeline Company of America as based on the experience of other companies and the market appraisals of such investments.

If I were to bring that exhibit down to date, I would take the issues that were shown in that exhibit and for the first step include those which are still in existence; and I would include also such refunding or replacement issues as I found replacing or refunding the issues used. I would also include such other financing as had been done by similar companies in the period 1933 through 1938. That would give me a list of securities to start with. If I were testifying as I did here at the early part of October, I would take the market price of those securities as of August 31, 1939, and from such market prices would determine the yield to maturity of each of the issues there shown. I would then determine the weighted average yield to maturity. Then having determined that weighted average yield to maturity, in order to arrive at a final figure which would be comparable to the figure of 11.25 per cent return which I arrived at in the Chicago District Pipeline case, the first step would be to multiply that weighted average yield by 50, if I found that to be the approximate proportion of bonds at that time.

I would determine the proportions of bonds, preferred stock and common stock now. When Mr. Slaff put the last question to me I thought he referred to that step and not to the 50 per cent. I cannot tell as to whether it would be 50 per cent or how near 50 per cent it would be today. Yes, I testified at the beginning of my cross-examination that a sound capitalization for a natural gas company today would be approximately 50 per cent bonds, 25 per cent preferred and 25 per cent common stock. On the basis of my 1934 study as to the proportionality of bonds, preferred and common stock, I would, in coming to my final figure, take as the first step the multiplication of my weighted average of bond yields by 50 per cent, if I found that to be the proper proportion now. If I found those same proportions to exist today between bonds, common and preferred stock, I would multiply the weighted average of bond yields by 50 per cent. If I found the same ratio to exist between earnings on preferred and earnings on bonds and the same proportionality to bonds, I would then multiply as my next step the weighted average bond yield by 1.1 and then by 14 per cent. The final step on the same basis would be to multiply the weighted average bond yield by 1.4 and then by 36 per cent.

That would give me an overall figure comparable to my figure of 11.25 per cent in the Chicago District Pipeline case on the basis of those same units. You have asked me to assume that the weighted average of bond yields that we have been discussing here is 5.5 per cent. Based on that assumption the over-all figure comparable to the
1420 figure of 11.25 per cent in the Chicago District Pipeline Company case would be 6.38 per cent. That is arrived at by multiplying 5.5 by 50 per cent, 5.5 by 1.1 by 14 per cent, and 5.5 by 1.4 by 36 per cent.

(At this point counsel for the Commission offered EXHIBIT 167 in evidence. The Examiner reserved his ruling until the following day.)

At the time I testified in the Chicago District Pipeline Company case I stated that a company should not be left on the verge of starvation and that therefore a liberal allowance should be made. After I explained how I had arrived at the figure of 11.25 per cent, I testified that that figure represents the rate which would command capital, in my judgment, without additional reward to the company for operation and management. I stated it would be a minimum rate; and in all probability it would be more than that. I was referring to that rate of 11.25 per cent. I then stated that I thought that an addition should be made to this computation for the reason that in order for any business to be in a position constantly to furnish high grade service to its customers, the company must not be kept on the verge of starvation, that is, it must be permitted to earn something more than the rate which would just barely command the capital. I was referring to defendants in making that statement. The sense of my testimony was that something in addition to 11.25 per cent should be allowed. The expression, "The company must not be kept on the verge of starvation," was mine. I then went on to testify that a reasonable return for a company of the character of defendants would not be less than 12 per cent after allowance for amortization and depreciation.

There has been a time in the last 20 years when bond holders demanded a very high amount of the total earnings as during that period 1932, 1933 and 1934 and most of the bonds carried warrants or some features which gave them valuations in excess of what would be indicated by their coupon rate. I think generally the coverage demanded now is greater than it was then, particularly to obtain acceptance by investors. In determining the relation of the yield of bonds and preferred stocks and of earnings on common stocks for natural gas companies, in which I used the yield on bonds as 1, on preferred as 1.1, and on common stocks as 1.4, I went back for a period of 10 years from the time I was then testifying.

That average yield of 9.7 per cent was the average for only 7 companies. The reason I could take only 7 was because I wanted to go back for a period of 10 years, as I stated in my answer read to me earlier today. The document to which I have been referring is the transcript of the 1934 case and I have also referred to my own notes in the 1934 case.

I testified earlier in my cross-examination that I had previously testified a year and a half or thereabouts ago in the Interborough Rapid Transit Company tax case. I was appearing there on behalf of the receiver for that company. The question of how much that company should take as an income tax deduction for annual amortization

of the value of its contracts to operate the New York subways, was involved there. The Interborough in that proceeding was interested in arriving at as high a value for its right to operate those subways as was possible. The
higher the valuation, the greater the annual deduc-
1421 tion would be. I made a valuation on the basis of
what a willing purchaser would pay for that system, buying it from a willing seller. I don't remember that there was anything like capitalization of the earnings. The present value was estimated by discounting the estimated earnings. I suppose there are two senses in which the word "capitalization" can be used. One is to place an amount against the capital account and the other is, as the saying goes, to capitalize earnings by dividing them by the required rate of return and arriving at a capital value that they would support. I don't think it was in the latter sense that I capitalized the earnings of the Interborough at a certain rate of return in order to arrive at the figure of value. I think it was a plain discount.

In my direct testimony I testified that: "At the discount rate of 6 per cent and the accumulation rate of 4 per cent as determined, I computed the value represented by annual earnings of $8,230,000 from March 1, 1913, at 1968 at $127,000,000." The accumulation rate of 4 per cent mentioned in that portion of the answer just read referred to the amortization fund that was being built up to amortize the investment. You ask me if I remember that on cross-examination the following question was put to me: "Of course, your figure of $8,300,000 as average earnings on which you relied in arriving at your March 1, 1913, valuation was an earning figure in excess of the earnings of the subway for the prior periods or periods prior to 1913?"; and if I did not answer: "It was a little in excess of it then, yes." You also ask if I was not then asked the question as to whether I capitalized, in a general sense, this figure of $8,300,000 in arriving at my valuation, to which I replied "Yes." I remember counsel asking me about that but I corrected that afterwards in the cross-examination. He referred to it again as capitalization and I corrected it. I do not understand at all that that is essentially what was done.

If I had used a higher rate of return than I used in the computation in that case, I would have arrived at a lower value. The higher the rate of return used as a capitalization basis, the lower the value that is reached. If in the Interborough tax case a rate of return higher than 6 per cent had been used, I would have arrived at a valuation lower than that reached. In that case I did use a rate of return of 6 per cent.

I testified in the Brooklyn Rapid Transit Company franchise tax case about a year or so ago. I don't remember whether the tax on the franchise value of the Brooklyn Rapid Transit Company or one of its subsidiary companies was involved in that case. In effect it applied to the Brooklyn Rapid Transit Company. The problem there was to find the franchise value of the company for tax purposes.

I was aware at the time I testified of the method in New York as set down in the case, I believe, of Jamaica Water Supply Company against the Tax Commissioners, of arriving at franchise value. The method set out in that case is to ascertain the gross earnings, deduct the operating expenses, which gives the net return, and then deduct a fair and reasonable return on that portion of the capital of the corporation invested in tangible property. The resulting balance gives the earnings attributable to the special franchise. Then if the balance be capitalized at a fair rate, you have the value of the special franchise. The less deducted as applicable to earnings on the tangible
property, the greater the franchise value. I testified
1422 in that case that a fair rate of return on the tangible
property of that company was 6 per cent, the tangible property being defined as the cost of reproduction new less a substantial amount for depreciation, which gave an amount substantially less than the bonds outstanding secured by the property.

With respect to my Exhibit 149, in preparing the exhibit originally I assumed that the cost of a line operating at a lower pressure was the same as the cost of the present line. I made the comparison on that basis. That is to say, I assumed that the cost of the entire project was the same in either case. As to whether or not defendants would require less reserves if they were selling less gas, I think that is entirely a matter of expectancy. I do not know enough about the field or the conditions there or the conditions confronting defendants to say. I have assumed that it would take the same amount of reserves in both cases. Generally speaking, a company which requires only 80 per cent of the gas that another company requires, does not require the same amount of reserves; but I do not know about the conditions under which defendants acquired their reserves. On the face of it they would not require the same amount of reserves as they do now if they were using only 80 per cent as much gas as now used, but, as I say, I do not know the conditions under which defendants acquired their reserves. Other things being equal, it might appear that they might get along with less reserves; but I do not know about the conditions surrounding defendants or what the expectancy was, or what they were confronted with in providing for their reserves. In my Exhibit 149 I have assumed other things to be equal so far as the line costs are concerned.

That exhibit shows the defendants would use only approximately 80 per cent of the gas which they now use, if they were to operate at the lower pressure. As to whether or not defendants would require the same amount of reserves that they do now if they were selling only 80 per cent as much gas under the conditions portrayed on my Exhibit 149, I can only repeat my answer that I do not know enough about the field or the conditions under which defendants bought their acreage to say. On the face of it, it would appear that they could get along with less, but I do not understand that the required reserve would be the proportion their holdings are exactly to what the line is taking.

In my testimony and exhibit I undertook to make certain comparisons of what I deemed to be important factors in this case. One of those was the comparison between the investment in the company operating at its present pressure, and an investment in the company operating at a lower pressure. I assumed in my direct testimony that the investment was the same. That assumption was based in the first instance, if we took this by steps, on the assumption that the company would require and would have the same amount of gas reserves operating at a lower pressure as it now has. As to whether that is a valid assumption I don't know. There may be other considerations in there. I think very likely there were. I don't know of any other.

So then we can summarize the situation in this respect by saying that I do not know of any conditions which would require defendants, if they were using only 80 per cent of the gas which they are now using, to have the same amount of gas reserves that they now have.

1423 I do not think it is correct to say that defendants, if they were to produce and use 80 per cent of the gas that they now produce and use, would not require as many wells as they now have. I think the drilling of wells is governed by the proving and protection of leases more than by the amount of gas required. In the course of years the amount of gas required does have a certain effect on the number of wells drilled, but not in the earlier years. As time goes on the amount of gas produced or required by a company is an important factor in the number of wells that are drilled. (Objection by Company counsel overruled.) Other things being equal, a company producing only 25 per cent of the gas that defendants require would not drill as many wells as defendants would. The number of wells depends upon the development of the field, which has been generally going on up to this time, and I would think that the number of wells would not be affected by the circumstance that defendants were taking only 80 per cent as much gas as at present. During the development of the field the number of wells drilled depends very little on the requirements of the particular company for gas. By "development of the field" I mean the period of exploration and the protection of acreage. It is my understanding that the Texas Panhandle field is still in the development period. From the viewpoint of going concern value to which I have testified, Texoma is a company whose reserves are in a field where the developmental period still continues.

1424 In my judgment a company which required 80 per cent of the gas which defendants have required in the last 7 or 8 years would have drilled the same number of wells as defendants have drilled, if it had purchased the same acreage that defendants purchased. I can not name any reasons why defendants would have bought the same amount of acreage if they had required only 80 per cent of the gas they had actually taken. All other factors being equal, if defendants had required 80 per cent as much acreage as they did, I think they would have required fewer wells to protect it. As to whether or not the company requiring 80 per cent of the gas that defendants require would not need the same amount of gathering lines that defendants now have, would depend upon the distribution of the acreage. Other things being equal, it would not require as much gathering line. I don't know whether it would require the same amount of field measuring and regulating station equipment that defendants now require. Generally speaking, other things being equal, if the acreage were less, the field measuring equipment might be less. Generally speaking, other things being equal and if the acreage were less, the whole natural gas production plant would be less.

Under the same circumstances, the company operating at 500 pounds pressure as compared with a company operating at higher pressure would require less compression equipment at the field station. It would not require less compression equipment at the stations along the line. The investment would be less at the field station and slightly less at the line stations on account of less cost of fitting. This was the first time that a line was operated at those high pressures. So far as I know, it was not necessary to make special designs for the compressor station equipment all up and down the line to operate the line at those high pressures, except that defendants have been put to some expense in replacing compression pistons. In the matter of discharge pressure, there was considerable advance above what had been done before in the industry as a whole. I do not know of my own knowledge but I am informed that this circumstance did not involve more expense for equipment than for equipment which had been standard up to that time in the industry.

With respect to the pipeline itself, I have made comparisons as to the cost of pipe for a pipeline operating at 500 pounds pressure and this pipeline over the same route. I have had comparisons made of the actual line and the principal items in a line built to the conventional pressures and stresses with the material available before this company undertook its research, which would be a lap weld pipe, stressed to 15,000 pounds per square inch and 13-32 inches in thickness. The cost of a line of conventional type would have been, including the compressor stations and an allowance for a reduction in the gasoline and refrigeration plant, $2,367,164 more than the actual cost of this line.

As I have explained, I have had the difference computed in the important items, and applying the difference

in the important items, I get an estimated cost of $52,197,643 for the pipeline, compressor stations, gasoline and refrigeration plants; as compared with a book cost of $49,830,479. Subsequent to the presentation of my
1425 direct testimony here, and in pursuance of an answer
to the Examiner's question, I asked Mr. Brown of our organization, who is familiar with such things, to make me up such an estimate. As I stated, he has only computed the important items that would be affected. I have not said that Mr. Brown was able to compute the cost of building a pipeline in 1930 and 1931 from the Texas Panhandle to Chicago to operate at 500 pounds pressure, in three weeks' time. Derived, as I explained, by computing the difference in cost of the important items that would be changed, we reached the result I have stated.

If any further explanation of that is required, this was arrived at after consultation with Mr. Rhodes who has had more experience in building pipelines and in estimates than anyone else in our office, and it was his opinion that except for these items, there would be very little difference. (Objection by Company Counsel overruled.) Yes, our Mr. Rhodes and our Mr. Brown in arriving at the estimate in the manner I have explained, were able to project themselves back to 1930 and 1931, and in a period of two or three weeks come up with an answer as to the cost of building a pipeline from the Texas Panhandle field up to Chicago to operate at 500 pounds pressure. Ford, Bacon & Davis built about 250 miles of this line. As I remember it, they bid on other portions of the line. They were bidding on the line that was actually built.

We were engaged at about the time this line was built as engineers for the Southern Natural, which was laying just this kind of a line, and our engineers are all very familiar with the prices that go into that. I hope I do not have to say that with our years of experience in the engineering business, we would not try to impose on this Commission. (Commission Counsel renews his motion and offer in evidence of Exhibits 164, 165 and 166 in the light of the witness's most recent testimony with the request that portions of Exhibit 165 be read into the record. The Examiner refused to reproduce the exhibits in the record and denied the offer and motion to receive the exhibits into evidence.)

Cross-Examination by Mr. Booth.

In response to a question that was addressed to me a few minutes ago by Mr. Slaff, I read into the record a figure which was prepared by certain members of the staff of Ford, Bacon & Davis. I did not personally prepare these figures or any portion of them. I did not participate in or supervise the construction of any portion of defendants' pipeline built by Ford, Bacon & Davis. I have very little to do with construction now. I used to years ago. That was 30 or 40 years ago.

I have given incidental attention to it at various times. I had something to do with the Edmonton line in the way of going over the job while construction was in progress, and at different times I have had something to do in the construction work, but not a great deal.

I am a member of the Executive Committee of our organization and executive matters come before that body. I keep up with them in an executive way.

Cross-Examination Interposed by Mr. Slaff.

Regarding the incident as to the changes in the bank interest rate to the Southern Natural, I think I might be permitted to say that that letter from the bank was dated July 13. I was out of the office from June 30 to September 2, except for one day in the office. I do not think I have known about that anyhow, because it is an administrative matter and it probably would go before the board of directors when they met. I doubt very much that I would have known about it unless I had come across it in going over their monthly report. I have said
1426 that I am a member of the Executive Committee of my firm.

Cross-Examination Resumed by Mr. Booth.

I hardly know how to characterize my participation in the construction activities of the company in the past 15 years. I am an officer and a director of the firm, and a director of our construction corporation. It seems to me that my connection with construction has been a little more than nominal, but it has not been extensive. There is a corporation that handles most of the construction activities of Ford, Bacon & Davis. It is known as the Ford, Bacon & Davis Construction Corporation. There are about 200 men altogether in the Ford, Bacon & Davis organization. It has a subsidiary construction corporation which for the last four or five years has done very little and has nothing more than a skeleton organization at present. That is due to the decline in its construction contracts. This separate construction corporation handled the building of such part of the line of defendants as was constructed by Ford, Bacon & Davis. The contract was with Ford, Bacon & Davis, Inc.

Mr. E. G. Hill, the president of the construction corporation, is in charge of the construction of most pipeline work. Mr. Whitaker has charge of the construction of the electrical work. I have never supervised the construction of a 24-inch pipeline, a 22-inch pipeline, or a 20-inch pipeline.

I think the Edmonton line was 16-inches, but it was constructed quite a number of years ago. I did not supervise the construction of that line. I think it was built about 1925.

Only about 10 or 12 per cent of my work has been in utility rate cases in the past few years. You ask me to assume the construction of a pipeline such as is owned by defendants and also the organization of a corporation such as Texoma in 1930, and that the investors were advised at that time by reliable and competent geologists and engineers that the property would have a life of 25 years, and to state over what period the investors would expect the property to be amortized. They would expect it to be amortized during the life of the project, not necessarily during the first year of the company's operations. No, the company would not wait until the 24th year. I think that when the earnings permitted the company to either amortize the investment or to set up a sinking fund for amortization, it would begin to make provision for amortization. You ask me to assume the company had substantial earnings during the first, the second and the third years of its operation. (Objection by Company Counsel overruled.) That is such a wild assumption that I cannot give any consideration to it. That is such an unusual combination of conditions that I am unable to apply my mind to it. For a pipeline to earn so much money during the first few years that it can amortize part of its property is an unusual combination of conditions.

I think that when it has earned a fair return on the investment from the time of the beginning and has accumulated a cushion fund, it would ordinarily be prudent to amortize the investment in one way or another, generally by retiring bonds. I am somewhat familiar with the history of defendants. You have asked me whether or not, based upon my study of the defendants' operations, they earned enough to set aside anything for depreciation or depletion during the first full year of their operations in 1932. (Objection by Company Counsel overruled.) They did not. That is my recollection of the situation. I think the defendants set aside a small amount for depreciation in 1933. I do not recall the amount. My recollection is that it was something like a million dollars, and that a similar sum was set aside in 1934. 1427

The indenture provides for a serial retirement of the bonds of defendants. I do not recall when the retirement was to begin. It was a few years after the line was placed in operation, but I do not remember the date. The bondholders, where bonds are distributed among the public, would require that a sinking fund begin as soon as the earnings permitted. That is a reasonable requirement.

You have asked me whether or not I consider it appropriate for the management of a company such as defendants to defer providing for amortization of the investment in a property such as this because they felt that some time during the operations of the company and before the company went out of business that the business would be subject to regulation at some future time. Supposing they felt that at some time during the operations of the company the business would be subject to regulation, what would they have to expect then? My answer is that I would not think that the appropriations for amortization would be governed by any such consideration as that. I should think that such appropriations would simply be a function of the earnings available and the expected time of passing out of business. (November 4, 1939.)

(At this point EXHIBIT NO. 157, theretofore offered in evidence by counsel for complainant, was received in evidence.)

Questions by the Examiner.

I have not made a figure for figure check of Exhibit No. 167, but I have no doubt but that it is an exact copy of Exhibit 49, of which it purports to be a copy. I have made a spot check of it which satisfied me that it is a true copy. I checked the heading and several items here and there.

(At this point, EXHIBIT NO. 167, theretofore offered in evidence by counsel for the Commission, was received in evidence, over the objection of counsel for defendants who were allowed an exception.

At this point, counsel for the Commission presented a document described as a copy of Exhibit 153 for identification, certified by the Secretary of the Securities and Exchange Commission. At the direction of the Examiner, the document was marked Exhibit No. 153 for identification. The previous uncertified copy of the same document, heretofore marked Exhibit No. 153, was stricken from the record. EXHIBIT NO. 153 was then offered and received in evidence without objection.)

Cross-Examination by Mr. Slaff.

The bulk of such financing as has taken place in the natural gas industry since 1934 has been debt financing. I cannot say definitely that practically no common stock financing has occurred in that time. I think there have been sales of stock, but I cannot name them definitely. The volume of stock transactions would be small in comparison to the transactions in bonds. The same is true of preferred stock financing since that time.

I have been working on testimony and preparation of testimony on rate of return in this proceeding and in the one which immediately preceded it before the Illinois
1428 Commerce Commission, off and on for 18 months. In
this period, I did not undertake this extensive computation involved in my Exhibit No. 149. You state that it was not such an extensive computation. It was quite a study. It is a question as to what you mean by "extensive" as compared with a "non-extensive" computation. I think there were more people engaged on that computation than 2. The time involved, as I remember it, was between three or four weeks. We arrived at an answer within three or four weeks after my direct testimony. When I testified on direct that was what I considered such an extensive computation that in the 18 months I had to prepare my direct testimony I had not done it. At the time I was testifying on direct examination I thought that, considering the use of the computation, it was not warranted at that time.

The interest rate on the Lone Star Gas Company bank loan referred to in Exhibit No. 148 was reduced from 2⅞ per cent to 2⅜ per cent, some time in 1939. I have the date here as September 18, 1939. I don't know whether that is the date of the S.E.C. authorization or the date of the reduction. I found out about this reduction some time during the course of our study. I doubt if I knew about it before I testified on direct. The note I am now looking at reads "Lone Star Gas Company, interest on bank loans reduced 2⅞ to 2⅜, authorized by the S.E.C. September 18, 1939". That is part of my working papers. It was authorized by the S.E.C. on September 18, 1939.

I testified here in October on direct, and put Exhibit No. 148 in evidence at that time. No, that is not one of those things that I was going to bring up on redirect. That reduction in interest had no bearing whatever on Exhibit No. 148 or on anything that I testified to. I think it had very little bearing on the subject of rate of return. I don't think it had any bearing on the subject of rate of return because, in effect, it would increase the equity earnings. Bank loans to gas companies today are governed more by the plethora of money in the banks. The amount of money in the banks has a great deal to do with the rate they ask for the notes. That has very little to do with the subject of rate of return to a company. I think it has very little effect on the final answer. I don't think it has anything to do with the subject of the determination of a fair rate of return for a company under regulation, except insofar as it is necessary to set it up in determining the entire amount of money invested in a company and the return shown thereon.

If I may explain directly to the Examiner, I have not undertaken to bring any of this data that I have shown up to the present stage. I have presented an exhibit as to the situation December 31, 1938, and I do not feel that it is incumbent on me to go through all of the records and bring up notations of this kind whether they affect the answer or not. Exhibit 148 deals entirely with 1938. May I add that Mr. Timberlake reminds me that data on one of the companies is given for 12 months to March 31, 1939.

There was only one issue of bonds of the Southern Natural Gas Company and there was one maturity date for the whole issue, but they were callable at different prices in different years. The maturity date is October 1, 1951. I don't think any of them matured in 1952. This record shows no such maturity and my memory does not recall any. When I say "this record", I mean my underlying work papers.

As of December 31, 1938 there were $1,409,000 of Alabama Gas Company, First Mortgage, 4½'s of 1951 outstanding. The report to the stockholders shows $1,385,000.

I do not know which is right. The report to the
1429 stockholders shows bank loans outstanding at December 31, 1938 of $1,475,000. This was a collateral note to the New York Trust Company at 4½ per cent. There were other bank and current liability notes to the extent of $188,838. It is about $100,000 different from the figure shown on our exhibit. I am not able now to explain why it is different.

Poor's Manual shows 1st mortgage 4½ per cent series due April 1, 1952, outstanding as of December 31, 1938, in the amount of $616,000, and that, together with the amount outstanding of the series due October, 1951, gives the total of $13,555,000 shown on page 5 of our Exhibit No. 148; so it appears there are two series maturing at two different dates in those 1st mortgage bonds shown on page 5 of our Exhibit No. 148. I think the exhibit does not show that. I have not mentioned that there were two series in my testimony. The information as to earnings and security prices was obtained from Moody's.

Southern natural is the company in which our firm has a substantial interest. I should know the facts about the Southern Natural Gas Company.

In my testimony on going concern value in the Syracuse Gas and Electric case before the New York Commission, I included as a part of the build-up of the figure of $4,000,000 finally arrived at there for going concern value, the fact that "the area now known as Syracuse was once the capital of the Great Iroquois Indian Confederacy." I made that statement. I also made the statement that "Syracuse is also possessed of a university ranking 22nd in size among the country's 700 similar institutions." The only use I made of my reference to the Indians around Syracuse and that the University of Syracuse was there, in discussing the going concern value, was that I drew a picture of the territory in which the company was operating. No consideration whatever was given to that element in arriving at my conclusion.

Cross-Examination by Mr. Booth.

On the question of reserves of the defendants, I indicated that one of the hazards in the minds of investors in determining the risk of investing in companies of this character is the question of failure of the reserves—that the gas will fail before the estimated life of the field. You ask whether or not that was one of the hazards I took into consideration in arriving at my conclusion as to what constitutes a proper rate of return for this company.

To answer that question I will have to explain that I did not make any definite allowance for hazards, and only took them into account to the extent that I satisfied myself that there were no greater hazards of exhaustion in the case of the average of these other companies than in the case of defendants.

Yes, I testified at page 5277: "The amount of gas available on which the life of the pipeline depends is bound to be known only to the extent of an estimate, the geologist's estimate which may be right and may not be." I made no independent investigation of the studies or reports that the geologists have made with respect to the life of the Panhandle field.

I have stated that I testified in the Chicago District Pipeline Company case on the subject of rate of return.

1430 I was not advised that J. D. Thompson, a geologist, testified as to the life of the reserves of the Panhandle field in this proceeding. I did not even know what he testified to in this case. I have no recollection that I was advised in the Chicago District Pipeline Company case that the same Thompson testified in 1934 that there was only a 12-year supply of natural gas in the Panhandle field. I am quite sure that I did not have that information. (Objection and motion to strike by company counsel overruled and denied.)

In the question propounded to me at page 5275 by Judge Morgan in which he asked me whether I had stated in my prior testimony that I was familiar with the natural gas business in all of its phases, I took his implication to refer to my firm rather than to me personally, as I had previously testified. I don't think I am familiar with the natural gas business in all of its phases. I would not claim to be personally.

I have made no investigation of the depreciation of the property of the two companies, except to the extent of Mr. Hill's trip at the beginning of our work. I did not make that trip, it was made by Mr. Hill.

I do not have an intimate knowledge of the element of fatigue as affecting the property of defendants. I have made no systematic inquiries to determine the effect of fatigue on their property. I have discussed it to some extent. I have made no study of fatigue.

I have made no independent investigation of the effect of the physical factors in connection with the operation of defendants' plants and property, except to the extent of Mr. Hill's observations.

Exhibit No. 130 constituted the basis of my conclusions on the subject of going concern value. Of the $8,568,000 shown on that exhibit, $4,859,896 constitutes the charges for interest on that portion of the capacity provided in advance of attached business.

1431 It was arrived at by taking certain proportions of the interest paid during 1932 to 1935, inclusive, due to the fact that the company had not utilized the full capacity of its line during each of those years. Yes, I know that the interest the company pays on its bonds is 6% per annum. Yes, if the interest rate on the bonds had been 12% instead of 6%, the interest instead of being $4,859,000 would have been twice that amount or approximately $9,750,000, and the going value which I found in this case would have been substantially greater under that assumption.

Yes, if in fact the ad valorem taxes of the company had been twice the amount $1,163,156 during 1930-1935, the item of ad valorem taxes constituting a portion of the going value which I found would have been as much as twice $396,000. Under those circumstances, naturally, the going concern value in this case based on this exhibit would have been affected. The item of depreciation was one of the principal factors entering into my conclusion on going value.

The figure I used for depreciation in that computation was taken from Mr. Biddison's conclusions as to the amount of observed depreciation. What I did was to allocate to those four years the proportionate parts of the total amount of existing depreciation determined by Mr. Biddison to have existed in the property of the company. I assumed that it took place uniformly year by year and assumed that Mr. Biddison's figures based on inspection were correct. I made no further independent inquiry on that point than I have stated here. If in fact the Commission should find that the existing depreciation of the property should be 20% as you suggest instead of 5% as found by Mr. Biddison, they would have to increase the amount for depreciation in my computation of going value about four times and the going value would have to be increased by the same amount.

Yes, the next item included in the exhibit as one of the elements going to going value was the expenses not affected by the volume of gas handled, in the amount of $3,499,037. In using those figures I assumed that the company was efficiently managed and operated. If it be assumed, as you suggest, that the company was not efficiently managed or operated and expenses of operations not affected by the volume of gas handled were substantially greater than those recorded on the company's books, and which I have used in this exhibit, that would have the effect of increasing the amount to be included for that item in the going concern value. However, I don't think that such a conclusion is justified here, for reason is applied to all such estimates. I did not make an independent investigation of these expenses to determine that they were in fact reasonable. I took the company's expenses for these classes of items as they were handed to me by the accounting officers of the company.

It is not true that if this study made in 1939 had been made in 1945, and it appeared that the lag which I found to exist between 1932 and 1935 had extended up through 1945, the going value in 1945 would be substantially greater. You inquire if the fundamental method I used in arriving at going value was the cost of soliciting business, of providing facilities, and of operating facilities in advance of the attachment of the substantially full and complete business of the company in 1936 and the substantially full operation of the company's facilities at the same time. I think that the going concern value of a business in this particular applies to the early years of a company's existence, when it is building up its business; and the rule of reason would have to apply as to how many years are taken. It has never been my practice to take over four or five years, although there may have been six in some cases; but it has been confined to that period when the business is getting going in motion.

1432 It is true that if in fact the company had attached fully and completely its business beginning in 1932 to the same extent that I found it had attached its business in 1936, there would have been no going concern value. If I were making this inquiry and found that defendants had failed to attach fully their business in 1939 I would have limited the period of development to a reasonable period. It is not true that I had in mind when I began this study of going concern value a figure of approximately $8,500,000 and that I searched around for this method to get this mathematical figure.

I did not know that Mr. Hamilton used the same method. I did not discuss my method with Mr. Hamilton. I have known Mr. Hamilton for many years. I knew he was employed on the valuation of the physical property. I really did not know that he had been called in on going concern value. I do not think I knew it until after his testimony was presented. Then I simply knew that he had testified. I never saw his testimony.

Cross-Examination by Mr. Slaff.

In my going concern value testimony in other cases, I have searched the records of companies in the past to determine the rate of build-up of their business in early years. In some cases, that has gone back forty or fifty years. I have checked the results in early years with actual results in recent years and may have used the actual rate of build-up so derived in determining the term of the build-up period. I do not remember whether or not I have had occasion to modify such figures in any particular instances.

I think that the questions and answers you read beginning at page 3284 of the record in the Public Service Company of New Jersey case correctly reflect my testimony to the effect that the build-up period arrived at was based partly on the history of a number of underlying companies in the system, the records for which were available, and also upon my own experience, and that the records to which I referred were of one company whose operations began in 1896, one in 1890, one in 1892, two in 1893, and another in 1891. I then added that as a matter of fact I had used the historical figures which I considered agreed with my experience.

I think that in the Syracuse Lighting Case I went back into the period 1884 to 1889 to determine the rate of build-up applicable to a company which was being theoretically reproduced about 1937. This is an electric company which handles no gas. I used those figures because they checked with my actual experience.

I have no doubt that in the Public Service of New Jersey case I used as the rate of build-up of the business for a company being theoretically reproduced in 1934, the rate I found actually existed in the period 1891 to 1896. I mean by this testimony that I used the actual costs incurred during the build-up period in the beginning, not the costs of the whole 40-year period. Yes, in those cases I assumed that at the time I was testifying the particular company's business would build up in just the same length of time as it did during the historical build-up period. However, I did check these figures with my actual experience of more recent times.

In the case of such an estimate, I think no one has
1433 any right to assume in a reproduction of business
that the groundwork of the business is already laid. It would be just like assuming that because the rock was blown out for a pole hole years ago, it would not have to be blown out again. I do not think of other assumptions used by me in those studies of going concern value that I wish to comment on at this time.

You ask me if it is not a fact that if the management of this company had, during the period 1932 to 1935, been less efficient and because of that lower efficiency the expenses not affected by the volume of gas handled had been greater than those reflected on page 1 of my Exhibit 130, my going concern value would have been greater than that at which I actually arrived. If your question means 3% less efficient, that is so. If it means an amount that would be palpable, it is not; but I cannot say where the line would be drawn. I have stated that the rule of reason would apply to such an estimate and if there was palpable inefficiency, account would be taken of it.

If the expenses during one of those years, 1933 for example, instead of being $835,000 had been $910,000 or $920,000, the going concern value would have been greater, unless the expenses had reached the point where in my judgment there was palpable inefficiency. I made no independent determination whether that item of unvarying operating expenses was proper or improper further than my acquaintance with the management.

Yes, for the year 1932, I had a figure of $1,072,759 for expenses not affected by the volume of gas handled. If I had found that same expense year by year for the years 1933, 1934, and 1935, I would have had a greater going concern value, subject to the limitation I included in my former answer and subject to the fact that I made no independent investigation.

Yes, I testified to going concern value in the Dayton case. I think there was considerable similarity in the nature of the testimony I gave in that case and that here. I do not know just the points of difference. In that case and here, there was no actual record and statement of the expenditures similar to this statement contained in Exhibit No. 130. Anything of that nature presented in the Dayton case would have been estimated. The general principles were the same, but I think a different consideration was given to the different elements at the time I testified in the Dayton case than I gave here.

The testimony on going concern value in the Columbus case was presented by another witness. I largely supervised the preparation of the testimony. Yes, the general principles underlying that testimony were the same as I used when I testified in the Dayton case, but there were differences in consideration of the various elements. Yes, those two cases went to the Supreme Court of the United States. I cannot vouch for the reference 292 U. S.

My testimony in the Syracuse case was before the New York Commission. The company's name is Syracuse Lighting Company and I testified two or three years ago. I have no doubt you are correctly stating my testimony in that case in reading from page 3416, in substance, that the rate base should be higher for a public service company which has the right to do business in what I consider the best part of the state for such a business. I assume that the question I answered there referred to going concern value. I would like to make an observation to the effect that in the preliminary cross-examination the specific question was put to me if I would include anything for those elements reflected on page 4792 of this record,
1434 and I said I would not. Regarding the case that extracts have been read from, at the time of presenting my testimony there I did believe, having in mind the

citations in the Indianapolis water case, that consideration should be given to the location of the property. Since then I have felt that that element should be disregarded in arriving at a figure, and I have not included anything for it.

That element would in no way affect my recognition of these costs that I have tabulated in Exhibit 130 relating to the provision of facilities in advance of attached business. It would not enter in any way in my recognition of these costs. The Indianapolis case was decided about 1925. You ask if, because they could make a higher profit in that portion of the state in which they were located than they could in any other portion of the state, they should have a higher rate base. Without having an opportunity to refresh my mind by reading the context of this quotation, that was the purport of my testimony in the Public Service Company case.

(November 6, 1939)

(At this point, counsel for the Commission handed the reporter a document described as a photostatic copy of facing sheet and pages 164, 165, and 167 of Poor's Public Utility Volume, 1939, with the request that it be marked for identification. At the direction of the Examiner the document was marked for identification as EXHIBIT NO. 168. The exhibit was offered and received in evidence without objection.

Counsel for the Commission then handed the reporter a document described as a photostatic copy of facing page and pages a-55 to a-61 of Moody's Manual of Investments, Public Utility Securities, for the year 1939 with the request that it be marked for identification. At the direction of the Examiner, such document was marked EXHIBIT NO. 169. The exhibit was offered and admitted in evidence over the objections of defendants who were allowed an exception.

Counsel for the Commission then presented to the reporter a document described as page 250 of the American Gas Association Monthly for July-August, 1939, with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit No. 170.

Counsel for the Commission next produced a document described as photostatic copies of pages 19, 20, and 37 of the magazine "Gas" for July, 1939, the same being an article "The Investment Attributes of Gas Utility Securities," by Percy S. Young, with the request that it be marked for identification. At the same time, counsel for the Commission stated that this was presumably the long article on which the summary in Exhibit 170 for identification was taken, in which article Mr. Young said: "The author is indebted to Dean John T. Madden and Dr. Herbert B. Dorau of New York University for statistical material recently prepared under their direction dealing with the experience of investors in public utility securities during recent years." At the direction of the Examiner, the document was marked Exhibit No. 171.

Counsel for the Commission handed to the reporter a document described as a photostatic copy of pages 251 and 252 of the July-August issue of the American Gas Association Monthly, an article "A Banker Analyzes Natural Gas Industry Investment Values" by Frank R. Den-
1435 ton, president of the Mellon Securities Corporation of Pittsburgh, Pennsylvania, with the request that it be marked for identification. At the direction of the Examiner, such document was marked Exhibit No. 172. EXHIBIT NO. 172 was offered and admitted in evidence over the objection of defendants who were allowed an exception.

Counsel for the Commission then handed the reporter a document described as a photostatic copy of pages 37, 38, and 43 of the magazine "Gas" for May 1939, an article entitled: "A Stock Broker Analyzes the Natural Gas Industry" by John Nickerson III, a partner of Winslow & Douglas, New York City, with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit No. 173. EXHIBIT 173 was offered and admitted in evidence over the objection of defendants who were allowed an exception.

Counsel for the Commission next produced a document described as a photostatic copy of pages 56 through 61 of "The Index" published quarterly by the New York Press Company, an article from the Autumn 1939 issue entitled "The Gas Industry," with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit No. 174. EXHIBIT 174 was offered and received in evidence over the objections of defendants who were allowed an exception.

Counsel for the Commission then produced a document described as a photostatic copy of page 66 of the August 1939 issue of the magazine "Gas," an article entitled: "Gas Air Conditioning Serves Dallas Office Building," with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit No. 175. EXHIBIT 175 was offered and admitted in evidence over the objection of the defendants who were allowed an exception.

Counsel for the Commission produced a document described as a photostatic copy of pages 253, 254, and 255 of the July-August 1939 issue of the American Gas Association Monthly, an article entitled: "Fifth Big Job, Air Conditioning, A Challenging Opportunity by Charles R. Bellamy, Columbia Gas and Electric Corporation, New York, New York, Chairman Industrial and Commercial Air-Conditioning Committee." At the direction of the Examiner, the document was marked Exhibit No. 176. EXHIBIT 176 was offered and admitted in evidence over the objection of defendants who were allowed an exception.

Counsel for the Commission produced a document described as page 27 of the September 14, 1939 "Gas Age," the first page of an article entitled "Coordinated Effort Needed in House Heating," by Walter C. Beckjord, vice president and general manager, Columbia Gas and Electric Corporation, stating he had been identified in the record as the present president of the American Gas Association. At the direction of the Examiner, the document was marked Exhibit No. 177. EXHIBIT 177 was offered and received in evidence over the objection of defendants who were allowed an exception.

Counsel for the Commission produced a document described as photostatic copy of pages 24 and 33 of the magazine "Gas" for January, 1939, being an article entitled "The Natural Gas Industry Provides Opportunities for Investment" by James S. Carroll, with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit No. 178 for identification. EXHIBIT 178 was offered and received in evidence over the objection of defendants who were allowed an exception.

Counsel for the Commission produced a document described as "Annual Statistics of the Natural Gas Industry in 1938, Statistical Bulletin No. 37, October, 1939" by
Paul Ryan, chief statistician of the American Gas
1436 Association. At the direction of the Examiner, the
document was marked Exhibit 179. Statistics such as contained in Exhibit 179 have to be cooperative and voluntary because there are some elements in the industry who are not even under membership compulsion; I am not

sure of the percentage; such statistics are prepared as the usual trade association statistics are gathered, using all the devices at its command; but such an association does not have the compulsion, such as Federal Power Commission has, when it asks a company to make a report. I believe that these statistics obtain general acceptance in the industry as overall statistics. I doubt whether there is any other agency which goes to the same trouble in gathering as comprehensive statistics. In the census of manufacturers, attention has been given to the gas industry, but that such reports are not very satisfactory because the units they use are of infrequent intervals, and they do not view it as a utility in any sense; they are usually reporting on the matter as a resource situation for which reason the material is not very useful.

(EXHIBIT 179 was offered and received in evidence over the objection of defendants, who were allowed an exception.

EXHIBIT NO. 154 was offered and received in evidence over the objection of defendants who were allowed an exception.

EXHIBITS 170 and 171 were offered and received in evidence over the objection of defendants who were allowed an exception.)

1437 H. B. DORAU, a witness for defendants, recalled for further cross-examination, testified:

Cross-Examination by Mr. Slaff.

(November 6, 1939.)

I think I stated in my direct testimony that Moody's assumed to rate only 32 out of 87 natural gas bonds, leaving 55 issues unrated. I think I pointed out in subsequent testimony that that left only a certain number to be analyzed as to how they were rated; and I think it was implied that the non-availability of any such observation with respect to such a large proportion did not leave the investor much opportunity to benefit by such observations with respect to those. I think I said in subsequent explanation that I considered it more important as to how those 32 issues were rated.

I considered the investor as not having access to the final opinion of a rating agency with respect to those issues not rated. There are apparently various reasons why final opinion of a rating agency with respect to those issues not rated. There are apparently various reasons why those issues were not rated. I think the reason the Natural Gas Pipeline Company of America's bonds are not rated by Moody's is that it has no securities publicly outstanding. The same reason applies to the bonds of Texoma Natural Gas Company, and to those of Northern Natural Gas Company.

It is possible that you are right in suggesting that 17 of these unrated issues were unrated because not publicly held. I did not count those companies. I was not giving particular attention to that group. I think it is a rather important consideration as to why they are unrated. There are other reasons applying to some of these issues than that they are not held by the public. As to those which are privately held, that fact would probably be the determining factor. There might well be other reasons in some situations. I did not mention that in my direct testimony. I had it in mind. I think it was the reason why I made the observation I did subsequently. The observation of which I speak, as I remember it, follows the testimony where I gave the number that are given different ratings. I think I made a statement to the effect that what was of more significance is the rating actually given those bonds which were actually found to have been given ratings. I cannot refer you to the page of the record. I am speaking from memory. I cannot find it in the record here. I certainly had it in mind. I say it should have been made if it was not.

I did not intend any particular implication in stating the over-all number. I was merely recording for the record the number, and that was in order to give some basis of comparison for the number that we actually dealt with. I do not have in mind those issues not rated because they are privately held. I made no attempt to memorize the particular issues because after having eliminated those which have no rating, I gave special attention to the others. I am willing to supply the information if you would like to have it.

The Examiner reminds me that I was to give the names of the two companies whose bonds were listed as Aaa. I think that was supplied to Mr. Slaff or Mr. Booth. In my statement shown at page 5676 of the record, in which I stated that I was convinced that people will receive service at a lower price under certain circumstances when we rely on the disposition and willingness of enterprising capitalists to take the chance than they would otherwise, I
1438 was not referring to the utility industry as a whole.

I think I meant properly to restrict the observation when I said "under certain circumstances". The circumstance that I believe would be important to consider there is that when there is a very considerable degree of risk present in an industry, the effort of putting it on a fixed or cost basis, so to speak, probably results in a higher over-all cost, because we are not taking advantage of the disposition of people to take the chances of getting 10 or 15 or 20% even, under conditions where the average return is probably 4 or 6 or 10%.

Calling my attention to my statement in my direct testimony that "there are conditions where a regulated industry actually develops a higher cost of capital than an unregulated industry," you ask what unregulated industries today are experiencing a lower cost of capital than say the telephone industry in the United States. I do not know. I have not made any statistical studies. You ask what unregulated industry is today experiencing a lower rate of capital than the electric industry. I have not made any such statistical study. You ask what fact I had in mind back of that general observation of principle. I had in mind the facts as to the conditions under which people are willing to employ their funds, a fact of human behavior that has been noticed over long periods of time. I made no statistical studies to attempt to prove that general observation at the present time. It was not intended to be based on any such statistical studies.

I made no statistical studies to support my statement that it is not an unusual observation at all to note that an industry where there is the largest chance of gain, actually averages out with the lowest cost of capital. I do not know that that principle has been statistically measured as such. I made no such observations, but I would like to add there that I am merely putting in summary form a principle which is common in the literature of economics from Adam Smith down. I think I quoted from that authority at this point in the direct. You ask me whether or not my discussion of this industry and the force of the Adam Smith doctrines and similar doctrines in relation to it necessarily embrace the free play of competition. My answer is yes, in large part, with respect to these bargains that have to be made in the competitive area. This is an inductive operation. It is a principle. I believe it is a principle. It is my opinion. I made no statistical studies to demonstrate the application of this Adam Smith principle to any present day facts. It was simply an observation of an old principle of the disposition of human beings to take a chance and they are willing to do it even with a lower return, and that is not capitalized on fully when you fix a rigid ceiling for their expectations. As I said before, I made no statistical studies to back up this principle.

You asked me whether or not from my observations of the electric industry as a whole, I think the people would receive service at a lower price if we rely upon the disposition and willingness of enterprising capitalists to take a chance than if we had relied, as in the past, 20 years or more, on regulation. Undoubtedly in the early period of the industry, they would not have received it at lower prices. In the late periods after understanding the principles of management and operation as they became more common, I am not so certain.

You ask me if I am familiar with the New Jersey situation. There are aspects of it that I understand quite well. You ask me if I concede that today rates are lower in New Jersey because of the presence of a regulatory commission than if there had been no commission with authority to regulate electric rates. I could not say as to that. That covers an awful lot of territory. There are other alternatives that I have in mind which you probably may not have. I was still thinking of the Public Service of New Jersey. I am not in position to say what would be the fact if there had been no public service commission in New Jersey since 1911. I am not certain but that circumstances might not be more favorable. One of the things I had in
1439 mind, of course, as an earlier alternative was municipal competition. I have also other considerations in mind which I really do not want to proffer, so I really say that I am not certain. I would hate to go on record with a categorical answer in that particular instance. You ask me whether I think that rates would have been lower in New York City if there had been no public service commission in New York since 1907 or 1908. I am quite certain that the top rates in the electric field would not be as low as they are now. I am very certain of that. I am equally uncertain as to what might be the willingness of the company to lower the price of larger volumes of consumption if the circumstances were different.

No, I do not think that the rates would be lower in Washington without the pressure of the so-called Washington Plan, because the attractive feature about the Washington Plan bearing upon this particular principle is that it does hold out some chance of sharing. I believe it is true that the company in Washington had to be forced by the pressure of regulatory process into acquiescing to that plan of regulation, and I will say that the really attractive feature of that plan is that it offers some opportunity for sharing as an inducement. The fixed rate base is another matter which the plan offers as an attractive feature. I do not associate it with the question of inducement in marketing the securities as intimately as that. I think I have long recognized that one good argument for a fixed cost rate base or something of that sort is the administratability aspect. That does not mean that there are not other arguments against it. I have long recognized that it has more administratability. (Objection by Company Counsel overruled.) I do not subscribe to your suggestion that given administratability and given inducement to the utility under regulation, you then have a thoroughly workable plan of utility regulation.

The plan has been in effect in Washington since 1925. These 15 years have been years of very good times here in Washington from the statistics I have seen. When other things turned bad, the gains of consumption and of customers looked very good in Washington. I remember looking at some telephone statistics and found that the telephone service in this area went counter to the trend in the rest of the country. I think you have an unusual situation here. You ask whether or not it has worked in the two fundamental aspects in which regulation should work according to my conception, that is, in lowering the cost of service to consumers, and increasing profits to the investor. Yes, under the unusual conditions prevailing here and under the unusual sequence of circumstances since the inception of the plan. I do not understand that the people who are probably moderately well satisfied with it would necessarily recommend it for employment in other communities. No, I have not discussed it with the commission here in Washington. I do not suppose they would recommend it for other communities—I mean outside. I am willing to say very frankly that I am personally not convinced that it is something that could be transplanted successfully to Milwaukee, Wisconsin or Minneapolis or Des Moines, Iowa. I think its very attractive feature is that of holding out inducement to the investor or to the management of the enterprise. If that feature were in it, it would presumably be common to all places.

It is my recollection that the companies which invested their money in defendants' enterprise had had some experience in the natural gas industry. They include the

Cities Service Company, Standard Oil Company, Southwestern Development Company, Phillips, Skelly. I am of the opinion that all of these participants had had previous experience in the natural gas industry. I think I said on cross-examination that Henry L. Doherty and Samuel Insull were examples of the individuals directing the destinies of these corporate entrepreneurs with respect to this enterprise.

1440 I rather doubt whether Mr. Doherty, at the time he was putting his money into this enterprise, pulled down Jordan on Investments or Lagerquist on Investments to find out whether he ought to put his money up or not. I do not mean to imply that he probably was not acquainted with what was there. No, I do not believe that Mr. Samuel Insull consulted Chamberlain in order to determine whether Peoples Gas Light and Coke Company and the other utilities with which he was connected should go into this enterprise; but he probably had some of his brain trust looking into that sort of thing, and probably Halsey Stuart were telling him what the possibilities of financing an enterprise of that sort were. I rather doubt whether in 1930 they were consulting books that had been published in 1911 to determine whether they should go into this enterprise. It is purely speculative as to whether they consulted any of those authorities you mention; but since a number of people who were in this organization had been students and subjected to that sort of thing, I should not be surprised if it reflected itself somewhat.

In putting in Exhibit 151, I was thinking more definitely of the investor who never had any experience in the natural gas business than I was of those who had had an extended direct experience. I think an informed investor might well have looked at what such treatises have to say on the natural gas industry, even though he were well informed with respect to other industries. I never made any investigation to determine whether those books were in the Cities Service library. It has a good library and I expect that they probably would be there. Mr. Doherty probably would not have taken this book out some time in 1930. If anyone took it out, it would have been done by someone else for him. I think the volume by Lagerquist was published in 1924. I recall reading a sentence or two from page 390 of that work. I do not have a copy of the exhibit here. He said there that the "proof of the rapid diminution of natural gas is evidenced by the fact that five times the quantity of natural gas was used in 1888 as in the last ten years." I do not consider the statement you have read significant. I did not analyze it and I did not check it to determine what ten years he was talking about. Yes, I looked at what I had copied out of Lagerquist. I did not note that it appears to be based on a special report of the U. S. Census of Mines and Quarries for the year 1902. I think the reference in the context there probably indicates he was making comparison between two periods.

If I was interested for a special purpose in what had happened in the earlier era of the industry, I would use the U. S. Census of Mines and Quarries for such purpose. No, I would not use it for determining the hazard in the industry today. I would not use it in determining what rate of return would tempt an investor today, except insofar as the past experience might be a guide to the future.

An investor in 1939 or 1930, judging the hazards of the natural gas industry from such point, would not rely particularly on the facts disclosed in a census report of 1902, except as that report might disclose the past and give him some basis of judgment for the future. I think an instance like the history of the pipeline built to Chicago prior to 1902, undoubtedly would throw quite a scare into him. I do not know whether the 1902 Census of Mines and Quarries referred to that pipeline. It probably did not because the census is probably primarily statistical. It is not historical in nature.

I put in evidence page 506 of Kirshman's work. I
1441 have no recollection that there is anything closely related to the subject appearing in pages 507 and 508 of the same work. It is well understood that after 1900 gas became more and more recognized as a medium of heat, fuel, and power. I think also that the language from Kirshman to the effect that "for these purposes it possesses many advantages. It is convenient to use, clean, it leaves no residue and is ready for instantaneous use at full heat capacity and may be suddenly extinguished," is of importance in this discussion. I considered it so obvious and so well known that it was not necessary to reproduce that from Kirshman. I did not reproduce the language you read from Kirshman to the effect that, "displaced from its present position for three-quarters of a century as the best means of lighting the home, gas has now become a greater necessity for heat in the home and for industrial purposes." The reason I did not reproduce it, as I remember it, was that when I came to the end of that other page there, the discussion seems to become more general and I

did not think it worthwhile to reproduce it. I think the statements are all right.

You read a statement that: "Gas for heating is in no danger of being supplanted by electricity, but even if electricity could be made a hundred per cent perfect for heating purposes, gas would still be more economical." I do not think that the facts there related are obvious. In fact, I do not know that they are true. I would state the situation quite differently from Kirshman. It was not true in my kitchen. Gas was supplanted. I have no objection to the statements contained on pages 507 and 508 of Kirshman. What was on those pages did not seem to add very much and I did not include them. I think the statements might have been added as an interesting comment. In the interest of economy, I did not extend that exhibit any further than seemed necessary. I am not saying that it is in the interest of economy to leave out the good things about the gas industry.

When I read into the record certain lines from Badger and Guthmann, it may be that I left out the first two sentences on page 486 of that work. If I recall correctly, the lines and portions that were desired in the record were suggested to me. I would have been willing to read the whole thing if you wanted the whole thing in. Whatever suggestion was made, was made right here in the hearing, while I was on the witness stand.

Certain portions of Exhibit 151[illegible]ere marked up, but those marks were placed there in the course of examining the volumes and when they were turned in for photostating, the marks were left there. That probably explains my hesitancy in reading, because the marked portions were construed to have a significance which they did not have.

I believe that on page 486 of the Badger and Guthmann work appears the language: "In summary it may be said that the gas industry has survived the severe crisis presented by the rapid development of the electric industry and now appears to be in a satisfactory condition. Consequently, the securities of properly managed gas companies may be considered as conservative investments."

(At this point the Examiner pointed out that further down on the same page appears the language: "Outside of one or two small subsidiary companies, no manufactured gas properties of any magnitude or importance are now in the hands of receivers;" and that the author then went on to say: "The greatly increased availability
1442 of natural gas at low prices in recent years has done

much to enhance the position of this branch of the industry''.)

To the best of my recollection, I read from Jordan on Investments that ''the cost of the construction and operation of long distance pipelines, however, largely offsets the basic saving in production costs.'' You ask me about that statement as one of fact. If the natural gas resources that are in Texas were available at the outskirts of Chicago the very substantial cost of transportation would be saved. You ask me what I know about how much the cost of construction and operation of long distance pipelines offsets basic savings in production cost. If you buy the gas for 4c or 5c in the field and it is necessary to sell it for 25c at the point of delivery, the cost of operation and cost of the investment in achieving that change in place is certainly responsible for a substantial change in the cost.

I think it might be assumed that the author quoted was comparing the production cost of natural gas with the production cost of manufactured gas and that he was saying that the cost of construction and operation of long distance pipelines for natural gas largely offsets the basic saving in production cost of natural gas when compared to the production cost of manufactured gas. Assuming the cost of manufactured gas at 35 cents a thousand cubic feet and assuming that it costs 25 cents to bring natural gas to your market against the 4-cent price in the field, that is probably a substantial offset. I do not think 35 cents for the bare production cost figure for manufactured gas is an absurd assumption. I made no calculation with respect to how much of the basic saving in the production cost is in the case of defendants offset by a cost of construction and operation of the pipeline. I think I know enough about it to agree that to a substantial extent, the savings are offset by the cost of transportation. I believe it is a self-evident fact that it costs mony to transport gas from Texas to Chicago.

I think I testified as shown by the record at page 5741 that if there is an intervention of a contractual relationship between two separate enterprises engaged in various stages of producing and marketing a product, whose interests are not in common in the matter, there still remains a grave economic hazard, namely, that if the terms of that contract turn out to be other than what is bearable under the economic conditions disclosed, such a contract is not construed to be very much of an economic protection, and it is very likely to be modified to conform to the economic possibilities of the situation. I was talking about a situation and not about the particular contract of defendants. I think it is a rather strikingly parallel circumstance to that of defendants.

In using the illustration of "the blades of pincers" at page 5745, I simply thought it the more dramatic way of reflecting the fact that the income is the difference between the revenue and the costs, and that the difference may result from a variety of changes. They may both be going up, both be going down, or both turning in, or both turning out. I had no insidious implication of any sort in that illustration.

I don't remember the name of the report which I read some months ago on the conservation policies in the State of Texas. I think I could supply it from my record
1443 of things that I read. In connection with my consideration of that point, I gave some thought to the possibility that other fields might be discovered or might be in existence which might tie into this pipeline when the Texas Panhandle is exhausted. I considered particularly the possibility that there might be a field closer to Chicago which would make a portion of the pipeline useless. That would mean an embarrassing supply of gas made available to Chicago. I think when I considered the possibility of other sources of supply, I also considered in that connection the fact that such other sources of supply might be the basis of a competitive supply. I considered as a possibility the fact that another source of supply might be available to defendants after the Texas Panhandle field was exhausted, so that it could continue in business after the Panhandle was exhausted.

I don't think I could characterize the consideration that I gave to that last suggestion in terms of weight. When I thought of the possibilities, I would take a look at the indicated fields and the areas that they appeared to cover; and it did not seem very probable that in that general area from which this pipeline came there would be additional areas between the Otis field, the Hugoton field, and the Panhandle, they seem to have pretty well explored the possibilities down there. The possibility of Nebraska and other portions of Texas is another matter.

I assumed that the probability of exhaustion constituted a hazard which the investment in this pipeline ought to face. I did not assume that the companies' business would end with the exhaustion of the Texas Panhandle field. I assumed that the probability of that happening was an important hazard in this undertaking.

At page 5754, I stated in substance that with reference to the possibility of a common purchaser statute, I had considered that possibility as one of the hazards. I appreciate the indirect possible consequences of a common purchaser statute. In that connection, I considered that it might tend to lessen waste.

I did not make a nine or ten months' comparison of the revenues of this company during 1939 with the corresponding months for the year 1938. I am under the impression that the revenues are improving. At the moment, I think an investor would be impressed with whether the short-term trend was up or down. One short period would probably be as significant as another. According to my recollection, I was not asked to compare the revenues of 1939 with the 1938 revenues for similar periods. My volunteering has been considerable restricted here. I do not mean that the Examiner has restricted me, but the manner of conducting such a hearing necessarily restricts a witness from saying everything he might want to.

I find that on page 5780, beginning at line 17, I discussed the falling off of revenues between 1937 and 1938 and gave substantially the same type of answer as with respect to the comparison of 1938 and 1939. I added that I thought that merely looking at one year's decline is not adequate for an investment judgment. I thought I said something to that effect.

At page 5788, I made the statement that the competition which natural gas finds itself in with such fuels as fuel oil and distillate and coal and things of that sort, is a factor to be taken into account with a company 40% of whose gas is sold for industrial purposes; that any change in the relative position of competitive service or competitive fuels ought to be taken into consideration; that any
1444 change in the relative position of such competitive fuels would have the same effect that the introduction of a directly competitive line would have; and that is that a loss of any substantial portion of the business due to the relatively more favorable price of oil or coal would reduce the volume, and that volume is apparently very significant for this particular enterprise. My statement there, "any change in the relative position of competitive service or competitive fuel", is a trifle broad. The change of course would have to be downward. I think, however, that is implicit in my answer. Naturally, the price of gas must remain the same. A change upward in the price of coal or oil would improve the position of natural gas and would

be appropriately considered. I am quite aware that there are some industrial applications where natural gas has unique characteristics and where the question of oil or coal is not a major factor.

Cross-Examination Interposed by Mr. Booth.

I examined the coal and oil prices, but did not attempt to make any comparison to determine at what price coal would have to sell in the Chicago area for industrial purposes in order to put it on a competitive basis with natural gas sold by this company for industrial purposes, because the price varies with the application most certainly and I do not think you could generalize it. I do not know at what price coal would have to sell for a particular use. I don't think you can generalize that. I looked up the price of coal at some time during the course of my studies but I did not attempt to equate them.

Cross-Examination by Mr. Slaff Resumed.

No, I do not know how much of a change there would have to be in the price of those competitive fuels before it would have any competitive effect on the sale of natural gas for industrial uses in those fields where there is that competition. I realize that the actual determination is a matter of the application under specific conditions, as the use of electricity and gas for example. It cannot be determined on a heat unit basis competitively.

At page 5791, I stated that I believed in building a solid foundation in the most fundamental factors and working up from those to the more immediately and directly observable applicable evidences.

I considered the background of the ideas that I was trying to develop as of that fundamental character. I merely meant to distinguish between the underlying considerations and the more obvious evidences such as would be displayed by the price of securities in the market. I think the question of the solidity of the fundamental factors is a limited term and relates to what a person can say in a limited time. I would invite you to come up to the course for a year and see what we could do.

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VOLUME IV.

TRANSCRIPT OF RECORD

SUPREME COURT OF THE UNITED STATES

October Term, 1941

No. 265

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, PETITIONERS

vs.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY

No. 268

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, PETITIONERS

vs.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT

Petitions for certiorari filed July 12, 1941, July 14, 1941

Certiorari granted October 13, 1941

IN THE

United States Circuit Court of Appeals
For the Seventh Circuit

No. 7454

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND TEXOMA NATURAL GAS COMPANY,
Petitioners,
vs.
FEDERAL POWER COMMISSION AND ILLINOIS
COMMERCE COMMISSION,
Respondents.

Petition for Review of Interim Order of the Federal Power Commission.

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1445 **E. D. OSTRANDER**, a witness for complainant, Illinois Commerce Commission, testified:

(November 6, 1939.)

Direct Examination by Mr. Booth.

My name is E. D. Ostrander. I live in Evanston, Illinois, and I am supervisor of the Rates and Research Section of the Illinois Commerce Commission.

My academic training included a degree of Bachelor of Science from the Kansas State Teachers College, Emporia, Kansas, and a degree of Master of Arts from the University of Chicago. I subsequently took some graduate work in public utilities at Northwestern University. My academic training was in accounting, statistics, mathematics, finance, money and banking, economics, public utilities and similar fields.

In 1929 and 1930, I spent a year with the Investment Research Corporation of America at Detroit, Michigan, as an assistant to Dr. Lionel D. Edie, the Corporation's economist. That organization performed an investment and economic advisory service for a group of investment trusts. My work with the firm covered statistical and economic research with regard to many phases of business activity including particularly studies of corporate profits, price-earnings ratios and relationships, statistical curve fitting, index number construction, statistical corrections of data for seasonal variation and so forth.

During the latter part of 1930 and the first part of 1931, I spent about six months with James O. McKinsey and Company of Chicago, a firm of business engineers and public accountants. My work with this firm was primarily public accounting.

In May of 1931 I went with the firm of Emery, Peck and Rockwood Company of Chicago, investment bankers, and was with that house and its successor until coming with the Illinois Commerce Commission in October of 1933. My work with the investment house included the preparation of prospectuses and sales memoranda, the study of indentures and other agreements, investment counsel work, and a number of routine duties such as keeping books for two small hydro-electric projects, including negotiations with trustees in regard to interest and principal payments, insurance policies and so on.

I have been employed by the Illinois Commerce Commission since October, 1933. In general my work with the Commission has been of a research character, but in a number of different fields. Included among these are statistical studies of the revenues of Illinois public utilities, rate analyses and comparisons, studies in relation to accounting and statistical procedure and reports of the utilities, research in connection with the problem of fair rate of return, studies in regard to cost of money, economic conditions, and various statistical and financial problems for the Commission.

1446 I have testified in several cases before the Illinois Commerce Commission. In Docket No. 23[illegible]15, a citation against Peoria Water Works Company to show cause why its rates for water service should not be reduced, I presented testimony in regard to the cost of money to the company. In Docket No. 22337, an electric rate citation involving Commonwealth Edison Company, I presented testimony with respect to the company's intercorporate relations, cost of money, the relief situation in Illinois, and some statistical computations in regard to working capital. In Dockets No. 23780 and 24792 involving applications by the Peoples Gas Light and Coke Company for an increase in rates, I presented testimony in regard to cost of money to the company, trends of interest rates and bond yields, the effect of billing methods upon the investment in operating expenses, and data in regard to public utility financing in recent years. In several other cases involving applications by utilities for rate increases after the enactment of the public utility tax act, I presented testimony in regard to the unemployment relief problem in Illinois.

In March, 1938, I testified before the Public Utilities Commission of Ohio as a witness on behalf of the City of Cleveland in a proceeding entitled "East Ohio Gas Company *vs.* Cleveland," which involved rates for gas service in the City of Cleveland furnished by East Ohio Gas Company. My testimony in this instance dealt with the problem of cost of money to Standard Oil Company, the parent company of East Ohio Gas Company.

During the past few years I have written certain articles in regard to public utility financing. During the years 1936 to 1938, inclusive, I prepared quarterly a review of public utility financing that was published quarterly by the Journal of Land and Public Utility Economics. I also prepared for the same journal a summary of public utility financing from 1919 to 1935. The article last mentioned dealt principally with the revision and computation of an index number of the volume of public utility financing.

I have prepared some material with respect to trends of interest rates and bond yields and have put that material into the form of an exhibit.

(At this point counsel for complainant produced a document entitled "Trends of Interest Rates and Bond Yields" with the request that it be marked for identification. At the direction of the Examiner the document was marked Exhibit 180.)

My exhibit has been marked Exhibit 180. Page 1 of this exhibit presents the trends of interest rates from 1923 down through the first eight months of 1939 for four different kinds of short term loans. The first kind is prime commercial paper of 4 to 6 months maturities. In the column under that heading I indicate the range during the year or month, as the case may be.

The second column shows similar ranges of rates of interest for prime bankers' acceptances for 90-day maturities.

The third column of figures represents the interest rates on 90-day stock exchange time loans.

1447 Finally, the column on the right hand side of the first page indicates the interest rates of stock exchange call loans, which, I should say, are the rates for renewals of call loans rather than new call loans.

The source of the information is indicated in a footnote at the bottom of page 1, and I believe that is true for the other pages of the exhibit. The material is obtained from the annual reports and monthly bulletins of the Board of Governors of the Federal Reserve System, which is generally recognized as an authority of source for material of this character for people working in the field of financial statistics and interest data. I would not say that they are infallible, but I would say that it is generally recognized as a very good source of financial data.

Page 2 presents the trend of interest rates charged customers by banks in the principal cities. The period is from 1919 to February, 1939. No later information is shown because this series has been discontinued. The Federal Reserve Board has announced that it expects to prepare and publish a slightly revised series in due course. The cities involved with respect to the information on page 2 are indicated on page 3 of the Exhibit. Interest rates charged by banks with respect to loans made to their customers are shown here for New York City, also for 8 other northern and eastern cities, and finally for 27 southern and western cities.

Page 4 of this exhibit simply set forth the trend during the last 10 or 12 years in the discount rate of the New York and Chicago Federal Reserve Banks. This discount rate is the rate charged by the Federal Reserve Banks for certain advances or loans made to the member banks.

On page 5 of the exhibit, the trend of average yields on long term federal and municipal bonds is given for the period from 1919 until August, 1939. The first column of the percentage figures is headed "United States Government." That refers to the average yield on long term Federal bond issues.

The second column of percentage figures—incidentally I just now note that it is not indicated as percentage, but opposite the year 1919, the figure of 4.46 should be indicated as per cent. In all events, those figures there are for 15 high grade municipal bonds as computed by the Standard Statistics Company. I believe in the Standard Trade and Securities Service, Volume 3, Statistical Section, there may be a list of those 15 bonds. I have not specifically checked it up, but that is the place where they give most of their statistical series, and in most cases I know that they indicate the list of bonds, stocks, or whatever it is that they use in their various averages and indices. I would hardly think that the 15 bonds remain uniform. I believe the list is confined to the United States Treasury bonds of maturities of 8 years or more. In other words, that is about their definition of "long term." It represents the average of the yields of such United States Government bonds as happen to be outstanding, meeting those qualifications, and, as I understand it also, they compute the yield to the first call date rather than to the nominal maturity of those obligations. The average set out represents the average yield of those outstanding during the particular month. It does not relate to new issues.

1448 On page 6, the average yield on 10 high grade railroad bonds as computed by The Annalist is given for the period from 1857 to August, 1939. As indicated by the footnote there, the number of bonds in that average was reduced from 10 to 7 beginning with 1939. Otherwise I think this page with the note given at the bottom is self explanatory. The purpose of it is to present the longer term picture of yields on what have been considered fairly high grade type of long term corporate bonds. The Annalist for a number of years made considerable use of this average in its weekly chart on economic conditions. Last spring—I do not have the exact citation at the moment—but last spring The Annalist computed a new series of high grade bond yields based upon the average yield of 10 high grade public utility bonds and indicated their intention of using that in their chart on economic conditions. Whether or not they actually followed through with their intention as to the use of that new series, I can not at the moment say, but at all events I have indicated on page 7 this new series prepared by The Annalist, namely, the average yields of 10 high grade public utility bonds. The series was of course computed back for a number of years. Specifically, I say here back through 1929, so the information on page 7 carried through from 1929 to August of 1939.

Cross-Examination Interposed by Mr. Morgan.

As to why the number of issues was reduced in the list above referred to, my own feeling is that the number of high grade bonds available probably has been reduced. In order to get a good sample which would avoid bonds selling above the call price and so on, they probably had to reduce the number. Of course there are a great many more issues of railroad bonds than seven in the year 1939. The same thing was done by Moody's Investors Service in its average ~~of the~~ yields of high grade bonds. For example, Moody's published the average yields of 10 high grade Aaa railroad bonds, 10 high grade Aaa public utility bonds, and 10 high grade Aaa industrial bonds. In the case of industrial Aaa bonds used by Moody, nominally there are supposed to be 10 bonds in that average, but they have only actually somewhere from three to five.

Direct Examination by Mr. Booth Resumed.

As I recall it, Dr. Dorau in his exhibit presents the Moody bond averages. I have examined his tables.

Finally on page 8 of this exhibit, the bond yield averages of domestic corporation bonds, as computed by the Standard Statistics Company, for public utility, railroad, and industrial bonds are presented. In the case of each of these three industrial groupings, six rating groups are shown, that is, A-1 plus, A-1, A, B-1 plus, B-1, and B rating groups are shown for each of the three major industrial classifications.

The data here are for the period 1925 to October, 1939. The information for October, 1939, is really based upon bond prices as of about September 20th. All prices are as of about the 20th of the preceding month, as given in the footnote on page 8. I cannot say definitely whether a weighted average or an arithmetic average was used here.

I think that about covers this exhibit. The general purpose of this exhibit is to show trends of interest rates and yields on both short term and long term loans of various kinds. The latest available data where used is as of the time the exhibit was prepared.

1449 You ask me to state briefly what the results are generally since the month of August in connection with the trends of bond yields as shown in the exhibit insofar as the data is now available. Broadly speaking, beginning about September 1st when the European War broke out, high grade long term bond prices declined fairly sharply for about three weeks. The bottom was reached along about the 20th, 21st or 23rd of September, when, of course, with prices falling, yields went up accordingly. The trend since about the end of the third week of September has been slightly upward, and a substantial part of the drop has since then recovered.

Speaking specifically with reference to this exhibit, I do have at this time some later information. With regard to page 1, the range of rates on commercial paper for September was from 5/8ths to 3/4, thus indicating a slight increase over August. As of about October 14th, based upon the weekly figures, there was published figures of from 5/8 to 1 per cent by the Commercial and Financial Chronicle. I think that was the week ended October 14th, if I recall correctly. The rate for prime bankers acceptances did not change in September. The same is also true of the rate of interest of 90-day time loans, and on the Stock Exchange renewals for call loans. There has been no material change up to October 14th in those figures either.

The data on page 2 of this exhibit, of course, are presented there for as late a time as is available.

The discount rates on page 4 have not since changed, to my knowledge.

On page 5, the latest data I have are for the week ended September 23rd, 1939. As I said, that was about the peak of yields of these high grade obligations, but for that week the average on United States Government long term bonds was 2.74 per cent. For the same week, the average on the 15 municipal bonds was 3.29 per cent.

With respect to page 6, the latest figure I have is a figure of 3.86 per cent for the week ended October 14, 1939. The corresponding weekly figure for the week ended September 23rd, 1939, was 4.04 per cent. That was the highest week during the intervening period. That will give you some indication of the extent of the recovery at the peaks of September.

With respect to page 7, for the week ended September 23rd, 1939, the average was 3.26 per cent, and that was the highest weekly average during the month of September and up to the middle of October. For the week ended October 14, 1939, the average was 3.10 per cent.

I have no later information with respect to the corporate bond yields shown on page 8 than what I here present. The yields set opposite the month of October, 1939, on page 8 of the exhibit are based on prices as of about the 20th of September. That is the basis upon which the computations are made up by the Standard Statistics Company. This information on page 8 is based upon a fairly large number of bonds, not just upon eight or ten or seven, but upon a rather extensive list of bonds,
1450 not a continuous list but whatever is available at that time in this classification as so rated by the Standard Statistics Company. Because it is a rather large clerical task, I presume, to prepare such information, they prepare it only on the basis of one point on a month. That is, it is not prepared daily or weekly, but it is prepared once a month on the basis of the price as of about the 20th of the preceding month.

Questions by the Examiner.

I noticed that in his testimony Dr. Dorau stated that the Standard Statistics does not make available its bond list in these different categories, and all I can say in addition thereto is this, that as indicated in the footnote here on page 8, there are a few thousands of bonds involved in this computation. It says: "Based upon all active bonds listed in the Standard Bond Investments." That is a publication that anyone taking the service can get, and so I presume to that extent you could go through that rather voluminous list and have the list of bonds. Of course they indicate at least that they do not include any bonds where the price is affected by call provisions or some other usual circumstance, probably conversion features, and so forth. They attempt to get figures that are representative yields and are not distorted by some particular momentary situation. So to that extent I just mentioned, the list probably could be available, but one from the outside might have trouble in applying their weeding-out process in order to get down to the actual list, but it is supposed to be a rather long list of bonds—several thousand in number as the starting point at least for the study.

(EXHIBIT 180 was offered and received in evidence without objection.)

At this point counsel for complainant produced a document entitled "Summaries of Recent Financing by Natural Gas Systems," with the request that it be marked for identification. At the direction of the Examiner the document was marked Exhibit 181.)

Direct Examination by Mr. Booth Resumed.

I prepared Exhibit 181 for the purposes of this case. This exhibit is a brief summary of financing during the years 1936, 1937, 1938 and 1939 up to about the middle of September, of ten natural gas systems, as I have called them here. The index of these companies is given at the beginning of the exhibit. That is followed by a separate statement or summary for each of the various systems.

At the outset, for each company I have given a brief summary of the character and scope of the operations of the company. That is not intended to be an exhaustive or intensive analysis of these natural gas systems, but is intended merely to show in brief summary form the general character of the system's operations, and where it operates, in order to provide the reader with general orientation, you might say, with respect to the information. That summary, the introductory statement, is followed by a review of financing during the period in chronological order. I don't know whether any further explanation is necessary or not.

In some places through here I have attempted to indicate the cost of money under certain long term debt financing, and I have said in some places, namely, where there were sinking funds involved in the particular security, that the cost of money computation gives effect to sinking fund requirements; that is, if you put out an
1451 issue that is nominally due in 15 years, you can
not figure the cost of money on it by figuring cost to that final maturity if there are intervening—you can call them—maturities—they have the effect of maturities if the intervening period contains a number of retirements due to sinking fund operations. I mean that factor must be taken into account, and I have attempted to do that wherever there are sinking funds involved or connected with a particular issue under discussion.

Questions by the Examiner.

It is just so much arithmetic. This yield basis mathematics that is used in the ordinary bond yield books is simply a matter of finding the present value of all future payments under that contract at the given rate of interest. That is, if we have a 20-year 4 per cent bond with semi-annual coupons, we know that for 20 years, every six months we are going to get $20, and at the end of that 20 years, we get $1,000—speaking now of a $1,000 value bond. If the rate of interest is 5 per cent, that is, if the yield is 5 per cent, you merely find the present value of all of those future payments at a 5 per cent rate of interest. The result is today's prices on such a bond in order to yield to maturity exactly 5 per cent. And the same principle could be applied to any series of future payments.

If I understand you correctly, it would not complicate my estimates here if I had an authorization to the company to reissue bonds under certain conditions under a sinking fund provision; but I don't know that that was involved here. I might say that these sinking fund provisions previously provided that year by year up to maturity a certain number of bonds were to be retired.

Frequently these bonds were retired by calling them at the call price provided for in the indenture for sinking fund redemption. Frequently there is a slight premium, and I have given effect to that in my computations. Of course as a matter of fact, at some future date one of these companies might be able to buy up enough bonds on the open market to satisfy its sinking fund in certain years, and obtain them at a lower price than the call price. If they did that, then the actual cost might work out something different from what I have shown here, but it would be less because of obtaining them at a less price. In other words, I think probably it can be taken as the maximum cost figures.

Cross-Examination Interposed by Mr. Morgan.

Exhibit 181 is my interpretation of the facts as I have gathered them from prospectuses issued in connection with public financing and from annual reports to stockholders or releases of the Securities and Exchange Commission, and in some cases from Poor's or Moody's Manuals. I might have gotten information from the Commercial and Financial Chronicle, and in one or two instances I think I obtained information directly from the underwriters. I have made no independent check of the accuracy of the information. I have my working papers that I used in connection with the exhibit. They will be available to someone representing the companies in the event they want to go over them with me.

(EXHIBIT 181 was offered and received in evidence without objection.)

1452 *Direct Examination by Mr. Booth Resumed.*

You have asked me to assume that an investment is to be amortized or depreciated over a 16-year period; that 8 per cent per annum is to be paid on the investment, and that this 8 per cent includes 5.25 per cent for risk premium. You then ask me, if the annual amortization allowance and the risk premium payments were accumulated together, how many years would be required for these two funds to aggregate 100 per cent of the original investment. These two items, that is, the risk premium and the amortization, would aggregate 100 per cent of the original investment in 8½ to 9 years. More specifically, the accumulation would be something less than 100 per cent in 8½ years and something more than 100 per cent in 9 years, but the precise amount would fall between those two extremes. My answer is based upon straight line amortization. I did not allow for interest on the funds accruing during the 8½ to 9 years.

Since the period considered is 16 years, 1/16, or 6.25 per cent, of the investment would constitute the annual straight line amortization. A risk premium of 5.25 per cent added to this amortization gives a total of 11.50 per cent of the investment as the annual addition to the accumulation. Obviously, if 11.5 per cent accrues each year, then 100 per cent divided by 11.5 per cent gives the number of years required to accrue 100 per cent. The result is 8.7 years, or, as I have already said, between 8½ and 9 years.

If the annual amortization were computed on a sinking fund basis instead of a straight line basis, the answer would depend somewhat on the rate of interest used to fix the amortization annuity and the rate of interest used to compound the aggregate fund. At 6 per cent interest, somewhere between 8 and 9 years would be required for the amortization and risk premium funds to accumulate to 100 per cent of the investment if the interest were compounded annually. If interest were compounded semi-annually, 8½ to 9 years would be required. Whether the interest rate used be 1 per cent, 2 per cent, 4 per cent or 8 per cent, the period would be between 8 and 9 years, that is, in each case upon the basis of annually compounding interest. On the basis of semi-annually compounding interest in the period, between 8½ and 9 years for 1 per cent, 2 per cent, and 4 per cent rates of interest, but it would be 8 to 8½ years on the basis of 8 per cent rate of interest and semi-annual compounding.

In getting these results the first step is to determine the percentage of the investment representing the annual or semi-annual amount of amortization required to accumulate at the chosen rate of interest to 100 per cent of the investment in 16 years. This percentage is readily determined by reference to standard annuity tables. The next step is to add the percentage of risk premium, namely 5.25 per cent on an annual basis or 2.625 per cent on a semi-annual basis, to the percentage found in the first step in order to arrive at the total percentage accruing annually or semi-annually. The final step is to determine in how many years the resulting total percentage of the investment would accumulate to 100 per cent of the investment when set aside each year or each six months at compound interest at the rate being used in the computation. Reference to standard annuity tables gives an approximate answer, but interpolation of values found in such tables is necessary for a precise answer.

1453 At 6 per cent, the amortization annuity would be 3.90 per cent of the investment for a 16-year period, upon the basis of annual compounding. Adding 5.25 per cent risk premium gives a total annual accumulation of 9.15 per cent. Annuity tables reveal that at 6 per cent, an annuity of 10.10 per cent of an investment will accumulate to 100 per cent in eight years, and that 8.70 per cent of an investment will accrue to 100 per cent in nine years. Since my figure of 9.15 per cent that I was talking about falls between 8.70 per cent and 10.10 per cent, the answer that I seek falls somewhere between eight and nine years. If one were to make a straight line interpolation between those two sums, the result is about 8.7 years.

Cross-Examination Interposed by Mr. Morgan.

You ask me whether I am taking a part of the rate of return and adding it to the amortization allowance. My answer is yes and no. What I am taking is the amortization allowance as computed by the various straight line and sinking fund methods that I have reviewed and adding to the percentage, that is 5.25 on the annual basis or 2.625 per cent on the semi-annual basis, and that latter sum—the percentage—is given to me as the portion of the over-all rate of return of 8 per cent representing risk premium, in other words, and carrying along together two series, namely the amortization on the one hand and the risk premium on the other. I put them together for simplification of the arithmetic, that is all. Yes, I am taking 5.25 of the 8 per cent assumed as the rate of return and adding that to the amount allowed there as a reserve for amortization in arriving at a return of 100 per cent of the capital.

You ask me whether or not that cuts the return down to 2.75 per cent automatically. I think what I am doing is merely some arithmetic based upon certain assumptions that were contained in the question given to me at the start, namely, that if we took annual amortization as a sum of money, and if we took 5.25 per cent as another sum, and if we added those two funds together, we would determine how long it would take the two working together to accumulate 100 per cent of the original investment. I did not allow interest on either fund in the first example by straight line amortization. On the next example, where I used the sinking fund method of determining the amount of amortization, the interest on both funds was compounded at the same rate of interest used in obtaining the amortization annuity in the first place. There is no significant difference in the number of years. I just bring in the arithmetic. I am not testifying to the propriety of doing it in that way. I am doing the arithmetic.

Direct Examination by Mr. Booth Resumed.

You ask me to assume the rate of return to be 6 per cent and to assume that the annual risk premium included therein is only 3.25 per cent instead of 5.25 per cent. With 3.25 per cent annual risk premium and with 16 years amortization, you ask me how many years it would require to accumulate 100 per cent of the original investment. For a 16-year period and a 3.25 per cent risk premium it would take 10.53 years to recover 100 per cent of an investment through the accumulation of the amortization and risk premium funds when the amortization allowance is determined on a straight line basis and when no interest is allowed upon either of the funds. If the depreciation or amortization allowance is determined on a sinking fund basis and if both funds are accumulated at the corresponding rate of interest the results would be as follows:

1454 At a rate of interest of 1 per cent, it would require 10 to 11 years to accumulate 100 per cent of the investment.

On the straight line basis of 3.25 for risk premium, the exact period of accumulation is 10.53 years. If a 1 per cent rate of interest be used, the period is somewhere between 10 and 11 years. As the rate of interest is increased, the length of time decreases, but it decreases very slowly, so that for rates of interest of 2 per cent, 4 per cent, 6 per cent, and 8 per cent, the period of time falls between 10 and

11 years. This is all based on annually compounding interest. If the interest be compounded semi-annually, rates of 1 per cent and 2 per cent would require between 10½ and 11 years to accrue the fund, and for interest rates of 4 per cent, 6 per cent, and 8 per cent, a period of between 10 and 10½ years would be required.

Yes, I am familiar with the procedure sometimes used in rate making whereby the rate of return is applied to an undepreciated rate base and the annual depreciation expense is determined on a sinking fund basis. As I understand that method of procedure, when the annual allowance for depreciation expense or amortization is determined on a sinking fund basis, the rate of return is applied to an undepreciated rate base in order to ascertain the amount of the return. That method of determining the annual depreciation expense or amortization allowance consists simply in finding that sum, called an annuity, that would accrue to the full amount to be depreciated or amortized if the annuity were set aside in a fund and compounded at the rate of interest used to determine the required amount of the annuity. If the return was allowed on an undepreciated rate base, but the annual depreciation expense was determined on a straight line basis, as regards any given rate base, the rate of return on the depreciated rate base would increase year by year. Yes, if the rate of return were originally fixed at 6 per cent, the rate of return on the depreciated rate base would rise progressively above 6 per cent in subsequent years.

If the annual depreciation expense were determined on a sinking fund basis and by use of an interest rate of 2 per cent, and if the rates were fixed so as to provide a rate of return of 8 per cent on the undepreciated rate base, the rate of return on the depreciated base would also rise year by year but less rapidly than in the case of the previous example.

If the annual depreciation or amortization allowance were determined by the use of a 6 per cent rate of interest and a rate of return of 6 per cent were allowed on the undepreciated rate base, the rate of return on the depreciated rate base would remain at 6 per cent in subsequent years if the annual accruals at 6 per cent on the amortization reserve were deducted from the amount of return.

Yes, it can be demonstrated as a general principle that when the annual depreciation or amortization expense is determined by use of a rate of interest equal to the rate of return, the rate of return on the depreciated rate base will remain at the same percentage throughout a period when the interest accumulations on the amortization reserve are deducted from the amount of the return. In other words, the procedure whereby the rate of return is related to an undepreciated rate base when the depreciation or amortization expense is fixed on a sinking fund basis, in reality represents a return at a given rate on the depreciated rate base plus the interest accrual required to accumulate the depreciation annuity to 100 per cent of the amount 1455 being depreciated. That is true so long as the interest rate used to determine the depreciation annuity is the same percentage as the rate of return.

Cross-Examination Interposed by Mr. Morgan.

By an undepreciated rate base I mean the total investment without deduction of anything for depreciation. In order to deal with compound interest problems you have to determine on a sum of money. Perhaps the use of the term "rate base" or something like that is unfortunate. I don't care what you call it particularly, but I am going to apply this arithmetic to a sum of money because we have to deal in those terms. You cannot shift around and use several different kinds of figure and not be consistent throughout in your computations.

While I am on the subject, I might also explain that I have talked and probably will talk more about the earnings on the amortization reserve. There again we may have word trouble if you think of a thing in the ordinary accounting sense. In the accounting sense "reserve" is merely a bookkeeping item and could not earn money, but I don't know just how to avoid those things. It may be that the English language is a little bit deficient in order to get around it. I figure depreciation or amortization or whatever you want to call it. I start out with a total amount without deduction, and when I speak of an undepreciated rate base, I mean the same original total that I started with; and when I speak of a depreciated rate base, I am talking about the original sum that I started with less accruals obtained by the method of amortization or depreciation that I applied.

(At this point counsel for complainant produced a document entitled "Computations in Regard to the Sinking

Fund Method of Amortization and Rate of Return on Net Investment," with the request that it be marked for identification. At the direction of the Examiner the document was marked Exhibit 182.)

Direct Examination by Mr. Booth Resumed.

There are three tables in Exhibit 182. The computations in Table I as well as in Tables II and III are based upon a total investment of $1,000,000 and a period of 10 years. In Table I the annual allowance for amortization, as shown in column B, is established on a straight line basis, therefore representing $100,000 a year in order to accumulate a reserve equal to the total investment of $1,000,000 at the end of the 10 years. The accumulation of the reserve by means of the annual allowance of $100,000 is given in columns C and D. The reserve at the first of each year is shown in column C and the reserve at the end of each year is shown in column D. In columns E and F the amount of the total investment less the amount of the reserve is given. Here again the data are shown both as of the first of each year and as of the end of each year. In column G the sum of $80,000 is given for each of the 10 years, and this represents 8 per cent on the total investment of $1,000,000. In column H the rate of return on the net investment; that is, the investment less the reserve, is shown for each of the years. This is obtained by dividing the $80,000 shown for each year in column G by the amount of the investment less the reserve as of the first of each year, as shown in column E. Obviously the rate of return on the net investment is 8 per cent the first year because the reserve was zero as of the first of the first year. As the net investment decreases the rate of return obviously rises because the amount of
1456 the return has been constant throughout the period.

The amounts in column I represent 8 per cent of the investment less reserve, as shown in column E. The amounts in column J merely represent the excess of 8 per cent on the total investment over 8 per cent on the investment less the reserve. These amounts are obtained by subtracting the amounts in column I from the amounts in column G.

In Table II the annual allowance for amortization, as shown in column B, is determined on a 2 per cent sinking fund basis. This annual allowance amounts to $91,327. In other words, that sum set aside at the end of each year with interest at 2 per cent compounded annually would amount to $1,000,000 at the end of 10 years. The annual interest accrual on the amortization reserve required to accumulate the total investment is given in column C. Column D merely represents the total of columns B and C and is therefore the total annual addition to the reserve. The accumulation of the reserve at the first of each year and at the end of each year is set forth in columns E and F. The amount of the investment less the reserve at the beginning and end of each year is given in columns G and H. In column I the sum of $80,000 is shown for each year as representing 8 per cent on the total investment. In column J the amount of the annual interest accruals on the reserve, as shown in column C, are deducted from the amount representing 8 per cent on the total investment, as shown in column I. In column K the rate of return on the net investment, as shown in column G, is computed by dividing column J by column G. In other words, these percentages in column K represent 8 per cent on the total investment less the interest accruals on the amortization reserve divided by the investment less the reserve. Since there is no reserve at the beginning of the first year the rate of return is 8 per cent for that year. As the reserve accumulates, in other words, as the net investment decreases, the rate of return increases progressively to 56.97 per cent of the net investment in the last year.

My column K on page 2 is similar to column H on page 1. It is supposed to represent the same thing applied to different conditions portrayed on two different pages.

In Table III, the annual allowance for amortization has been computed on an 8 per cent sinking fund basis, or in other words, at the same percentage as the rate applied to the total investment, as set forth in column I. Otherwise Table III is prepared in the same method as Table II. As shown in column B the annuity required to accumulate to $1,000,000 in the 10 years at 8 per cent is $69,029. The necessary interest accumulations at 8 per cent are given in column C. When these interest accumulations are deducted from the 8 per cent on the total investment, as shown in column I, the amounts given in column J are obtained. It may then be seen that these net amounts in column J result in a rate of return of 8 per cent in each year on the net investment, as shown in column G. In other words, the 8 per cent on the total investment, as shown in column I, represents 8 per cent on the net investment shown in column G plus 8 per cent interest accruals, as shown in column G, on the amortization reserve, as shown in column E.

1457 *Cross-Examination Interposed by Mr. Morgan.*

You ask me in which of the cases in which I have testified heretofore I presented figures of this character dealing with the subject of amortization. With respect to Exhibit 182 I have never seen anywhere this arithmetic or this analysis. I have never used it before. It is something that I came upon a few weeks ago in connection with an analysis or study of this sinking fund depreciation method in connection with the undepreciated rate base. I just worked it up in my own mind. It took a number of days and nights of scratching to find out what it was all about; and this is the answer that I have come to, and, as I asked myself, what is involved in the theory to make it a usable and workable method of fixing rates? After considerable use of scratch paper and so on, I finally discovered what was involved in this principle.

No, I don't think the whole study is based on the assumption that there should be no earning on anything except rate base less the reserve. I think in the last analysis it goes even behind that. I think you have to start out with this principle, that any rate making principle to be fair in its application should be such as to allow the recoupment through the rates charged of all the capital consumed in the enterprise, and it should also allow for rate of return on the capital not recouped or not paid back by the rate payers.

You ask whether I am treating that part of the capital investment which has been passed to reserve as having been recouped. When you say "passed to reserve," I would say that part that has been returned through rates by the rate payers and allowed as one of the costs of the business.

(EXHIBIT 182 for identification, offered and received in evidence without objection.)

Direct Examination by Mr. Booth Resumed.

During the past few years in connection with my work before the Illinois Commerce Commission and prior thereto, I have given some consideration to what is known as the factors or influences with respect to the money market. I have given some attention to that problem in connection with studies I have made for the purposes of this case. I believe the outstanding factor or influence has been the large volume of idle funds that has accumulated in recent years. These idle funds are reflected in the banking system in two forms, namely, deposits in banks and excess reserves of the banks themselves. I have prepared an exhibit in connection with this problem.

(At this point counsel for complainant requested that the document just referred to by the witness, entitled "Money Market Factors," be marked for identification. At the direction of the Examiner the document was marked Exhibit 183.)

Table I of this exhibit shows the number of banks and the amount of bank deposits in the United States as of December 31, 1923, and as of the same date for all subsequent years up to and including 1938, and also as of June 30, 1939. The first two columns of figures are for all banks. It shows the number of all banks and the amount of their deposits.

The second two columns of figures are for member banks of the Federal Reserve System. The remaining two columns are for non-member banks.

I might explain briefly that when I refer to member banks, I refer to banks that are members of the Fed-
1458 eral Reserve system. All National banks are of course required by law to be members of the System. State banks and private banks and so forth can become members if they can meet certain conditions prescribed by law and by the Board of Governors of the Federal Reserve system. I believe that gives the general scope of the information shown there.

Total bank deposits rose from $42,163 millions at the end of 1923 to a peak of $56,766 millions at the end of 1928. The decline that followed carried the total down to $38,505 millions at the end of 1933. Since 1933 the volume of deposits has risen steadily to reach a total of $55,988 millions as of June 30, 1939.

Bank deposits plus money in circulation constitute the most liquid form of capital. From 1921 to 1929, inclusive, based upon data as of December 31 each year, the amount of money in circulation ranged between $4,403 millions to $4,817 millions. Since 1929 the trend has been generally upward. As of December 31, 1938, the amount of money in circulation was $6,856 millions. On August 31, 1939, the total was $7,171 millions. I do not show in this exhibit the amount of money in circulation.

I would say that this large volume of liquid resources influences the money market in two ways or from two different points of view. Large balances held by institutional and other investors exert pressure on the money market from the standpoint of the supply of money available for investment. In other words, these resources are ready to flow into new securities and investments whenever the opportunity is afforded. Large balances held by commercial and industrial firms is an important factor in reducing demands for capital from outside sources. That is, when commerce and industry have large liquid resources there is less need to rely upon banks and investors for funds with which to expand operations. This situation helps to account for the reduced demand in recent years for commercial loans and new capital financing.

In 1929, total loans by all member banks exceeded 26 billions of dollars. The total declined steadily to a figure of a little less than $12 billions in 1935. Subsequent increases carried the total to $13,141 millions as of June 30, 1939,—about half of the 1929 total.

Table II is nothing more than a breakdown of the amount of deposits shown for member banks in Table I. On Table II the deposits of member banks are broken down into demand deposits and time deposits. The amount of each class of deposits is shown, together with the percentage relationship that each class bears to the total. Technically, you might observe that in recent years the demand deposits have come to occupy a little greater percentage of the total compared with what was true back in the early 30's—of 1930, 1931, and 1932.

A demand deposit is a deposit that is payable on demand. Time deposits are savings deposits which technically at least can be withdrawn only upon certain notice to the bank. Actually, of course, most banks will let you take out time deposits on demand, but they can if they want enforce a 30 or 60-day notice rule or something to that effect.

Another important item to be considered in relation to the volume of bank deposits is the rate of turnover of bank deposits. Table III presents the average annual rate of velocity or turnover of demand deposits in recent

1459 years for New York City and for 100 leading cities outside of New York City. I might explain that by velocity or turnover I am referring to the relation between the amount of checks drawn upon an account to the average amount of the account. That is, if the deposit or the account averages $1,000, we will say, and if checks are drawn in the amount of $12,000 during the year, the turnover would be 12 times. This turnover is expressed in the "Times" in Table III. Ordinarily speaking, whatever the amount of the deposits in the New York City banks were for the year 1939, there were 23.2 times that turnover of those deposits during the year. It is the ratio of, you might say, bank debits, which are charges for checks drawn against individual accounts, to the average balances, namely deposits.

The bank reserves to which I am referring are the deposits that member banks have in the Federal Reserve banks. That is, the member banks keep their extra resources on deposit with the Federal Reserve banks. Part of these reserves are known as "required reserves." Under the Federal Reserve Act, member banks must at all times keep on deposit with the Federal Reserve a certain percentage of the deposits placed with them by their depositors. Any excess on deposit with the Federal Reserve over and above these required reserves is known as excess reserves.

Turning to Table V, that is merely a schedule showing for different periods the percentages of deposits required to be kept on deposit with the Federal Reserve bank by the member banks. On Table V, the heading on the left which reads as follows, "On Net ~~Demand~~ Deposits," there are three headings, namely, "Central Reserve, City," "Reserve City," and "Country." I ought to explain that the percentages shown opposite that "Central Reserve, City" refer to the percentage of deposits required as reserves from banks located in what are known as central reserve cities. Presently those are merely Chicago and New York. The percentages opposite the heading "Reserve City" refer to the percentages of reserves required in the case of banks in the reserve cities. Reserve cities are designated by the Board of Governors of the Federal Reserve system and include some of the other large cities in the country, I think principally the 10 other cities where the other reserve banks are located. All other banks are known as country banks;

that does not mean small town banks necessarily, but that would include banks in some pretty good sized cities.

Finally, of course, the percentage required of time deposits is shown. That is the same for all classes of banks there.

Table IV, which you asked me to discuss, shows the total reserves of member banks on deposit with the Federal Reserve system and that total is broken down into required and excess reserves. You will observe that the excess reserves are rather nominal until 1932. So that since 1932 or beginning in 1932, the total reserves of the member banks have risen quite rapidly and the excessive reserves have also risen quite rapidly.

I have inserted in this table references to changes in the percentages of reserves required in order to help explain some of the rather marked changes up or down in the excess reserves.

Questions by the Examiner.

The excess reserve is placed by the member banks with the central bank. These are pretty much idle funds we are talking about here. The central banks—the Federal Reserve banks—might be called bankers' banks. 1460

They stand in the same relation to the member banks that the member bank stands in with its depositors. The member banks do not keep their funds on hand; they do not keep on hand these billions of dollars of cash. The Federal Reserve is a better depository for that purpose than they are themselves, and if all of the member banks, for example, had 5 billion dollars of total reserves with the Federal Reserve system, part of that 5 billion dollars would be required reserves, that is, under the law these banks are required to keep there a certain percentage of their deposits, just as a safeguard for the depositors, and if the Federal Reserve were to increase their percentage, that would automatically decrease the amount of the excess.

I have put references in here to the changes in the percentage requirements in order to explain some of the larger changes up or down in the excess reserves as shown in the extreme right hand column of Table IV.

Direct Examination by Mr. Booth Resumed.

As I just said, these excess reserves represent the idle funds of the member banks. Banks are presumably in business to make a profit, so the more idle funds they have, the greater the pressure to put those funds to work and earn a return on that; that is, the banks will do whatever they reasonably and legally can to put their money to work and make a profit. Furthermore, I might point out that this amount of excess reserves shown here in Table IV does not tell the whole story until you consider the possibilities of credit expansion connected with the amount of reserves; that is, every dollar of excess reserves represents several dollars of potential loans and investments. That is, a bank may use its excess reserves to make loans to a customer. That results in a deposit to the customer's credit given by the bank, but the bank is required to keep only a percentage of this deposit at the Federal Reserve, but an excess is still available for further loans and investments.

The principle factor accounting for the growth in member bank reserves in recent years has been the increase in our gold stock. Other factors affecting reserves are the operations of the Federal Reserve system, and of the United States Treasury. You ask how the growth in the gold stock has been a factor. I might say before going into that answer, that the monetary gold stock of the United States from 1933 to date is given in Table VI. That gold coming into the banking system here from abroad or from newly mined sources has resulted in deposits in the banking system to the credit of whoever brought in the gold; but since only a percentage of these deposits must be kept as required reserves, the balance has operated to become excess reserves. Reserves are, after all, hard cash with the Federal Reserve banks.

The Federal Reserve system, pursuant to policy set by the Board of Governors, can effect changes in bank deposits and member bank reserves by controlling the discount rate, by open market operations and by changes in reserve requirements.

The discount rate is the rate of interest Federal Reserve banks charge member banks for loans made to them. Since such a loan is a deposit in a Federal Reserve bank to the credit of the member bank, such a loan adds to the bank's

reserves, which are merely deposits with a Federal
1461 Reserve bank. By increasing or decreasing the discount rate, the Federal Reserve can, within limits, discourage or encourage member banks to borrow; in other words, to increase reserves. This control is, of course, limited because member banks would not borrow even at a very low rate if it were not profitable to do so. As a matter of fact, member bank borrowing is presently very nominal in relation to the amount of 1928 and 1929. Specifically, borrowings by all member banks were only $5,000,000 on June 30, 1939, as compared with $1,162 millions on December 31, 1928. In view of the excess funds held by the member banks and the consequent absence of need for borrowing, the discount rate presently is not an important or effective factor in the growth of member bank reserves. Nevertheless, since the member banks now hold nearly $11 billions of U. S. securities, they could borrow on them at present very low interest rates by discounting them or pledging them with the Federal Reserve System, and thus obtain a very large volume of additional money if commerce and industry were to place any such demand for funds upon the banks.

By buying or selling securities in the open market, the Federal Reserve can increase or decrease member bank balances. That is, when the Federal Reserve buys, its funds get into the banks and increase deposits and reserves. When the Federal Reserve sells, it of course takes funds out of the banks, thus decreasing deposits and reserves. The Federal Reserve banks have contributed to easy money conditions by increasing their holdings of Government securities from $511 millions on December 31, 1929, to $2,826 millions as of September 20, 1939.

When reserve requirements are raised, the amount of excess reserves is automatically reduced, thereby reducing the amount of funds available for loans and investments by the member banks. By reducing reserve requirements, the opposite result can be produced, of course. The extent to which reserve requirements can be raised or lowered is limited by provisions in the Federal Reserve Act. Even under maximum requirements now possible, there would still be a huge volume of excess reserves, however. I might point out that the maximum legal requirements are the percentages shown by Table V to have been in effect from May 1, 1937 to April 15, 1938, and these are the maximum percentages of required reserves under the Federal Reserve Act.

That brings us to Table VII. Table VII shows the gross debt of the United States by months from January 1933 to July 1939. The table also shows the investment of member banks and of the Federal Reserve banks in the direct obligations of the United States at various dates over the past few years. The holdings of member banks rose from $6,540 millions at December 31, 1932, to $10,946 millions at June 30, 1939. The holdings of the Federal Reserve banks rose from $1,763 millions at January 31, 1933, to $2,426 millions at August 31, 1939. When the Federal Reserve banks acquire U. S. securities, it results in the ultimate expansion of deposits and reserves of the banks. What it really amounts to is a shift of funds from the Federal Reserve—its own funds—to the banks. Eventually it gets back in the Federal Reserve in the form of deposits by member banks in the Federal Reserve. When the member banks acquire U. S. securities, no immediate expansion in deposits and reserves results unless the member banks borrow in order to buy securities. That is, if they were to borrow from the Federal Reserve in order to buy United States securities, that would create additional deposits in the banking system and additional reserves at the Federal Reserve bank, but when they use their own
1462 funds, of course there is no such increase in deposits and reserves. I mentioned a while ago that member banks have practically no debt owing to the Federal Reserve at this time, so the process whereby a member bank borrows in order to buy United States securities has actually not been operative. It is potential, but it has not been operative as a matter of fact; but these roughly $11,000 million dollars in United States securities held by the member banks represent potential means whereby the banks can obtain funds if they find a need for them.

Speaking of the United States Treasury operations further, the Treasury in recent years has made large purchases of silver, and that adds to the deposits and reserves just the same as the increase in the gold stock. The reason is that the Treasury has issued silver certificates to finance the purchase of the silver. Silver certificates, of course, getting into the banking system as cash add to deposits, and in turn add to the cash reserves of the Federal Reserve System.

There are certain potential means of making still further additions to the volume of excess reserves. If the Treasury were to disburse funds representing gold held in the Stabilization Fund, and if it were to reduce its large balances at the Federal Reserve banks or if it were to issue currency against its holdings of silver bullion, deposits and reserves of the banking system would be increased substantially. Furthermore, the Treasury has authority to issue up to $3,000 millions of United States notes, that is, currency. On the other hand, the volume of reserves could be reduced by the Treasury through sale of securities to increase its balances at the Federal Reserve bank or by acquiring additional cash. The Federal Reserve could also effect some reduction in excess reserves by again raising reserve requirements to the maximum permitted by the law.

Cross-Examination Interposed by Mr. Morgan.

You ask if these affirmative statements that I have been making about Exhibit 183 are contained in the sources and merely abstracted or paraphrased by me or whether they represent my own interpretation of what the figures taken from those authorities show. I would say partly both. I think if you will read the annual reports of the Federal Reserve system, that is the Board of Governors of the Federal Reserve system, for recent years, you will find that most of these things are discussed. That is, the Board of Governors is required by law to set forth in its report to Congress its actions and its reasons therefore; that is, it must state its policies in black and white. There can be no secret about it. You ask if these statements I make as to why this or how that might influence the banking situation are my own interpretations. Yes, I believe them to be true. I do not want to take any credit for being original in this. Other people have said the same thing, and you can find this view expressed probably in a number of places if you make a search for it. I am willing to take the responsibility for any opinions that I might have expressed.

(At this point EXHIBIT 183 was offered and received in evidence without objection.

At this point counsel for complainant produced a document described as a copy of Exhibit 20 introduced before the Illinois Commerce Commission in Docket No. 21170, which counsel stated was another exhibit submitted by Mr.

Ralph W. Gallagher in that proceeding, with the request that it be marked for identification. At the direction of the Examiner the document was marked Exhibit 184.)

1463 *Direct Examination by Mr. Booth Resumed.*

I have examined Exhibit 184 for identification. It shows the basis of computing the estimated amortization charges. Most of the property was amortized, or the amortization requirements were computed, upon the basis of a 15-year period and a rate of interest of 6 per cent. The gasoline plant property at Fritch, Texas, was set up upon a 10-year basis, but still at 6 per cent. It also provided that in the case of gas wells drilled in say the tenth year of the 15-year period, those wells would be amortized over the remaining five, but in general a 15-year period was used and throughout a 6 per cent rate of interest was used. The method of amortization provided for was on a sinking fund basis.

(At the request of counsel for complainant and at the direction of the Examiner, the reporter copied into the record the material embodied on pages 13, 14, 15, and 16 of Exhibit 184, as follows:

Page 13.

Amortization of Cost of Gas Leases and Wells.

A Gas leases were amortized at the rate of 4.3% per year which is on the basis of a 15-year sinking fund with interest compounded annually at 6%. The investment involved is $15,429,768 and the annual expense is $665,000.

B Gas wells were all amortized by the end of the 15-year period. Wells drilled or purchased in the first year were amortized in 15 years on the sinking fund basis. Wells drilled in the 10th year were amortized in 5 years. Thus this charge varies from year to year but averages $472,000.

Page 14

Amortization of Investment in Gathering Lines.

Total investment amortized during the 15-year period of operation. The amount spent the first year was amortized in 15 years, on the sinking fund method compounding the interest annually at 6%. The amount spent in the 5th year was amortized in 10 years, etc. The investment changes from $4,589,000 in the first year to $7,109,000 in the fifteenth.

Page 15

Amortization of Investment in Gasoline Plant.

This plant was amortized in 10 years, assuming a net salvage value at the end of that time of 10%. Thus the amortization rate on this plant was computed at 7.6% per year on 90% of the investment. This gives $51,000 per year.

Page 16

Amortization of Main Line and Compressor Stations.

This was computed on a fifteen year sinking fund basis compounding the interest annually at 6%. This gives an amortization rate of 4.3% per year which is applicable to $49,608,123, resulting in an annual figure of $2,140,000.

Above investment includes pipeline, telephone, compressor stations, interest during construction and overhead.)

1464 CHARLES W. KNAPP, JR., a witness for the Federal Power Commission, testified:

(November 6, 1939)

Direct Examination by Mr. Slaff.

My name is Charles W. Knapp, Jr. I am employed by the Federal Power Commission in the capacity of Principal Examiner of Accounts in the Division of Finance, which is a division of the Bureau of Accounts, Finance and Rates. I have been with the Federal Power Commission since December, 1938.

I attended the University of Vermont and graduated with the Bachelor of Arts degree. I am a certified public accountant of the State of New York, having obtained my certificate in 1934. I was a member of Phi Beta Kappa. I am also a member of the New York State Society of Certified Public Accountants. As to employment previous, going backward in time, prior to my commencement with the Federal Power Commission, during 1938 I was engaged in private practice in and about New York City, having a construction, manufacturing and publishing clientele. During 1937 and 1938, or a very small part of 1938, I was employed by Allen R. Smart & Company, certified public accountants, in their New York office as senior accountant, and was in charge of audits of United Aircraft Corporation and subsidiaries for the year 1937.

Prior to joining Allen R. Smart & Company, I was employed by the Federal Communications Commission as an accounting expert on its investigation of the American Telephone & Telegraph Company, and while with that Commission, I was engaged on an analysis of the principles and methods of consolidation employed in the preparation of the Bell system financial statements, in analysis and reports of the history of holding company investments in the Associated Telephone Companies, in analysis and reports of financial history of the Western Electric Company, as well as other studies and reports. The period of employment with that Commission was during the years 1935 to approximately the early part of the summer of 1937.

Prior to my employment by the Federal Communications Commission, I was employed by Arthur Anderson & Company, accountants and auditors at their New York office as senior accountant, in charge of the audits of the eastern operating subsidiaries of one of the largest, if not the largest, independent systems of telephone utility companies in the country, as well as of holding and subholding company audits and consolidation work of that system.

I was also engaged during my period with Arthur Anderson & Company, which was the period 1932 to 1935, on audits of electric, gas and water utilities.

Prior to my employment by Arthur Anderson & Company, I was for several years employed by public accounting firms, including approximately a year with Peat, Marwick, Mitchell & Company in 1925 and 1926, as well as having held positions as accountant in private industrial and commercial companies.

1465 In connection with this proceeding certain exhibits have been prepared dealing with various factors involved in arriving at a determination of a proper rate of return. These exhibits were prepared at the direction and under the general supervision of Mr. Charles W. Smith, Chief of the Bureau of Accounts, Finance and Rates of the Federal Power Commission. They have been prepared in two parts, which have been designated Part 1 and Part 2. I am going to testify to so-called Part 1, and Mr. Smith is going to testify with respect to so-called Part 2, according to my understanding.

Briefly, Part 1 contains data on general interest rates and yields, general economic conditions, comparative risks of public utilities and other forms of enterprise, and economic conditions in and adjacent to the Chicago industrial area.

Part 2 contains data relating specifically to the natural gas industry and is comprised of general statistics pertaining to the natural gas industry as compiled by the United States Bureau of Mines and the American Gas Association, and information concerning the issuance, ownership, prices, and yields of securities of natural gas companies.

(At this point counsel for the Commission handed the reporter a document entitled "Rate of Return Study, Part I" with the request that it be marked as an exhibit. At the direction of the Examiner the document was marked Exhibit 185.)

In the very first part of Exhibit No. 185 will be found a table of contents from which it will be seen that the data contained in Part I consists of exhibits ranged in several groups or sections. These sections in the order of their appearance, as indicated by the table of contents, are as follows:

1. "General Interest Rates and Yields," which relates generally to yields on investments and commercial paper.

2. "Utility Interest Rates and Yields," pertaining to yields on utility securities and containing information on recent financing by public utilities in general and, in addition, data compiled separately covering new financing by electric utilities during the period from 1935 through August, 1939.

No. 3 is the section "Economic Conditions," which gives a general picture of economic conditions both currently and for the period since 1920 as indicated by indexes of wholesale prices, general business activity and, for the period since 1929, national income payments.

The fourth section is entitled "Comparative Risk" and gives an indication of the relative risks of public utilities as compared with other forms of enterprise.

By reference to the table of contents it will be noted that the various sections which have just been described contain exhibits which consist of charts and schedules. The schedules support the charts, or, in other words, contain the detailed information which is reproduced on the charts for the purpose of facilitating the giving of testi-

mony. For example, where a schedule number ap-
1466 pears on the same line as a chart number in the table of contents, the schedule and chart should be read in conjunction with one another. In certain instances a schedule number appears without a related chart number, in which case the schedule stands by itself.

The first section of this exhibit has three charts and three schedules and deals with general interest rates and yields. As a preliminary to Chart 1 and Schedule 1, pages 1 to 11, inclusive, I might say that Moody's Investors Service publishes a considerable amount of financial data, and its publications are accepted and relied upon generally for purposes such as are now being considered. Chart 1 shows the bond yield averages of 120 domestic corporations according to ratings given by Moody's publications. There are not always 120 corporations in the list, and there are not that number of corporations at this time, principally because of the difficulty of finding industrial bonds of the higher ratings. By reference to page 8 of Schedule 1, it will be observed that the industrial group of Aaa bonds consists of only four issues or issues of four companies. For Aa bonds there are only the bonds of three industrial companies. Page 10 shows that for Moody's rating of A there are only 8 industrial bonds, whereas for Moody's rating of Baa, shown on page 11, the list contains ten bonds. With respect to public utilities, I believe there are 10 bonds in each one of the groups.

Chart 1 shows the range of bond yield averages since 1920. The composite average yield for all bonds included in the data, as will be noted, had reached by the end of 1936 the lowest level recorded since 1920, namely, 3.67 per cent. These percentages, incidentally, may be found in the schedule immediately following the chart. After rising during 1937 and the early part of 1938 to 4.50 per cent in April, 1938, a decline took place which has carried the composite average through August, 1939, down to about the 1936 level. It is down as of August, 1939, to where it was in January, 1937, at about 3.67 per cent. The composite line is the one that has the tag, "120 domestic corporations," which is written out over the years '34, '35, and '36. The dotted line is the 30 domestic corporations rating A.

Now, to continue, since Chart 1 shows the individual rating group averages from which the composite average is derived, it can be seen that the decline since April, 1938, has brought the average yields for bonds of Aaa and Aa rating considerably below the 1936 level, while A bonds, that is bonds of A rating, remained slightly above the 1936 level. The low point in 1936 as compared with the yield shown for August, 1939, is as follows: Aaa bonds, 1936—3.10 per cent, August, 1939—2.93 per cent; Aa bonds, 1936—3.28 per cent; August, 1939—3.11 per cent; A bonds, 1936—3.78 per cent; August, 1939—3.80 per cent.

I don't think the fact that the dotted line becomes a solid line in parts is indicative of anything. I think that is due to the process of reproduction. I believe it is entirely due to the method by which the chart was reproduced.

Now, I was just pointing out that the bonds of Aaa and Aa rating were in August, 1939, considerably below the 1936 level, while bonds of A rating remain slightly above that level. The risk factor associated with bonds of Baa rating is reflected by the marked rise commencing
1467 in the latter part of 1937 and culminating in the
early part of 1938, since which time the yield has declined and in August stood at 4.85 per cent, or almost one-half per cent higher than at the close of 1936, in contrast with the experience of bonds of higher grade.

I think further examination of Chart 1 reveals the virtual collapse of the bond market in 1931 and the continuation of an extreme degree of weakness in that market for the greater part of three years. In this period bonds most severely affected were those regarded as subject to greater investor risk. It is noteworthy that while the yields on Baa and A bonds reached 11.63 per cent and 8.5 per cent, respectively, in this period, the highest yield recorded for Aaa bonds was only 5.41 per cent and for Aa bonds 6.60 per cent.

The data upon which Chart 1 is based appear in Schedule 1 which will be found immediately following the chart. For example, page 1 of Schedule 1 contains the composite monthly and annual average yields for each year commencing with the year 1920 on bonds of 120 domestic corporations including bonds of the four highest Moody bond rating groups. These rating groups are, respectively, Aaa, Aa, A and Baa. Similarly, page 2 contains the average yield on bonds of Aaa rating, page 3 on bonds of Aa rating, page 4 on bonds of A rating, and page 5 on bonds of Baa rating. Each rating group includes, so far as they are available for inclusion, 30 domestic corporation bonds. I pointed out earlier that because of the dearth of industrials in the higher ratings, the Aa and Aaa groups could not contain 30 bonds.

A footnote on page 5 indicates the source from which the data were taken. The lines on the chart can be readily associated with the data contained in these pages of the schedule. For example, page 1 of the schedule shows that the composite yield on bonds of 120 domestic corporations was 4.50 per cent in April, 1938, and this is easily seen by reference to the chart to be the case.

Page 6 describes the mathematical basis of the yield computations. Monthly yield averages are unweighted arithmetic averages of daily yields computed on the basis of closing prices and calculated to maturity dates. No, the statement I have on page 6 under the heading, "Compilation of Moody's Bond Yield Averages," is not a statement of my own. It is a statement which has been published by Moody, and by reference to page 7, a footnote indicates that the source of the definition of Moody's ratings was the "Moody's Public Utilities Manual for 1938" page VIII. I show also the Moody ratings in the "Key to Moody's Bond Ratings" on pages 6 and 7.

Referring to pages 6 and 7, you will note that bonds of Aaa rating are defined as representing the highest type of bond investment. Principal and interest on such bonds are protected by characteristically wide margins, the fluctuation in which is not at all likely to jeopardize the security. Among all rating groups, these bonds hold the best prospect of unchanging quality. Bonds of Aa rating lack one characteristic or another of the highest type of bond investment, while bonds carrying the A rating are more vulnerable to fluctuation in the borrower's position than in the case of the first two classes. It is indicated that some speculative elements exist in bonds of Baa rating, and that the extent and stability of income and security may be satisfactory but certainly not noteworthy.

1468 Pages 8 to 11, inclusive, contain lists of the bonds currently used in Moody's bond yield averages according to rating groups. Aaa bonds, grouped according to classification as "Industrials," "Railroads" and "Public Utilities" are listed on page 8, Aa bonds are similarly listed on page 9, A bonds on page 10, and Baa bonds on page 11. It will be noted that, as we mentioned before, the lists of industrial Aaa, Aa, and B bonds contain fewer than ten bonds, but this is because there were not a sufficiently large number of bonds available to include in these groups.

In introducing Chart 2, I would like to relate it, also, to Chart 3 and state that the purpose of these two charts is to show that the trend of bond yields is not an isolated phenomenon but is part of the broad movement of interest rates in general, as indicated by the somewhat similar patterns observed in interest rates on 4-6 months commercial paper and 60-90 day time loans, as well as in yields on U. S. Treasury bonds. I mean the pattern of the curves shown on Chart 2 and Chart 3 seems to follow the same direction since 1932. Of course, they are on different levels. I think that in a general way it could be said that the curves follow the same general pattern since 1932 as the composite line on Chart 1. The period 1935 through 1939 reflects relatively little change in the rates for either 4-6 months commercial paper or 60-90 day time loans.

In other words, Chart 2 and Chart 3 are merely to portray historically the movement of interest rates, as such, and are not an attempt to offer short term money rates or yields on Treasury bonds as a measure of a proper rate of return.

Chart 2 shows the interest rates charged by banks and is based on averages computed by Standard Statistics Company from data appearing in the Commercial and Financial Chronicle for 4-6 months commercial paper and 60-90 day time loans. The 4-6 months commercial paper is issued by such seasonal borrowers as Armour's and Swift's and is sold to banks through dealers. The 60-90 day time loans on the other hand represent loans to New York Stock Exchange brokers and are secured by mixed collateral, substitutions of collateral being permitted from time to time. Two factors which may be assumed to effect a higher rate for 60-90 day loans than for 4-6 months paper, despite the apparent inconsistency due to the time limits, are that the rate for 60-90 day loans is understood to be more or less fixed by agreements between banks and that a service charge element is presumed to exist by reason of the allowance of substitutions of collateral.

Questions by the Examiner.

The 60-90 day loans bear a rate of interest more or less fixed by agreement, which accounts for the course of the line, which was extremely irregular for a time and then flattened out into a series of plateaus in the lower part of the curve. I can not answer definitely your question as to whether that rate was fixed by agreement before 1934. I can only say that I learned that at present that is the understanding. I can not say whether the Federal Reserve has instituted any method of control that would determine that. Incidentally, my information concerning the explanation of these two lines was obtained through the Federal Reserve Board.

1469 The current rate of 1¼ per cent on 60-90 day time loans is indicated as being lower than at any time since 1920 except for the period extending from 1932 to 1935, while the rate on 4-6 months commercial paper is again at the lowest level since 1920 at ¾ of 1 per cent, after having risen to 1 per cent early in 1937.

Direct Examination by Mr. Slaff Resumed.

Following that chart is Schedule No. 2, pages 1 and 2, which show in figures what the chart portrays graphically. There are also certain footnotes on both pages of Schedule 2 which give the exact source of the data.

Chart 3 shows the yield on U. S. Treasury bonds due or callable after twelve years, as computed by the U. S. Treasury Department for the period since 1920. This chart shows a somewhat similar trend to that shown in Charts 1 and 2, that is, a low point for the period 1920-1936 being reached at the end of 1936 in this case with a yield of about 2¼ per cent. Increasing in 1937 to 2.80 per cent, the yield on U. S. Treasury declined gradually through 1938 and more rapidly in 1939 to 2.16 per cent for July, 1939.

Undoubtedly the low yields associated with Treasury bonds as compared with corporation bonds of Aaa rating, that would be 2.16 per cent against 2.93 per cent, may be attributed to the low risk associated with these securities and to certain tax-exempt features of Treasury bonds.

From the data presented in this section it is seen that money rates are now lower than at any time since 1920 and probably lower than at any time in the histor the country.

A one-page schedule following that chart shows the figures which are portrayed graphically on the chart and the source of the data.

Chart 4 shows Moody's bond yield averages commencing with the year 1934, based on the bonds of 40 public utilities according to Moody's bond ratings. In contrast with Chart 1, which, for bonds of 120 domestic corporations shows declines in yield below the 1936 level only for bonds of the two highest rating groups, that is Aaa and Aa, Chart 4 shows declines below that level through August, 1939, for public utility bonds of all four rating groups. The August, 1939, averages for the various groups are as follows: Aaa—2.83 per cent, Aa—2.97 per cent, A—3.41 per cent, Baa—4.39 per cent.

This chart, I think I have previously stated, deals exclusively with public utility bonds. The names of the companies whose bonds are included in each one of the classifications are shown on page 3 of Schedule 4.

Chart 5 shows Moody's bond yield averages for the period since 1920, based again on bonds of 120 domestic corporations classified as railroads, public utilities, and industrials. They are classified functionally, using the term broadly, rather than according to rating groups. That is the essential distinction between Chart 5 and Chart 1. Chart 5 segregates the bonds according to the type of business of the company as distinguished from the type or quality of rating. If there were a composite line shown on Chart 5, it would be identical with the composite line shown on Chart 1.

1470 The general trends reflected in Chart 5 are similar to those described in connection with the previous charts. In Chart 5, starting from the low point for all groups reached in 1936, the average yields increased until the summer of 1938. The rise in yield for railroad bonds in this period was much more abrupt than in the case of public utilities and industrials and carried the yield on railroad bonds to 5¾ per cent, while public utility yields increased only to 4.11 per cent and industrials to 3.55 per cent. From those points the trend toward lower yields has continued with minor interruptions for all groups, but only in the case of public utilities and industrials have the yields established new lows, the August, 1939, figures being 3.40 per cent for public utilities, and 3.68 per cent for 1936, and 3.21 per cent for industrials, and 3.36 per cent for 1936.

Questions by the Examiner.

The only explanation for the course of the public utility bond yield that I could give would be the investor's attitude. The yields on these securities are based on market prices, as I have stated, and those prices in turn reflect the favor or lack of it on the part of investors.

Direct Examination by Mr. Slaff Resumed.

Railroad yields in August averaged 4.41 per cent, which was still considerably higher than the 3.95 per cent yield recorded for January, 1937, reflecting, as I have just stated, the greater degree of risk attaching to railroad securities from the viewpoint of investors.

The chart indicates that the experience of the industrial group has been somewhat more favorable than that of the public utilities, especially in recent years, but this may be due in part to the limited number of industrial bond issues available for inclusion in the four highest Moody bond rating groups.

This chart is supported by Schedule 5, pages 1 to 3, which shows in figures the data portrayed graphically on the chart and which contains the source of the data, and pages 4 through 6, which contain the names of the companies used currently by Moody's compilations, which are shifting lists.

Chart No. 6 shows the average price of new capital as indicated by Moody's weighted averages of yields on newly issued domestic bonds of industrial corporations, railroads, and public utilities. By the "price of capital" is meant the average yield to maturity on newly issued bonds, such yields being weighted by the amounts of all new issues floated in any given classification or period. The classification "utility bonds," which includes bonds of light, power, and gas utilities, consists wholly of operating companies. The yields indicated in Chart 6 are not, of course, representative of bonds of the same companies or of the same issues at any one date or during any given period. This chart shows a generally downward trend in the price of new capital for all classes of companies commencing about 1932 and continuing until about

1936, from which date the decline has been less pronounced in general. The yields are on the basis of the offering price.

1471 In 1938 the yield on newly issued utility bonds had fallen to 3.49 per cent, which represented the lowest point for any year throughout the entire period since 1921. We have superimposed on that compilation a line showing Federal Power Commission compilations supported by data shown in Schedule 7. These compilations show an average yield on newly issued bonds of electric utilities beginning with the year 1935. I think the lower caption with the arrow points to the lowest line on the chart and states that it is a Federal Power Commission compilation of electric operating companies. That line seems to cross the curve for utility bonds, light, power and gas, in the year 1937 and seems to be somewhat below it again in 1938. As a matter of fact, the 1938 figure for the utility bonds, including light, power and gas, is 3.49 per cent, while the electric utility bonds for the year 1938 average 3.43 per cent or slightly lower than the figure for the utility bonds in general.

That chart indicates that since 1921 the average price of new capital for industrial concerns has been consistently higher than that for public utilities. It is also indicated in that connection that from 1921 through 1932 the market for new railroad bonds was more favorable than for public utility bonds. In 1933, however, this position was reversed and public utility bonds were marketed from 1933 through 1936 on more favorable terms than either railroad or industrial bonds. While the yield on newly issued railroad bonds was slightly more favorable in 1937 and 1938 than on public utility bonds in general, the lowest yield in 1938, as I have just stated, was for bonds of electric operating utility companies for which the average yield in 1938 was 3.43 per cent.

The data supporting the line on Chart 6, representing the average price of new capital for electric operating utilities as compiled by the Federal Power Commission are summarized in Schedule 7, where the information is shown by years on page 1 and according to Moody rating groups on pages 2 and 3.

The rapid decline in the price of new capital, particularly noticeable since 1934, suggested that the decline could be attributed not only to the course of the bond market itself but also to the quality of the offerings. This assumption is greatly strengthened by comparison of the average price of new capital for utility bonds with the average yield on utility bonds of the three highest Moody bond rating groups, i. e., Aaa, Aa and A, so the line superimposed on Chart 6, showing the average annual yield from 1934 to 1938 on 30 utility bonds carrying these Moody ratings, very closely conforms to that showing the price of new capital for utility bonds, and indicates that a very large proportion of the utility bonds offered during that period consisted of bonds of high rating.

That is the explanation for that superimposed line and also explains why we omitted the Baa. We wanted to find out whether, if we took the higher or the highest rating groups, we would find that the resulting curve would conform to the curve for the average price of new capital of utility bonds in general.

Questions by the Examiner.

A graph of Baa public utility bonds, together with that for Aaa, Aa and A, is contained in the preceding Chart 4. Chart 4 gives the information for public utilities, referring to yields on outstanding bonds and not as to new capital.

1472 *Direct Examination by Mr. Slaff Resumed.*

Schedule 8 contains a description of all known electric utility bond issues sold during the first eight months of 1939 and this schedule, consisting of three pages, shows that the market for such bonds, that is, electric utility bonds, continues to be exceptionally favorable, the weighted average yield on all newly issued electric utility bonds during this period, as shown opposite the words "Grand Total" on page 3, being 3.36 per cent or slightly lower than the corresponding average for the year 1938. In this connection it will be noticed, however, that the only new bond issue offered to the public during this period having a Aaa rating was that of Consolidated Gas, Electric Light and Power Company of Baltimore, $7,000,000 principal amount, which sold at a price to yield 2.75 per cent to purchasers.

You state that it appears to you that on this Schedule 8 we had three bonds with Aa rating, ten with A rating, eight with Baa rating, and three with Ba rating, while there were eleven which had no ratings assigned. That is correct with the exception of the A rating group, in which I can count only eight. The Baa bonds that were issued totaled $107,000,000, which was very roughly 20 per cent of the total, and the A bonds totaled $260,000,000, which according to the same very rough calculation is about 40 per cent of the total. The financing done this year and listed in Schedule 8 was represented to the extent of approximately 60 per cent of the total by issues having ratings of A or Baa. The source of the information for Schedule 8 was the various financial publications such as, primarily, the "Commercial and Financial Chronicle," with some reference to the supplements to "Moody's Manual" and "Investments in Public Utilities."

Schedule 9 presents a compilation of all known preferred stock issues of electric utility operating companies sold in the period 1935-1938, showing the cost of money to issuing companies and the yields to purchasers. Comparison with Schedule 7 indicates the relative importance of preferred stock as compared with bonds as a financing medium for electric utilities during this period, bonds and preferred stock being issued in proportions of about 22 to 1, based on dollar volume during the four-year period. Yes, I mean 22 times bonds as per preferred stock issued in dollar amount.

However, at this point I would like to refer to "Statistics of Electric Utilities in the United States" for the year ending December 31, 1937, Classes A and B, page 3, published by the Federal Power Commission. In that publication it is shown at page 3 that preferred stock comprised at December 31, 1937, 15.9% of all outstanding securities, whereas long term debt comprised 51.2%, which indicates that the actual securities outstanding of the various electric utility companies are not in the proportions that are shown by these two schedules. They are both correct for the thing which they indicate.

The statistics published by the Federal Power Commission show the composite balance sheet of the electric utility industry for Class A and B companies, and from that I have derived these percentages of preferred stock and long term debt as percentages of total outstanding securities, whereas in Schedule 9 and in Schedule 7 the facts por-

trayed there merely are issues of securities during
1473 the period 1935 through 1938, which has no specific relation. The distinction is that the Federal Power Commission statistics show outstanding securities, and Schedules 9 and 7 show issues during the period.

In addition to what I have said I would like to call attention to the yields shown by Schedule 9. The average yield to purchasers on preferred stock issues sold in 1935 was 4.38 per cent. There was one issue in that year. For 1936 the yield was 4.62 per cent; for 1937 it was 4.63 per cent; and for 1938 it was 4.85 per cent. The over-all yield during that period on issues of preferred stock was 4.62 per cent. In addition to the yield to the public I show also the cost to the company, which is 4.77 per cent. There appears to be a progressive increase during those four years of the yields on preferred stock. The yields for 1936 and 1937 were almost identical, and the fact is that these yields varied from an average of 4.38 per cent in 1935 to 4.85 per cent in 1938. However, it must be borne in mind that we have here no segregation of yields according to any known rating groups for preferred stocks.

Schedule 10 shows a compilation of new preferred stock issues sold during the first eight months of 1939. In this period the average yield to purchasers was 4.63 per cent, but the yields for individual issues ranged from 4 per cent to 6.90 per cent in quite a variation. In this connection, it will be seen that the 4 per cent yield was for a limited number of shares of an issue of 4½ per cent Series B Preferred Stock of Consolidated Gas Electric Light and Power Company of Baltimore. However, a rather large issue of West Penn Power Company, 297,000 shares of 4½ per cent preferred stock was sold to yield 4.09 per cent to investors and, incidentally, this 4.09 per cent yield was the lowest yield, if we except the 4 per cent yield shown for the small number of shares, recorded for any new preferred stock issued during the entire period since 1935.

A comparison of the average cost of new capital for bonds and preferred stock indicates, as you would expect, that the investors are willing to accept a lower yield on bonds because of the greater security of principal and dependability of income.

(November 7, 1939)

Just prior to the conclusion of my testimony last night

I referred to certain statistics of electric utilities in the United States published by the Federal Power Commission for the year ending December 31, 1937. Those statistics were published in two volumes, and the volume to which I was referring was Volume I. Volume I of those statistics contains data on balance sheets, income statements, and outstanding securities of Class A and Class B electric utilities, while Volume II contains data on operating revenues, operating expenses, electric fixed capital, and physical quantities for the same classes of companies.

We now come to the third group in Exhibit 185 headed "Economic Conditions." Chart 7 shows the range of the composite wholesale commodity price index of the United States Bureau of Labor Statistics over the period since 1920, as well as the indexes for raw materials and finished products. This chart clearly portrays the severe decline in prices which started in 1929 and reached a record low point for the period in 1933. It will also be seen that from March, 1933, to March, 1937, prices rose with minor interruptions, the composite index rising from 60 per cent to 88 per cent of the 1926 level during this period. Since 1937 there has been a gradual but steady decline in whole-
1474 sale prices, with June, 1939, indexes at the lowest levels since 1937.

The all-commodities index covers 813 commodities. The source of that index is indicated at page 3 of Schedule 11. The indexes were computed by the United States Bureau of Labor Statistics and are contained in their publications. As I understand it, the index is weighted according to the importance of the various commodities in the national economy.

The index for June, 1937, for all commodities was 87.2 per cent of the 1926 average. For July, 1937, it was 87.9 per cent. Since July, 1937, there has been a steady decline practically month by month in that index down to the last date shown on the chart, which is June of 1939, at which time the index stood at 75.6, as compared with 87.2 for June, 1937. It has been, on the whole, a downward trend. I find here that in 1930 the average for the year was 86.4; in 1931 the average for the year was 73, and in 1938 the average was 78.6; so that compared with 1930 there has been a decline of approximately 8 points, and as compared with 1931 a rise of approximately 5.5 points. Looking at the first six months of the year 1939, a very rapid mental calculation here indicates that the average for the first half of the year is about 76.5. As to what has happened since June, all I can answer is that for July it shows a further decline to 75.4, which is the last figure I had the opportunity to examine.

I would like to read a few excerpts from the Department of Commerce publication, "Survey of Current Business," which, I think, will relate the indexes here to show their place in economic conditions. The statement comes from the February, 1939, issue of that publication. The quotation is as follows:

"Among the principal price-depressing influences in 1938 were the decline in industrial activity and in consumer income; the heavy supplies of many important farm products, resulting from the record 1937 crops and the above-average harvest of 1938; and the large stocks of many other staple commodities. The expansion in business activity during the second half of 1938, while checking the decline in prices, did not result in any general rise. The need for further inventory readjustments in certain lines, the large volume of idle resources, and the unsettled world political situation tended to prevent any great amount of forward buying, which frequently has been an important price stimulus in the initial stages of expansion in industrial activity. * * *

"As is usual in a period of marked changes in business activity, prices of raw and semifinished materials declined more rapidly than prices of finished products in the 1937-1938 recession and responded more quickly to the rise in industrial activity that began in the midyear (1938) * * *.

"The fall in prices of industrial raw and semifinished materials, which was halted in June (1938), reflected chiefly the reduced purchases resulting from declining business and the accumulation of stocks in producers' hands. Sharp advances from late June to July (1938) in prices of staple commodities (notably rubber, nonferrous metals, scrap steel, hides and silk) were reflected in a moderate advance in the index of prices and industrial raw and semifinished materials, as well as the sharp rise in the spot commodity index. There was no sustained general rise in prices of
these materials, despite the rapid advance in indus-
1475 trial activity subsequent to June (1938), as large
stocks were available to meet increased demands."

These comments serve to indicate that wholesale commodity prices are sensitive to and reflect changes in business trends, industrial activity, and the national economy in general.

Schedule 11, pages 1, 2 and 3, shows the supporting data in back of the graph lines on Chart 7.

Chart 8 shows the Federal Reserve Board's index of industrial production and the Department of Labor's indexes of factory employment and payrolls for the period since 1920, all without adjustment for seasonal variation. The Federal Reserve Board also publishes a seasonally adjusted index of industrial production, as well as an adjusted index of factory employment derived from the unadjusted indexes computed by the U. S. Department of Labor. For the purposes of this study it was considered preferable to use unadjusted indexes for all three series for the sake of uniformity. Comparison of the adjusted and unadjusted indexes for industrial production discloses slight variations, but the general pattern of the indexes over a period of time is quite similar. The seasonally adjusted figure, for example, shows the peak in industrial production following 1933 occurring in December, 1936, at 121 per cent of the 1923-25 average, whereas the unadjusted index shows the peak occurring in March, April and May, 1937, when that index stood at 122 per cent of the 1923-25 average.

In other words, the adjusted indexes generally follow the pattern of the indexes used here. That merely would appear to precede, by a month or two, the pattern of the unadjusted index.

The index of industrial production serves as a measure of changes in the physical volume of the country's industrial output and is made up of two components, manufactures and minerals, covering industries which, in the base period 1923-25, represented directly and indirectly about 80 per cent of the total industrial production, according to Census data. The base period 1923-25 means that the average for that period was taken as 100 per cent.

The chart indicates that industrial production, after reaching in March, 1937, its highest level since 1933, was maintained through May, declined moderately in June, and commencing in September fell abruptly through the remainder of 1937 and more gradually thereafter until May, 1938. From 77 in May the index advanced to 104 in November, 1938, and fell to 94 in May, 1939. The month of June, 1939, witnessed a reversal of the downward trend, the index for that month advancing to 98.

The chart also shows that the general pattern of the trend in industrial production has been reflected also in the indexes of employment and payrolls. It may be observed that early in 1937 the paths of the employment and payrolls indexes met for the first time since 1929, but that since 1937 the gap between them has broadened, indicating that total wage payments are lower now than in 1937, which was the best year that business has experienced since 1929.

1476 *Cross-Examination Interposed by Mr. Morgan.*

I would not be prepared to make any statement concerning wage scales. I have made no study of comparative wage scales between the last year or two and the present time, and 1930 and 1931, for instance. I have some data which I propose to introduce which throws some light on that, but it is not a very extensive study.

Direct Examination by Mr. Slaff Resumed.

Pages 1, 2 and 3 of Schedule 12 are supporting data in the back of Chart 8.

Chart 9 represents another attempt to depict economic conditions and shows carloadings, steel ingot production and building contracts awarded indexes based on a computed normal equal to 100. This chart also shows the decline commencing in 1929 followed by recovery commencing in 1933 and leading up to 1937, in the latter part of which year another decline is recorded. Starting in the early months of 1938, a considerable rise in all indexes occurred but was reversed late in 1938, this time the decline continuing almost to midyear of 1939. All three indexes currently, that is, as of July, 1939, reveal an upward trend but have not yet reached the levels established in the latter part of 1938.

The chart is supported by Schedule 13, pages 1 to 3.

Cross-Examination Interposed by Mr. Morgan.

I have not had the opportunity to carry these figures forward any further than as shown, except perhaps another month; and the change would not be conclusive because the figures that I have are preliminary figures, that is, they are published as preliminary figures. I would be glad to furnish that information.

Direct Examination by Mr. Slaff Resumed.

Chart 10 shows the total amount of national income payments by type of payment for the years 1929 to 1939, inclusive, as computed by the U. S. Department of Commerce. A description of these data in some detail is contained in an article which appeared in the October, 1938 issue of the Survey of Current Business. Briefly, however, the series is intended as an index of the current flow of income to individuals. For this reason the series is not identical with the annual estimates of national income published by the Department of Commerce. The principal differences are that in arriving at estimates of national income payments, all business savings and employer and employee contributions to Social Security, contributions to Federal retirement, and employee contributions to railroad retirement funds are deducted from national income; and all direct relief payments, veterans' compensation, benefit payments under the Social Security Act, and annuities and refunds to Federal employees are added.

The chart shows, as might be expected, that the bulk of national income payments represents compensation of employees. The other major classes of income payments consist of entrepreneural income and dividends and interest.

In 1929 national income payments are estimated to have been in excess of 78½ billions of dollars. The chart starts with that 78½ billion dollars in 1929. By 1933, the figure had declined to less than 46 billion dollars, or only 58 per cent of the 1929 total. In 1934 national income payments increased to 52 billions, in 1935 to 56 billions, in 1936 to over 64 billions, and in 1937 to about 69 billions, 1937 being the peak year following the decline which
1477 carried through to 1933. From 1937 forward the
chart shows for each month a 12-months ending total in order to disclose the trend. Up to that point the chart shows only the yearly total. That was one point on each line, the point in each case being on the line immediately above the year listed at the bottom of the chart. From this point on, that is from 1937 on, the chart discloses the 12-months period for the 12 months ending each month of the year.

The purpose of showing the 12-months ending figure is to carry the trend forward so you can see which direction it is heading in. It is comparable to the figures that are published by corporations where they give each month the figure showing the 12 months' earnings for the month. It is comparable to a moving total. In other words, if the index figure at the beginning of the year were 100 and at the end of the year 90, but at the middle of the year it had been 80, and if I had just plotted the two points at the beginning and end of the year, I would show a downward trend; whereas if I plotted the three points, one at the beginning, one in the middle, and one at the end of the year, I would show a downward trend for the first half of the year and an upward trend for the last half of the year.

Cross-Examination Interposed by Mr. Morgan.

The Department of Labor publishes a series of statistics on average factory weekly earnings. As to whether, in regard to the cost of pipeline construction and operation, the wage scale is more important than the aggregate income of the whole country, that gets down to a question of purpose. Here we are trying to depict general economic conditions. There is a chart contained in this Part I which gives an over-all average of the wage scale, factory wage earners. Let me refer you to Schedule 23, which appears toward the end of Part I. That gives a wage scale, presented in dollars, and with a correlary index.

Direct Examination by Mr. Slaff Resumed.

I had started to tell you that from 1937 on the chart indicates a 12-months average. It is indicated that the trend of national income payments was steadily downward through all of 1938, with the result that total income payments for that year were almost 5 billion dollars less than in 1937. Beginning in 1939, however, this downward trend appears to have been reversed, and each of the first six months of 1939 has witnessed a gradual but consistent increase in total income payments. This movement is in accordance with that previously noted in the discussion of production, employment and payrolls.

Schedule 14 supports Chart 10. I am asked what keeps the dividend and interest payments fairly constant in amount. As a matter of fact, I think if you were to compute the changes in that little section, you would find that while they do not appear graphically to change very much, there is a decided percentage change. That shows on the next page, on Schedule 14 in the column in the middle of the page headed "Dividends and Interest." You see, that column starts out in 1929 at $11,331,000,000, and in 1937 the corresponding figure was down to $9,563,000,000. Comparing 1935 with 1936, which on the chart shows no great relative difference, I see that for 1936 dividends and interest were a billion dollars more than for 1935.

The differences shown on Chart 2 and Chart 3 are 1478 much greater than on Chart 10. When I spoke of dividends and interest on Chart 10, I was referring to dividends on stock and interest on bonds or other types of securities. It represents dollar totals, income received or paid out. The interest on Chart 2 represents interest rates on two specific types of loan, 4—6 months commercial paper, and 60-90 day time loans. Chart 3, of course, represents the yield on Treasury bonds, and those figures in Chart 2 and Chart 3 are merely rates; they are not indicative of volume of income. I would say that if the yields on investments declined, the tendency would be for income from investments to decline.

1479 If the amount of Treasury bonds outstanding, on which Chart 3 is based, does not change materially but the public's desire for those bonds increases, the yield will go down. The dollar amounts of income received by the public, however, will not change. Chart 10 shows the dollar amounts of income.

Questions by the Examiner.

So far as I know, there is no published refinement of the gross income figures shown on Chart 10. Now, in the comments supporting the changes in national income payments, which appear in the Survey of Current Business, it is indicated that the writers had access to information concerning dividends and interest as such separately, but the figures are not published separately, just in a combined form. Of course, no indication is given whatsoever as to the breakdown of the source of this income, whether it is from government bonds or corporation bonds, or stocks. No information of that sort is published.

Direct Examination by Mr. Slaff Resumed.

We now pass to Chart 11. In any discussion of national income, some means of determining the relative value of the dollar, that is, its purchasing power over the necessities of life, is desirable in order to compare changes in real income as distinguished from cash income. For this purpose, the index of the cost of living may be used. Such an index has been computed by the National Industrial Conference Board to show the trend of living costs of wage-earners' families. The index is based on a comprehensive list of retail prices and rents in five classifications which are weighted according to their relative importance as follows: —and these are percentages of the total—Foods, 33; housing, 20; clothing, 12; fuel and light, 5; and sundries, 30. In the latter group are included such items as household furnishings, reading materials, recreation and tobacco, as well as organization dues, medical care, carfare, drugs and toilet articles, and candy.

By obtaining the reciprocal of the cost of living index (base year 1929) the purchasing power of the dollar at 1929 prices may be determined for any date. For example, Schedule 15 indicates that the cost of living index for the year 1933 was 74.9. The reciprocal of this index is 1/74.9, or 0.01335, which, translated into dollars and cents becomes $1.335. This represents an increase of 33.5 per cent since 1929 in the purchasing power of the dollar in its command over the necessities of life for the average wage-earners' family.

Now, I think it may make the statement a little clearer if I were to give you a simple illustration bringing that point out. If you assume that there has been a change in the cost of living index between 1929 and 1933 from 100 down to 80 in 1933, you can proceed along this line to determine what change has occurred in the purchasing power of the dollar. Assume, for example, that four units of a given commodity can be purchased in 1929 for $1, the index for cost of living having declined to 80 in 1933, those same four units in 1933 could be purchased for 80 cents. It is quite clear then that in 1933 five units of that commodity could be purchased for one dollar. In other words,
the number of units which may be purchased in 1933
1480 is 25 per cent more than the number of units which
could be purchased in 1929. Therefore, there has been
an increase of 25 per cent in the value of the dollar, from

a purchasing standpoint, and that indicates that the dollar, at 1929 prices, was worth $1.25 in 1933.

Schedule 15 also shows national income payments at 1929 prices, on the basis of the cost of living index which I have used. Also the chart, of course, indicates by a curve the line showing national income payments at 1929 prices compared with the index of actual cash income during that period.

Schedule 15 also indicates that for every $100 of national income payments received by individuals in the year 1929, only $58.40 was received in 1933. That is seen by reference to column B. But each dollar of this reduced amount of income was worth 1.335 times as much as the 1920 dollar in its command over the necessities of life, so that $58.40 of 1933 cash income was equivalent to $77.90 of 1929 cash income. That last figure of $77.90 of 1929 cash income would be indicated by the figure 77.9 in the third column on Schedule 15 opposite the year 1933.

Therefore, although the index of national income payments declined from 100 in 1929 to 58.4 in 1933, the decline in real income was only from 100 to 77.9. In other words, the effects of the depression would have been much more severe if the cost of living had remained at the 1929 level.

It is of interest to note that the purchasing power of income payments received by individuals in 1937 on the basis indicated, was practically the same as it was in 1929. In 1938 there was a decline both in income received by individuals and in its aggregate purchasing power, while in 1939 the first six months have shown a steady improvement from the standpoint of both cash income and real income.

In my preceding discussion I spoke particularly of 1933 when I was discussing any year after 1929. That was because 1933 was at the low point. I want to emphasize the conditions that existed at the low point, because that gave it the greatest contrast and made it easier to illustrate the problem.

Both my chart and schedule carry the figures and the graph lines down through June 30, 1939. I might add that for the year 1938 and a portion of the year 1939 I have used a 12-months' moving average in order to carry or disclose the trend of those payments during that period of time. That is a 12-months' moving average. Due to the method of reproduction in setting out the years 1938 and 1939, it states those are 2-months' averages ending in the months shown there. That should state that 12 months are shown on there. That completes the section on general economic conditions.

This is followed by a section called in the Table of Contents "Comparative Risk". On Chart 12 the trend of corporate earnings of public utilities is compared with the trend for industrial and railroad corporations. From this chart it may be seen that the trend of utility earnings has not been subject to very sharp deviations as in the case of industrials and railroads. While there was a sharp
1481 decline for the latter two groups, commencing in 1929, and a pronounced rise commencing in 1933, particularly for industrial corporations, no comparable decline from 1929 to 1933 was experienced by public utilities, and utility earnings have shown a more gradual recovery. In all three corporate groups there has been a decline in earnings evidenced since the latter part of 1937, but the decline in public utility earnings has been less pronounced. It will be noted that an upward turn in earnings is evident in the first quarter of 1939 for each of the three groups.

In back of that chart is Schedule No. 16, pages 1 to 6, which show the supporting data and which contain a foot note, or a note showing the source of the statistics. The names of the companies used are not shown in the supporting schedule. I believe it is possible to obtain such a list, if it would be desired. This chart is based on Standard Statistics data, and the data may be found in Volume 3, Current Statistics Section of Standard Trade and Securities, a publication of Standard Statistics Company.

Chart No. 13 shows the relationship of net profit to invested capital based upon studies and publications of the Standard Statistics Company. Two methods of computing invested capital are used. By one of these methods invested capital is considered as representing outstanding securities plus surplus and capital reserves. This method is the basis of the data reflected in Chart 13. Net profit, as defined in the computations used for this chart, represents the amount available for fixed charges after depreciation in order to obtain comparable figures. Reference to Chart 13 indicates again that utilities have greater stability of earnings and a relatively lower investor risk than railroad and industrial corporations.

I have made no calculation which shows the average per cent net profit to total invested capital for each one of those three groups for the entire period 1927 to 1938. You ask me to check your figures bearing on that point, as follows:

The percentages of net capital to total invested capital shown for 400 industrial corporations for each of the years 1927 through 1938, divided by 12, average 6.6 percent; for the years 1930 through 1938, for the same group, 4.6 percent; for the group of 21 leading utility corporations, for the period 1927 through 1938, 5.95 percent, which compares with the 6.6 for the industrials; for the average, for the period 1930 through 1938, for the 21 utility corporations, 5.6, which compares with the 4.6 for the industrials; for railroads, for the period 1927 through 1938, an average of 3.87 percent, and for the period 1930 through 1938, 3.13 percent. I will be glad to check those figures.

I believe I can furnish the names of the 21 leading utility corporations which make up that list, if you will allow me to look at my papers.

Chart 14 is the same as Chart 13 except that Chart 14 is based upon invested capital as representing the property accounts less reserves for depreciation plus inventories. I need add no further comment. I believe the characteristics revealed by both charts are similar and indicate that in the case of the utilities you have a more stable level of earnings, not subject to the very sharp fluctuations that are obtained for the railroad and the industrial corporations.

I would like to refer again to previous testimony on bond yields as indicating that since 1921 public utilities have enjoyed, on the whole, about as favorable a market for
1482 their securities as other forms of enterprise; that since 1933 they have been able to obtain capital at lower costs than other enterprises, and that at least since 1935, in the case of newly issued electric utility bonds, they have been offered on the average at even more favorable terms than those obtained for public utility bonds as a class. Thus, the attitude of investors aids in confirming the favorable position of public utilities from the standpoint of comparative risk.

Questions by the Examiner.

I am referring here specifically to the charts in the section entitled "Utility Interest Rates and Yields". There are a number of these charts. I think it can be quite clearly related.

Direct Examination by Mr. Slaff Resumed.

Chart 15 shows the comparative rediscount rates of the New York and Chicago Federal Reserve banks and indicates that these rates are at the lowest point since 1920. Now the rate of the New York Federal Reserve Bank currently is 1 percent and that of the Chicago Federal Reserve Bank 1½ percent. In examining this chart I have found several points of interest that I would like to mention.

The date of the Federal Reserve Bank of Chicago was the same as that of the New York bank during all or a part of the years 1920 and 1921 and from 1926 to 1933, inclusive, and higher than the rate of the Federal Reserve Bank of New York during the years 1922 to 1925, inclusive, and from 1934 to date except for a few days in August 1937 when both rates stood at 1½ percent. Examination of Chart 15 indicates that when the Chicago rate was higher than the New York rate the variation was generally equal to form 0.5 percent to 1 percent, with an occasional variation of 1.5 percent, as in the latter part of 1922 and early part of 1923. Only twice since 1920 has the New York rate been higher than the Chicago rate, namely, in 1929 and 1932. During 1929 both banks maintained their rates at 5 percent, except from August 9 to November 1, when the New York bank's rate was raised to 6 percent. In 1932, the Chicago bank reduced its rate from 3.5 percent to 2.5 percent on January 25, whereas the New York bank did not reduce its rate to 2.5 percent until June 24. In 1928, when both banks began to increase their rates, it is indicated that the initiative was taken by the Chicago bank, which in three successive moves increased its rates from 3½ percent to 5 percent, corresponding increases being made by the New York bank after intervals of from two to 28 days. No change in rates has been effected by either bank since August, 1937, so far as I am aware.

Schedule 19 supports Chart 15.

Questions by the Examiner.

You ask me what conclusion is to be drawn from those relationships. Ordinarily, you would expect the rates of the New York bank to be lower than those of the Chicago bank, inasmuch as it is the largest money center in the country and the greatest volume of transactions takes place in New York City. As Mr. Ostrander explained yesterday,

the Federal Reserve Banks make use of the rediscount rate in an attempt to control financial conditions, and in periods of boom, for example, as in 1929, you would naturally expect the bank to make it less profitable for the member banks to obtain loans from the regional banks. In an at-
1483 tempt to reduce the amount of credit which might be extended, and which might have the effect of continuing undesirable boom conditions, the bank would make it more costly for the member banks to do business; and, therefore, since they are operating on a profit motive, they would not tend to borrow or increase their borrowings.

Direct Examination by Mr. Slaff Resumed.

Chart 16 compares the prevailing rates charged customers by banks in principal cities of the country and shows separately the rates for banks in New York, banks in eight northern and eastern cities exclusive of New York City, and banks in 27 southern and western cities. As indicated in Schedule 20 supporting the chart,—and that may be found on page 4 of Schedule 20,—the figures relate to rates charged by reporting banks to their own customers as distinguished from open market rates, the averages being based on rates reported for three types of customer loans —commercial loans, and demand and time loans on securities. The cities included in the group of eight other northern and eastern cities and 27 southern and western cities are listed on page 4 of Schedule 20. As indicated by Chart 16, the rates charged customers by New York City banks are considerably lower than those charged by the banks outside New York, while the rates of the eight northern and eastern cities other than New York in turn are lower than the rates charged by the southern and western cities.

It will be noted that all rates have drifted steadily lower since 1933. The levels reached in February, 1939, in which month the Federal Reserve Board discontinued the series, were: New York City—2.24 percent, eight northern and eastern cities, including the City of Chicago—3.33 percent, and 27 southern and eastern cities—4.09 percent.

Schedule 21 contains comparative indexes of department store sales for the United States and the Federal Reserve District of Chicago. It indicates that during the period since 1923 the level of department store sales in this district has compared favorably with that for the nation and in recent years has shown a tendency to remain somewhat higher than that level as compared with the base period 1923-1925.

Schedule 22 contains comparative indexes of factory employment and factory payrolls for the United States, the State of Illinois and the Chicago industrial area. The index for the United States, as computed by the U. S. Bureau of Labor Statistics, is based on an average for the three years 1923-1925 taken as 100, while those for the State of Illinois and Chicago industrial area, as computed by the Illinois Department of Labor, are based on an average for the three years 1925-1927 taken as 100. In order to make the indexes comparable and at the same time more closely related to the year 1929 and subsequent years, a base period 1929-1931 was chosen and the indexes were adjusted so that the monthly average for the three years 1929-1931 is equal to 100.

This schedule indicates that since 1930 employment conditions in the State of Illinois have been somewhat less favorable than for the country as a whole, although in 1937 when the employment index for the United States reached its peak for the period at 114.8, the State of Illinois showed a corresponding high point of 107.1. Since 1937, employment in the State of Illinois has not kept pace with that for the United States, the index for 1938 falling off to a somewhat greater extent and in 1939 recovering in somewhat smaller degree than that for the nation. Employment conditions in the Chicago industrial area, in turn, have
1484 been somewhat less favorable than those for the State
of Illinois, although, also in 1937, employment in the Chicago area reached a peak for the period since 1930, being only 0.6 of 1 percent below the 1929-1931 average. A decline in 1938 is also noticeable in employment in the Chicago area, but that has been followed by some improvement during the 12 months ended August 31, 1939.

With respect to payrolls, the schedule indicates the existence of similar relationships among the three indexes, but generally lower levels for all indexes after 1930 than in the case of employment. However, the improvement in 1939 over 1938 is more marked in the case of the payrolls indexes than for the employment indexes.

Cross-Examination Interposed by Mr. Morgan.

It is questionable whether I could have gotten the same character of comparative material for the States of Iowa, Nebraska, Kansas, Oklahoma, and Texas. I believe that there are only about five or six states which publish that information.

Direct Examination by Mr. Slaff Resumed.

From the fact that the payrolls indexes since 1930 have been generally lower than the employment indexes, it would appear that wage scales had declined to some extent. Further, the greater improvement show in the payrolls indexes than in the employment indexes in 1939 would seem to indicate an upward trend in wage scales. These indications are confirmed by Schedule 23, which shows the factory average weekly earnings for the United States, as computed by the National Industrial Conference Board, and the corresponding figures, as computed for the State of Illinois by the Illinois Department of Labor. Comparable figures for the Chicago industrial area were not available.

From the data referred to, indexes have been adjusted to the base period 1929-1931 in accordance with the method followed for factory employment and payrolls in the preceding schedule.

Now, Schedule 23 shows that the index of weekly earnings after 1930 declined considerably and reached its lowest level for the United States in 1932 at 66.4 percent and for the State of Illinois in 1933 at 68.7 percent of the 1929-1931 average. The indexes show gradual improvement thereafter, however, and for 1937 were above the 1929-1931 average both for the nation and the State of Illinois. In 1938 the indexes fell off to some extent but in 1939 (12 months ended July) the index for the United States rose to slightly above the 1929-1931 average, while for Illinois the index advanced to slightly less than the 1929-1931 average.

It is of interest to note that the dollar amounts of factory average weekly earnings shown in this schedule do not differ greatly as between the United States average and the Illinois average. In 1929, the average for the United States was $28.55, whereas for the State of Illinois it was $28.67. From 1929 to 1934 the Illinois average exceeded the United States average in each year, by amounts ranging from $0.12 in 1929 to $1.61 in 1932, the average difference being approximately $0.80 in favor of the State of Illinois during those years. In 1935, 1936 and 1937, however, average weekly earnings for the United States were in excess of those for the State of Illinois. In 1938, Illinois' average weekly earnings exceeded those for the United States and in 1939 (seven months ended July) the position was reversed, the two figures in 1939 differing, however, by only $0.14.

1485 *Cross-Examination Interposed by Mr. Morgan.*

The average factory weekly earnings for the United States for the years 1930 and 1931, the years when defendants' pipelines were constructed, was $24.23. The average for the years 1938 and 1939 would be approximately $25.30. In 1938 the figure is $24.49; in 1939, $26.12. There would seem to be some slight increase there. For the State of Illinois, the average for 1930 and 1931 is $25.39, whereas for 1938 the figure is $25.07, and for 1939, $25.98, there being less difference in that case.

I am afraid I could not have gotten comparable figures for construction wages. The U. S. Bureau of Labor Statistics publishes a slightly more comprehensive index of factory average weekly earnings, but the disadvantage is that that index only starts in 1932 and it does not get us back far enough in time, and that is why I used this other index. It may be possible that the index computed by the National Industrial Conference Board is broken down, but I am not sure of that point, whether the detailed information is published or not. They undoubtedly have it, but I am not sure whether it is published.

Direct Examination by Mr. Slaff Resumed.

Passing now to Schedule 24, the fact that factory employment and payroll conditions in the Chicago industrial area were indicated as being somewhat less favorable than for the country as a whole led to an inquiry concerning the experience since 1929 of the companies which render utility services in the Chicago area.

For this inquiry, annual operating revenues for the period 1929-1938 of the three companies which render gas, electric and telephone service in Chicago were ascertained and are shown in Schedule 24. The companies are: Gas—The Peoples Gas Light and Coke Company; Electric—

Commonwealth Edison Company; Telephone—Illinois Bell Telephone Company.

The annual operating revenues of these companies have been reduced to indexes taking the 1929-1931 average of total operating revenues as equal to 100, in order to make those indexes again comparable with the preceding schedules.

It is indicated that for all three companies operating revenues declined after 1930, the index in each instance reaching its lowest level in 1933, at which point they were: The Peoples Gas Light and Coke Company—86.4; Commonwealth Edison Company—87.8; and Illinois Bell Telephone Company—79.7.

Revenues for all three companies recovered after 1933 and in 1937 were, in the same order, 104.4, 107.0, and 96.5. In 1938, however in contrast with the experience of industry generally, the indexes for both The Peoples Gas Light and Coke Company and Commonwealth Edison Company reached their highest levels for the entire period 1929-1938, being 106.8 and 112.4, respectively. In contrast,, telephone revenues fell off slightly in 1938.

That completes the detail concerning the charts and schedules of Exhibit 185.

1486 I think it would be helpful to summarize my testimony, and in doing that it may be said that the period since 1929 has been attended by severe economic depression, and that this period has been characterized by declines in interest rates and return on money to about the lowest levels witnessed in this country since 1900.

The improvement in economic conditions during 1937 was followed by a recession in 1938. However, despite the gradual upturn in business which now appears to be in progress, interest rates and yields on investments have continued to decline and in August, 1939, were down to 1936 levels and even lower in some instances.

During the period since 1929, earnings of public utilities have shown a greater degree of stability than those of industrial and railroad corporations, which is an indication that public utilities, in general, are less subject to the risks confronting other forms of business enterprises.

And, finally, while there appears to be some lag in improvement in economic conditions in the Chicago industrial area and adjacent territory as reflected by indexes of factory employment and payrolls, as compared with the country as a whole, nevertheless, other indexes, such as department store sales and average factory weekly earnings, seem to indicate that, in these respects, conditions are on about a par with the rest of the country. And, as has been shown, operating revenues of the gas, electric and telephone utilities serving the City of Chicago have reflected consistent improvement since 1933 to the extent that in 1938, although telephone revenues were slightly below the 1929-1931 average, revenues for the gas and electric utilities serving the City of Chicago were substantially in excess of their 1929-1931 averages.

Questions by the Examiner.

You ask what the social-economic significance of the department store index is. I would simply say department stores, of course, handle a great many varieties of merchandise, and any indexes relating to department store sales would naturally reflect a much wider scope of business activity and manufacturing, and would have greater implications than sales of just one variety of merchandise, such as paint, clothing, or something of that sort.

A department store index has wider applications than that of any single store whose variety of merchandise is very limited. I do not know that you can make that generalization that a department store index is a little more sensitive than the food, clothing and shelter indices. I think each one of those things is sensitive in itself, but by taking department store sales you get a variety. All of these sensitive figures are concentrated into one index largely.

Cross-Examination Interposed by Mr. Booth.

With respect to Schedule No. 24, under the caption "Commonwealth Edison Company" for the year 1938, 1487 the revenues are shown to be $92,926,649. I believe that includes revenues for the Super-Power Company of Illinois, which was taken over by the Edison Company and incorporated as part of its physical property either in that year or the previous year.

I might say here, though, that the figures for the Peoples Gas Light and Coke Company and the Commonwealth Edison Company are figures of the companies alone, without their subsidiaries, to the extent that figures in that direction were available, and if any figure for Super-Power Company is included in Commonwealth Edison it is only because there was no breakdown by which you could determine what the figures for the Super-Power Company were.

Cross-Examination Interposed by Mr. Morgan.

I prepared Exhibit No. 185. In some instances, of course, the actual work was done under my direct supervision. I kept up with it even though I utilized the services of my staff. There weree several employees whose assistance I obtained.

You ask why I started with 1929 instead of 1930. In making up these last several tables, they range from 1929 to 1939, inclusive, ordinarily. Speaking specifically of those last two schedules, 22 and 23, I think an examination of those schedules will indicate that 1929, as we all know, was the most prosperous year, at least from the standpoint of national income, that the country had experienced. Now it seemed to me that in building, and selecting the period to use as a base period, that if I had taken 1930 and 1931, or 1930, 1931 and 1932 as a base, the result would have been to make the indexes currently much more favorable than they actually are if we include 1929.

I meant to say we would be criticized for selecting indexes of this kind, two years of which were not very good years for business—the indexes here indicate that for 1930 and 1931 the index for the United States on factory employment, for example, was 100.2 and 84.7. Now if we had used 1930 and 1931 as an index, we would have arrived, in 1938 and 1939, at indexes much higher than 94 or 101, and I do not think that we should have used those years, because they did not include a sufficient period of time. It would seem to me to be fair that you should use a period which has some prosperity and some depression in it in order to try to get some normal basis upon which to build your indexes. No, we haven't any boom period in these last three years comparable to 1929.

While the pipeline under investigation happened to be built commencing in the middle of 1930, these indexes covered a period of time which is about the lowest length of time you can use in constructing an index. A 10-year period is considered to be about the minimum period which should be covered in an index. I think you have misunderstood me when I said that we would have gotten more favorable results by omitting the 1929 index in our calculations. I did not mean more favorable from the standpoint of one side of this case or another. I mean if we had omitted 1929 from our indexes here, in the base period, that our indexes in 1937 and 1938 would have been much higher in per cent of the base period than they now are. It is just mathematical results.

Direct Examination by Mr. Slaff Resumed.

1488 Taking the Chicago industrial area column on Schedule 22 for 1931, we show an index figure of 82.1. For the 12 months ending August 31, 1939, we show an index figure of 82. If we had taken 1931 as 100, the 12 months ending August 31, 1939 would have been 100. So if we compare the index figures which we show for 1931 and the present time, we get the relative comparison, or the relative relationship that exists. If instead of taking 1931 as 100, I had taken 1931 as 1000, then the 12-months period ending August 31, 1939 would have been 1000. I do show, therefore, the relationship here between individual years, one with another. And the significance of those averages is not hidden. The figures are shown here for each of the years involved. If we took 1913 or 1915, or any year as the base period, and constructed an index from that point upon it, the relationship between given years would appear.

Questions by the Examiner.

If I were to recompute this table on the basis of, say, 1931, or, say, 1930, and just forget 1929, I do not see why it would not be possible to get the same relationship between years from those indices which I have there by scaling all of them up proportionately. The figure for each year would bear the same relation to any other year, no matter what year or period of years you take as a base period. In other words, the proportion of difference in the indexes between years does not change as the result of changing the base period. I have seen the 1929 base used in other instances. However, we find that commodity prices are on, as I recall it, a 1926 base, I think, and labor statistics are usually on a 1923 to 1925 base.

When I use the National Industrial Conference Board figures in this Schedule 23, that is not presented as the

National Industrial Conference Board setup. That has been revised. The National Industrial Conference Board revision date is mentioned in the footnote. I think I have the figure here. That Board's original figures are based on the three-year period 1927-1929. I know it is published, and I just merely have neglected to put it down.

(EXHIBIT 185 was offered and received in evidence without objection.)

Direct Examination by Mr. Slaff Resumed.

I have seen Exhibit 167 in this case, which is Exhibit 49 previously introduced by Mr. James A, Emery in the Chicago District *vs.* Lindheimer case on July 31, 1934. I have made a certain study in connection with that exhibit at Mr. Slaff's request. I attempted to bring that exhibit up to date. (Objection by Company Counsel overruled.) In bringing forward the issues listed in that exhibit, a search was made first in Moody's or Poor's Current Investment Manual, in order to determine whether the issues listed were still outstanding. This was followed by examination of successively earlier editions of the Investment Manuals until complete information was obtained, insofar as possible, with respect to the ultimate disposition of each of the issues shown in that exhibit, that is, whether the issue was permanently retired either through payment, reorganization, and so forth, or whether it was replaced by new issues as the result of refunding operations,
1489 or as the result of consolidations or mergers.

Having proceeded to the point I have just described, information was then obtained concerning new bond debenture and note financing by natural gas production and transmission companies, or by transmission and distribution companies, or by fully integrated companies during the period from January 1, 1933 to August 31, 1939, in order to project the data contained in Exhibit 167 forward into 1939. Care was taken to see that no duplication of issues was permitted to occur, inasmuch as certain issues replacing those contained in Exhibit 167 also, of course, appeared in the compilation of new issues during the period 1933 to 1939.

Exhibit No. 167 indicates that the overall weighted average yield to maturity to purchasers in 1934, on the basis of market prices at June 30, 1934, of the issues listed in Exhibit 167, was 9.7 per cent. This weighted average is indicated as having been computed on the basis of adopting 15 per cent as the maximum yield to maturity on any individual issue.

Using the list of issues contained in Exhibit 167 projected into 1939 by the method previously described, the yield to maturity approximated to the nearest price quotation based on the average of bid and asked prices as of August 31, 1939, was computed for the individual issues. The overall weighted average of these yields was then computed as of August 31, 1939, based on the most recently available data as to principal amounts outstanding.

That over-all weighted average yield to maturity as of August 31, 1939, the closest date thereto, comes to 5.5 per cent as compared with the 9.7 per cent shown in Exhibit 167.

In that connection, I also took the issues of similar companies which were privately sold during the years 1933 to 1939 and added them in. I added those into the weighted average and got a new weighted average figure. Taking those new issues during the period 1933 to 1939 privately sold, and adding the yields to maturity based on offering price to purchasers, and weighting those issues in with the ones previously described, the resulting overall weighted average yield to maturity was determined to be 5.08 per cent.

At Mr. Slaff's request I also made some studies in connection with Exhibit 150, introduced in this case by Mr. Gilman. I determined the weighted average yield to maturity for all mortgage bonds of domestic electric and gas utility companies traded on the New York Curb September 15, 1939, as shown on pages 3 and 4 of Exhibit 150. That weighted average yield came to 4.69 per cent, as compared with the simple average yield of 5.12 per cent shown in Exhibit 150.

I also made a study of the mortgage bonds of domestic electric and gas utilities traded on the New York Stock Exchange on September 15, 1939. I obtained the weighted average yield to maturity of those bonds. On September 15, at September 15 prices, the weighted average yield to maturity of all electric and gas utility mortgage bonds traded in on the New York Stock Exchange was 3.63 per cent.

1490 The principal amount outstanding of the issues traded in on the New York Stock Exchange, as of

September 15, was $1,974,700,000. The comparable figure for the bonds shown on pages 3 and 4 of Mr. Gilman's Exhibit 150, was $1,299,410,000. The Stock Exchange list contains approximately 60 issues:

I then proceeded to weight the weighted average figure of 4.69, arrived at for the Curb bonds, with the weighted average figure of 3.63 which I arrived at for the Stock Exchange bonds, and the over-all weighted figure was 4.05 per cent.

At Mr. Slaff's request, I then eliminated from the Stock Exchange list of those companies having more than one issue outstanding, all issues except the one showing the highest yield. With that elimination the over-all weighted average of bonds traded on the New York Stock Exchange was 3.69 per cent. I then weighted that result with the weighted average of 4.69 for Curb bonds and got an over-all weighted average of 4.16 per cent.

I next made a compilation of preferred stocks of electric and gas companies listed on the New York Stock Exchange and traded in on September 15, 1939, of the same character dealt with on page 5 of Mr. Gilman's exhibit for the preferred stocks listed on the New York Curb Exchange. The weighted average yield for the preferred stocks shown on page 5 of Exhibit 150 came to 5.93 per cent as compared with the simple average of 6.4 per cent shown in Exhibit 150. The weighted average yield for the preferred stocks of electric and gas companies traded in on the New York Stock Exchange on the date last mentioned was 4.77 per cent. The combined weighted average yield for preferred stocks shown on page 5 of Exhibit 150 and those shown on the New York Stock Exchange list was 5.43 per cent. The total market price of the outstanding shares on the issues of preferred stock traded in on the New York Stock Exchange on September 15, 1939 was $510,346,144. The corresponding figure for preferred stocks traded in on the New York Curb Exchange shown on page 5 of Mr. Gilman's exhibit, was $672,213,463.

I have the working papers in connection with my testimony here and these working papers will be made available to counsel for the companies and for the Illinois Commerce Commission. These working papers do not show what the issues were as such; but they can be related to the various exhibits by a key system.

Cross-Examination by Mr. Morgan.

My working papers will be made available to Mr. Gilman in case he wants to check them. I have done no more with reference to this check on Exhibit 167 than I have testified to here. I have made no comparison to show the relationship between the percentage of total securities represented by bonds, preferred stocks and common stocks at the prsent time as compared with 1934.

I am not prepared to say what percentage of the total outstanding securities of natural gas companies at the present time is represented by bonds. I do not know the percentage with reference to the seven companies which the witness Emery testified about in connection with his Exhibit 167.

1491 I do not know whether the yields of preferred stock as compared with bonds, and the yields of common stock as compared with bonds, are in the same ratio as in 1934. I have made no study to determine that.

I have testified in only one other rate case. That is in the matter of Safe Harbor Water Power Corporation, Docket No. IT-5494, which was a hearing before the Federal Power Commission, conducted within the past month. I had never testified in any rate case prior to that time. I have had no articles published.

1492 CHARLES W. SMITH, a witness for the Federal Power Commission, testified:

(November 7, 1939.)

Direct Examination by Mr. Slaff.

My name is Charles W. Smith. I live at Halethorpe, Maryland. I am Chief of the Bureau of Accounts, Finance and Rates of the Federal Power Commission. On July 1, 1936, I became Chief of the Commission's Bureau of Finance and Accounts, and on February 2, 1938, the Division of Rates and Statistics was transferred to my jurisdiction and the name of the Bureau changed to that just indicated.

I have a B. S. degree in Finance and Business Administration and an LL.B. degree. I am a Certified Public Accountant of North Carolina and of Maryland, both by examination, the first being obtained about 17 years ago.

I am a past president of the Maryland Association of Certified Public Accountants, a member of the American Institute of Accountants, the American Accounting Association and the American Economic Association. I am also a member of the Maryland Bar. In addition, I am a member of the Committee on Public Utility Statistics and Accounts and the Special Committee on Depreciation of the National Association of Railroad and Utilities Commissioners. The latter association is composed of members of railroad public utility regulatory agencies.

As to experience, after working a few years in various capacities such as copy-boy for a newspaper, clerk and bookkeeper, I became, in 1920, an auditor in the Income Tax Unit of the U. S. Treasury Department, leaving that organization in 1929. About one-half of this time I was an office auditor specializing in consolidated returns, that is, joint returns of two or more companies, usually large companies, including public utilities. The remaining part of the time I was with the Income Tax Unit I was a field auditor and, in this capacity, I examined the books of practically every kind of business institution in Maryland, again including public utilities.

In 1929, as the result of obtaining the highest mark in a competitive examination, I was appointed Chief Auditor of the Public Service Commission of Maryland, which position I held until I accepted my present position. As Chief Auditor of the Public Service Commission of Maryland, I had all the experiences devolving upon the chief financial officer of an active regulatory commission. In that capacity I prepared many financial, accounting, economic, and rate studies and testified relative thereto before the Commission and occasionally before courts. My work with the Federal Power Commission is similar to that while with the Maryland Commission, except, of course, it is now on a national instead of a local scale.

I taught accounting in evening schools for about 10 years. During this time, I covered most accounting subjects. For eight years I taught accounting systems, and for two concurrent years, cost accounting at Johns Hopkins University. I have delivered a good many lectures and have written, somewhat, on financial accounting and economic subjects.

I have testified before relative to the rate of return of a public utility company.

1493 While I was with the Maryland Public Service

Commission, all matters appertaining to fair rate of return were under my supervision and I testified before the Commission in all cases in which rate of return was involved, and, in addition, I testified before the three judge court which heard the case of *C. & P. Telephone Company of Maryland v. West, et al.,* constituting the Public Service Commission.

Since I joined the staff of the Federal Power Commission, I have had supervision of matters appertaining to rate of return and have testified in two cases before the Commission. I have supervised the preparation of exhibits in all cases in which rate of return was involved since I joined the staff of the Federal Power Commission.

I supervised the preparation of a report entitled "Rate of Return Study, Part II," in Dockets G-109 and G-112, which you have just handed me.

(At this point, counsel for the Commission requested that the document just referred to by the witness be marked for identification. At the direction of the Examiner, the document was marked Exhibit 186 for identification.)

Cross-Examination Interposed by Mr. Morgan.

Exhibit 186 was prepared by members of my staff under my direction. That is the usual way of preparing this sort of material. Of course, I participated more actively in some of the exhibits than I did in others. I outlined the entire scheme of the exhibit, I told them just exactly what I wanted and how it was to be prepared. In some instances I partake in the preparation much more than others. That is, my directions are followed out by men who have made similar studies in the past. I rely on those working under me to obtain the facts and for mathematical accuracy particularly.

Direct Examination by Mr. Slaff Resumed.

In broad outline, the report is divided into two sections: the first section comprising Schedules 1 to 4 and Charts 1 to 3, inclusive, is designed to give a statistical picture of the natural gas industry in the United States, particularly by showing the volume of transactions during the last several years; the second section consisting of related Schedules 5, 5-A, 5-B, 5-C, 5-D, 5-E, 5-F, 5-G, 6, 7 and 8 and Chart 4, deals with certain financial aspects of natural gas companies, particularly matters relating to the securities of such companies.

Schedule No. 1 shows certain revenue and customer statistics for the years 1929 to 1938, inclusive. The schedule is divided into three sections, the upper section dealing with revenues, the middle section relating to cubic feet of gas sold, and the lower section relating to customers.

It will be seen by scrutinizing the upper section that total revenues increased from $376,000,000, in round figures, in 1929 to $419,000,000, in round figures, in 1938, a substantial increase. During the depression years, the revenues from sales of gas were off, the low point being reached in 1933; then a general recovery set in and total sales in 1938 were the highest in the period portrayed,
1494 except for the year 1937. The year 1937 was generally a better business year than 1938, so that the decrease in sales in 1938 from 1937 conformed substantially to the general business trend.

The latest figures released by the American Gas Association show total revenues of $253,700,000, in round figures, for the six months ended June 30, 1939. This amount was 8.3 per cent above total revenues for the first six months of 1938, and 2.5 per cent above the like period of 1937.

The revenues from sales to domestic customers amounted to $223,000,000 in 1929 and $244,000,000 in 1938—again a substantial increase. The domestic sales followed the trend of total sales quite generally. Commercial sales, unlike domestic and total sales, did not decrease during the depth of the depression but instead steadily increased except for a rather minor decline in 1938. The total commercial sales were, in round figures, $32,000,000 in 1929 and $47,000,000 in 1938. As was to be expected, industrial sales fluctuated a great deal with the change in economic conditions. The sales of $117,800,000, in round figures, in 1929, decreased to a low of $74,100,000, in round figures, in 1932. There was a recovery, however, the high point being reached in 1937 when such sales amounted to $143,800,000. In 1938, industrial sales amounted to $125,000,000, being off from 1937 and slightly under the sales of 1936. Miscellaneous sales, I believe, need no explanation.

It will be noted that the annual revenue per thousand cubic feet of gas sales amounted to 38 cents in 1929 and 34.9 cents in 1938. The revenues per thousand cubic feet have varied somewhat from a high point of 41.1 cents in 1932 to a low of 33.7 cents in 1937. Under the heading

"Domestic," it will be seen that the average revenue per thousand cubic feet in 1929 amounted to 66.7 cents whereas in 1938, the corresponding revenue was 70 cents. The revenue per thousand cubic feet of gas sold under the category of commercial sales has generally declined from 1929 to 1938—the average revenue per thousand cubic feet was 55.5 cents in 1929, whereas the pertinent figure for 1938 was 47.6 cents. Industrial sales have varied from a high point of 20.1 cents in 1929 to 16 cents in 1934; the 1938 figure being 17 cents.

The middle section of that Schedule No. 1 shows the quantity of gas sold. The total sales in thousands of cubic feet for 1929 amounted to 991,000,000, the low point being reached in 1932 when 834,000,000 M. cubic feet were sold.

Thereafter, increased sales were reflected, the high point being reached in 1937, when 1,316,000,000 M. cubic feet were sold. The sales for 1938 amounted to 1,200,607,000 M.C.F. The sales to domestic consumers in 1929 amounted to 335,400,000 M.C.F. The low point for the period, 1933, reflected 300,200,000 M.C.F., after which the sales increased, reaching a high figure in 1937 of 360,200,000 M.C.F. The figure for 1938 was 349,200,000 M.C.F. The sales to commercial customers have increased very substantially in the period under review, the sales being 58,600,000 M.C.F. in 1929, 103,300,000 M.C.F. in 1937, and 99,800,000 M.C.F. in 1938. The sales to industrial customers amounted to 585,000,000 M.C.F. in 1929, after which they declined, reaching a low point of 427,000,000 M.C.F. in 1932, a high point of 836,000,000 M.C.F. in 1937, and 736,000,000 M.C.F. in 1938.

1495 The total sales per customer were 173.7 M.C.F. in 1929 and 170.7 M.C.F. in 1938—a slight decrease. During the interim, the sales decreased and then increased, reaching a high point in 1937 when the annual sales per customer were 191.9 M.C.F. The sales to domestic customers per customer generally declined from 1929 to 1938, although there was a slight increase from the low point of 52.4 M.C.F. in 1934 to 53.6 M.C.F. in 1938. The sales per commercial customer were 184.8 M.C.F. in 1929 and outside of a slight decline for 1930 and 1931 have increased, reaching a high point of 222.0 M.C.F. in 1937 and dropping off to 207.6 M.C.F. in 1938. The average annual sales per industrial customer in terms of volume have varied rather considerably, as would be expected. The sales amounted to 30,642.5 M.C.F. in 1929, reaching a low of 17,393.9 M.C.F.

in 1932, a recovery to 24,592 M.C.F. in 1936 and with average annual sales of 19,846 M.C.F. per industrial customer in 1938.

The lower section of the schedule contains statistics appertaining to average number of customers during each year of the period under review. The total number of customers has generally trended upward from 1929 to 1938, the number being 5,703,000 in 1929 and 7,033,700 in 1938. The average number of domestic customers has increased, the figure being 5,300,000 in 1929 and 6,500,000 in 1938. The number of commercial customers has followed the trend of the total and of domestic customers, the average being 317,000 in 1929 and 481,000 in 1938. The average number of industrial customers has likewise increased during the period from the low of 19,000 in 1929 to 37,000 in 1938. That is almost double.

The average annual revenue per customer for all customers for the year 1929 amounted to $65.97 and in 1938, $59.64, somewhat of a decrease. For domestic customers, the pertinent figure for 1929 was $41.65 and for 1938, $37.52, the 1938 figure still being under the 1929 amount. The average revenue per commercial customer was $102.64 in 1929 and $98.93 in 1938, a slight decrease. This slight decrease took place while the sales to commercial customers increased substantially in volume and, as shown in the top section of the schedule, was accompanied by a decrease in average revenue per M.C.F. The revenue per industrial customer has quite naturally fluctuated considerably, the figure being $6,170.00 in 1929 and $3,372.00 in 1938. Thus, while industrial sales have increased substantially in volume, there has likewise been a substantial increase in the number of customers, although, at the same time, the average revenue per M.C.F. for industrial customers has fallen from 20 cents in 1929 to 17 cents in 1938.

Cross-Examination Interposed by Mr. Morgan.

No, I do not realize that practically none of the gas that is sold by defendants was included in those figures. You are correct. The exhibit does not include the figures of companies who sell mixed gas. It is confined to companies which sell natural gas only.

Direct Examination by Mr. Slaff Resumed.

1496 I would like to state that the source of the information is generally given at the bottom of each schedule.

Schedule 2 shows the condensed income accounts of the natural gas industry for the years 1931 to 1937, inclusive. The revenues from sales to customers for each of the years from 1931 to 1937 are somewhat lower than the totals shown on Schedule 1, from which I would surmise that statistics for a few companies included in Schedule 1 are not included in Schedule 2. The differences, I might say, are relatively minor and do not affect the comparisons which are shown in Schedule 2.

I would like to call attention to items on Schedule 2. The first is net operating income which amounted to $111,264,000 in 1937, $109,108,000 in 1936, $93,050,000 in 1935, $71,029,000 in 1934, $64,840,000 in 1933, $76,092,000 in 1932 and $83,588,000 in 1931. It will be seen that the operating income in 1937 is higher than for any previous year shown in the schedule and is substantially higher than net operating income for 1931. The other item to which I would like to call attention is income available for dividends and surplus. Such income was $74,623,000 in 1937, $68,866,000 in 1936, $55,981,000 in 1935, $31,337,000 in 1934, $26,796,000 in 1933, $43,873,000 in 1932 and $50,816,000 in 1931. Again it will be seen that the net income available for dividends and surplus was substantially higher in 1937 than in 1931, and that 1937 was higher than any other year portrayed in the schedule. The amount of fixed capital is given for the years 1934 to 1937, inclusive, and it will be seen that the fixed capital increased about $83,000,000 between those years.

I would like to state that I do not have figures for years prior to 1931, and that is the reason I did not include them in this report. For fixed capital the figures that I have available go back only to 1934.

Both of these pages of the exhibit have to do with retail sales of distribution companies. The fixed capital figure is a figure for gross fixed capital.

Chart 1 shows in graphic form the monthly sales and revenues of the gas industry. The top lines on the left-hand side of the sheet show total revenues from both manufactured and natural gas industries by months for the years 1929, 1937 and 1938. The 1938 line is an unbroken line. The 1937 line is a dotted line. The 1929 line is a dashed line.

It will be seen that the revenues for the three years mentioned clearly approximate each other. In the lower section on the same chart, revenues from the sale of manufactured gas for 1929, 1937 and 1938 are indicated. On the chart to the right are sales of natural gas in billions of cubic feet. Thereunder, the revenues for the natural gas industry are portrayed for the years 1929, 1937 and 1938. It will be seen that the business of natural gas companies is somewhat more seasonal than that of the manufactured gas companies and it will also be seen that the revenues from the natural gas business are somewhat higher than revenues from the sale of manufactured gas.

1497 Chart 2 has to do with distribution companies. In this first section you have to consider the charts together in order to get a proper picture of the natural gas industry. You see you do not have quite the volume of statistics in the natural gas industry that I would like to have, chiefly because we haven't had the regulation of the interstate movement of natural gas. In a couple of years I am sure we will supply that need. I think you must consider all these charts together in order to get the proper picture. Chart 2 has been included in the exhibit for the purpose of giving some information as to the trend of sales in 1939. That chart shows the monthly revenues for 1938 broken down into classifications of total, domestic, industrial and commercial. The revenues up to July, 1939, are shown by the same classifications. It will be seen that the revenues for 1939 are higher than those for the year 1938.

Chart 3, which is taken from the Annual Statistics of The Natural Gas Industry in 1937, issued by the American Gas Association, compares natural gas sales with manufactured gas sales and industrial activity. The line portraying industrial activity is taken from the Standard Statistics index of industrial activity. All of the lines on the graph are chained together in 1926 which is taken as 100. It will be seen that the sales of natural gas have exceeded sales of manufactured gas since that date and that both the sales of natural gas and manufactured gas have not been accompanied by as great a decline as experienced by the industry in general during the depression years.

The caption on the chart, "Stability of the Gas Industry compared with General Industrial Activity," is the American Gas Association's caption.

I took that chart from the statistics for the year 1937 and carried it down to 1938. I would like to add that we have added the year 1938 in ink on the chart. It does not show it separately, but it has been added in ink from the publications of the American Gas Association. This chart is shown on page 4 of Exhibit 179, which is Statistical Bulletin No. 37, issued in October, 1939, by the American Gas Association.

It is my understanding that Charts 2 and 3 also have to do with gas distribution.

Schedule 3 shows natural gas production, consumption and transportation in the entire United States for the years 1926 to 1937, inclusive. On this schedule, column (b) shows the production; column (c) shows the consumption, which is exclusive of the gas used for field operations and manufacture of carbon black; column (d) shows the amount of gas transported in interstate commerce; column (e) shows the percentage of total consumption, transported in interstate commerce; and the final two columns show the total number of states in which gas was produced and consumed.

Here I am dealing with production and transmission of natural gas and not with distribution, as heretofore.

It will be seen from Schedule 3 that in 1937 approximately 48 per cent of the total natural gas consumed
1498 was transported in interstate commerce. Heretofore such transactions in interstate commerce have generally not been subject to regulation, but since the passage of the Natural Gas Act, this condition has been changed. The schedule shows very clearly the importance of natural gas as a commodity of interstate commerce.

I show the sources of the data at the bottom of the schedule.

I do not know offhand which two states in 1931 quit producing gas. There were 26 producing in 1929 and 1930 and since then only 24 have been producing gas.

Schedule 4 has been compiled for the purpose of showing the natural gas transported into the State of Illinois from other states. It shows that no gas was transported into the State of Illinois from other states in the year 1928; a relatively small amount from the State of Louisiana in 1929 and a substantial amount from Louisiana in

1930; in 1931 substantial amounts of gas were imported into Illinois from Texas and Louisiana; and in 1937, of a total of 77,610,000 M.C.F., 56,957,000 M.C.F. came from Texas, 17,367,000 M.C.F. from Louisiana, 2,973,000 M.C.F. from Kansas, and 313,000 M.C.F. from other states than those mentioned.

The sources of the data shown in Schedule 4 are given in the footnote.

Beginning with Schedule 5 of Exhibit 186, we show data relative to security issues of certain natural gas companies. The companies included in Schedule 5 were all the companies I could find which had the following characteristics:

(1) Were engaged in the production and transmission of natural gas; or

(2) Were engaged in the transmission of natural gas; and

(3) Had operating revenues in 1938 of $2,500,000 or more.

In taking those companies which had $2,500,000 revenue or more, my general purpose was to try to get companies which were somewhat comparable with the companies involved in the present proceeding, and the companies with annual revenues of less than $2,500,000 would not, in my opinion, be comparable. We did not pick and chose among the companies with revenues of $2,500,000 or more. We took all the companies which I could find which had the characteristics I have just mentioned. I mean they had to be engaged in production and transmission, or transmission by itself. They had to have those characteristics. They could have distribution, but they had to have transmission. They could have production as well.

I have not made any calculation as to the number of companies shown on this list which have more securities outstanding than Natural Gas Pipeline Company of America. I will do that before I return for cross-examination.

On Schedule 5 there are shown for each of the 31 companies having the characteristics previously described, the total amount of securities outstanding and the amount of those securities held respectively by the public, by institutions and by affiliates. By institutions, I mean
1499 banks, insurance companies, universities, etc. The information as to securities outstanding is as of the latest dates for which we could obtain the pertinent in-

formation. Some of the information is as of a recent time, some as of December 31, 1938, and, in a few instances, as of December 31, 1937.

On Schedule 5-A, there is given certain information relative to bonds, debentures and notes of the companies held by the public.

On Schedule 5-B are shown the holdings of bonds, debentures and notes of the companies by institutions.

On Schedule 5-C, the holdings of bonds, debentures and notes by affiliated interests are set forth.

On Schedule 5-D, certain information relative to public holdings of preferred stock of the companies is portrayed. That schedule will be explained subsequently.

Schedule 5-E shows the holdings of preferred stocks by affiliates.

Schedule 5-F shows market value and other data relative to common stocks held by the public, whereas Schedule 5-G shows the common stocks held by affiliates.

I would like to state that Schedules 5-A to 5-G, inclusive, are tied in with and, in a sense, support Schedule No. 5. As to Schedule No. 5 itself, the sources of information are not disclosed, because the sources were varied. We have work papers supporting the information, which will be gladly made available.

(EXHIBIT 156 for identification, received in evidence, subject to counsel for complainant supplying a properly certified copy in lieu of the document admitted. Motions to strike Exhibits 141 and 142 by Commission counsel denied.)

(EXHIBIT 184 for identification, offered and received in evidence.)

I have prepared in narrative form a statement with respect to each of the companies shown in Schedule 5 and have handed that statement to the reporter with the request that it be incorporated in the record as my statement with respect to that schedule.

(At this point the Examiner directed the reporter to copy into the record, from the typewritten document handed the latter by the witness, pages 15 to 30, inclusive, and the first half of page 31. The statement follows:)

1500 The Arkansas-Louisiana Gas Company is engaged in the production, transmission and distribution of natural gas. Its sources of supply are Monroe, Richland and Elm Grove fields in Louisiana and certain other fields in Texas and Arkansas.

The company supplies natural gas to a larger number of communities in Arkansas, Louisiana, and Texas. The principal communities served at retail are Little Rock, Arkansas, Shreveport, Louisiana, and Texarkana, Texas. Gas is sold at wholesale to, among others, Consumers Gas Company for distribution in the City of Hot Springs, Arkansas, and to other companies for distribution in two smaller communities in Arkansas.

The company has 1,371 miles of transmission lines and has about 10 compressor stations with an aggregate rated capacity of 26,390 h.p. The First Mortgage, 2¾% 1940-1944 bonds in the amount of $3,300,000 were held, it is indicated by page 1 of Schedule 5, by institutions. Referring to page 1 of Schedule 5-B, it will be seen that the $3,300,000 First Mortgage bonds just mentioned are held by the Guaranty Trust Company of New York and by the Central Hanover Bank & Trust Company, the former owning $2,800,000 of the bonds and the latter, $500,000 thereof. The First Mortgage, 3½% 1945-1954 bonds in the amount of $9,700,000 were also owned by institutions, as is indicated by Schedule 5, and Schedule 5-B shows that the entire issue was owned by the following institutions in the amounts indicated:

Equitable Life Assurance Society of U. S.	$4,850,000
Metropolitan Life Insurance Company	3,550,000
Massachusetts Mutual Life Ins. Company	400,000
Sun Life Assurance Co. of Canada	350,000
Teachers Ins. & Annuity Assoc. of America	300,000
Provident Mutual Ins. Co. of Philadelphia	250,000
	$9,700,000

The $6,500,000 of Debentures shown on Schedule 5 were all held by the Arkansas Natural Gas Corporation as is shown on page 1 of Schedule 5-C. Common stock of the company outstanding was 298,988 shares of a par value of $50 each or an aggregate book amount of $14,949,400. All of the common stock was held by affiliates and Schedule 5-G indicates that the entire issue in question was owned by the Arkansas Natural Gas Corporation.

The next company is the Canadian River Gas Company. That company is engaged in the production and transmission of natural gas. Its source of supply is the Texas Panhandle field, and its main line extends from that field to a point near Clayton, New Mexico. As has been shown by testimony in this proceeding, the Canadian River Gas

Company supplies 25% of the gas requirements of the Natural Gas Pipeline Company of America. The company owned 98 miles of trunk lines of various sizes at the end of 1938. The first Mortgage 6% Bonds in the amount of $6,244,000 of the Canadian River Gas Company are all owned by the Colorado Interstate Gas Company, as shown by page 1 of Schedule 5-C. The entire common stock of the company, having book amount of one dollar, was owned by the Southwestern Development Company, as is shown by Schedule 5-G.

1501 Chicago District Pipeline Company. This company is engaged in the purchase, transmission and sale of natural gas. Its gas transmission system appears to consist of approximately 43 miles of 24-inch pipeline from Joliet, Illinois, to a point of connection with one of the Peoples Gas Light & Coke Company's transmission mains on the southern limits of the City of Chicago; approximately 1.3 miles of 20-inch pipeline from the company's 24-inch system to a point on the Illinois-Indiana State line; approximately 31 miles of 24-inch pipeline and 4 miles of 20-inch pipeline forming a connection with one of the Peoples Gas Light & Coke Company's transmission mains on the western limits of the City of Chicago. I believe it has been shown by testimony in this proceeding that the Chicago District Pipeline Company purchases its gas requirements from the Natural Gas Pipeline Company of America. The largest sales by the Chicago District Pipeline Company are to the Peoples Gas Light & Coke Company. The notes payable of the company in the amount of $2,769,897 were owned by the Natural Gas Investment Company, as shown by Schedule 5-C. The common stock, consisting of 1,000 shares of no par value, with book amount of $10,000, was all held by the Natural Gas Investment Company, as indicated by Schedule 5-G.

Cities Service Gas Company. This company is engaged in the production and transmission of natural gas. It obtains its gas from a number of fields in Texas, Oklahoma, and Kansas, including particularly, the Panhandle field in Texas and the Oklahoma City and Seminole fields in Oklahoma. The company's system consists of 4,273 miles of pipeline and 29 compressor stations. Gas is sold at wholesale to distributing companies serving 229 communities, including Kansas City, St. Joseph, Springfield, and Independence, Missouri; Bartlesville, Oklahoma, and Kansas City, Leavenworth, Topeka and Wichita, Kansas.

The company has outstanding First Mortgage 3¼% and 3¾% bonds due 1940-1954 in the amount of $35,000,000 all of which bonds are held by institutions, as shown on page 1 of Schedule 5-B. $20,000,000, consisting of 3¾% bonds, are owned outright by four banks and two insurance companies, and the remaining $15,000,000, 3¼% bonds, are held as collateral for loans. The $8,000,000, Debentures, 5½%, 1956, are held by the Cities Service Company and subsidiaries, as shown by Schedule 5-C. The common stock of the company consisting of 300,000 shares of no par value is all held by the Empire Gas & Fuel Company, as shown by Schedule 5-G. The Empire Gas & Fuel Company, I might state, is owned 100% by Cities Service Company and certain of its subsidiaries.

Colorado Interstate Gas Company: The Colorado Interstate Gas Company is engaged in the transmission of natural gas. The main transmission system of the company extends from a point near Clayton, New Mexico, to Denver, Colorado, a distance of 254 miles. The company also has 165 miles of branch lines connecting with the main system at different points along the line. The company acquires its gas from the Canadian River Gas Company, described heretofore. The First and Collateral Trust, 3½%'s, 1948, in the amount of $10,898,000 were held partly by institutions and partly by affiliates. As shown on Schedule 5-B, the Mutual Life Insurance Company of New York owned $4,865,000 of such bonds and, as shown on Schedule 5-C, the Imperial Oil Ltd. and Standard Oil Company of New Jersey owned $6,033,000 of the bonds outstanding. Of the preferred stock of the company consisting of 6% par value $100, $2,000,000 in amount, the entire issue was owned by the Standard Oil Company
of New Jersey and Consolidated Oil Corporation in
1502 equal amounts, as is shown by Schedule 5-E. The
common stock of the company consisting of 1,250,000 shares of no par value was owned by the following companies in the proportions indicated, as is shown by Schedule 5-G:

Southwestern Development Company	42½%
Standard Oil Company of New Jersey	42½%
Public Service Company of Colorado	15%

East Ohio Gas Company. This company is engaged in the production, purchase, transmission and distribution of natural gas. The company supplies the gas requirements in Cleveland and in many other cities and towns in eastern and northern Ohio. It has over 6,000 miles of pipeline. The preferred stock of the East Ohio Gas Company is owned by the Standard Oil Company of New Jersey, as is shown by Schedule 5-E, and the common stock is all owned by the same company, as is indicated by Schedule 5-G.

The El Paso Natural Gas Company is an operating and holding company. It purchases gas from producers in southeastern New Mexico. The company and its subsidiaries are engaged in the business of purchasing natural gas from producers in New Mexico, transmitting it through a pipeline system and selling it at wholesale to public utility and industrial customers located principally in or near El Paso, Texas; Hurley, New Mexico; Phoenix, Arizona; etc. The pipelines of the company and its subsidiaries consist of 1,331 miles, including duplicate lines, branch lines and gathering lines. The First Mortgage, 3½% bonds of the company in the amount of $6,000,000 are held by the following institutions, as is shown by page 1 of Schedule 5-B.

Sun Life Assurance Co. of Canada	$ 891,102
Equitable Life Assurance Society of U. S.	2,250,000
Massachusetts Mutual Life Ins. Co.	275,000
Metropolitan Life Ins. Co.	2,000,000
Mutual Life Ins. Co. of New York	475,000
	108,898
	$6,000,000

The serial notes in the amount of $3,480,000 were all owned by The Chase National Bank, likewise as is shown by Schedule 5-B. All of the preferred stock of the company, consisting of 7% Cumulative, par value $100, was owned by the public and the common stock of the company was likewise held by the public.

Equitable Gas Company. This company is engaged in the production, purchase, transmission and distribution of natural gas. The company's production properties are in western Pennsylvania, but the major portion of its natural gas is obtained from the parent company, Pittsburgh & West Virginia Gas Company, which in turn obtains gas from West Virginia and eastern Kentucky. The company produces, transports, and distributes natural gas in the western part of Pennsylvania, including particularly Pittsburgh and cities in the vicinity. The notes of the company outstanding in the amount of $13,540,408 are all held by affiliated companies. The common stock of the company was held by Pittsburgh & West Virginia Gas Company.

The Hope Natural Gas Company is engaged in the production, purchase, transmission and distribution of natural gas. It is one of the oldest and most important 1503 gas subsidiaries of the Standard Oil Company of New Jersey in the Appalachian field. The company's operations are confined to the State of West Virginia, but its main outlet are sales to the East Ohio Gas Company which operates in the State of Ohio, and to the Peoples Natural Gas Company which operates in the State of Pennsylvania, both of which companies are likewise subsidiaries of the Standard Oil Company of New Jersey. The only security outstanding of the Hope Natural Gas Company was common stock, all of which was owned by the Standard Oil Company of New Jersey.

The Houston Gulf Gas Company is engaged in the production, purchase, transmission and wholesale distribution of natural gas. The principal producing properties of the company are located in south Texas. The main pipelines extend from the field in south Texas to Houston, Texas, and industrial areas in that vicinity. Pipelines of the company aggregate 482 miles. The company sells at wholesale substantially all requirements of about 18 communities in southern Texas. The company is also engaged in the production, transportation and sale of a limited amount of crude oil. The bonds and debentures of the company, as shown by Schedule 5, were largely held by the public. The notes were held by an affiliate, United Gas Pipe Line Company, as shown by Schedule 5-C. The preferred stocks were largely held by an affiliate, United Gas Corporation. Most of the common stock of the company was held by the United Gas Pipe Line Company, as shown by Schedule 5-G.

The Indian Territory Illuminating Oil Company is engaged in the production of oil and natural gas and the transmission of natural gas, and is an operating as well as a holding company. The transmission lines of the company connect with other subsidiaries of the Cities Service Company. Its outstanding notes were held by affiliates and by a bank, and some of its common stock was held by the public, although the majority was held by Cities Service Company, and Empire Gas & Fuel Company, as shown by Schedule 5-G.

The next company is Interstate Natural Gas Company, Inc., whose securities outstanding consisted of common stock, some of which was held by the public but most of which, however, was held by Standard Oil Company of New Jersey and the Columbian Carbon Company, as indicated by Schedule 5-G. The Interstate Natural Gas Company, Inc., owns 170 miles of main pipeline, 22 inches in diameter, running from the Monroe gas field in northern Louisiana to Baton Rouge, Louisiana. It serves at wholesale companies supplying natural gas to Natchez and Baton Rouge, and it connects at Baton Rouge with a pipeline of the United Gas Pipe Line Company, which supplies gas to the City of New Orleans.

The Iroquois Gas Corporation is engaged in the production, purchase, transportation and distribution of natural gas and manufactured gas. The company's operations are confined to the western part of New York State. The company's outstanding securities, consisting wholly of common stock, were all held by National Fuel Gas Company, as is shown by Schedule 5-G.

The Lone Star Gas Company is engaged in the production, purchase, and distribution of natural gas and also, somewhat, in the production of crude oil. Its transmission lines are in two service groups—(1) a main group extending from the southeastern extremity of the Texas Pan-
1504 handle to Fort Worth and Dallas, where it connects
with transmission and distribution lines which extend through the central part of Texas and southern Oklahoma. The company distributes gas directly in Fort Worth. (2) The secondary groups extends in a southwesterly direction from Brownwood, Texas, to San Angelo, Texas, etc. The company owns 4,384 miles of mains and field lines and 21 compressor stations. The company has outstanding mortgage notes in the amount of $214,100, all of which were held by the public, and 4½% notes, 1953, in the amount of $19,600,000 which were held by the Lone Star Gas Corporation, parent company, as shown by Schedule 5-C. All of the company's outstanding common stock was held by the same parent company, as indicated by Schedule 5-G.

The Manufacturers Light and Heat Company is engaged in the production, purchase, transmission and distribution of natural gas. The company distributes gas in western Pennsylvania, northern West Virginia, and eastern Ohio. Important cities in which the company distributes gas include Pittsburgh, New Castle and Washington, Pennsylvania; Steubenville and East Liverpool, Ohio; and Moundsville, West Virginia. It obtains its supply in southwestern Pennsylvania, West Virginia and Ohio. The company's notes payable of $360,000 and practically all of the common stock having a book value of $22,530,400 is held by Columbia Gas & Electric Corporation.

The Memphis Natural Gas Company is engaged in the purchase and transmission of natural gas. The company's main pipeline extends from the Monroe field in Louisiana to Memphis, Tennessee, a distance of 402 miles. All of the notes of the company were held by institutions and somewhat more than half of the common stock of the company was held by the public while the remainder was held by affiliates.

Unless there is some objection, or unless some question arises concerning a particular company, from now on I will not describe the institutional or the affiliated holders of the securities of the various companies. Such information is shown in detail in Schedules 5-B, 5-C, 5-E and 5-G.

The Mississippi River Fuel Corporation is engaged in the transmission of natural gas. The company owns and operates 450 miles of main pipeline from Louisiana to St. Louis, Missouri, together with main compressor stations and branch pipelines incidental to the delivery of natural gas to industrial consumers and to distributors to communities along the route. All of the first mortgage bonds of the company were held by institutions. The 6%, 1940, notes were held by affiliates and all the common stock was held by affiliates.

The Mountain Fuel Supply Company is engaged in the production, transmission and sale of natural gas. The company's sources of supply are chiefly in Colorado, Utah and Wyoming, and it has 530 miles of transmission lines. Principal cities served by the company are Salt Lake City and Ogden, Utah. The common stock of the company outstanding was of the book amount of $19,899,025, $15,090,455 of which was owned by the public and the balance by affiliates.

The Natural Gas Pipeline Company of America is one of the companies involved in the present proceeding, and I believe an adequate description of its facilities is included in the record; suffice it to say at this time that the company's bonds and stocks are all owned by affiliates.

1505 The Northern Natural Gas Company is engaged in the production, purchase, transmission and distribution of natural gas. The company and subsidiaries own and operate approximately 2,200 miles of natural gas transmission lines, extending from the Texas Panhandle and Hugoton, Kansas, fields to South Dakota and Minnesota. The main transmission lines are largely 24 inches in diameter. Natural gas is sold principally at wholesale in Iowa, Kansas, Nebraska, South Dakota, and Minnesota. Cities supplied at wholesale include Omaha and Lincoln, Nebraska; Council Bluffs, Des Moines, Sioux City, Mason City and Fort Dodge, Iowa; Sioux Falls, South Dakota; and Minneapolis and Rochester, Minnesota. The First Mortgage, 3¼%, 1954, bonds of the company were all held by institutions. The bonds were sold to the institutions in August of this year. The common stock of the company was all held by three affiliates.

The Ohio Fuel Gas Company is engaged in the production, transmission and distribution of natural gas. The company has the most extensive gathering, transmission and distribution system in the State of Ohio. It supplies some 300 cities and towns in that State. The 4% notes, 1940-1946, were held by institutions and other notes aggregating $6,734,363 were held by affiliates. All of the common stock of the company was likewise held by an affiliate, Columbia Gas & Electric Corporation.

The Oklahoma Natural Gas Company is engaged in the production, transmission and distribution of natural gas. The company has 2,182 miles of pipeline. It obtains its supply of gas in Oklahoma, and ⅓ of the business of the company in terms of volume of gas sold is in Tulsa and vicinity and another ⅓ in Oklahoma City and vicinity. The First Mortgage 3¾%, 1955, bonds of the company were all held by the public and were issued in August of this year. There were also outstanding bank loans in the amount of $8,000,000, which were held by institutions. The two issues of preferred stock were held by the public and the common stock was likewise held by the public. The stock of the company was formerly owned by the Gas Utilities Company, which company was dissolved in 1936, and the common stock of the Oklahoma Natural Gas Company was distributed to approximately 2,500 stockholders of the Gas Utilities Company.

The Panhandle Eastern Pipe Line Company is engaged in the production, transmission and distribution of natural gas. The company owns a natural gas transmission system extending from the Amarillo gas field in the Texas Panhandle through Oklahoma, Kansas, Missouri and Illinois to a point near Dana, Indiana, adjacent to the Illinois-Indiana State line. The major portion of the gas transmitted is sold at wholesale to other gas transmission and distributing companies, the balance is sold to industrial consumers. The principal distributing company served is the Michigan Consolidated Gas Company which supplies gas to customers in Detroit, Michigan, and vicinity. The company's transmission system consists of approximately 2,100 miles of pipeline. The First Mortgage, 4%, 1952, bonds of the company are owned in part by the public, but largely by institutions. The bonds were issued in March, 1937. There was outstanding bank loans in the amount of $2,000,000. The preferred stock, both Series A and Series B, was all held by the Columbia Oil & Gasoline Corporation, and the common stock was held by the Columbia Oil & Gasoline Corporation and by the Missouri-Kansas Pipe Line Company.

1506 The South Penn Oil Company is engaged in the production of oil and natural gas. The chief sources of supply are Pennsylvania, New York, West Virginia and Kentucky. The only securities outstanding consisted of common stock, book amount of $25,000,000, of which $20,681,425 was owned by the public and the balance by affiliates.

The Southern California Gas Company is engaged in the purchasing, transmission and distribution of natural gas. The company purchases natural gas in California and transports and distributes natural gas to various customers in Los Angeles, San Bernardino, Fresno and other counties in California. The major part of the company's revenue is derived from the distribution and sale of natural gas to domestic customers. About ⅔ of the First Mortgage, 4% 1965, and First Mortgage, 4½%, 1961, bonds of the company outstanding, were held by the public and ⅓ of each issue held by institutions. About ¾ of the 6% preferred stock, par value $25, was held by the public and ¼ by affiliates, whereas all of the 6%, Series A, par value $25, was held by the public. The common stock was all held by the Pacific Lighting Corporation.

The Southern Counties Gas Company of California is engaged in the transmission and distribution of natural gas. The company purchases its gas in California and distributes gas to about 98 cities and towns in that state. The company has about 230 miles of transmission line. Of the First Mortgage, 4½%, 1968, bonds outstanding, $9,432,860 were in the hands of the public, whereas $2,067,140 are held by institutions. All of the common stock was held by the Pacific Lighting Corporation.

The Southern Natural Gas Company is engaged in the transmission of natural gas. The company purchases gas under long term contract from the Monroe and Richland fields in Louisiana and transports gas from those fields to markets in Mississippi, Alabama and Georgia. The main line extends eastward to Atlanta, Georgia, approximately 504 miles. Gas is sold chiefly to 12 distributing companies. The First Mortgage, 4½%, 1951, bonds were held almost equally by the public and by institutions. The First Mortgage, 4½% 1952, bonds were all held by institutions. The Adjustment Mortgage bonds of 1960 were held by the public and affiliates and notes in the amount of $1,475,000 were held by banks. Of the common stock of the book amount of $5,189,776, $2,698,667 was in the hands of the public and the balance owned by affiliates. The Adjustment Mortgage bonds were issued in 1936, pursuant to a reorganization plan to holders of predecessor company's convertible 6% debentures, 1944, and to holders of filed and allowed claims on the basis of $500 of the new adjustment bonds, plus 48 shares of new Class A stock, for each $1,000 principal amount of old debentures and each $1,030 of claims. The Class A stock together with Class B stock was subsequently converted into the presently outstanding common stock.

The Texoma Natural Gas Company is one of the companies involved in the present proceeding and all of the securities of the company, as already shown in the record, are owned by affiliates.

1507 The United Fuel Gas Company is engaged in the production, transmission and distribution of natural gas. The company's production operations are carried on in West Virginia and it supplies natural gas to many communities in that state as well as in southeastern Ohio. The 4% notes of the company, 1940-1946, in the amount of $5,250,000 were all held by institutions and other notes aggregating slightly in excess of $13,000,000 were held by the Columbia Gas & Electric Corporation and all of the common stock was held by the same company.

The United Gas Pipe Line Company is engaged in the purchase, and transmission of natural gas. Gas is purchased principally at the wells in Texas, Louisiana and Mississippi, and is gathered and transported for sale to distributing systems of United Gas Corporation, to industrial corporations, and to others. The company owns 4,743 miles of pipeline in Texas, Louisiana, Mississippi, Alabama and Florida. The company, therefore, has long pipelines serving a very wide territory. All of the outstanding securities of the company were held by affiliates, the debentures and common stock being owned by the United Gas Corporation, and the bonds being held by Electric Bond & Share Company.

The United Natural Gas Company obtains its supply from northwestern Pennsylvania and supplies gas to several towns in Pennsylvania and a large quantity of gas is sold to Iroquois Gas Corporation, an affiliated company, for distribution in western New York. The only security the company had outstanding was common stock, all of which was held by the National Fuel Gas Company.

The summary on page 6 of Schedule 5 discloses that of a total of $418,882,597 of bonds, debentures and notes outstanding of the 31 companies which I have just described, $65,668,459 was in the hands of the public, $153,572,164 was owned by institutions, and the balance, $199,641,974, was owned by affiliates.

The preferred stock outstanding was $60,713,200, of which $34,381,900 was owned by the public, and the balance by affiliates. Of the common stock outstanding, somewhat less than 10%, namely, $54,848,338, was held by the public, and the balance, $503,806,766, was held by affiliates. Of the total securities outstanding, aggregating a book amount of $1,038,250,901, $154,898,697 was in the hands of the public, $153,572,164 owned by institutions, and $729,780,040 owned by affiliates.

The outstanding characteristic of security issues is the large amount of securities owned by affiliated companies in comparison with the small amount owned by the public and institutions. This leads, naturally, to the conclusion that great care must be exercised in selecting samples for the purpose of disclosing what is proper cost of money to any natural gas company in connection with rate of return studies. It will be seen from the summary of Schedule 5 that a fair sample of bonds outstanding can probably be had. Preferred stock outstanding, however, is very minor in amount, being approximately 6% of the total of outstanding securities, and only one-half of this amount is held by the public. When it comes to common stock, the amount outstanding in the hands of the public is so small that erroneous conclusions may easily be drawn from a study of such a meager sample. I would like to reiterate, that the companies included in the study are not handpicked but are all the companies I could find with the characteristics which I have previously mentioned.

By "affiliates" as I used that term on page 6, Schedule 5, I mean corporate stockholders. Of course, some of the bonds held by institutions are held by corporate stockholders, but I mean a broader sense than that. I mean what we ordinarily have in mind by affiliated companies. Affiliated companies is not a term which can be exactly defined. It is defined differently in many statutes but I use the term in the broad sense of being an affiliated company.

I assumed that Columbian Carbon Company, for instance, was an affiliate of Natural Gas Pipeline Company. Columbian Carbon Company owns 2 percent of the stock in the Pipeline Company and also owns a million dollars of bonds of the Pipeline Company. When you consider the historical development of the Pipeline Company, I think you would naturally conclude that Columbian Carbon Company is an affiliated company.

Your suggestion that whenever I find another company owning part of the stock of the company under consideration I have called it an affiliate, is not altogether accurate. Generally, they are gas companies and, generally, if they own a sufficient amount I would consider them affiliated companies. Some of the institutions are likewise corporations but we would not classify those as affiliates. The term "affiliates" is not necessarily confined to gas companies. I think the reading of the list will pretty well explain for itself the list of affiliated companies. One of the reasons we set forth the security holdings in great detail was for the very purpose of showing the degree of affiliation. For instance, Colorado Interstate Gas Company which is shown in Schedule 5-E, the preferred stocks were held 50 percent by Standard Oil Company of New Jersey.

Direct Examination by Mr. Slaff Resumed.

I show in detail the name of each company which I set out as an affiliate with respect to the bonds, debentures and notes of natural gas companies, and the preferred and common stocks of natural gas companies. Those are more specifically shown in detail in Schedules 5-C, 5-E, and 5-G.

In 5-G we also show percentages of ownership of outstanding stocks. Now, you will find in many cases that the percent of ownership is very large, 100 percent in a great many cases. I will repeat, I have used the term in a general sense and not with any exact definition in mind.

Cross-Examination Interposed by Mr. Morgan.

I have had a good deal of experience in trying to define the word "affiliates." When the system of accounts was being drafted I spent days in trying to get a definition which would meet the views of many state accountants. The job was so difficult that we finally defined associated companies and did away with affiliated companies. I am using this term in a broad sense in this report. I realize the difficulties of trying to have an exact definition of what is meant by affiliated companies.

Question by the Examiner.

1509 No, I do not show the dates on which the issues were floated in connection with the holdings by affiliates and the public of preferred and common stock. I do not know how we could get that information. It is difficult to get proper information for the natural gas industry. We have been able to obtain holdings of securities by the public, institutions, and what I term affiliates, from public sources, but you will find by reference to the footnotes in the various schedules that the public sources are varied. You can't find the information at any one place.

Direct Examination Resumed by Mr. Slaff.

Schedule 5-A gives certain financial information relative to the bonds, debentures and notes shown on page 6 of Schedule 5, which securities were held by the public. There are given in that schedule the name of the issuing company, description of the issue, total amount of issue outstanding, amount held by the public, and the total of the amount held by the public will agree with the pertinent figure on page 6 of Schedule 5,—the ratings of Moody's and of Poor's, the times fixed charges earned for 1938, percent of funded debt, to total fixed capital as of December 31, 1938, the high and low quotations for 1937 and 1938, together with the closing price of the latest date available when the schedule was prepared, and, finally, the yield to maturity on the basis of the last quotation, which is contained in the last column on the page.

It will be seen—referring now to the figures in the last column—that the Houston Gulf Gas Company's First and Collateral, 6%'s, were selling on a basis of 5.13% yield to maturity. It should be noted that the quotation was 103½ although the call price was 101½ on September 30, 1939, and it is well known that under such circumstances, the yield to maturity is not a correct portrayal of the proper yield. In other words, when the call price is higher than market, it is well established that the call price is probably holding down the market value.

The Houston Gulf Gas Company's debentures, 6½%, 1943, were selling on a basis of 5.90 as of September 30, 1939. Here again the quotation was 102 whereas the call price was 101½.

No information is available as to the market quotation of the Lone Star Gas Company's mortgage note.

The Oklahoma Natural Gas Company's First Mortgage 3¾%, 1955, was selling on a 3.55% basis to maturity as of September 30, 1939. Incidentally, this issue was sold in August of this year.

The Panhandle Eastern Pipe Line Company's First Mortgage, 4½%, was selling on a basis of 3.63% as of September 30, 1939, and here again the quotation of 103⅞ exceeded the call price of 102½.

The Southern California Gas Company's First Mortgage, 4%'s, 1965, were selling on a basis of 3.70% as of September 30, 1939, and the Southern California Gas Company's First Mortgage, 4½%'s, 1961, were selling on a basis of 4.00% as of the same date. The difference between the yield to maturity on the 4's and 4½'s of the Southern California Gas Company is clearly attributable to the call provisions of the respective issues. The 4's were selling at 105⅝ whereas the call price was 107½, while on the other hand, the 4½'s were selling at 107½ whereas the call price was 104.

1510 The Southern Counties Gas Company of California's First Mortgage, 4½%'s were selling at 4.20% as of October 3, 1939. Once more the market price of 104⅜ exceeded the call price of 101½.

The Southern Natural Gas Company's First Mortgage, 4½%, 1951, bonds were selling at 3.90% and the market price and the call price were equal at 105. The Southern Natural Gas Company's Adjustment Mortgage, 6% bonds, 1960, were selling on October 3 at a yield to maturity of 6.35%.

The weighted average yield on those bonds for which a figure is given in the last column, that is to say the column headed "Approximate Yield to Maturity," was 4.02%. These bonds which I have discussed and which are shown in Schedule 5-A, are the bonds in the amount of $65,668,459 set out on page 6, Schedule 5, that is the bonds, debentures and notes, stated there to be held by the public.

I have explained Schedules 5-B and 5-C in my earlier statement with respect to this exhibit.

Schedule 5-D supports Schedule 5 in that it shows certain information relative to preferred stocks of natural gas companies listed on Schedule 5, and which preferred stocks are held by the public.

Schedule 5-D shows the issuing company, a description of the issue, total amount of each issue outstanding, amount held by the public, Poor's rating, the times dividend requirements earned, the times fixed charges and dividends earned in 1938, the high and low quotations in 1937 and 1938, the latest available quotation we could get at the time the schedule was prepared, and the current yield based upon such 1939 quotations.

While all the information on Schedule 5-D is of interest, I would like to discuss particularly the current yields, that is, the figures in the last column.

The El Paso Natural Gas Company's 7% cumulative preferred stock, par $100, had a yield on September 30, 1939, of 6.48%. We could obtain no market quotations on the two issues of preferred stock of the Houston Gulf Gas Company. Only a very small amount of that stock was held by the public.

The Oklahoma Natural Gas Company's $5.50 preferred stock had a yield on September 30 of 5.26%, whereas the same company's $3.00 preferred stock had a yield on September 30, 1939, of 7.10%.

I would like to call attention to the fact that the Oklahoma Natural Gas Company has a very large amount of funded debt and preferred outstanding, so that the second preferred, the $3.00 preferred, ranks more in the class of common stock than the genuine preferred stock. The total securities of that company are shown on page 4 of Schedule 5.

I believe the bonds, debentures, notes and preferred stock, aggregate 70 per cent of the company's capitalization; that is, the prior preferred stock.

1511 The Southern California Gas Company's 6% cumulative preferred stock had a yield based on market price of September 30, 1939, of 5.00%, whereas the 6% cumulative preferred, Series A, had a yield of 4.96% as of the same date. It will be seen that the weighted average yield on the securities for which a yield is given in the last column, that is to say, the column headed "Current Yield" is 5.35%.

I have previously discussed Schedule 5-E, which shows the holdings by affiliated companies of preferred stocks.

In Schedule 5-F, there is given certain pertinent information relative to the common stock issues of 10 of the 31 companies heretofore mentioned. The stocks of these 10 companies are held in whole or part by the public. The schedule shows the name of the issuing company, the shares and book amount of stock outstanding, total number of shares and respective amounts held by the public, the par value of each issue or designation of no par where that is a fact, earnings per share based on 1938 figures, per share dividends paid in 1938, Poor's rating, high and low market quotations for 1937 and 1938, latest quotations in 1939 which we could obtain at the time the schedule was prepared, and the per cent of 1938 earnings to the latest quotation. I might quote the percentage earnings.

El Paso Natural Gas Company, 8.12%; Houston Gulf Gas Company, no quotation available; Indian Territory Illuminating Oil Company did not have any earnings for its two classes of preferred stock in 1938, although there was a small bid price for each in 1939.

Interstate Natural Gas Company, 9.06%; Manufacturers Light & Heat Company, quotation not available; Memphis Natural Gas Company, 11.89%; Mountain Fuel Supply Company, 8.22%; Oklahoma Natural Gas Company, 10.71%; South Penn Oil Company, 3.69%; Southern Natural Gas Company, 10.15%.

The weighted average of figures shown in the last column, is 7.33%, ignoring, however, the two figures included in parentheses, which figures are negative in character.

I have a little difficulty with South Penn Oil Company. That is a large oil company and it appears to be a large natural gas company; in fact, Standard Statistics Service classifies it as one of the largest natural gas companies east of the Mississippi River, but I have not been able to obtain sufficient information to classify it as a producing and transmission company purely. I have included it and at the same time I will give an average exclusive of the stock of that company. The weighted average is 7.33 per cent including South Penn, and 9.14 if South Penn is excluded. I do not include the Houston Gulf and Manufacturers Light and Heat Company in the average.

I have already explained Schedule 5-G, which shows holdings by affiliates of the common stock of the natural gas companies listed in Schedule 5.

In Schedule 6 we show recent issues of bonds by natural gas companies; by recent issues I mean issues since 1935. The issues are shown by Moody's ratings. For instance, Southern California Gas Company in July,
1512 1935, issued first and refunding mortgage 4% bonds
due 1965, with a rating of Aaa in the amount of $15,000,000.

The net cost to the company was 4.11%. The yield to the public was 3.91% as shown in the last column.

Incidentally, the last quotation we had for that security showed that it was selling on a basis of 3.70% to maturity and was selling above call.

The Arkansas-Louisiana Gas Company issued in 1936, $10,000,000 of bonds with a rating of "A," with a yield to the public of 4.18%. That security was refunded in 1939 as shown by the table when $3,000,000 first mortgage 2¾% bonds and $9,700,000 first mortgage 3½% bonds were issued at 2.75% and 3.50%, respectively. Those refunding issues are shown down towards the bottom of the page.

The Panhandle Eastern Pipe Line Company in March, 1937, issued $24,000,000 of bonds with a rating of "A," and a yield of 4.23% to the public, and those securities were selling on a 3.55% basis, on the latest date for which we could get a quotation, and the market price at that time was above call.

The Oklahoma Natural Gas Company in June, 1936, issued $20,000,000 of bonds with the rating of "Baa," at a yield to the public of 4.64%. In 1939 the same company issued $17,000,000 of first mortgage 3¼% bonds for refunding purposes, at a yield to maturity of 3.46%.

The Southern Natural Gas Company in 1936 issued principal amount of bonds of $15,000,000, rating "Baa," at a yield to the public at maturity of 4.50%. Those bonds were selling at the last quotation we could get, on the basis of 3.90%.

The El Paso Natural Gas Company, in June, 1936, issued bonds in the principal amount of $7,500,000, with the rating of "Ba," at a yield to the public at maturity of 4.6%. Those were refunded in December, 1938, as shown in the lower section of the schedule, by an issue of other bonds yielding 4.20 and 3.59. There were two issues.

The Northern Oklahoma Gas Company—and that is a company which I probably should not have included in this schedule because it has earnings of less than two and a half million dollars, but it was included through an oversight—issued a million dollars of bonds in 1936 at a yield to maturity of 5%.

In the final section of the schedule are shown issues of bonds for natural gas companies, which issues were sold privately and for which we could not get ratings.

Thus, the Mississippi River Fuel Corporation in February, 1937, sold bonds in the principal amount of $10,000,000 at a yield of 4%.

The Southern Natural Gas Company in October, 1937, issued a small amount of bonds, $650,000, at a yield of 4.71%.

1513 The El Paso Natural Gas Company issues have already been described.

The Cities Service Gas Company in December, 1938, issued mortgage bonds in the principal amount of $20,000,000, on the basis of 3.75%.

I have already described the issues of the Arkansas-Louisiana Gas Company in 1939, yielding 2.75 and 3.50%.

The Northern Natural Gas Company, in August, 1939, issued $16,000,000 of first mortgage 3¼% bonds, at a yield to maturity of 3.25%. The average yield of those bonds sold privately, for which no ratings are assigned, was 3.59%.

I did not show the over-all per cent cost to the company for the "A" bonds, the "Baa" bonds, and the "Ba" bonds, similar to the per cent yield to the public. It would vary, of course, but it would be pretty close to the average between the two. It would not be much different. It probably should have been given.

Question by the Examiner.

The time element is an important factor in explaining why the "Baa" Oklahoma Natural Gas Company bonds should yield 3.46 while they have a lower rating than some of the others. You can't compare that issue with "A's" and "Aaa's" because they were prior years. The Oklahome Natural bonds were issued in a very favorable market in August 1939.

Direct Examination by Mr. Slaff Resumed.

Passing now to Schedule 7, we could only find two issues of preferred stock of natural gas companies sold during the period from January 1, 1935, to September 30, 1939, and these were issues of the same company. The Oklahoma Natural Gas Company in October, 1936, issued prior preferred stock at a yield of 6%. In 1939 it issued 5¼ preferred stock to yield 5.29%.

I would like to explain Chart 4 headed "Companies Affiliated (Directly and Indirectly) with Natural Gas Pipeline Company of America and Texoma Natural Gas Company," starting with the bottom, to show at the bottom on the left the Natural Gas Pipeline Company of America, and on the right the Texoma Natural Gas Company. The Columbian Carbon Company owned 2.5298% of the stock of both companies. It also owned over a million and a half of bonds of Natural Gas Pipeline Company. The bonds are in the same percentage.

The Texas Corporation owned 17.5832% of the stock of each of the companies, and owned bonds of the Pipeline Company in the same percentage.

The Standard Oil Company of New Jersey owned 13.3145% of the stock of the Natural Gas Pipeline Company, and the same percentage of bonds of that company.

The Southwestern Development Company owned 13.3145% of the stock of the Natural Gas Pipeline Company, and the same percentage of the bonds of that company, and owned 26.629% of the stock of the Texoma

Natural Gas Company. The Southwestern Development Company owned 100% of the Canadian River Gas Company.

It owned 42½% of Colorado Interstate Gas Company.
1514 And the Standard Oil Company of New Jersey owned 42½% of the stock of the same company, and the Public Service of Colorado owned 15% of the stock of the Colorado Interstate Gas Company.

The Mission Oil Company owned 47.28% of the stock of the Southwestern Development Company, and Consolidated Oil Company owned 51% of the stock of Southwestern.

The Cities Service Company owned 26.629% of the stock of Natural Gas Pipeline Company as well as the same percentage of bonds of that company, and it owned a similar percentage of the stock of the Texoma Natural Gas Company. Cities Service Company also owned 100 per cent of Cities Service Power & Light Company, which in turn owns 100 per cent of Public Service of Colorado. When the term "owns 100%" is used in that connection, I mean 100% of the voting stock.

The Natural Gas Investment Company owned 26.629 per cent of the stock of the Natural Gas Pipeline Company of America, and the same percentage of the bonds of that company, and owned the same percentage of the stock of the Texoma Natural Gas Company.

79.54% of the stock of the Natural Gas Investment Company is owned by the Peoples Gas Subsidiary Corporation, and that company was controlled 100% by the Peoples Gas Light and Coke Company.

14.05% of the stock of the Natural Gas Investment Company was owned by the Public Service Company of Northern Illinois; 99% of the stock of Public Service Company of Northern Illinois was owned by Commonwealth Edison Company, which company owned 100% of the Commonwealth Subsidiary Corporation, and the latter company in turn owning 63% of the Western United Gas and Electric Company, and this last company owned 6.41% of the stock of the Natural Gas Investment Company. The Natural Gas Investment Company also owned 100% of the stock of the Chicago District Pipeline Company.

Schedule 8, as indicated in the heading, shows recent financing by certain affiliates of the two companies involved in this proceeding.

One of the companies, the Standard Oil Company of New Jersey, in May, 1936, issued $30,000,000 of 3% debentures, 1961, at a yield to purchasers of 3.12%. I might state that the figures in parentheses to the far right in the schedule refer to the sources of the information contained in the schedule, and the footnotes are explained on page 2 of Schedule 8.

The same company in May, 1936, issued $55,000,000 of 3% debentures, 1961. Private sale to Rockefeller Foundation at 3.12%. The company, likewise, in July, 1938, issued $50,000,000 of 2¾% 1953 debentures at a yield of 2.83%. In the same month the company issued $31,000,000 of serial notes to yield 2.50%.

The Texas Corporation, in June, 1936, issued $60,000,000 of 3½% debentures, at a yield of 3.50%, and the company in April, 1939, issued $40,000,000 of 3% debentures, at a yield of 2.93%.

1515 The Consolidated Oil Company in June, 1936, issued $50,000,000 of 3½% debentures at 3.67%, and in August, 1938, issued $25,000,000 of debentures at a yield of 3.38%.

The Public Service Company of Northern Illinois, in October, 1938, issued $80,000,000 first mortgage bonds at a yield of 3.34%.

The Commonwealth Edison Company, in June, 1938, issued $33,000,000, 3½% bonds, at a yield to purchasers to maturity of 3.38%. In August, 1938, it issued $33,000,000, 3½% bonds, at a yield of 3.31%. In November, 1938, it issued $34,000,000, 3½% bonds, 3.29%. In June, 1938, it issued $39,083,195 3½% debentures at a yield of 3.50%. In August, 1938, it issued $39,250,000, 3½% debentures at a yield of 3.50%. In December 1938, it issued $24,896,900 of debentures, 3½%, at a yield of 3.50%. In May 1939, the Commonwealth Edison Company issued $114,500,000, 3¼% bonds, to fourteen insurance companies, the bonds selling at 102. The latter issue is not shown on this schedule.

The Peoples Gas Light and Coke Company, in May, 1936, issued $22,000,000 first and refunding mortgage bonds, at a yield of 4.16%.

I would not classify any of the bonds shown on pages 1 and 2 of Schedule 8, as natural gas company securities.

(A[illegible] this point EXHIBIT 186 was offered and received in evidence without objection.)

Generally speaking, I am familiar with the operations of defendants. I have studied the financial reports relative to the transactions, the financial positions of the companies.

I have read considerable testimony in this present case; and in addition I have had a staff of accountants investigating the books and records of the two companies, and that staff has made preliminary reports to me. I have also read summaries of the contracts on file with the Commission by the companies.

Both companies have undoubtedly bad financial structures, although due to the fact that all their outstanding securities are held by affiliates, the problem is not important from the investigator's viewpoint.

Thus, the Texoma Company had outstanding on December 31, 1938, capital stock in the amount of $500,000, and bonds in the amount of $19,650,000.

The Pipeline Company had outstanding as of the same date, capital stock in the amount of $3,000,000, and funded debt in the amount of $46,500,000.

Both financial structures are obviously top-heavy with bonds.

Cross-Examination Interposed by Mr. Morgan.

No, I do not mean that if an investor desires to go into business and use his own money, he is using a bad financial structure. I mean that viewed as a study in financial structures, the financial structures are bad from the viewpoint of corporate entity. If you ignore the corporate en-
1516 tity and go to the fact that all the securities are held by affiliates, then it does not become important. If you look at the Natural Gas Pipeline Company as an operating company, an independent company, its financial structure is bad, but if you look at it as being an ownership by an affiliated company then, of course, the picture changes.

If the owners of that company had issued common stock to themselves, it would not be poorly financed. I mean, particularly, that the company's structure is such that the company could never hope to finance publicly with such a structure. It just couldn't do it. It wouldn't try to do it.

Direct Examination by Mr. Slaff Resumed.

The companies would have no difficulty in financing at a low cost if they restricted their securities to a proper amount with a reasonable ratio of bonds, preferred and common stock. I have not the least doubt that the companies could finance on as favorable, if not a more favorable, basis than any natural gas producing and transmission company in the United States.

Cross-Examination by Mr. Morgan.

I am basing my statement on my experience in making rate of return studies, and all the qualifications I have given here.

I have testified in other rate of return cases. From 1929 to 1936 I testified before the Maryland Commission in all rate cases which the Commission had. I might mention the large ones, the Potomac Edison Company, the Conowingo Power Company, the C. & P. Telephone Company, a couple of cases involving transportation of milk to the City of Baltimore, and the water utility.

I have also testified in the court case involving the C. & P. Telephone Company versus the Public Service Commission of Maryland, tried properly in 1933 before a statutory court in Baltimore, Maryland.

I have testified before the Federal Power Commission in the Albany Lighting Company case, in the Interstate Power Company case, and I have been responsible for the testimony given by members of my staff in the Safe Harbor Water Power Corporation case which was recently heard by the Federal Power Commission.

I do not have any working papers by which I have undertaken to compare the two companies here involved with other natural gas pipeline companies as to financial items. All the financial information was contained in the report. However, as to other facts, we do have information. I have two volumes of information in my office dealing with natural gas companies. One of them is an immense volume which shows all natural gas companies which have responded to one of the orders of the Commission, Order 51 or 53, I forget which, in which we analyze the transactions of the company, give its business, its transmission lines, wholesale and retail sales, et cetera. That information will be available for examination by representatives of defendants.

1517 FRED KLEINMAN, a witness for complainant, testified:

(November 7, 1939)

Direct Examination by Mr. Booth.

My name is Fred Kleinman, I am Chief of Accounts and Finance of the Illinois Commerce Commission.

(At this point the witness handed the reporter a document consisting of a statement of qualifications of the witness which the Examiner directed the reporter to incorporate in the record. The statement follows:)

I graduated from Cornell University, Ithaca, New York, with the degree of Bachelor of Arts in 1913.

Very shortly thereafter I was engaged in the capacity of clerk by the Brooklyn Union Gas Company, in Brooklyn, New York, which company then operated and still operates one of the largest manufactured gas companies in the United States. At that time it had four subsidiary operating gas companies and one subsidiary operating electric company.

During the period of approximately four years that I was with the Brooklyn Union Gas Company I served in various capacities, in the branch offices, and in the general office, and finally became the man responsible for the final clerical approval on the monthly statements prepared by the accounting department for the use of the management, and the annual statements prepared by the company on their various properties, and the annual reports to the Public Service Commission.

In the course of the work I handled routine investigations of many phases of accounting for these utilities and worked on the rate cases then pending, under the supervision of the general auditor.

As part of my duties there I made a regular audit of the main company and its subsidiaries—an internal audit, of course—as to the results of reporting by the various departments which furnish information to the general accounting office, from which data the final accounts are compiled.

In 1917 I left the company and took a position with the National Aniline and Chemical Company. That company was then a recent merger of six of the largest dye stuffs and chemical specialty companies in the United States.

They were doing a gross business in excess of $100,000,000 a year. I was the assistant to Mr. George W. Yates, who had been comptroller of the American Tobacco Company, and who was then engaged by the officers of National Aniline in the installation of a complete accounting and cost accounting system.

As Mr. Yates' principal assistant, I was very thoroughly familiar with the entire procedure of the installation of this new system, as well as investigating the results of the system then being replaced.

At the end of a year Mr. Yates' engagement terminated and there was a change in the officers; I was called to military duty and I left.

1518 Immediately after the War I took a position with the Emergency Fleet Corporation. I was originally assistant local auditor and afterwards the local auditor of the Newark Bay Shipyard of the Submarine Boat Corporation. This was the second largest shipping Board contract in the United States, the largest being the so-called Hog Island plant. I was the responsible accounting official in charge of the work at that yard; I signed checks for all disbursements subject to a counter sign, collected the receipts and handled the accounting. These disbursements ran into hundreds of millions of dollars. The principal work that I was engaged on was a re-analysis of the records of the company leading toward the ultimate settlement of this contract between the Submarine Board Corporation and the Emergency Fleet Corporation, which represented the United States Government. There were, of course, many differences of opinion and many claims and counterclaims arising out of the sudden cessation of this large contract for building 150 vessels and a shipyard to build them, when the entire ship-building program ceased with the termination of the War.

I remained there until the settlement contract was drawn and the work practically abandoned.

I then accepted a position with the firm of Barrow, Wade, Guthrie & Company, public accountants. Barrow, Wade, Guthrie & Company had been the auditors for National Aniline during the period of my engagement there. I knew several of the partners, and some of the men very well, and when I contacted one of the partners for a position with that firm I was immediately engaged.

The firm was engaged in the general accounting practice and had many offices all over the United States, and connections in foreign countries.

While I was employed by that firm I worked on a variety of accounting work, but from about 1925 on I specialized in utility work and principally in the investigation of utilities prior to the purchase of the utility, either as property or as a company, by some banker or some holding company.

The type of utilities covered were manufactured gas, natural gas, electric, telephone, water, street railways—every imaginable type—and the examinations covered companies large and small, and some with well-kept accounting systems, others with very poor accounting systems.

I was with Barrow, Wade, Guthrie & Company continuously for a period of twelve and a half years, that is, until April, 1933.

In April, 1933 I felt that it was advisable to make a change and secured a position with S. D. Leidesdorf & Company, public accountants, in their Chicago office, with the principal activity to advise and consult with the Illinois Commerce Commission, principally again with regard to the electric rate case of the Public Service Company of Northern Illinois which was then pending.

After working for Leidesdorf on Illinois Commerce Commission work until February, 1934, the Illinois Commerce Commission asked that I be transferred to their staff, and I became a member of the staff of the Commerce Commission. In November, 1934, I became Chief Accountant of the Illinois Commerce Commission.

1519 I testified somewhat briefly in the electric rate case of the Public Service Company of Northern Illinois, and at length on operating results in the electric rate case of the Commonwealth Edison Company, the gas rate case of Peoples Gas Light & Coke Company, as well as in other cases of less importance. In the last two cases mentioned, I made an investigation of the operating expenses of those companies for rate-making purposes.

I was also engaged in the investigation initiated by the joint resolution of Congress into the affairs and activities of the telephone industry, my particular part of that investigation being an investigation of the Western Electric, a manufacturing organization which the American Telephone and Telegraph Company owns and controls, and which supplies the Bell Telephone companies with a very substantial part of materials and equipment for operations and for plant construction. That is the investigation conducted by the Federal Communications Commission.

With the Illinois Commerce Commission I am in charge of all accounting work. This includes investigations for rate negotiation purposes as distinguished from formal rate cases. Also, I have made investigations for the Commission on the subject of impairment of capital by payment of dividends, on the cost of property, and on the accounting methods of Illinois utilities. The annual reports filed by utilities are forwarded to my department for review. We have established a detailed audit program and check certain items every year and also every class of report is checked in detail for every company once every few years. This detailed audit reveals inconsistencies which are forwarded to the utility and whenever errors of accounting or reporting are found they are corrected. Certain basic information is compiled by my department and furnished to the Commission or one of its staff.

The Commission has promulgated revised Systems of Accounts on my sponsorship for electric and gas companies. I have been a member of the Committee on Statistics and Accounts for Utility Companies of the National Association of Railroad and Utilities Commissioners since 1935. This Committee, which is a cooperating committee between state and federal agencies, has compiled accounting regulations for gas, electric, telephone and water companies which have been recommended by the Association to the state commissions for adoption and have been widely adopted; Illinois being one of the states.

For the period 1925 to 1933, I was almost continuously in touch with the financing of corporations. Many of the prepurchase investigations led to purchase, and securities were sold. It was part of my regular duties to prepare various pro forma balance sheets reflecting alternative plans for financing. These financings were sometimes of new corporations, sometimes additional issues, sometimes mergers, or reorganizations, and, during the later part of the period, bankruptcy reorganizations. My experience was sufficiently continuous and detailed to permit of critical judgment on the various plans under consideration.

As to my duties relative to finance with the Illinois Commerce Commission, when a company files an applica-

tion with the Commission for permission to issue securities, it is my function, sometimes delegated to my assistant, Mr. Tholin, to hear the case as examiner and ob-
1520 tain full and complete information on the pertinent factors which the Commission will be called upon to consider in passing on the application, and to report to the Commission concerning those matters. These factors are principally and briefly: (1) Are the statutory requirements as to security issues complied with; (2) After the issuance of the proposed securities, will the company have a satisfactory financial structure; (3) If the securities proposed to be issued are fixed return obligations, is the effective rate of interest, determined by the coupon rate and the discount or premium on the bond, reasonably in line with current money market conditions; and in the case of common stock, is the price asked a reasonable one under the circumstances; (4) In the case of acquisitions and mergers involving exchange of securities, or a recapitalization involving an exchange of one type of security for another, is the basis upon which the exchange is supposed to be made reasonable from the point of view of the consumer, the company, and the investors.

The number of financial cases I have handled is quite large, well over one hundred. The amount of securities involved exceeds $500,000,000. The companies are of all types and sizes; the securities are issued by subscription, by exchange, by private sale and by sale to underwriters. In this connection I must keep informed as to the financings of other companies and the trend of money market rates. In connection with my duties on behalf of the Illinois Commerce Commission, involving the issues of securities presented to that Commission for its approval, I determine, on the basis of investigations my staff and I make, whether or not the cost of money to those companies is considered by me to be fair and proper. The cases before the Illinois Commerce Commission involving the issuance of securities and the approval thereof by the Illinois Commerce Commission are referred to me or my assistant as hearing examiners and the Illinois Commerce Commission has at no time recently found it necessary to require bids. Instead they place the burden on the hearing examiner to determine whether in accordance with the evidence presented by the company and his own knowledge of the cost of money under current market conditions, the proposition of financing proposed by the company presents a reasonable cost of money to that company. That investigation is generally conducted either by me directly or under my supervision, in view of my duties as chief of the Accounts and Finance Division of the Commission.

During the course of my accounting and business experience I have had to give consideration to the factors which constitute risk in business. During the periods when I was working for a company, the Brooklyn Union Gas Company, and the National Aniline and Chemical Company, I had excellent opportunities to become familiar with the business process and the way profits and losses come into play. Later when I was auditing or investigating companies, the risks of business became an integral part of my work. The operating results and the risks undertaken by a company must be considered in order to approach the work intelligently even to the extent of contingencies which require the setting up of special reserves or the notation of contingent liabilities appearing as footnotes on the balance sheet.

In finance the questions of risks become especially important because of the implication inherent in financing that the past earnings of a company are an evidence of future expected earnings. The duty of the accountant certifying past earnings is to reveal so-called non-recurring profits and this duty demands a thorough consideration of risks both past and future. For more than 20 years, in connection with these and other problems, I have been giving consideration to risks in business.

1521 I have testified once on the subject of rate of return. That was in the gas rate case involving Peoples Gas Light & Coke Company before the Illinois Commerce Commission. The accounting department of the Commission under my general supervision has for the past year or two been engaged in making an investigation of the books and records, operating income and expenses, fixed capital account and other matters of defendants. I have obtained the earnings of the two companies up to August 31, 1939. I have prepared an exhibit setting forth the condensed comparative statement of combined profit and loss for eight months ended August 31, 1939, and 1938.

(At this point counsel for complainant requested that the document referred to by the witness, entitled "Comparative Statement of Combined Profit and Loss for 8 Months Ended August 31, 1939 and 1938," be marked for identification. At the direction of the Examiner the document was marked Exhibit 187.)

The figures in Exhibit 187 have been obtained from the books and records of the two companies and have been combined with proper eliminations of inter-company transactions by a member of my staff. The gross earnings from operations shown on line 1 for the 8 months ending August 31, 1939, are somewhat in excess of $1,000,000 more than the gross earnings from operations for the 8 months ended August 31, 1938.

The net earnings from operations for the two periods show an increase of $802,518.70. The net earnings available for dividends for the two periods show an increase of $1,228,984.42.

The operating expenses which are used to determine the net earnings from operations by deduction from gross earnings from operations and shown on line 2, are per the books and records of the company.

My examination reveals that during this period the amount of expense which the company has set up for regulatory commission expense is probably subject to future charges as the amount of that expense does not appear to contain all of the bills for regulatory commission expense which the company has incurred during the 8 months. However, the increase of $201,000 in expenses can be summarized as arising to the extent of approximately $175,000 due to the increased cost of gas purchased. Pipeline expense, compressor station expense, telephone expense, and other production expenses, as well as new business expense, are substantially offsetting. General and miscellaneous expense has increased approximately $150,000. The gas used by the company has increased approximately $45,000 and that expense is an offset item. In other words, an increase in the gas used by the company results in a decrease in the total expenses of the company.

The increase of general and miscellaneous expense is accounted for to the extent of $100,000 by an increase in income tax on the increased earnings, approximately $27,000 increase in other taxes, and approximately $12,000 increase in legal expenses. The regulatory commission expense on which I have just commented, has decreased by $59,000 and a new expense, the employees' retirement plan expense, amounting to $59,532.40, appears in the 1939 accounts without any item for that expense in the 1938 accounts.

During the first 8 months of 1938 the Natural Gas Pipeline Company of America paid dividends amounting to $1,687,000. During the first 8 months of 1939 the dividends amounted to $1,500,000. That is the way those dividends
1522 were declared. I think the rest of the exhibit speaks for itself.

(EXHIBIT 187 was offered and received in evidence without objection.)

A risk in business arises out of a decision which must be made by a management and which, when made, will affect the subsequent profits realized by the business.

In a discussion of risks in business it is necessary, in my opinion, to distinguish between the continuous actions of conditions surrounding an industry and the continuous risking of money by the companies in the industry. The first set of factors, in general, determines whether the industry will be profitable as a whole. The second set of factors determines the relative prosperity of the companies within an industry. The risks arising out of the continuing commitment of money in a business are much more important than the risks arising out of the conditions surrounding an industry. The latter are slower and can be met over a period of years. The former are immediate and cannot be escaped. They can only be turned into a profit or loss. The risks surrounding an industry slowly affect the profitableness of the investment in the fixed assets, that is the plant, the business itself; the other factors affect the profit and loss for a given period, and its cash and credit standing.

One of the continuing risks that faces industries other than the utility industry is the conversion of cash into inventory. The size of inventories varies with the industry and with the company, but, in general, constitutes a major portion of the invested capital of an industrial company. Furthermore, in most industries this sum is risked several times during the same year—so-called turnover of capital. Beginning with the pre-season planning, industry is compelled to make provisions for a supply of the raw materials and piece parts which go into its manufacture, or of merchandise to be sold. Whether the management decides to contract in advance at a fixed price or to pay the current market price prevailing when the materials are required, there is no way of escaping the inventory problem.

The fluctuations in the price of materials which a concern consumes or sells will go on from day to day. If a business man contracts today to sell at a fixed price, he must decide whether he will buy his raw materials at today's prices or at some future price. Whether he chooses the one or the other, he has assumed a business risk which will inevitably be a major factor in determining the size of the profit or loss his year's business will produce. If, as some businessmen do, the risk is shifted to the purchaser of the goods or the vendor of the raw and semi-finished materials, profits are drastically curtailed, but, of course, so are losses.

From the point of view of the investor the mere showing of handsome profits in one year by a company cannot be taken as a measure of the desirability of investment. A manufacturer might finish the year with a very handsome profit arrived at entirely through advance in price of one of the raw materials which he uses and of which he had a large stock or contract, and all of his sales may have been made at an actual operating loss if the price level of materials used is considered.

1523 This type of profit cannot be relied on and is, of course, hazardous in the extreme. A year such as 1937 found financial writers emphasizing this type of risk. Prices of raw material and indexes of production had been rising quite steadily over a period. But the end of summer in 1937 found most industries with well-stocked shelves at what proved later to be high prices. The manufacturer who during the first seven or eight months of the year had been manufacturing for sale and not for stock and had stored up no supplies of raw materials could show a much more substantial profit, all other conditions being equal, than one who manufactured for stock or had contracts outstanding for his raw materials.

However, during 1936 the opposite condition had in general been true and the man who had contracted in advance for stocks of raw and semi-finished materials showed a larger profit than did the man who merely manufactured or purchased for sale. Every accountant knows the importance of this risk—he must carefully examine the inventory pricing. The almost universal valuation of inventories at cost or market, whichever is lower, for reporting to stockholders and for income tax purposes, without the valuation at market if market is higher than cost, is indicative of the importance of the risk.

Only public utilities and those few manufacturers whose raw materials and products are so specialized that there is no competitive market, escape this risk. The two companies we are considering have a very small percentage of capital in inventories, and the fluctuation in price is too small not to permit the recoupment of full cost through operations.

Another type of risk arises out of the labor situation. Whenever a manufacturer contracts to deliver his products at some future date at today's prices he must face the risk inherent in the labor situation. It must be kept in mind that in manufacturing industries the element of wages is a much more important part of sales value than it is in the utility industry and particularly in a case of the two companies. The census of manufacturers, for example, shows for 1937 that 1/6 of the value of products of all industries is accounted for by wages, whereas in the Natural Gas Pipeline Company and Texoma the wages paid are a substantially smaller proportion of the sales value of the gas.

Further, their workmen are not collected in one location, a condition which removes to a very great extent the risk of strikes and other labor disturbances. The principal substitute of gas, coal, is an example of the labor risk; natural gas has no substantial risk in this respect.

Another type of risk arises out of the overhead expense connected with business, that is, the expenses of operations other than productive wages and consumed materials. To a certain extent these expenses go on even if a factory is shut down completely; to a greater extent these expenses accumulate if the business is operating but at an unprofitable capacity. In the first place, the cubic foot sales of the Pipeline Company do not measure its revenue.

Even if the Pipeline Company sold not one cubic foot of gas, it would collect a demand charge from its principal customer, Chicago District Pipeline Company, sufficient to pay all of its expenses, including its present interest. Any business that has its complete overhead paid for

regardless of business conditions need not worry
1524 about risk. This one factor removes the Pipeline Company from the plane of ordinary industry into that of a guaranteed industry.

Another risk from which Natural Gas Pipeline Company escapes is the credit risk. It is true that many manufacturers take out credit insurance in order to escape this risk, but general industry will not pay prices which will support such insurance. It requires too much carrying charge per dollar of sales to make it economically feasible.

Natural Gas Pipeline Company has very few customers and its one large customer that takes 90% of its sales has not only its own credit standing to rely on but its payments are guaranteed by three Chicago area utilities, which guaranty would satisfy any credit man. Utilities have a very small credit risk, compared to industry in general, the two companies have substantially none.

Another type of risk which the Pipeline Company does not face arises out of competition between rival concerns for the same market with the same product. It is true that natural gas has competition with coal and oil, although it should be borne in mind that natural gas is the new competitor threatening coal and oil and not the old line established concern being threatened by a new substitute product, and that the competition is practically limited to sales to industrial concerns, not the highly profitable sales to the Chicago area utilities for resale to residential and commercial customers.

The type of competition which natural gas is called upon to meet, in general is slow in its effect on the companies' profits and small in amount. It is entirely different from the competition between rival concerns for the same market with the same product, as, for example, the rivalry between Ford, Chevrolet and Plymouth for the Chicago market for low priced automobiles, which rivalry is immediate and violent in its effects. Were one of these three manufacturers to fall behind in public favor, the result reflected in the profit and loss account for that year would be noteworthy.

This type of competition causes heavy expense for advertising and selling, an outlay which can only be recouped if the product meets with public favor. This form of competition hinges around price for quality comparisons, the development of styles and the introduction of minor changes. A price for quality competition arises out of many varieties of the same product graded in price and in quality, so that the customer can decide his own price level and then shop for the best buy at that level. This type of competition necessarily means low profits.

The development of new styles introduces a risk which falls unevenly among competitors, permitting one to make substantial amounts of money and causing another to lose substantial amounts of money. The development of minor changes especially if covered by patents, might lose a market for a manufacturer or gain it.

It is often necessary for manufacturers to buy up or obtain rights to minor changes which are covered by patents, even though they doubt the usefulness or desirability, because they must have control over its use if it meets with public favor. The two companies have no competition from a better gas or a cheaper gas produced by a rival natural gas company.

1525 Still another type of risk arises out of varying demands for a product. This type of risk must not be confused with the demand for a particular manufacturer's product which I just discussed. In general, the risk of varying demand for a general product cannot be overcome by any manufacturer. For example, when the demand for steel falls off a manufacturer may obtain increased sales at the expense of his competitors, but he, nevertheless, has been facing the risk inherent in change in demand. The experience of the Natural Gas Company has shown the pressure of this type of risk, but it takes a microscopic examination to find its effect in the profit and loss account. Its sales to industry during 1938 fell off substantially from the peak in 1937, but the effect on profits was hardly noticeable and could be determined only with a very detailed study.

The effects of change in demand for industries other than the utility industry are much more violent and are promptly reflected in the profit and loss account for the year, and even in the stock market. The last decline in demand was sufficiently noteworthy and widespread to be known to everyone by name—the recession. Right today if the war were to stop immediately or were not to lead to the sales industry expects, I think we will find a new name for its effects. That risk, an example of risk in change of demand, is today of vital importance to industry.

If all goes as industry expects, certain companies, not all, may realize substantial profits. But if it does not, I am of the opinion that the effect on industry, barring public utilities, and barring a few other lines of business, will be staggering. Its adverse effect on the two companies will not be noteworthy.

I examined the direct testimony of the witnesses Floyd C. Brown, Delafield, Dorau, Gilman and Emery dealing with the subject of risk.

The type of risk which arises out of technological changes has several aspects. In most lines of industry there is a need for expending substantial sums of money in research on the products to be sold. In our case, the product, natural gas, needs no such research expense and its sales cannot be affected by the research expense of any competitor which results in an improvement in the quality of its gas.

It is true that change in utilization appliances may put coal or oil in an improved competitive position (all industry finds itself faced with that type of risk), but the effect would be slow to appear and small in amount. The effect of changes in a product, in this case, natural gas, due to research within an industry, acts more rapidly and with greater intensity than does the effect of changes due to research which bring forward a substitute product.

Another type of technological change is brought about by research in manufacturing methods and devices. Here, again, no technological change in the drilling of wells or in the building of pipe lines can have a substantial effect on the business done by Natural Gas Pipeline Company. Its pipe line is built and is estimated by the company to be useful only until 1954. Until that date this pipe line is the best and it is inconceivable that another pipe line could be built to take its place. This is not true in industry in general.

1526 A steel mill might be the last word today, but if a competitor obtains either a price or a quality advantage due to a new type of mill, the older type must be replaced or content itself with substantially reduced profits.

In many lines of industry the manufacturer makes no attempt to control his ultimate market. For that reason I fail to see very much point in the testimony of experts for the company that Natural Gas Pipeline Company has a risk which should be given consideration in the rate of return due to the fact that it does not control the market. Most manufacturers prefer to be relieved of the risk of selling and credits in return for relinquishing a margin of profit. The entire jobbing industry is indicative of this fact.

Sales agencies, such as the motor industry has established, are another example. Retail selling is divorced from manufacture more than the retail distribution of gas is divorced from production and transmission in our case. Furthermore, it must be kept in mind that to a substantial extent the Pipeline Company does control the entire Chicago area market much more than does any manufacturer and at no cost to itself.

In the first place, the Chicago area utilities have guaranteed a demand charge payable by Chicago District Pipeline Company to Natural Gas Pipeline Company which, once paid, makes it impossible for them to obtain their requirement of high B.t.u. gas from any other source in large amounts economically. In the second place, they made an investment of approximately $5,600,000 in addition to their investment in the Natural Gas Pipeline Company and Texoma.

These Chicago area utilities incur the selling expense which is substantial. I am well acquainted with the operations of all three and it is to the interest of these Chicago area utilities to sell all the gas they can. It must be remembered that at the present time the only gas that they can sell to the consumer is either natural gas or mixed gas containing a very high percentage of natural gas.

Questions by the Examiner.

You ask what is the percentage of natural gas in the mixed gas sold by the Chicago utilities. This mixed gas is an 800 B.t.u. gas. I think the artificial gas formerly sold was 530 or 565 in Chicago. The cost of the natural gas is more than half the cost of the total gas which is mixed. The $5,600,000 investment to which I referred, consists of a $3,000,000 investment in the Chicago District Pipeline Company, and approximately $1,662,000 investment by

The Peoples Gas Light & Coke Company in the conversion of its own system to take care of this high-powered gas, and approximately $800,000 expended by the Public Service for the conversion of its distribution system, and approximately $150,000 expended by Western United Gas and Electric Company for the conversion of its distribution system. The total of those is somewhat in excess of $5,600,000. I have not included in my computation the other expenses which were expended by the three Chicago area companies for such things as house heating equipment, and special expenditures of that type which they are amortizing over a period of years because it is rather difficult to find out what the total is, and $5,600,000, I think, is enough to show that these companies have a very substantial interest in seeing that they obtain a supply of the high B.t.u. content natural gas.

1527 *Direct Examination by Mr. Booth Resumed.*

These Chicago utilities do a reasonably good job of selling their commodity. The Peoples Gas Light & Coke Company, the largest of the three, recently won a national contest among gas companies for the effectiveness of its advertising. It receives favorable notices as often as any other gas company does, commenting on its selling activities.

The record of FHA houses in the Chicago area shows that in general the range and the refrigerator is a gas utilizing installation in about the proportions that are to be expected. In my opinion it would require substantial factual proof, and it cannot be based on an assumption, for anyone to predicate risk on the theory that Natural Gas Pipeline Company could sell more gas in the Chicago area market if it were allowed to control such market directly, instead of indirectly by its arrangement with the three Chicago area utilities.

Cross-Examination Interposed by Mr. Slaff.

You ask if I know anything about how the moving picture production industry fared in its attempt to control the retail market for its product. They are up before the Federal Trade Commission right now. As a matter of fact, I think an attempt to control the market by an industry or by an individual company leads to trouble with the Federal Trade Commission or with other regulatory bodies. The only way to control a market which is legitimate is to sell the best product at the lowest price.

Direct Examination by Mr. Booth Resumed.

I have studied the exhibits and testimony presented on behalf of defendants dealing with their future operating results and future investment in plant. I have put the results of my study in the form of an exhibit entitled "Proforma Comparative Balance Sheets Annually at December 31, From 1939 to 1954 and After Liquidation."

(At this point counsel for complainant requested that the exhibit just referred to by the witness be marked for identification. At the direction of the Examiner the document was marked Exhibit 188.)

In studying the exhibits dealing with future investment and future earnings presented by the company in this case, I found it desirable to put down on paper, as an accountant or even a bookkeeper would, what these things really mean. The exhibits I will refer to, used in compiling my exhibit, were Exhibits 116, 117, 137 and 141. I will refer to those as I go along. We find that in 1939, in accordance with line 14 on page 2 of Exhibit 141, the company will spend $106,530 as a capital expenditure for replacements. Now, bookkeeping-wise, to an accountant, that means that cash will be reduced by $106,530, and that the property will be increased by $106,530. In the next line we have the cost of retiring capital replaced, $8,692. To an accountant that means that $8,692 of cash is to be expended, and the cash will be reduced by that amount, and that will be charged against the reserve for depreciation and depletion.

The next line shows salvage value of retirements, $50,832. That means that out of the property that has been replaced the company will get, either in cash or in materials, $50,832 which will be credited to the depreciation and depletion reserve.

1528 I have set down in my exhibit the information contained in Exhibits 116, 117, 137 and 141, in the way that they would affect the accounts year by year, in order to get the picture as to what would the balance sheet of these companies be at the end of each year, and what would it be after liquidation.

No, my exhibit does not show the earnings. It shows the balance sheet, what is the position of this company at the end of each year, what are its assets, what are its liabilities, and how much are each of them.

A proforma balance sheet is an accounting device that is very widely used. Whenever it is desirable to see the effect of certain future transactions on a company, they put them down in exactly the same way as they would be recorded when they actually do occur. Of course, you assume that your information is correct and from that information you build up the balance sheet in exactly the same way as if you were recording actual transactions. Because they are not actual, they are called proforma. I accepted the figures set forth in the four exhibits and am using them to see what the balance sheet would be on the basis of these four exhibits at the end of each year and after liquidation. I have said that my proforma sheet is a balance sheet based on certain assumptions. In this case it is based upon the four exhibits.

This exhibit which I have prepared is all-inclusive. In other words, it is all of the working papers that there are. It shows exactly how I built up this exhibit. You can turn to any page after page 4 and you will find listed there two types of items at the bottom of the sheet, the source, by which I mean something which the company has in the record, and the data, by which I mean something I have compiled and the source of which I show exactly.

My summary sheets are sheets 2, 3, 4, and 5, which are Schedules 1, 2, 3, 4. I think that for the purpose of explaining the exhibit that I would like to point out one of the supporting sheets; for example, take Schedule 5 which is shown on sheet 6.

Now, here on this schedule in column "(b)", I give the cost of additional property, and you will see from "Source" that it comes from Exhibit 141, page 2, line 22. The way the exhibit was prepared was finding the cost of additional property in a company exhibit, we took that and listed it down year by year. Next to it, in column "(c)", we put capital expenditures for replacements, which comes from Exhibit 141, page 2, line 14. Next in column "(d)", we have the total additional capital investment which, while it is the total of columns "(b)" and "(c)", can also be obtained from Exhibit 117, page 1, line 3, direct from the company, so that I took the precaution to see that these four exhibits that I am using seemed to be made up on one and the same basis and that it is proper to use the four of them at one time.

Now, in column "(e)" we have the book cost of property retired, and that comes from Exhibit 117, page 1, line 6. The difference between column "(d)" and column "e)" is the net change for each year in the capital assets, and by adding or deducting the net change to the balance at the end of the previous year, you get the balance at the end of the year as shown by footnote "B."

1529 The figure at the bottom of column "(g)", $69,179,314, is the balance which will be in the capital accounts of the two companies as of December 31, 1954, at which time these two companies will be ready for liquidation. That figure is based upon exhibits presented by the company and admitted into evidence as Exhibits 116, 117, 137, and 141.

While, in general, I found all of the information which was needed to compile this exhibit, I did find it necessary to make certain assumptions. Page 1 shows the four most important assumptions. The first assumption was as to dividends. The company had made no estimate as to what future dividends were to be. The dividends which I have allowed for the purposes of this statement are cash dividends to be paid each year, 25 per cent of the stated value of the capital stock of Natural Gas Pipeline Company of America, outstanding January 1, 1939.

No dividends are to be paid on the capital stock of Texoma Natural Gas Company until liquidation.

The next assumption I made dealt with other net current assets. This caption reflects, as you will find from the sheet bearing that title, quite a number of accounts, but the ones that we are principally interested in were the changes in taxes accrued resulting from the payment of Federal and State income tax in the year following accrual because they vary in substantial amounts, and changes in interest payable, based on the assumption of borrowings and repayments. Changes in current assets other than cash and changes in current liabilities other than taxes accrued and interest payable, have been assumed to be offsetting.

I think that assumption is a proper one to make because in all events the principal item of your current assets will be the accounts receivable of these companies from the Chicago District Pipeline Company, and that amount remains substantially the same according to the earnings statement submitted in Exhibit 141, and at all times the company will have a sufficient amount of cash, in accordance with the other assumptions that I have made, to pay all of their bills at the end of the year or as they become due.

The third assumption I made was in reference to the item of salvage. I assumed this item to represent either cash value realized, or materials reused during the year for which the salvage was estimated. There may be some slight delay, but the amount involved is so small that if I am in error in that assumption, the net effect on the exhibit as a whole will be negligible.

The fourth major assumption that I made was with respect to borrowings in those cases where I found it would be necessary for the company to borrow money. I assume that the borrowings would be made 15 days in advance of the date on which the company is obligated to make its sinking fund payments to retire bonds. The interest is assumed to be six per cent. So that, in effect, the bonds due to be retired under the provisions of the company's mortgage will be extended by the holders thereof for the additional period required until there is sufficient cash in the company to pay the amount up.

Interest on borrowings are assumed to be payable
1530 every six months and repayments of borrowings are
assumed to be made on a semi-annual date at which the recurring six months' interest becomes due. In my opinion those assumptions are sufficiently liberal that I think they cannot be criticised.

Based on the four exhibits reflecting the information necessary to arrive at balance sheets at the end of the year with the assumptions which I have just referred to, I find that the balance sheet at the end of each year would be as shown on sheet 2, with amortization of capital assets on an arbitrary straight-line basis. The accounts which I show are in column "(b)", the capital assets, and column "(c)", the cash.

In column "(d)" are other net current assets; column "(e)", bond discount, with the total assets shown in "(f)"; column "(g)" shows debt obligations; column "(h)" is reserves for amortization of capital assets; column "(i)" is the capital stock; column "(j)" is surplus, and "(k)" is total liabilities and net worth. Columns "(k)" and "(f)" are the same, as they must be.

In lines 1 to 16 we have the balance sheet for the date

December 31, years as noted. Line 17 is the balance sheet after liquidation. That is based upon the assumption which the company has made in this case, namely, that it would be compelled to go out of business at the end of 1954 due to the exhaustion of the supply of natural gas in the Panhandle field. The figure $47,537,862 shown in column "(c)" under the caption "Cash," line 17, is the cash that will be on hand after these properties have been liquidated to pay off the previously unpaid investors and consists of capital stock, $3,500,000.

That means that the company would have $47,537,862 in cash, and retirement of the bonds which are now outstanding or the retirement of such indebtedness, other than the capital stock, as the company might incur between now and the end of 1954, and the payment of 25 per cent cash dividends each year on the capital stock of Natural Gas Pipeline Company of America. In other words, I have assumed that the company would pay an average annual cash dividend of 25 per cent on the $3,000,000 common stock of Natural Gas Pipeline Company of America during each of the years 1939 to 1954, and have arrived at the conclusion on the basis of the company's own exhibits introduced in this case, that the company would have remaining $47,537,862 after the retirement of the company's bonded indebtedness.

That figure is also based upon the assumption that there be no rate reduction during that period. Of the $47,537,862 remaining, only $46,250,230 will be available on January 1, 1955. I presume that it will take some time to liquidate the company. The balance comes in after the disposition of the pipe line.

Page 3, as its heading indicates, is the same as page 2, that is, it is a comparative balance sheet at the end of each year and after liquidation, excepting that the reserve for amortization of capital assets is built up on an arbitrary sinking fund basis instead of on an arbitrary straight-line basis.

I would like to point out that the only difference between the two is the amount at the end of any one year which is in surplus, and the amount which is in reserve at the same time. The total of surplus and reserve is always the
1531 same because that is the total of the profits remaining
for depreciation, depletion, amortization of capital assets, and return, so that it doesn't make any difference which way you set up your amortization of capital assets,

or which way you depreciate and deplete, excepting as to the intervening surplus accounts.

The amount of cash at the end of each year is exactly the same. The amount of capital assets is exactly the same, the net current assets are exactly the same. Everything else remains exactly the same. Because this company is allowed to recover the value of its capital assets, which it will lose during its operation, at some time during the whole period, each person might have his own idea as to how much should go in in any one year. If he puts in more there is less left for surplus available for dividends. If he puts in less, there is more left for surplus and dividends, but over the whole period he can only get $69,105,182, which is a loss on the capital assets.

Cross-Examination Interposed by Mr. Morgan.

I get the figure $14,867,000-odd from Schedule 10-B. I start the amortization in 1939, but of course I bring forward the balance on the books of the company as shown in Exhibit 137, page 1, line 36, column 8. I haven't gone back of regulation or anything else. I have taken the balance sheet as shown in Exhibit 137. I have applied to it the information shown in the other exhibits which I have mentioned, and the results are these balance sheets which we have here.

The rate of interest I have used on my sinking fund is 6 per cent, as you can see from Schedule 14, on page 23. You see the only difference it would make if you take any other sinking fund interest, is that you would allocate more to the payment and less to the interest, and the only difference between straight-line basis and sinking fund basis is how much do you take in in each year. Some time or other out of the earnings of the company it is necessary to set aside a reserve sufficient to take care of the loss on its capital assets.

How that is set aside is only of interest if we are looking at this year's situation. If all we had before us were today's value of this property, no estimate as to what will happen in the future, and today's earnings, say, for two years past, and possibly an estimate for next year, and it is necessary for the Commission then to set a rate of depreciation or a method of depreciation, it becomes of vital importance as to how much is set aside for that particular factor. But, when we are dealing as I am with the entire future life, all I have to be interested in is that some time or other, during this company's history, it will get back all of its loss due to its investment in capital assets ultimately being of no value.

When I speak of the entire future life of the company, I am taking it as per the four exhibits. The 6 per cent interest comes from the company. Of course there isn't any sinking fund in sinking fund amortization. Sinking fund amortization is an accountant's method of computing amortization, but there is no sinking fund in it then. When the California Commission talked of sinking fund depreciation, they were not talking of any sinking fund being set aside; that is merely a method of getting at it. There is no sinking fund. It is merely as if there were a sinking fund. So far as the earnings coming from the outside, I am sorry to talk like this but it really did amuse me, because that just doesn't happen. There is no such thing.

1532 *Direct Examination by Mr. Booth Resumed.*

In the summary sheets 2 and 3, I show that the company will have $47,537,862 left to liquidate the common stock after the redemption of the company's bonds, debt obligations, and the payment of the 25 per cent cash dividend annually from 1939 to 1954, whether or not the amortization of the assets is being taken on a sinking fund or straight-line basis.

As to summary sheets 4 and 5, you ask if I assumed a rate reduction of $3,000,000 and demonstrate that also based upon those same company exhibits that the company would have $3,930,923 in cash to liquidate the same amount of capital stock after redemption of all the debt obligations and the payment of 25 per cent common stock dividend annually for each of the years 1939 to 1954, inclusive. That is correct except when you say that I assumed the rate reduction of $3,000,000 a year. I calculated the rate reduction which would leave the company with enough to pay off all of its investment and the dividends which I have stated and the odd money which in this case is $430,923.

That calculation shows that a reduction of $3,000,000 a year effective January 1, 1940, can be made and still leave the company with enough money to pay all its interest, pay out to all of its investors 25 per cent on the common stock of Natural Gas Pipeline Company, and $430,923 is the final liquidating bonus on $3,500,000 of stock.

Questions by the Examiner.

My calculations were made at a place indicated by these footnotes at the base of the column, and I think you will find as you follow those footnotes through, that I have included in the balance of my exhibit, that is from Schedule 5 on, everything. My desire was here to put in the complete story. The figures in line 17 that have been changed are $3,930,923 in column "(c)", $3,930,923 in column "(f)", $3,500,000 in column "(i)", $430,923 in column "(j)", and $3,930,923 in column "(k)".

Sheets 4 and 5 are the summary sheets where I made the calculations based on a $3,000,000 rate reduction effective January 1, 1940. Page 5 is the same as page 4. You ask if the corrections are the same. They are not corrections. They simply did not show up either in the girl's typing or in the dittoing, but it is merely again to illustrate the difference between the sinking fund basis and the straight-line basis because for this purpose it makes no difference which you use, or how much you use. Over the entire period they are entitled to recover a certain sum of money.

Direct Examination by Mr. Booth Resumed.

I don't think there are any working papers; but all of my working papers on this matter will be available to the company, their counsel and experts.

Based upon the study I have made of defendants' operations, upon my familiarity and knowledge of the money markets, upon the many years of study and analysis that I have given to business conditions, upon the experience I gained in handling the financing of utility corporations as Chief of the Illinois Commerce Commission's Accounts and Finance Department, I have given consideration to a rate of return which in my judgment should be reasonably sufficient to assure confidence in the financial soundness of the two companies and which would be adequate under
1533 efficient and economical management to maintain and support its credit and enable it to raise money necessary for the discharge of its contractual and public duties. In my opinion a fair rate of return which meets these tests is 6 per cent.

(At this point EXHIBIT 188 was offered and received in evidence without objection.)

Questions by the Examiner.

The list I gave of the cases in which I have testified is not complete or full, but they have all been before the Illinois Commerce Commission; and a great many of the cases are small and my testimony was minor. The important cases are listed.

(At this point counsel for the Federal Power Commission offered in evidence Article 4 of the Indenture between Texoma Natural Gas Company and The Chase National Bank of the City of New York, and Articles 4 and 5 of the Indenture between Natural Gas Pipeline Company of America and The Chase National Bank of the City of New York, and asked the privilege of withdrawing the originals, and substituting photostatic copies thereof. Counsel for defendants offered the remainder of each of the two indentures referred to in the event the articles offered were received in evidence. The Examiner announced that he would withhold his ruling until the next session of the hearing.

Mr. Booth: If the Examiner please, I now desire to present to the Examiner and to the Federal Power Commission a motion for an immediate order requesting the Federal Power Commission to reduce the rates charged by the Natural Gas Pipeline Company of America. This motion is a motion presented on behalf of the Illinois Commerce Commission by John E. Cassidy, Attorney General of the State, by myself as Assistant Attorney General, for the Illinois Commerce Commission, and it is joined in by Mr. George Slaff, and D. A. Myse, who are of counsel in this case, for the Federal Power Commission.

This motion is presented, I will say, after very serious consideration to the evidence that has been presented in this case on behalf of the company. It demonstrates that based upon the company's own evidence that the earnings of the Natural Gas Pipeline Company and the Texoma Company over and above either the investment or the original cost of the companies' property, after payment of all expenses, taxes, and providing for amortization, or based upon the companies' reduced costs evidenced that the earnings for this year and next year, 1941, vary from nearly $3,000,000 over and above either 6 or 6½ per cent return, upon either the investment or the reduction cost, to more than $4,000,000 over and above a 6 to 6½ per cent return upon those bases which I have suggested.

We recognize that if the Power Commission is to give consideration to the evidence that was submitted yesterday and today that the companies probably have a right to cross-examine the witnesses that were presented yesterday and today, but we believe that the case should be set down for cross-examination at the earliest possible time. The company may also present such evidence by redirect as a result of the cross-examination as conducted by the companies' witnesses on rate of return.

If the procedure is proper, I will hand to the Examiner now an original signed copy and 10 copies, and ask that they be received as part of the record in this case at this time.

I also hand to counsel for the company copies of the petition at this time.

Mr. Slaff: Mr. Examiner, as has been pointed out by Mr. Booth, I join in this motion and Mr. Myse, who is also of counsel for the Federal Power Commission, joins in this motion, and I want to add to what Mr. Booth has said, the suggestion that this motion be transmitted by the Examiner to the full Commission and that with the suggestion that argument of the motion be set down before the full Commission immediately upon completion of cross-examination of the witnesses on rate of return who have been presented by the Illinois Commission and the Federal Power Commission, and the completion of redirect testimony on the subject of rate of return by the companies.

This is, as you will observe, a motion for an immediate interim order, and the efficacy of such a motion, the efficacy of the rate regulatory process when such a motion is involved, depends upon expedition.

Mr. Morgan: Do I understand that counsel are resting their case?

Mr. Slaff: By no means.

Mr. Booth: No, we are asking, and we believe the Federal Power Commission has ample statutory authority to enter an interim order fixing fair and reasonable rates whenever it appears from the evidence in a case of this nature, as the evidence clearly discloses, that the rates of these companies are unjust, excessive and unreasonable, and contrary to the Natural Gas Act, under which the Power Commission is regulating these companies.

Mr. Slaff: May I add that such an excellent lawyer as Judge Morgan is thoroughly aware of what an interim order is in this proceeding and any other proceeding and counsel for the Federal Power Commission is by no means resting the case of the Federal Power Commission as it will be presented by counsel for the Federal Power Commission who have come to the conclusion that the Commission is now in a position to order a reduction in rates based upon the evidence which has already been presented, that the Commission has full power to do so, and that the Commission should do so, the presentation of cross-examination of other company witnesses will continue and the presentation of direct evidence by the Federal Power Commission will take place in due course.

The Trial Examiner: The motion will be received as a part of the record and will be given proper consideration by the Examiner..

Mr. Booth: I assume it will be transmitted immediately to the Commission.

The Trial Examiner: It will be given proper consideration, Mr. Booth.

Is there anything further at this time?

Mr. Slaff: Nothing except the setting of a place and date for the next hearing.

The Trial Examiner: Mr. Booth.

Mr. Booth: We have nothing else to offer at this time.

The Trial Examiner: Judge Morgan.

Mr. Morgan: Nothing else.

The Trial Examiner: There will be a five minutes recess.

Mr. Slaff: I take it the next hearing will be devoted to cross-examination of witnesses who have been presented by the Federal Power Commission and the Illinois Commission on the subject of rate of return and redirect testimony by the companies on the same subject.

Mr. Morgan: It depends on how long the hearing will last. We can say as to all of that if we know now how long it will last. It is going to take some time to cross-examine the witnesses.

The Trial Examiner: Yes, the hearing will be in recess for five minutes.

(Whereupon, a short recess was taken.)

After Recess.

The Trial Examiner: The hearing will be in order.

The first order of business at the next hearing session will be corrections.

In view of the motion that has been made, it behooves counsel to get the record completely cleared so that there will be no delay in forwarding the record along with the motion when the proper time comes.

Subject to the approval of the Commission, the Examiner sets for the date on which argument will be heard on the motion filed by counsel for the Illinois Commerce Commission and the Federal Power Commission for an immediate order reducing rates, Monday, December 11. The Commission may, of course, determine to hear argument itself. Counsel desiring to file briefs addressed to the motion will do so on or before Monday, December 11.

Mr. Morgan: Mr. Examiner, it will be absolutely impossible for us to write a brief between now and December 11 and do all that has been assigned to us with reference to cross and redirect examination of the witnesses who have already testified. It can't be done.

The Trial Examiner: If necessary the matter will be the subject of a motion at the conclusion of the next hearing session.

Mr. Morgan: I doubt if the next session will be over then.

The Trial Examiner: With respect to the next session, the Examiner sets as the date, Monday, November 27, and as the place, the Club Room on the Mezzanine Floor of the Sherman Hotel, Chicago, Illinois, and the hour 10:00 o'clock a. m.

Mr. Booth: I want to suggest right here that if the company asks for any more delay, and I think that they should be ready for cross-examination and redirect testimony on the 20th, that they file a stipulation with the Federal Power Commission to the effect that any order entered by the Federal Power Commission reducing the rates of their company be made retroactive if the order is sustained in the Courts.

Mr. Morgan: Mr. Examiner, is there going to be any requirement that we be furnished with briefs or the movants, or must be anticipate what they have to say in support of this motion?

Mr. Slaff: As far as the Federal Power Commission is concerned, or counsel to the Federal Power Commission in this case, the basis of the motion is set out in the motion papers. It is possible, I suppose, that the—I withdraw that.

Mr. Booth: Yes, the motion is in considerable detail.

The Trial Examiner: If there should be any question of setting a date for reply briefs, that will have to be considered.

Mr. Slaff: That, I presume, will be considered by the Examiner or by the Commission whichever hears the argument on the motion.

The Trial Examiner: After giving further consideration to the motion.

Mr. Booth: We will also consider the question.

The Trial Examiner: Now, with regard to setting the date for the 27th, the Examiner wishes to say that that was done after due deliberation and consultation with counsel.

Mr. Booth: I understand that counsel for the company have stated that they cannot be ready before that date and that that was the reason the date was fixed on the 27th.

Mr. Morgan: That is correct.

1534 (November 27, 1939.)

(Counsel for complainant produced a document described as a certified copy of Exhibit 156, which, he stated, was a copy of Exhibits 2 and 2-A in The Peoples Gas Light & Coke Company case, Docket No. 21170, taken before the Illinois Commerce Commission, and requested that it be substituted for the original document bearing that exhibit number. Exhibit 156 was received in evidence without objection in lieu of the previous document bearing that exhibit number.)

CHARLES W. KNAPP, a witness for the Federal Power Commission, recalled, testified:

Direct Examination by Mr. Slaff.

(At this point counsel for the Commission produced a document with the request that it be marked for identification. At the direction of the Examiner the document was marked Exhibit 191 for identification.)

Exhibit 191 is a revision of Chart No. 8 in my Exhibit 185. The revision in this chart was made by the United States Bureau of Labor Statistics, as announced in its August, 1939 issue of Employment and Payrolls, Serial No. R-1007.

It was explained that this revision referred to the figures from 1935. The data have been revised to conform with results obtained from a study of the 1937 census of manufacturers. The revisions affected only payrolls and employment as shown on Chart No. 8 of Exhibit 185, and the supporting schedules, which may be identified as Schedule No. 12, page 2, "Employment," and Schedule No. 12, page 3, "Payrolls." A comparison of this chart with the original chart contained in Exhibit 185 indicates that there has been no substantial change, except that the year 1938 shows a somewhat wider gap between employment and payrolls in the revised chart.

The changes, such as they are, in the figures can be seen by comparison of pages 2 and 3, Schedule 12, as contained in Exhibit 191, with pages 2 and 3 of Schedule 12 as contained originally in Exhibit 185. Of course, it should be pointed out that in Exhibit 191 the information contained in the chart and in the schedules has been brought up through September, 1939, whereas the previous chart and schedules carried through only the month of June, 1939.

Questions by the Examiner.

With regard to that exhibit, the corrections were made in a bulletin published August, 1939. It did not come to our attention until we were making a study in an attempt to bring some of these figures more nearly up to date, as we had been requested by counsel for the company. I discovered it after I testified before.

(EXHIBIT 191 was offered and received in evidence without objection.)

1535 (Counsel for the Commission handed the reporter a document and asked that it be marked Exhibit 192 for identification. At the direction of the Examiner the document was marked Exhibit 192.)

Direct Examination by Mr. Slaff Resumed.

Exhibit 192 is a revision of Chart No. 10 and supporting Schedule No. 14 of Exhibit No. 185, which was entitled "National Income Payments by Type of Payment." This revision was necessitated by reason of the fact that in attempting to bring these data up to date it was discovered that the United States Department of Commerce had made a complete revision of its estimates of national income payments for the period since 1929. It will be noted from Schedule No. 14 of Exhibit 192, in comparing that schedule with Schedule 14 of Exhibit No. 185, that, in general, the estimates of national income payments have been increased by amounts ranging from $300,000 to as much as $3,800,000,000 in various years. For example, in 1929, the original Schedule 14 showed total income payments for that year of $78,574,000,000. In Schedule 14 of Exhibit 192 the total income payments for 1929 are shown at $81,660,000,000. Those changes are brought about by adjustments affecting the types of payment designated as compensation of employees, entrepreneurial income and net rents and royalties, dividends and interest, social security benefits and direct and other relief.

In most instances the amounts shown for compensation of employees have been revised downward. However, for the year 1930 an increase of some $200,000,000 appears to be involved; for 1929 an increase of some $900,000,000 and in 1936 an increase of some $100,000,000.

The changes in entrepreneurial income and net rents and royalties are understood to have been brought about primarily by the inclusion of what is designated as business savings for agriculture in the total amount of income shown, business savings being the amount of income in excess of annual withdrawals. That change was with respect to agriculture but not with respect to any of the other types of income.

In the case of dividends and interest there have been upward revisions in every year varying from $200,000,000 in 1929 to as much as $700,000,000 in 1936.

It will also be noted that the last two columns of original Schedule 14 have been combined in Schedule 14 of Exhibit 192 and the increase in this type of payment in the new Schedule 14 is occasioned primarily by the inclusion of pensions by private corporations which had not been previously included in the estimates of national income payments.

(At this point Exhibit 192 was offered in evidence.)

Exhibit 192 is substituted for Chart No. 8 and Schedule No. 12. My explanation of that change is the discovery of the corrected figures, the same as in the case of Exhibit 191.

(EXHIBIT 192 was received in evidence without objection.

Counsel for the Commission then handed the reporter a document with the request that it be marked for identification. At the direction of the Examiner the document was marked Exhibit 193.)

1536 Exhibit No. 193 for identification consists of Chart No. 11 and supporting Schedule No. 15, which are being substituted for the same chart and schedule number of Exhibit No. 185.

At this point I should like to direct your attention to Chart No. 11 of Exhibit No. 185 and point to an error discovered in the curve for national income payments at the 1929 prices for the year 1932, to which the arrow points. It was subsequently discovered after previous testimony that the figure in Schedule No. 15, column (d), for 1932, should have been 81.0 instead of 93.8, and the new Chart 11 will indicate that had this correction been made there would have been a continuous decline in that curve from 1929 to 1933. The reason for the revision of Chart No. 11 was primarily to record the changes produced in the index of national income payments by reason of the changes already described in connection with Chart No. 10 and Schedule No. 14 of Exhibit 192. The revision of the Department of Commerce brought the figure of $78,574,000,000 in 1929, up to $81,660,000,000. For 1932, of course, the figure shown here in column (d) of Exhibit 193 is 77.7, which is in the vicinity of the 81.0 revision that we mentioned before but is not identical because of the difference in the actual basic figure.

(At this point EXHIBIT 193 was offered and received in evidence without objection.)

You ask if there are any changes to be noted with respect to any of the other schedules or charts in Exhibit 185 as the result of revisions or changes embodied in Exhibits 191, 192, and 193. The answer is, only with respect to changes in Exhibit No. 191 with respect to employment and payrolls. I haven't prepared a revised schedule in this instance, but by reference to Schedule No. 22 of Exhibit No. 185 it will be noted index figures are shown for factory employment and factory payrolls for the United States in the first column of index figures, and due to the revision of index figures from 1935 forward, the figure of 106.1 for 1936 on the factory employment becomes 107.4; the figure for 1937 becomes 117.8 instead of 114.8; and for 1938 the figure becomes 97.3 instead of 94.1. There was no change in the figure for the twelve months ended August 31, 1939. Under factory payrolls for the year 1936 the figure becomes 96.2 in place of 96.0; for 1937 it becomes 114.9 instead of 114.3; and for 1938 it becomes 87.3 instead of 86.9, with no change in the figure for the twelve months ended August 31, 1939.

That is another one of the indices I brought down to date. I can give you them for the twelve months ended September 30th, all three columns if you would like. Under United States factory employment for the twelve months ended September 30, 1939, 112.1; under State of Illinois, 88.8; under Chicago industrial area, 82.7. Under factory payrolls, United States, for the twelve months ended September 30, 1939, 97.0; under State of Illinois, 85.2; under Chicago industrial area, 74.6.

I have read over my testimony and have handed Mr. Slaff certain corrections which I made in my testimony. All of my indices have been brought down to date so far as I have been able to do so with these amendments, Exhibits 191, 192, and 193.

1537 I have brought the Labor Bureau index down to date. In every instance the figures shown in all the charts and schedules have been brought down to date as nearly as possible and in many instances, if current figures are desired, sometimes I have weekly figures.

Cross-Examination by Mr. Morgan.

The changes to which I have not called express attention, but which have been handed to Mr. Slaff, go to typographical errors and things of that sort and not to the substance of the testimony. I have found there were errors, typographical errors, or errors produced by misunderstanding of my language which would ordinarily arise from attempting to transcribe what you hear. Otherwise, I stand on my exhibit and my testimony as I offered it in Washington.

I obtained my degree from the University of Vermont in the year 1931. I became a certified public accountant in the State of New York in 1934. During the interim I was engaged in public accounting work solely. I was employed by two different accounting firms, giving my entire time to the matter of accounting. During that part of the year 1938 in which I stated I was engaged in private practice in and about New York, I engaged in the practice of public accounting. I was offering my services to the general public as auditor or accountant. I don't know that there is any difference between an auditor and an accountant in the accounting field. The two terms are often used interchangeably. The general understanding is that an accountant does not keep accounts but merely checks the accounts kept by others. Such procedure is practically synonymous with auditing those accounts. The accounting department in a business is the department that keeps the accounts.

I stated in my testimony that prior to joining Allen R. Smart & Company I was employed by the Federal Communications Commission as an accounting expert on its investigation of the American Telephone & Telegraph Company. That was not work on that report which was exhibited in the hearing room at Washington, known as the "Federal Communications Commission, Telephone Rate and Research Department, Telephone Investigation," having to do with the problem of rate of return. I had no part in the preparation of that report. The term "accounting expert" is the designation or classification under which I was employed by the Federal Communications Commission. I can't say whether that designation means an employee who hasn't qualified under the Civil Service. I had not taken my examination at the time as an accountant and had not qualified and received my appointment under the Civil Service. If I understand the question thoroughly, the appointment was approved by the Civil Service Commission. Of course, the appointment was not on the basis of competitive examining. I am not an expert on Civil Service law or procedure. I have told you that I was hired as an "accounting expert." That was my designation. What that implies ordinarily would be one who is versed and skilled in the subject of accounting.

While with the Federal Communications Commission I made a study of the principles and methods of consolidation employed by the Bell system in the preparation of its consolidated financial statements. I did not refer to the books of the companies. I was furnished with all of the accounting detail which was used by the company
1538 in the preparation of its consolidated financial
statements, and from that ascertained the principles and methods by which the consolidated statements were prepared. I mean the accounting principles and methods that they employed in that connection. Another part of my work consisted of preparation of reports based on accounting and research performed by others of the investments of the American Telephone and Telegraph Company and four of its associated telephone companies, those researches extending back to the origin of each of the companies.

Another task was in connection with the Western Electric Company, where, on the basis of accounting work and research on the part of the staff, I was engaged to prepare a report on the financial history of the Western Electric Company, extending back to its origin, and also during that investigation I assisted in the preparation of studies, economic studies of one sort or another, such as the scope of the Bell system in the telephone industry. That is one title. Banking relations of the Bell system; interlocking directorates—I forget the exact title of that. Various other studies. These latter studies were not primarily of an auditing or an accounting nature. They were somewhat on the order of statistics. Bearing in mind that the information had to be requested, it is appropriate to say that it was taken from the figures that were available to me and put in my possession. In other words, I had to form some knowledge of the subject, and on the basis of that make inquiry for the type of information I thought possibly might be available. I called for the figures and such explanation of them as I required.

In my service with Arthur Andersen & Company and Peat, Marwick, Mitchell & Company, I was performing the same general accounting duties as those I have already described in connection with Allen Smart & Company. I would say that with the Peat, Marwick, Mitchell firm I was, you might say, a beginner.

My present title with the Federal Power Commission is Principal Examiner of Accounts. I have had no other experience in the business or financial field than that I have described here in connection with my direct and cross-examination. I believe the record contains a full explanation of my experience.

I have never had any experience in the matter of issuing securities because I have never had occasion to perform that type of work for any private company. I have never had anything to do with the sale of securities nor with the conduct of negotiations for the sale of securities. I have never had anything to do with the purchase of securities or negotiations for the purchase of securities in the capacity of one conducting such negotiations.

I have made studies relating to or going to the relation between bond yields and equity yields in connection with my studies with the Federal Power Commission. I don't believe that the relationship between bond yields and equity yields is altogether completely covered in these exhibits. I have data on bond yields and data on preferred stock yields, but common stock or so-called equity yields, are not shown as such in this study.

There is nothing contained in this study as yet pertaining to the subject of common stock. Now, when I
1539 said "this study" I am referring to Exhibit 185. I
prepared that exhibit. I exercised my own judgment as to what was to go into it. You ask why I left out of the study anything at all concerning the yields and cost of financing from and through common stock. It was not so much that they were left out, as you phrased it. I felt that the subject of common stock would be adequately covered in so far as this case was concerned by Exhibit 186.

Exhibit 186 deals with common stocks of natural gas companies. I could not say that I did not think it was pertinent to go into common stocks except as to those natural gas companies, and that that was the reason why I did not go further with my Exhibit 185 and include studies of common stock. As a matter of fact, there is no information included in this report directly as to yield on preferred stocks, as based on market prices. We have no issues of preferred stocks showing cost to company and yield to purchasers. Except in so far as that gives you an indication of market prices; we have no data in here on yields on preferred stocks as such. Yes, of course, I think that yields on common stocks and the costs of financing through common stocks are just as pertinent as the costs and yields on preferred stocks and bonds. As a matter of fact, the record does contain information on yields on common stock and yields on preferred stock, although it happens that they were presented in the record by witnesses for the company.

You are aware, of course, that I have testified concerning certain studies we had made of testimony presented by company witnesses.

In the two exhibits here I undertook to cover the field of general financing, and Mr. Smith confined his studies to the subject of natural gas financing. In my study on general financing I confined it to bond yields and to certain preferred stock yields, and gave no information on common stock yields or the cost of financing through common stock. It is certainly my view that the yields on the 120 rated bonds charted in this Chart No. 1 of Exhibit 185, and based on Moody's thirty bonds of four different ratings, have something to do with arriving at a proper rate of return for natural gas companies. You ask me to explain why the yield on common stock of the same character of companies as those included in those Moody curves would not also have something to do with the proper rate of return to natural gas companies. In the first place, I still hold to my reply to your previous question that Chart No. 1 has something to do with the rate of return for a natural gas company. Of course, as has been testified and as presented in this exhibit as Chart No. 4, it is my feeling that Chart No. 4 is more specifically related to the discussion of rate of return for natural gas companies. Chart No. 4 would have more to do with it than Chart No. 1 because the former, as you will see by the title, is based on bonds of forty public utilities, according to ratings, and in examining bond yields, in a discussion of public utilities' rate of return, you would naturally be primarily interested in knowing the status of public utility securities. In the statement I just made I am assuming that a natural gas pipeline company, such as defendants, is a public utility.

No, I have not put in preferred stock yields and common stock yields based on market prices, as such, although, as I have mentioned, we have in here something that very closely resembles what such a study would indicate in the case of preferred stock. I made no attempt
1540 in here to show common stock yields, that is true. I have made since the time of my last testimony a study of yields on preferred stocks and common stocks, and it might be desirable to present them as testimony at this time. I haven't offered it yet. It was not prepared at the time I testified. This study might be considered as an extensive picture of the securities market with this one exception of common stocks. Now, with respect to common stocks, you are undoubtedly aware that the market for common stocks in the last several years has been practically non-existent, and it is my recollection that we made an attempt to compile new common stock issues, and my recollection is that we found no representative issues. Had we found them we would have inserted those in this study.

You ask why there have been comparatively few common stock issues in the last few years. Well, there has been little expansion, of course; and, further, investors have been primarily concerned in recent years with the safety and security of their investment, which would naturally lead them into bonds. I think it would be a fair statement for the last few years to say they have been running away from risk in the making of their investments. I recognize from my study of these statistics that it has been very difficult to raise money by the issuance and disposition of common stock. I do not think that will necessarily continue. There were some issues of equity securities just about the time war broke out, or slightly afterwards, because at that time the prices of common stocks increased in some cases substantially. If that condition should continue to hold, it might be reasonable to expect that companies will attempt to obtain funds through common stock financing.

I can't tell you, without having made the necessary search, which companies have issued common stock securities and offered them recently. I just mentioned that I had read this general comment. Not having studied it, I do not know whether there is any basis for that comment, but the comment appearing in a well-known business magazine, I suppose that it could be relied upon generally.

Questions by the Examiner.

Market yields on issues which were previously issued prior to the time when I was making my study of yields could be used as well as yields on new issues. I am not saying they could not be, but I was merely commenting on the fact that we had shown preferred stock issues and not yields on market prices; and I was commenting on the fact that in attempting to do the same thing for common, we were stopped by the lack of data. I am referring to new issues. The data on outstanding issues can be used.

Redirect Examination Interposed by Mr. Slaff.

It is a considerably more difficult task in that, when we are attempting to get bond yields, we have a fixed interest rate to which to relate market prices. With respect to preferred stock, we would have essentially the same thing as in the case of bonds, that is, the preferred rate. With respect to common stock, we would have to get our earnings for given periods from the published company records, and then relate those to market prices. The earnings, instead of being fixed as in the case of bonds where the interest is fixed, and preferred stocks where the dividends are fixed, would vary considerably from time to time.

Cross-Examination by Mr. Morgan Resumed.

I am not going to take the position that it is not highly important in arriving at a proper rate of return to know the cost of financing through common stock. I believe the record does contain evidence of common stock yields of certain gas companies and electric companies.
1541 Exhibit 185 is a type of exhibit that could be used in any proceeding similar to this one. I had that in

mind in preparing it. I think it is pertinent to the question of what is a reasonable and proper return for these two pipelines. We have here two kinds of information, financial information and economic information; and it certainly seems most important to anyone who is considering the subject of rate of return to know what the course of financial and economic conditions was, and, as such, it is to be used in forming a background on which some judgements concerning the subject of rate of return can be based. Largely, orientation is its purpose. It is to provide a background of information regarding general financial and economic conditions. I would have difficulty in relating the material contained in this exhibit to the specific situation of defendant in so far as the question of natural gas securities is concerned, because I have not covered that in Exhibit 185, it being understood, as I previously testified, that Exhibit 186 would cover that field. I think the two exhibits are definitely related, as an attempt to depict, first, general economic and financial conditions and, second, the financial status and outstanding securities and issuance of securities for natural gas companies. In other words, the two studies as a whole are related in that way, that you need both studies to get a rounded picture.

You ask me what Exhibit 186 discloses or shows that it would not show if I did not have Exhibit 185 in here at all. It is somewhat similar, as I gather the question's meaning. I would put it this way. That in attempting to consider what is a rate of return that is proper, your mental processes are apt to be somewhat similar to those which you would experience if you were attempting to arrange for, let us say, the flotation of an issue of securities, refunding or otherwise.

I have already testified that I have had no direct experience in connection with negotiations for the purchase and sale of securities. At the same time, I do have an opinion on some of the things that I would do if I were so engaged.

I would want to know what current financial conditions were, in general, for public utilities and for natural gas companies, and I would like to know something about economic conditions and I would like to know something about the securities of natural gas companies and issues of natural gas companies' securities over a period, and interest. All of those things I think, would enter into a determination of the rate of return, just the same as they would enter into any consideration of what should be done in connection with the arrangement for the issuance of securities.

I would not agree that this material could be used "merely" for orientation. I think it is a very important matter. I recognize that in arriving at a proper rate of return for these companies there is involved the return to the common stock as well as the bonds.

You ask me to tell the relationship between the material in Exhibit 185 and the proper rate of return for defendants. I have already stated, I believe, what this relationship is and how it is to be construed. I don't know how I can make myself any clearer on it. Bear in mind, of course, that I have not attempted to use Exhibit 186. I have not made a study of that exhibit. I did not prepare that exhibit and there may be a few things about that exhibit that I do not recall. But if it has in it what I think
it has, it has the information on common stock earn-
1542 ings—price, ratios, preferred stock yields and bond
yields of natural gas companies, which, taken in conjunction with the general economic and financial data contained in Exhibit 185, should afford a basis upon which it should be possible for the Commission to arrive at what it considers to be a fair rate of return.

That is as far as I can go in stating specifically what the relationship is. I have given you a general answer. I cannot give you details, because I am not as fully acquainted with Exhibit 186 as I should be in order to answer your question.

You ask whether I think that the yields on bonds and the cost of money raised through bonds of natural gas pipeline companies are just as usable without the bond yields of industry in general and business in general as the information concerning common stock of natural gas companies is usable in the absence of any information concerning the financing through common stocks of business in general. I think it is necessary to bear in mind, in answer to that question, that at least, so far as I am aware, there are no published statistics currently in use from which it is possible to derive common stock earnings—price, ratios, and preferred stock yields in the same manner as it is possible to determine or obtain yields on bonds. Now, in the absence of statistics covering a period of time, the only alternative would be a prohibitive one, and that would be to compile your own statistics.

You ask me if the bond yields shown in Exhibit 186 are more usable in arriving at a proper rate of return for defendants because of the yields shown in Exhibit 185. In answer to that question, it would appear to me from merely glancing at page 6 of Schedule No. 5 of Exhibit 186, that out of one billion dollars of natural gas companies' securities outstanding, comprising the group of companies which are listed, a mere 15 per cent is held by the public, which would appear to indicate that perhaps the study of natural gas company securities as such, would not be a sufficient basis alone upon which to determine a proper rate of return for a natural gas company. Therefore, the yields shown there must be related to the bond yields of the companies shown in Exhibit 185.

It would appear that bond yields of other companies such as are shown in Exhibit 185 are important in appraising the bond yields of natural gas companies when the latter are used in connection with a study looking to the proper rate of return for defendants. You ask if it is any less important that the yields on common stocks and the cost of financing through common stocks of the same companies whose bond yields are dealt with in Exhibit 185, be also available when we go to appraise the financing through the sale of common stock of natural gas companies. It would be necessary to bear in mind, I think, that when you say the same companies it is quite possible the common stocks of each of those companies is not held by the public, for one thing, but held by holding companies. As I stated there are no published figures concerning common stock and preferred stock yields similar to those for bond yields and it would require a compilation based on research to obtain such figures. Now, it can be done and in my opinion it would be possible to get compilations for earning—price ratios on common stocks for a month or two months or three months which would probably serve as a fair indication of what the market was for common stocks of electric utilities or public utilities in general, at least, during 1543 a fairly recent period. The period would not necessarily have to be contemporaneous with the period which the study of bond yields covered; it might be interesting and it might be helpful if it were developed in that manner. Of course, financial information on yields and such, the reason for giving that over a period of time, as I have previously stated, is to form a background of information. In stating that it might be interesting and it might be helpful, I do not mean to express doubt as to whether it would be of any value. It probably would be of value. I mean it might not be necessary to go back, say, to 1919 and construct a series of common stock earnings-price ratios in order to determine what might be a proper and fair rate of return today. It would be just as logical to go back to that point for yields on common stocks as on bonds, but I still don't feel that it would be essential.

Redirect Examination Interposed by Mr. Slaff.

I have already stated before that it was my opinion and belief that in many instances the common stocks of the companies represented here would not be held by the public. Whether I have the basis of that detailed information with me I can't say without making a search. I am primarily speaking of the present rather than the time covered by these Moody curves which I have brought in here. The Southwestern Bell, Illinois Bell, and Pacific Tel. and Tel. are among those whose bonds are listed in the list of ten Aaa bonds used by Moody. My recollection is that Pacific Tel. has some common stock outstanding in the public hands. The common stock of the other two companies, I am fairly positive, is held by the holding company.

Cross-Examination by Mr. Morgan Resumed.

Those may not necessarily be the bonds that go clear back to the year 1920. They are changed from time to time to reflect changes in outstanding securities. I would be inclined to think in the case of a telephone company you would always find some of those in the Aaa group that had stock in the hands of the public from which a similar curve and index could be worked out; and the same thing would apply to these companies all the way back. With respect to the utilities it is a little more doubtful, because my recollection is since 1919 quite a good number of public utility holding company systems have come into being. While the bonds or stocks may formerly have been held by the public, they may subsequently have been held by holding companies after the formation of the system. In the fairly recent past and today I recognize, as I have already stated, that there is a great deal more difficulty in financing through common stock than there is through bonds, particularly high-grade bonds.

You ask me whether the bonds outstanding in the natural gas business aggregate only approximately 20 per cent of the total capitalization. I attempted to see whether that relationship existed on page 6, Schedule 5, of Exhibit 186. It does not appear to do so. I have made no study of any compilations or composite balance sheets of the natural gas industry, so I don't think I could answer that question. It would appear that more than one-half of the total outstanding securities of natural gas companies is represented by common stock in the group of companies listed on page 6, Schedule 5, of Exhibit 186, previously mentioned. Whether that would be true for the industry is another thing, but at least it would be true of companies of some size; and it would have to be borne in mind that the figure would be only an average and that individual instances may vary widely from it. That would be the over-all percentage. The common stock would be over-all somewhat in excess of 50 per cent on that basis.

1544 Yes, I know that the prices of the bonds which determine the bond yields depend largely upon the earnings of the company and the property coverage. I don't know that I can quite follow you in the suggestion that with reference to any particular company, it might be able to get money for a certain small per cent of its total capitalization at a very low rate of interest and yet find a great deal of difficulty in financing its common stock. It would seem to me, if you could get a very low interest on the bonds, the assumption would be it would be possible to obtain the remaining capital by other means. I did not say anything about cost. It would depend, of course, on many things in a situation. It would presumably depend largely on the risk. I could not compute the cost of financing through common stock by reference to the cost of financing through bonds for a comparatively small percentage of the total investment value. (Objection of counsel for the two commissions to the scope of the cross-examination overruled.)

I have made a study of certain decisions of courts and commissions from which have been derived certain elements or principles which surround the problem of the rate of return. Now, you ask me to state what elements or factors I think are important to study and develop in connection with arriving at a proper rate of return for these companies. My answer to that would be the elements that I have derived would apply to these two companies or to any company wherever rate of return is being considered. These factors are ten in number and I will read them in that order.

1. A proper return or rate of return is a flexible concept, and not a static rule.

2. What return is proper necessitates the exercise of an enlightened judgment in each case.

3. Current conditions are controlling and general conditions affecting all business should be considered.

4. The return should be sufficient to assure confidence in the financial soundness of the utility to maintain its credit and to attract the required capital.

5. The propriety of the allowed return depends largely upon the circumstances, locality and risk of the utility enterprise.

6. The return should be equal to that generally being made at the same time and in the general region on investment in other enterprises which have corresponding risks.

7. The historical cost of money to the utility and the current cost of money should be considered.

8. A utility's corporate structure, financial history and past operations should be considered.

9. The return should accomplish, among other things, due recognition of efficiency, or lack of efficiency in management.

10. The future prospects of the utility, its taxes, its development, the potential stimulation from reduced rates, and the character of the service should be considered.

I agree that those ten elements are important. They are taken verbatim from the June 1st issue of the Federal
1545 Communications Commission, Telephone Rate and Research Department study entitled "Factors Underlying Rate of Return in Public Utility Regulation as Disclosed in Court and Commission Decisions," page BII.

I have stated that Chart No. 1, Exhibit 185, is the chart which is issued by Moody to show the particular curves portrayed for the four classes of bonds rated Aaa, Aa, A, and Baa. I have stated that those bonds are not the same from 1920 on through to the point in 1939 when the curves stop. The identity of the bonds on which the yield is computed is changed from time to time. The number of the bonds is not intentionally changed. There was a change, if my memory serves me correctly, in 1928, since which time 120 bonds were used rather than the 60 previously used, and 120 would be used today if the number of issues was available. If there were 30 bonds of each rating available for use, they would use 120, or 30 in each classification or rating. I stated at page 7856 of the record that there are not always 120 corporations in the list, and there are not that number of corporations at this time, principally because of the difficulty of finding industrial bonds of the higher ratings. This is because there would not be very many of these bonds in existence which meet the specifications for those ratings. Most of the bonds fail to classify as Aaa and Aa bonds. They do not reduce the number of bonds in other ratings when they reduce the number of the higher class bonds. There are not 30 Aaa or Aa bonds listed at the present time. It seems there are 28 A bonds listed. It is not until we get to the rating Baa that we find the full quota of 30 bonds.

I deem this Chart No. 1 as being pertinent to some of the elements going to arriving at a proper rate of return for defendants. I would think Chart No. 1 is pertinent to elements Nos. 1, 2, 3, 4, 5, 6, and 7 of the ten elements enumerated a little while ago. You could include No. 8 as well. Undoubtedly No. 9 has a connection. Of course, it is difficult to see on just what elements these bond yields do not have some bearing. If you would get behind the statistics and examine the companies, you probably would get some indication of whether the company was efficient or inefficient in management. I think that this chart decidedly reflects facts of value with reference to the accomplishing of due recognition of efficiency or lack of efficiency in management. I think if the companies concerned were investigated that you would find companies having the high rating bonds to be companies who had efficient management. I would say the exhibit shows that in the sense that it gives you a basis or a point of start or beginning in any search for such an indication. I wouldn't say just because a bond was not included in the list of bonds shown here that that would reflect any indication that the company whose bonds were not included was not efficient. You say Moody's listing. Well, that is 120 bonds. There are other bond issues which carry Moody's Aaa rating and which are not included here. I would say that some of these securities were issued by companies which have very good management. I have not, as a matter of fact, made any study of the application of this chart to that particular element, except just the general observation that it takes good management, efficient management, to obtain low rates in obtaining capital--any kind of capital.

You ask whether I think that a bond with proper earnings times interest coverage and proper property coverage might sell for a lower yield than that of another company which had less earnings and property coverage, even though the latter were the better managed of the two. That is a
1546 pretty difficult question to answer. Management may
reflect itself in various ways. It takes efficiency of management from a financial point of view to obtain a low rate on bonds. It may take efficiency of operations for a company to make enough money so that on a larger proportion of bonds its earnings coverage would be equivalent. I mean there are too many factors involved there to give a simple answer, I believe. I think a fair statement of my view is that good management leads to a lower capital cost or cost of raising capital. Following that up, on the average I would say that a well managed company ought to have a lower rate of return, because it can get its capital at a lower cost. You ask if I think that element No. 9, "the return should accomplish, among other things, due recognition of efficiency or lack of efficiency in management," is to be recognized by reducing the rate of return for well managed companies, or whether it means exactly the opposite of that. My answer to that would be that the public is entitled to efficiency in management, and that if management is inefficient, a company would be penalized. The investor is entitled to good management, if you mean by that, we will say, an investor in a company is entitled to have that company operated under efficient management.

I haven't said that because an investor is entitled to efficiency in management he should be penalized. You ask if I think an investor should be penalized, if he has good management, by being allowed a lower rate of return on his investment. (Objection by commission counsel to above testimony overruled.)

I did not first state, I don't believe, or at least I don't recall having stated that a company should have a lower rate of return because it obtained its money at a low cost. Nevertheless, I will say that the return should be sufficient—going back to element No. 4—to assure confidence in the financial soundness of the utility to maintain its credit and to attract the required capital. Now, by the term "to attract the required capital," there is necessarily involved the subject of cost as applied to that capital. And I have already stated that the public is entitled to efficiency in management, and that if a company was not efficient in management the result would be to penalize that company as against the company which had efficient management. I hope I have answered your question.

You ask what I mean by "the result would be to penalize that company" as against one efficiently managed. Assume that a company is so inefficiently managed that its operating expenses are excessive beyond reasonable limits. In that case a company should be entitled to reasonable operating expenses, and if its operating expenses were unreasonable, it would be penalized to the extent that such unreasonable operating expenses would not be allowed.

I certainly subscribe to element No. 9, that the return should accomplish due recognition of the efficiency or lack of efficiency in management. You ask if that means that if a company is so managed that it earns special compensation and reward for itself by reason of that special management, recognition should be given that circumstance through the allowance of an added return. I think I have said what I consider to be the meaning of No. 9.

Questions by the Examiner.

Due recognition of efficiency would not be a bonus in that sense of the word. Probably it is conceivable that there may be circumstances involved, what might be considered a revolutionary departure from existing practice, which might entitle a company to some additional reward; but I think also that that would imply in the very statement that the public is entitled to a high degree of efficiency.

1547 You call my attention to a footnote to element No. 9 reading "See Chapter 8," and point out that Chapter 8 begins on page 46 of this study which has been referred to as the source of element No. 9, and that in the third paragraph an underscoring reads: "Mr. Justice Brandies suggests that the reasonable rate to be prescribed by a commission may allow an efficiently managed utility much more." The section you have just read is subject to the same deficiency as we have been discussing before. It purports to compare something, but does not give the thing with which the comparison is being made; when it says "may allow an efficiently managed utility much more," the question is, much more than what? If an argument should be made later in this case that there should be an element added to a certain rate of return to recognize efficient management, and it should be contested, and the Examiner should be persuaded that it should be allowed, I do not think he could find any index in Exhibit 185 for the amount of allowance that should be made. I think it is a matter of judgment in the final analysis. I don't think you can put it down in so many figures or such and such a percentage.

Exhibit 185, as I have explained before, is a general study that could apply to any similar proceeding. Now, if there is something unusual, so unusual as to be revolutionary in the efficiency of management of these two companies under discussion, I have made no such study as would give any indication of that one way or the other. I believe that possibly by this time the record must contain some discussion of the subject of efficiency of management of these two companies; but so far as that factor was concerned, I don't think that it is something that you can give recognition to in such and such percentage or so many dollars. As I have said before, I believe it is a matter of judgment. Each individual case would have to be judged on its own merits.

Cross-Examination by Mr. Morgan (Resumed).

You ask whether, if all the other elements would check out about equal and I was considering element No. 9 in particular, I would agree that if a company is well managed and if it is earning more money as a result of its good management than would be the case if it were characterized by the ordinary or conventional type of management, that it would be entitled to a higher rate of return. (Objection by counsel for the two commissions overruled.)

I have already stated my belief that the public is enitled to good management, and to service by a well managed company. Now, in view of that, I don't see how I can make any statement as to the so-called ordinary or conventional type of management which would have any effect upon the rate of return of the well managed company. You ask me whether, while I have enumerated No. 9 here, I, as a matter of fact, do not give it any effect when I get down to the question of the actual rate of return that ought to be allowed. (Objections by counsel for the two commissions overruled.)

My answer is that I haven't got down to the actual rate of return that ought to be allowed in this case. You ask what I mean by element No. 9, which I have said ought to be considered in arriving at a rate of return. (Objection by commission counsel to above testimony overruled.)

My answer will be again that if a company is efficiently managed, as the public has a right and is entitled to expect, there should be no particular award for efficiency. If a company is not as efficiently managed as the public is entitled to expect, the company in its assumed excess of operating expenses would be penalized to the extent that those expenses were unreasonable.

1548 That is my conception of what is meant by giving due recognition to efficiency in management in fixing a rate of return, except that I might add once more, in the event of this highly unusual, revolutionary departure from present practice, if it could be shown, they would be entitled perhaps to some recognition for that unusual type of management. It is probable that such a type of unusual efficient management would be among the pioneers of any industry. That is bound to be true.

Redirect Examination Interposed by Mr. Slaff.

No, I would not say that all pioneering in an industry was included within what I have called revolutionary management. The mere fact that there is such a thing as pioneering does not necessarily impute something altogether unusual in efficiency of management. It is to be assumed that under given circumstances efficient management will always try to do the thing in the best way which science knows about or has developed, or can be developed under the existing degree of efficiency of the art in general.

Cross-Examination by Mr. Morgan (Resumed).

I think I got that expression "revolutionary" as a result of study and thought about this subject and what might be considered a reasonable interpretation of element No. 9. I think if the facts show in a particular inquiry that the conventional type of management, regarded by the industry as good management as of a given time, would result in a certain earning, and that by reason of a departure in the direction of efficiency from that conventional type of management increased earnings resulted under those circumstances, the company which has departed from the conventional and through efficiency increased its earnings over what they would have been had they gone along the lines that were usually followed, would be entitled to a higher rate of return under a proper application of element No. 9.

Going back to Chart No. 1, at page 7860 of the record, I made a comparison between the low point in 1936 and the figures shown for August, 1939, in which I pointed out that Aaa bonds and Aa bonds reflected lower yields in August, 1939, than at the low point in 1936, while for A bonds and Baa bonds the reverse was true, with the exception that for A bonds there was only a slight increase in August, 1939, as compared with 1936, of three-one-hundredths of one per cent. There was a perceptible increase, however, between the latter part of 1936 and the middle of 1939 in the case of the Baa bonds. I would say about one-half of one per cent higher in August, 1939, for Baa bonds than in 1936.

I think I can give you the relationship of each of the rating groups in September, 1939, to their 1936 levels. For Aaa bonds of thirty domestic corporations, 1936, the low point was 3.10; September, 1939, 3.25. Aa bonds, 1936, 3.28; September, 1939, 3.49. A bonds, 1936, 3.77; September, 1939, 4.05. Baa bonds, 1936, 4.52 as compared with 5 per cent in September, 1939. I have also the figures for the month of October here, if you would like those. For the month of October we have 3.15 for Aaa bonds against 3.10 in 1936; for Aa bonds, 3.35 in October, 1939, against 3.28 in 1936; October for A bonds, 3.94, against 3.77 in 1936; Baa bonds, October, 1939, 4.88, as against 4.52 in 1936.

1549 The difference between the Aaa and the Aa bonds is described at page 6 of Schedule 1, where Aaa bonds are shown as representing bonds of the highest type of investment. With respect to these bonds, the principal and interest are protected by characteristically wide margins, the fluctuation in which is not at all likely to jeopardize the security, and among all rating groups Aaa bonds hold the best prospect of unchanging quality. Aa rank high by reason of asset and income protection, but they lack one characteristic or another of the highest type of bond investment. I don't know whether it is someone or another characteristic that distinguishes the two classes of bonds. I don't know that the language is quite as definite as that. It does say one characteristic or another, but I don't think you can be too literal about it. I don't know how you can measure the difference between Aaa and Aa bonds because if one characteristic or another is lacking in Aa bonds, certainly there is a difference which Moody's consider worth noting. I agree that these Aaa bonds and Aa bonds come more nearly moving along parallel lines in comparing those bonds with the curves representing the yields of the other two classes of bonds—A and Baa.

The spread between Aaa and Baa bonds at the end of 1936 was 1.42. In October, 1939, the spread is 1.73. There is a wider spread in October, 1939, between Aaa and Baa bonds than there was at the end of 1936. If we go back of the depression period and take a look at the figures for December, 1927, it develops that the figure for Aaa bonds is 4.46, for Baa bonds, 5.32, which is a spread of .86 of one per cent. The spread at the end of 1927, then, was less than it was at the end of 1936, and still less than it was in October, 1939. That indicates to me that the investor is demanding greater compensation for the risks he undertakes; or, to put it in different words, he is willing to accept a lower yield in order to secure safety of principal and income. He is demanding greater compensation for risks in 1939 than he was in 1936 or 1927.

You ask which of those curves there do I regard as being more indicative of the situation obtaining with reference to financing through preferred stock or common stock. It would appear that with respect to preferred stock the yields would be more in line with those on bonds of A or Baa rating. The lower ratings of bonds are more comparable to preferred stock than would be the higher ratings of bonds because the element of security is lacking. That is true when you get preferred stock that has bond issues behind it. That observation as to lack of security is more true of common stock as compared with bonds. If we apply the observation I have made as to what this chart indicates, to financing through common stock, there would be a wider spread between yields of Aaa bonds in 1939 and the yields on common stock that year than would have been demanded in 1936 or in 1927, if we apply that method of determining the matter. On the evidence I would say that that indicates the investor is demanding more security and less risks. In the line of what I have said about those common stocks it would necessarily follow that there would be more compensation required for the risk going with the common stock in 1939 than was true in 1936 or 1927.

As a matter of fact, the greater preponderance of the financing through bond issues in the past several years would appear to be within the three higher rating groups so far as I can determine.

1550 Chart 6 shows a line which indicates the trend of the composite of Moody's bond yield averages for 30 public utility bonds with Moody's bond ratings of Aaa, Aa and A, with a line showing the average price of new capital on utility bonds, and those lines very nearly conform to one another which indicates, to my mind, that the bulk of the financing was by bonds of the three highest Moody's rating groups.

Passing over to page 2 of Schedule 7, it appears that the total volume of Aaa and Aa electric utility bonds is approximately $2,486,000,000. In the other two classes, A and Baa combined, the amount was approximately $942,000,000. The A bonds exceed the Aaa by about $130,000,000. That is for the last four years, 1935, 1936, 1937, and 1938. That circumstance indicates that investors are leaning toward security and safety, as I have already stated, that they are running away from risks, and that they are demanding higher returns for risks these last few years and at the present time, than they did in former years.

Chart 2 shows interest rates charged by banks. The figures for both 4 to 6 months' commercial paper and 60 to 90 day time loans were obtained from averages computed by Standard Statistics Company which are to be found appearing in the Commercial and Financial Chronicle; and I consulted with the Federal Reserve people in order to get an explanation of these two rates, and my interpretation based on that conversation was that these were the rates charged by banks.

I stated before that I believe the information portrayed by Chart 2 is pertinent, that insofar as these particular figures are concerned they are pertinent not because they themselves show what should be considered a fair rate of return, but because they represent just one more phenomenon to show that what is true of interest rates for one type of security, in general is true for other types.

Redirect Examination Interposed by Mr. Slaff.

My recollection is that I did make that statement on direct examination at the top of page 7865, because I wanted to have clearly understood the purpose of putting that chart in the record. I testified on direct that Chart 2 and Chart 3 are merely to portray historically the movement of interest rates, as such, and are not an attempt to offer short term money rates or yields on treasury bonds as a measure of a proper rate of return.

Cross-Examination by Mr. Morgan Resumed.

I may or may not have said in that connection that this is just another indication of yield required in one type of financial transaction as indicating the tendencies in other financial transactions. You ask whether the lower rate of interest on this type of short term paper may indicate difficulty in over-all financing of such institutions as defendants. I don't quite see the connection to which you refer, unless it would be to assume that defendants were seasonal borrowers, or something of that sort, which is not the case. I don't quite see the direct connection between what this chart shows and the difficulties that defendans would have. I have already testified this was not put in here to indicate what should be a proper rate of return, and from that it can be deduced that it doesn't follow here rates are those that would be applicable to any type of security for a public utility company.

1551 You are approximately correct in summing up my statement at the bottom of page 7863 and the top of the following page to mean that there was a parallel movement in all types of interest and that Charts 2 and 3 were offered as evidence of the tendency in a downward direction. They do show the present time interest rates of all kinds are down to about the lowest levels.

Yes, by that I mean interest rates on borrowed money rather than yields on securities of corporations of the junior type. I am talking about debt capital and government securities and commercial paper. I don't quite see the connection between the prevailing low interest rates on 4 to 6 months' commercial paper and 60 to 90 day time loans and the amount of money available for the financing of natural gas companies. I stated, and I repeat, that this exhibit was offered to show a broader background of interest rates than would be obtained by merely examining figures showing bond yields. In other words, I am trying to broaden the financial picture so that the reader will be better informed as to just what conditions were generally in the money markets. I can't see any connection between 4 to 6 months' commercial paper and 60 to 90 day time loans, and such capital as a natural gas pipeline company would require. I think the answer that follows from my previous testimony is that this would have no direct connection with the type of capital that these companies require. I think it is important in getting a general background to see what other factors exist in the money market, and whether bond yields, as such, are isolated as an indication of financial conditions, or whether the indications shown by bond yield averages carry through to the whole field of the money market. We gave it some consideration and decided that would be desirable.

This index does not move in the same fashion as bond yields, but it does show, especially since 1933, that the rates are at the lowest level since 1920; and I have already indicated that the same thing is true of bond yields in general. That is down to the most recent figures shown on that chart. I am merely comparing the figures of 1933 with the latest available figures that I had, in making that statement. The interest rates on the paper portrayed in Chart 2 and the bond yields portrayed in Chart 1 have not travelled together even as between 1933 and 1939, but at the same time the changes since 1935 have not been anywhere near as great in bond yield averages as for the entire period prior to that time. I think I am justified in making a generalization based on what appears to be a fact, that the changes in proportion, the relative changes, have not been very great during that period.

I can't trace a movement of bond yields and of interest rates on the paper portrayed in Chart No. 2, movement for movement, day by day, and month by month. I don't think the fact that they do not travel together indicates a lack of relation. I think you have got a general pattern here. In 1929 we had the start in our bond yield averages of something that indicated a virtual collapse of the bond market. In 1929 the interest rates on both types of paper were very high. I don't mean, and I didn't mean when I made the statement, that you could take each one of these lines and follow it down month by month and day by day.

There is a great amount of idle resources which has not
been put to work, and that, of course, is one of the
1552 things, in my opinion, that is responsible for the low
interest rates that we see here. I do not know that I
would answer that it is the major thing, as there are other factors involved, such as the fact that the Federal Reserve Bank has been buying in government bonds in the last two months or so in order to support the market for treasury bonds. I mean there are a good many things that enter into it; but I think that a very important one, that idle re-

sources are bound to create cheap money. It is a fair statement to say that the banks are full of money belonging to depositors who are not willing to invest it in the light of compensation promised for the risk involved. That is a matter of common knowledge in this country. I do not know whether the banks refuse to loan it or whether business refuses to ask for the money. You have got to look at both sides of the picture, I think.

Whichever it is, there is a congestion of money which is available for the type of loan that is portrayed here in Chart No. 2, which has driven the interest rate down. That would be a fair assumption.

My understanding is, from my inquires, that the four to six months' commercial paper is paper of such borrowers as meat packing houses who need these funds for seasonal purposes, and the 60 to 90 day time loans are loans to brokers, New York Stock Exchange, which are collateralized by securities subject to substitution from time to time. I think it would be a fair assumption to say that they are the very highest kind of bank loans known to business. I don't believe the four to six months' paper has any tangible security in back of it other than the credit standing, and so forth, of the borrowers. That credit standing involves the earning capacity of the borrower. I do not know that I quite agree with your suggestion that the property which the borrower has would be subject to execution in the event that the debt was not paid, but in any case, that paper is only extended, say, to borrowers who can give reasonable assurance by their history and present position that the loans will be repaid on maturity. The borrower had to convince the bank that it is going to get its money back and that there is not any doubt about it.

Chart No. 3 has to do with the yield on U. S. Treasury bonds. I stated in my direct testimony at page 7867 that the bonds included are "bonds due or callable after 12 years, as computed by the U. S. Treasury Department for the period since 1920." I think you will find at the bottom of Schedule 3 that the bonds were not due or callable for 12 years or more beginning with January, 1926. It states that earlier figures are for treasury bonds not due or callable for 8 years or more, together with certain liberty loan issues, so that the type of bonds would not be identical for the entire period. I do not know why they used 8 years at one time and 12 years at another unless 8 years was ultimately considered to be too short a period for long-term money.

In my direct testimony, I stated that the yield on treasury bonds portrayed in Chart No. 3, like the interest rates reflected by Chart No. 2, as such are not indicative of a proper rate of return for defendants. On the whole, I think the comments I made in my direct and in response to cross-examination going to Chart No. 2, would apply to Chart No. 3. As a matter of fact, the same congestion of money in the banks and in the hands of depositors has entered into the
low yield on government or treasury bonds. In addi-
1553 tion to that, there has been a supported market for
treasury bonds in the last two months. I believe that it has been a supported market for some time.

I cannot say that I recall that the daily press carried a story that the Federal Reserve Bank would withdraw support for U. S. Treasury bonds about the early part of September, about the time the war broke out. I do know that there was quite a fall in the price of government bonds and an automatic rise in the yields of those bonds about the time the war broke out. Since that time, the yields have tended to go down and the prices to go up to where they were prior to the outbreak of the war, but they have not reached that point as yet to my knowledge. That has been due to the fact that there is a supported market for those securities.

I think it is largely a fact that much of the money which has heretofore been invested in government bonds was induced into that investment by the liquidity of bonds as a sort of standby investment. People consider that government bonds are safe as a medium of investment. They are liquid. People are willing to put their money into that type of bond with a very low yield because they can get their money any time something offering more comes along. When there was a spurt upward in the business conditions resulting from the outbreak of the war in Europe, there was an immediate rush on the part of those holding government bonds to sell those bonds and turn them into money for use in other things. That not only applied to government bonds but to other bonds as well, I understand. That turned out to be a mere temporary flash. The market has not quite recovered with respect to government bonds, but has largely done so with respect to corporate bonds.

Charts Nos. 2 and 3 are relevant to some of the elements I enumerated, because they are a part of the picture of the whole economy and as such they do have relevancy even though they cannot be applied specifically in constructing a rate of return.

I think judgment would have to be associated in applying Moody's bond yields, portrayed in Chart No. 1, to a proper rate of return, because I think that Moody's bond yield averages are a step nearer to the immediate problem than would be the yields on U. S. Treasury bonds. Naturally, you would have to exercise judgment in undertaking to orient the one to the other, because of the very nature of the data.

My statement on page 7867 was to the effect that "from the data presented in this section it is seen that money rates are now lower than at any time since 1920, and probably lower than at any time in the history of the country." The section referred to gives a general picture, and that would apply to all three charts, numbers 1, 2, and 3, because all were included in this section.

I think the use of the term "money rates" is justified even though all three of these charts deal with interest rates. Interest cost enters into the cost of money. I just can't see the line of distinction involved in your question.

You ask if I would make the statement that the money rate going into the cost of natural gas pipeline companies is lower than it has been in the history of the country. I
have not made a specific study of the rates for natural
1554 gas pipeline companies. When I made that summary
statement, I was, as a matter of fact, summing up the deductions I made from Charts 1, 2, and 3, referring to yields on interest-bearing securities; but I think that it follows, while you can't perhaps impute a direct percentage relationship except by making compilations for that purpose, yet if the cost of common stock money is low, and it is decidedly lower than heretofore, it might be that that fact would have an important bearing on the over-all cost of capital, and preferred stock money would very probably follow the trend of bond money. Common stock money might tend to even increase when the other two decreased. As we have already seen, that cost of equity capital is subject to greater risks than other forms of capital; so the cost of common stock money capital would tend to be higher than the cost of capital represented by interest-bearing securities.

I made no study and have made no computation of cost of common stock money over a period of years. Of course, we know that in 1929 the common stock prices in the market were probably way beyond what was reasonable; and that would tend to make a very low cost of money if you were selling common stock at that time. That is a matter of common knowledge. But aside from one or two general observations of that kind, I could not make a detailed comparison over a great period of years and give you any direct answer.

The fact is then that these two higher classes of bonds portrayed in Chart No. 1, and the interest rates on the type of commercial paper portrayed on Chart No. 2, and the interest rates on government bonds, or U. S. Treasury Bonds, are not necessarily an indication of the money rates for equity capital. That is, they are not indicative of the total cost of obtaining equity capital. It would be more accurate in my summation on page 7867 if I had said interest rates instead of money rates, except that I feel that as to a strong company, which is paying dividends on its common stock, the market prices of its securities would vary from the market price of preferred stock, let us say, by perhaps one and one-half to two per cent absolutely. I did not point that out in this exhibit here or in my direct testimony. That is part of what I would say is general knowledge. I made studies which give recent indications of cost of common stock capital, so far as you can derive a cost for that kind of capital from market prices of outstanding stocks.

Over a great period of time, I could arrive at a proper level or trend of levels for financing through an issue of common stock. Over a reasonable period of time, beginning with 1931, the year the pipeline was completed, for instance, I could do that by some such process as was followed by the Federal Communications Commission in its study on rate of return, that is, taking two dates from any years and making my computations on that basis. (Objection by commission counsel, overruled.)

Strictly speaking, it is or was my intention, as I consider the matter at this time, that the rates to which I was specifically referring were interest rates, and not rates such as you have in mind, which would cover the entire cost of capital as such; although I realize that within reasonable limits it would be possible to proceed on the basis of known relationships prevailing or existing among yields on various types of securities, and to at least make a fair approximation of rates on preferred stock and common stock under current conditions; not, however, over a period of time that had not been studied.

1555 I do not see why my statement that "money rates are now lower than at any time since 1920, and probably lower than at any time in the history of the country," is not true even as to interest rates. I mean, the studies I have made seem to bear that out; and I believe I can refer you to a similar statement made by Mr. Willkie of the Commonwealth and Southern in proceedings before the Securities and Exchange Commission. No, Exhibit 185 does not show that that statement is not true. Well, now getting back to these exhibits, I think if you will refer to Chart 2 you will have no difficulty in following the indication laid down in my statement. I think if you will refer to Chart 3 you will have as little difficulty. If you refer to Chart 1 I think you will find that the composite rate on 120 domestic corporations in August, 1939, was 3.67 and in 1936, in December, was also 3.67. So I think my statement is fully justified. Those are the lowest bond yields for those 120 domestic corporations shown in Schedule 1 since 1920.

I believe it was quite clear from my testimony I was not talking about interest rates for particular classes of bonds, as the testimony includes statements giving exact details with respect to comparisons between 1936 and 1939 on different classes or groups or qualities of bonds. I think my statement will stand analysis in view of the facts reflected by Chart No. 1, because, as I said before, I am speaking in general terms when I make the statement. When you make a general statement, as I did, you try to get some index that represents an over-all picture, and I think by using that composite rate I have done just that. If I would have taken Aa bonds, for example, or Aaa bonds, you would have found the yields on those bonds were much lower in August, 1939, than in 1936, yet I didn't quote those in making my general statement. I was talking about money rates in general. My composite curve is not weighted in any way so far as I can gather. It is simply an arithmetic average of all the bonds included in the group of 120 bonds.

I believe you have to allow a witness some leeway in the matter of timing. In making my testimony, quite obviously I had to work when information was available to me and in front of me, and I did so. I think it must be obvious to everyone I was basing my statement on what was in the exhibit. I made my statement based on the charts and schedules included in the section of Exhibit 185 on general interest rates and yields. My statement was just a summary of that section as I saw it, as evidenced from the data and curves shown on the chart. Of course, when I make a statement that rates are now lower than any time since 1920, and probably lower than any time in the history of the country, that last section of the statement is naturally based on general observation or information which was familiar to me, having to do with the same subject matter as reflected by these three charts. But the statement was not altogether reflected by information which only went back to the year 1920. I mean it was quite obviously so.

If my general summary statement be applied to bonds rated A by Moody's or to bonds rated Baa by Moody's, it is not a correct statement of the situation. I did not make that statement with respect to those. I did not intend the statement to apply to those two classes of bonds. You ask me whether or not my statement would apply to Ba bonds and B bonds as rated by Moody's. That seems to raise a fundamental question as to the desirability or nondesirability of including bonds in the four rating groups in an average. When you talk about interest rates, money rates, you don't go out and pick the poorest or the least efficient company in existence and say that is a basis of generalization. My summary statement obviously does not apply to bonds in those two classifications, because I based my conclusion on what is here. That is all I intended in that statement.

I have stated that Chart No. 4 portrays the yields on Moody's forty utility bonds, rated Aaa, Aa, A and Baa, from the year 1934 down to August, 1939. I put that chart in there because I was trying to get from the general to the specific. I was trying to get from a composite average and
quality ratings of bonds to something that was more
1556 specifically related to the regulation of public utili-
ties. I did not put the Moody curve for industrial bond yields in separately by rating groups. I thought it sufficient to put in the utility bonds because my understanding is pipeline companies conducting interstate transportation of natural gas are subject to regulation in certain respects. I won't go into all the features. And in that sense such companies partake of the nature of regulated utilities. In other words, I was using the terms "utility" and "regulated company" as being synonymous. Investors probably regard natural gas pipeline companies as utilities if they read Moody's at all, because Moody includes pipeline companies in its public utilities manual. It includes such companies as Natural Gas Pipeline Company of America. The bonds of the latter company are not rated. I didn't mean to imply that. It has never included the bonds of the Natural Gas Pipeline Company in any list of rated utility bonds be-

cause they are not publicly held. They are held by the participants.

You ask how investors classify natural gas pipeline company bonds. I am not acquainted with many investors personally. I have not seen any of their portfolio lists, but even if I had, I don't think I would be able to make an answer to your question from it. Undoubtedly Equitable Life Assurance Society of New York has many investments. I can assume that it is a large purchaser of securities because insurance companies are.

(At this point, counsel for defendants handed the witness a pamphlet entitled "Schedule of Securities Owned by the Equitable Life Assurance Society of the United States, 393 Seventh Avenue, New York, December 31, 1938—" Objection by commission counsel to testimony with respect to above document overruled.)

You ask me to turn over to the caption "Public Utilities," in the list of securities, and see how many natural gas company bonds I find in that list. I find that there are one or two companies in here with which I am not quite as familiar as I should be to answer the question. I think it may be possible either the Kansas City Gas Company or the LaClede Gas Light might possibly be natural gas companies, I am not sure, but I can't base any conclusion on a hurried examination of this.

I notice in the utility bond section—assuming that there were no natural gas company bonds in the public utility bond section—I feel that would be inadequate as evidence to support the fact these companies are not considered as public utility. On the other hand, glancing through the book here, I find included under "Industrial and Miscellaneous," Northern Natural Gas, El Paso Natural Gas, Mississippi River Fuel, Panhandle Eastern Pipe Line, and Cities Service Gas. I don't believe I could take this as an evidence of what an investor considers the securities of the companies to be. I believe there are nine pages of bonds listed here. They list these five natural gas pipeline bonds under "Industrial and Miscellaneous." Kansas City Gas Company and LaClede Gas probably would not be pipeline companies. I was thinking of natural gas. You did say that.

Coming back to Chart No. 4, you asked if I note whether there is the same characteristically wider spread between the yields of the Aaa bonds and the yields on Baa bonds in August, 1939, the date to which these curves are extended, than at the end of 1936. There is a slightly wider spread in

1939 than in 1936: For Aaa bonds, 3.07 in December, 1936, and in August, 1939, 2.83; for Baa bonds, the low point in January, 1937, 4.50, and in August, 1939, 4.39. Now, the spread in 1936 was a difference between 4.50 and 3.07, which is 1.43; and the spread in August, 1939, was the difference between 4.39 and 2.83, which is 1.56. The spread had not materially widened, although it is wider. It is wider in the case of utility bonds as in the case of all bonds portrayed in Chart No. 1.

1557 The companies listed on page 3 of Schedule No. 4 are the companies whose bond yields are reflected as of the present time in Chart No. 4. I do not see any companies in the list that I would recognize as natural gas pipeline companies. With the exception of Peoples Gas Light and Coke Company, they all appear to be primarily electric or telephone companies. Peoples Gas Light and Coke Company is a distributing company which distributes mixed gas. Its bonds are classified as Baa bonds in Moody's classification.

Chart No. 5 portrays bond yield averages for bonds of 40 industrials, 40 public utilities and 40 railroads, comprising all of the bonds included in Moody's list of 120 domestic corporation bonds, for which the composite average yield is shown in Chart No. 1 of Exhibit 185. The 120 bonds represented by the composite curve are the same as those which make up the other four curves, Aaa, Aa, A and Baa. It is just a classification by types of business rather than by bond ratings. I have made no comparison of the curves shown on Chart No. 5 with a curve showing the bond yields on natural gas bonds over the same period. It might be helpful in orientating the information conveyed by this chart to the natural gas pipeline companies' situation if such a curve were superimposed on that same chart. I believe, however, that the information as to natural gas company bonds has been introduced in evidence in another exhibit by one of the company witnesses, so that information is available for that purpose. I would have to make the observation, of course, that the bonds shown in Chart No. 5 are bonds which Moody's classifies as Aaa to Baa, and, therefore, it would be necessary to make some grouping of natural gas company bonds according to quality; and, furthermore, it would be necessary to determine for such natural gas company bonds the particular type of natural gas company represented. By that I mean whether it would be a pipeline company, producing company, distributing company or wholly integrated company. In this inquiry it would be proper to select bonds of those gas companies which had the business of producing and transmitting natural gas.

I don't know that it would be extremely difficult to find pipeline bonds that would classify under these four classes. Moody's investment manual gives a considerable amount of information concerning the nature of operations of natural gas companies. Moody has not done the classifying. The classifying would have to be done by the investigator. I just stated that Moody's does not classify these companies, so far as I know, according to their grouping to transmission or distribution or so on. I am talking about the classification according to operation which I understood was what you meant. It may be that it would be difficult to find natural gas pipeline bonds that would classify as to ratings so far as Aaa bonds or possible Aa bonds are concerned. That statement is probably less true with respect to A bonds or Baa, and, furthermore, there are a good many natural gas company bonds which are owned by holding companies and not outstanding in the hands of the public which, of course, would not be seen in Moody's rating.

You couldn't make up these curves if you didn't have comparable information concerning market prices of securities outstanding in the hands of the public. I don't think 1558 there would be difficulty in orienting this to the requirements of this particular proceeding. If certain conditions as to capital structure and earnings are met, it certainly seems that one could impute from these facts some judgment which could be applied to natural gas company bonds. Before I would undertake to relate these curves to a particular situation I would first be faced with the necessity of including only those bonds which have a public market. Secondly, it would be necessary to obtain Moody ratings for each of the bonds which are outstanding in the hands of the public, and then it would be necessary to obtain market prices, daily average market prices, for each of the bonds. It would then be necessary to compute yields to maturity for each of the bonds. In other words, it would be practically a prohibitive task to make such a compilation which would be directly related to Chart No. 5 or Chart No. 1. That is not to say it could not be done, but it would not be a practical matter to attempt. I don't think it would be necessary to go through all of those motions before Charts No. 5 and No. 1 could be related to a proper rate of return, because, while information concerning bond yields over a period of years provides a good background of information, it can be assumed that bond yields in general for securities of this type would follow the pattern exhibits in Chart No. 5, and that if you were to obtain bond yields of reasonably current data you would have a basis of comparison which would be reasonably accurate.

Your question was directed to me concerning natural gas company bonds, if I am not mistaken; and I was attempting to explain how this chart could be used as a basis for drawing some conclusions concerning any type of bond which bore the characteristics of these bonds as to quality. I have already stated that it would not be necessary to chart the yields for natural gas companies. You ask if it is necessary to relate Chart No. 5 to the curves representing yields on natural gas company bonds. I believe I have already answered that question, describing the manner in which this chart could be used. Since you state that you have not followed me if I have stated how I am going to use this chart in relation to the rate of return for natural gas pipeline companies, I will repeat my statement. This chart reveals a pattern of bond yield averages of bonds carrying Moody's ratings, ranging from Aaa to Baa for 40 industrials, 40 public utilities and 40 railroads. Bonds exhibiting the characteristics of bonds classified by those Moody's ratings would follow the trends indicated in Chart No. 5, and that would be true for all kinds of corporate bonds. Therefore, if we know something about current market prices, current yields on natural gas company bonds exhibiting the characteristics of the bonds as to quality, I believe that the chart certainly speaks for itself as to what might be considered the course of the bond market for natural gas company bonds. I don't believe that I intended to imply that railroads, as such, had the same characteristics as natural gas companies; but I do believe, if you take my statement as applying to public utilities, that with that correction the statement can stand.

I didn't make the statement that all we have to do is look at the utility curve and then fix the rate for natural gas pipelines. I said you would have to consider, in relation to the pattern followed by the public utilities, the current conditions with respect to market price and yield on natural gas company bonds of the type under consideration. I

mean of the type as to rating. No, you couldn't take
1559 the two lower curves, the ones called 40 industrials and 40 public utility bonds, and from those chart the trend or the course of the yield on railroad bonds. The trends are naturally dissimilar. I think you will notice if you examine this chart carefully that it has only been since the latter part of 1937 that the curves for these various types of securities have exhibited a marked divergence from one another.

You ask me whether in the early part of 1937 I could have safely used the curves showing the yield on 40 public utility and 40 industrial bonds as an index to what a railroad yield would have to be. I would have to say that you have to go from Chart No. 5 and make a rather complete study in order to determine which of the 40 railroad bonds could be grouped under the various rating groups, and get some determination in that way. I think it would be necessary, in any case, to have some knowledge of exactly how many railroad bonds were included, and the proportion of the number in each group to the nominal number in each group; that is to say, whether there were 4 railroad bonds available for inclusion in a group of 10 required or not. Then you could get some idea. You would have to study the situation in order to determine what the status of railroad bonds was and you couldn't safely rely on a curve of this kind for that purpose, in my opinion. You would have to go behind the curve. We have already done that in connection with arriving at a rate of return for natural gas pipeline companies, not on this chart, but right in this connection in Chart No. 4.

Redirect Examination Interposed by Mr. Slaff.

It is not possible to get the whole story on rate of return from any single chart in Exhibit 185 or Exhibit 186.

Cross-Examination by Mr. Morgan (Resumed).

Exhibit 185 is not intended to be a complete story from which you could make a deduction for natural gas companies. You have to use both of the exhibits, 185 and 186. All of the charts in Exhibit 185 would be of assistance, in my opinion. I have already stated that this entire Exhibit 185 is intended as an exhibit to portray general economic and financial conditions over a period of years, with which any one would wish to be acquainted in forming any opinion on the subject of rate of return at this time. It is just a background and orientation, but that means a lot. It is not to be cast aside by the phrase "all it means."

Questions by the Examiner.

Going back a little bit to my statement that I would have to go behind Chart No. 5, speaking of railroad bonds, I meant that you would have to break them down into rating groups and find out, as we did for public utilities. The question directed to me was how I would go about studying rate of return requirements for a railroad. Well, we are not doing that here. We are studying the requirements of a public utility. I state in my exhibit before Chart No. 5, how Moody rates those bonds. The information is in there. It is in Schedule 1, pages 6 and 7, with respect to the bonds of the type represented in Moody's averages. You ask 1560 how definite the characteristics of a railroad bond are that Moody uses in determining his classification to which it should go. I have never consulted with Moody's but I think the key to their ratings, as indicated in Schedule 1, gives a very good picture. I believe the information could be obtained from Moody's. I don't know just what mathematical process or otherwise Moody's would go through in order to make their determination; but the results of their determination, as can be seen on Chart 4 in the case of public utility bonds, certainly show that there is a decided difference in the average yields of bonds according to Moody's ratings.

If you have, for instance, under consideration a rate of return on a security of the natural gas company which may be a pipeline or something else, the securities of which are not publicly held, you have no market indices. You ask whether I can do anything other than come to a general conclusion as to what category that type of security would fall into. I think there are a good many considerations involved there. You would have to decide, among other things, if the securities were owned by a holding company, whether the capital structure as dictated by the holding company represented what might be called a properly related capital structure; and, of course, it would not necessarily follow that because a company had 80 or 90 per cent of bonds in its capital structure, that that represented a properly related capital structure. I believe there are a number of factors bearing upon the inherent characteristics of a company which are made available in Moody's Manual of Investments, and it is possible to relate various ratios of one kind or another to market prices and find some consistent pattern that shows a definite relation exists between market price and other factors.

Cross-Examination by Mr. Morgan (*Resumed*).

You ask how I would orient to these curves here a situation dealing with a natural gas pipeline company that wanted to issue securities, 30 per cent bonds and 70 per cent common stock. (Objection by commission counsel overruled.)

I would take Chart 5 and I would ignore the railroad curve altogether because we are not dealing with railroads in this case and none of the underlying circumstances would be similar. I would next look at the curve for public utilities and find out what lies behind that curve. Then turning to Chart No. 4 I would see the rating groups of public utility bonds and yields for each rating group. I would then take Moody's group of 10 corporations rating Aaa. I would then turn to page 3 in which those ten corporations are listed. It would then be possible to localize the information and find out from examining the statements of these companies, which are available to the public, what characteristics those companies exhibit as regards capital structure; and if I found that on an over-all basis those 10 companies had a capital structure which indicated that 40 per cent of the outstanding securities consisted of bonds, I would say that a company which was going to issue 30 per cent of bonds could be expected, assuming that they were mortgage bonds, to merit a rating of Aaa, all other things being equal as to earnings, interest coverage, etc.

You ask whether anything else would have to be considered besides the percentage of the total capitalization represented by bonds. You would have to give some con-
1561 sideration to the company's history of earnings. If
it previously had securities outstanding you could refer to the market prices and yields on those securities. You could see whether there was any inflation in the fixed capital, and there would be other tests I possibly could mention but will not. That gives you a general picture.

I would consider the circumstance that natural gas comes out of the ground from reservoirs which are exhaustible.

In the case of a natural gas company you would want to see that the bonds had a sinking fund requirement that would permit their retirement so that there would not be any such obligations outstanding beyond the useful life of the gas field. I don't know just how far short of the indicated life of the field they should mature. I would have to know whose indication of the life of the field it was and on what basis. There are a good many things to take into consideration.

These considerations lead a considerable distance away from the mere determination of the per cent of the capitalization represented by bonds. I did not mean to imply a mere thirty per cent would be sufficient; but I say it leads you to a comparison and study of bonds in the Aaa classification, and, of course, you would have to take in the other factors to see if the company in particular exhibited qualities and requirements that would be necessary to make the bonds merit an Aaa rating.

I am quite sure there are no Aaa natural gas company bonds, that is, pipeline company bonds. I believe Southern California Gas Company, which conducts some transmission operations, has bonds rated Aaa. I would say it is probably largely a distribution company. What I had in mind as a possibility was the Southern Counties Gas, and I believe that is primarily distribution also. I can't say that I know of any natural gas pipeline company whose bonds are rated Aaa or Aa. The Panhandle Eastern Pipeline Company has bonds rated A. There may be smaller companies than those in here which would have A ratings, with which I am not familiar. I don't happen to know of any.

You ask why I would go back to Chart 4 and use that chart in connection with the public utility curve on Chart 5, if I were going to relate Chart 5 to the rate of return required by natural gas pipelines. If you will look at Chart 5, as I have stated, you see the curve for the 40 public utility companies. The reason for selecting that particular curve is, as I have previously stated, that the natural gas pipeline company that conducts operations involving the interstate transportation of natural gas, and is subject in certain respects on that account to regulatory action, certainly seems to exhibit the characteristics of a public utility. A railroad is subject to regulation, of course. I don't believe you want me to say a railroad is comparable to a natural gas company. I think a telephone company is much more nearly comparable to a natural gas company than a railroad be-

cause it is in the business of rendering a service to consumers in communities. A railroad does not do that as such. To my way of thinking, a railroad doesn't remotely resemble a company that furnishes gas, electric or telephone service. It is an entirely different kind of service. A natural gas pipeline company that sells gas at wholesale doesn't furnish gas directly, but it certainly does furnish it indirectly. Yes, a railroad brings the groceries to town and the grocer sells them, just like the Natural Gas Pipeline Company brings gas to the town and The Peoples Gas
1562 Light and Coke Company sells it. You can hardly
consider grocery stores as public utilities.

You presented to me yesterday a pamphlet which purported to show, in the case of one insurance company, natural gas company bonds were carried as "Industrial and Miscellaneous." I have told you or testified that Moody's Manual of Public Utility Investments shows pipeline companies in its manual to be public utilities. You might refer to the Bond Quotation Record and the Public Utility Bonds and you will find natural gas companies listed under public utility bonds in that source. Just what action or decision the investor is going to come to as to whether they are public utilities or not public utilities, is something I can't predict; but I certainly think he is just as much entitled to base an opinion on the Bond Quotation Record as he is to base an opinion on a pamphlet which indicates the securities are securities of industrial companies.

I was trying to indicate that to the investor there is just as much reason for considering this company as a public utility, based on the facts I have mentioned, as there is for him to come to the conclusion it is an industrial company because it happens to appear as such in the little pamphlet put out by one insurance company. Therefore, I would say the bonds of the natural gas companies, pipeline companies, distribution companies, and what not, are logically to be related with public utility bonds rather than railroad bonds. I think that I was leading up to that reply and I think that would be my answer to your question.

I would like to point out with respect to Schedule No. 4, page 3, to which you have made reference as already has been indicated, that we find no Aaa bonds among natural gas pipeline companies; that we find no Aa bonds among natural gas pipeline companies; and we find no A bonds except that one, the Panhandle Eastern, whichever group that fell in. As for Baa, there may be some bonds in there. I would not be surprised. In Exhibit 186, Schedule 5-A, you have the Houston Gulf Gas Company, the Oklahoma Natural Gas Company and the Southern Natural Gas Company. If you are setting out to make a list of representative public utility bonds, even if you consider those companies as public utilities, you would not necessarily consider them as representative in every characteristic of the type of bonds for this schedule.

These curves on Chart 4 reflect the actual yields on the particular 40 bonds whose yields make up the curve. There is no natural gas pipeline company in there in the case of the chart. In the rating group there could not be any natural gas pipeline company bonds in there.

I would say the ratings shown on Chart No. 4, which form the basis of the composite curve on Chart No. 5, grow out of the yields of bonds which I have already said were predominately those of electric, telephone and gas distribution companies. I would put the electric company first. They are predominately electric. They are predominately electric and gas utilities with some telephone utilities, but a much smaller number of telephone utilities are represented there.

1563 In the sense that it has a commodity to sell, it is my theory that a natural gas company which produces natural gas down in Texas and brings it through pipelines to Chicago and to some towns west of Chicago and sells it at wholesale, is more comparable to a telephone or to an electric distribution company than it is to a railroad. A telephone company sells service. It could almost be considered as selling a commodity. Of course, it is not a physical commodity. It is a service that enters your home. If you didn't have gas you couldn't serve it. Electricity is a commodity in the sense I am using that term. You can't touch it unless you want to get a shock. It is a commodity.

A lot of the expense of the telephone company and electric company is made up in the service and the expense of getting the small quantity of electricity or the reflection of the human voice into the home. Naturally, all of their equipment, all of their operating expenses, are designed for the purpose of rendering service. There is no question about that; but the whole point of bringing gas up from the Texas field to Chicago is to render service likewise. The fact that for the past several years the yield for public utility bonds is substantially lower than that of railroad bonds would have nothing in the world to do with it, in my opinion. I don't believe it would have made any difference in my answer if I had been considering the matter back of 1935 when railroad bonds were yielding less than public utility bonds. I would still stay with utility bonds if I were considering a natural gas pipeline company.

You ask me to explain why railroad bonds showed consistently lower yields during the years 1933 and 1934, and then cross and become substantially higher than the 40 public utility bonds whose yields are reflected here. My answer would be based on general observation, not on the detailed study. I would say that the depression largely caught up with the railroads, and since that time their earnings have continued to fall off and by the time 1937 rolled around investors considered there was too much risk and perhaps not enough earnings to warrant their continued investment. They were wiser to some extent to the extra risk they assumed. This is another instance illustrating that there is a demand for a higher return for risk. I think that is just an elementary principle of financing.

You ask for my explanation of why industrial yields, which were consistently higher than the yields on public utilities until about the end of 1932, crossed over and since that time industrial yields on these particular bonds have been consistently lower. For one thing, reference to Schedule No. 1, page 8, shows that there are only four industrial bonds with the Aaa rating which were available for inclusion in that group. On page 9, as indicated, there are only three industrials whose bonds were available for inclusion in the Aa group. On page 10 it is indicated that there were but eight industrials whose bonds were available for inclusion in the A group, and not until we reach the Baa group do we find the full complement of ten industrial bonds; and I think the answer to your question is, it is largely due to the fact that only the very highest type of industrial bonds were included in these averages, and that
these were the only bonds available; and I believe that
1564 had an effect in tending to keep the yield curve for
industrials as low as it appears. Nothing but the very highest type of bonds could meet the specifications for these higher ratings except in a few isolated instances. I would not agree with you that this industrial curve does not turn out to be of much value as an index. An index is designed to show something and this curve does show something. It shows something in the sense that any indexes of financial or economic conditions show something. They give you the

picture so you can see the relationship of one group of securities to another; and it gives you the necessary background of information which it is quite essential to have to get an all around picture.

The specific deduction is that it takes an exceptionally high grade or high class industrial bond to command these low yields reflected by these curves. That is true of any curve of high type securities. It takes high type securities to get into the grade that makes that curve. I do not follow the reasoning that that indicates there is more risk involved in industrial than in utility investments. I don't see how I could agree to that from this evidence alone. The mere fact that the industrial bond is not there is what keeps the ordinary industrial bond from qualifying. It is true that my quoted description of an Aaa bond means a bond that is practically free of risk, as nearly as a corporate bond can be made such. Then if industrial bonds cannot qualify as Aaa or Aa or even A in representative numbers, that indicates that there is more risk in industry and it is harder for their bonds to be brought within the specifications for these higher classifications of bonds.

Question by the Examiner.

The Moody averages are straight arithmetical averages and not weighted averages.

Cross-Examination by Mr. Morgan Resumed.

The term "new capital" used in the caption, "Average Price of New Capital" on Chart 6, means newly issued domestic bonds. I think that is explained in the second line of the caption. It says "Moody's Weighted Averages of Yields on Newly Issued Domestic Bonds". That does not mean new capital as opposed to existing capital which is being refunded in the issue. It includes all kinds of new issues of domestic bonds during the whole period from 1921 through 1938. It has to do with railroad bonds, utility bonds and industrial bonds, just like the other charts. The line "F. P. C. Compilation Electric Operating Companies" represents an F. P. C. compilation of electric operating company bond yields. There is no separate segregation for natural gas company yields. I have not made a compilation of the issues included in the various lines, but I should state that Moody's have prepared these bond yield averages and the logical deduction would be that they have included in the various curves the bonds of any rating whatsoever of companies which they classify as public utilities, railroads and industrials. The line captioned "Composite of Moody's Bond Yield Averages for 30 Public Utility Bonds with Moody's Bond Ratings of Aaa, Aa and A (10 Bonds in Each Group)", has been superimposed on this chart to show what the composite average of Moody's bond yield averages is for 30 public utility bonds of the character indicated. The other curves on that chart represent weighted averages of yields on newly issued bonds of all descriptions.

1565 During these last few years there has been a perceptible decline in the bond yields indicated. They began to fall in 1934 and they have continued toward lower levels, rapidly during 1934, less rapidly in 1935, and have tended to level off in 1937 and 1938. I think by reference to Chart No. 1 it can be seen, pretty generally, that the trend has been downwards for bonds of higher ratings and that would be the explanation that I would offer for the rapid decline in the yields of bonds during that period. That is the reason for superimposing this curve which shows that the trend pretty closely conforms to the trend for 30 public utility bonds of Aaa, Aa and A rating in each group. In other words, the financing through bonds during those years has been overwhelmingly of the high type bond character. I think the circumstance that a very large proportion of the financing was of a refunding character has an effect which cannot be ignored. Of course, we all know that the majority or the major portion of new financing has been refunding during this period. It has been refunding of the very highest type of bonds. During this time I would say it is less costly to a company to refund an existing debt, where there is an earnings experience and property coverage behind it, than it is to go out and get new capital.

I believe it is true that it is more costly to go out and raise capital for the purpose of developing or constructing an industry from scratch or as a new enterprise, than it would be to get additional money to expand an existing enterprise. You ask if I think that the course of these yield curves during these four or five years is a very safe index to the proper cost of money for the natural gas pipeline business. That answer will have to be broken down, because it will depend upon the question of whether the natural gas pipeline company in particular is a well established company or one that is just proposing to construct a pipeline at this time.

You ask if it is my theory that a company which is well established is entitled to a lower return on its investment than one which is just starting out in business. (Objection by counsel to Illinois Commerce Commission overruled.) My theory is that every company in the public utility business should be allowed a fair rate of return, and a fair rate of return must take into consideration all circumstances in individual instances. I testified this morning that a company which was established in business could obtain money at a lower rate or at a lower cost than one which was just starting out in business, and that that would have to be taken into account in applying the facts reflected by the curves in Chart No. 6 to the financing problem under consideration. The mere fact that a company is starting in business does not entitle it to charge rates which represent a cost of service to the consumer at more than its real value. I think that the rates of companies in the same general type of business should be considered, rates in the same general area, and that some judgment based on such an investigation would have an influencing effect upon what might be considered a proper rate for the company in question. You ask me to assume that one company is selling natural gas at a price which, when compared with the prices charged by other companies selling the same commodity, is lower, and to state whether I think that circumstance should be taken into account in arriving at a proper rate of return. (Objections by counsel for the two commissions overruled.)

My answer to that is that a mere difference in rate 1566 levels does not afford a basis for determining whether a rate of return is fair or not. If in the case in question the rates were based on operating expenses that were reasonable for the type of operation involved and the type of operating conditions involved, a difference in rate levels would not express a differential in favor of one company as against another. My answer just before the last one, taken in conjunction with the underlying basis upon which rates are predicated, I think fully answers the question that was directed to me.

You ask me to assume that two pipelines are coming from the same gas field, are of the same type and have the same cost, and are built to the same general vicinity where the gas is marketed or to be marketed; that one of them has been in existence for several years and has an earnings record which will enable it to borrow money at a lower rate than the other company which it is assumed has just been completed and just launching out in the business; and you ask me to state whether or not I think one of those companies should have a higher return than the other. In this connection you state that you are assuming that they are in the same situation in every respect, except that the one is just launching into business and therefore is not in a position to borrow money as cheaply as the other. It makes a very great difference in my opinion whether or not they are competing companies, because it might not be economical for a company to compete with another company and go to the expense of constructing an enormous pipeline for the sole purpose of competition with an associate company, and if it is not economically feasible there wouldn't be any proper basis upon which to establish rates for an enterprise that was not feasible. If there is room for both of them so that each one is supplying a part of the needs and I am examining the rate of return for both of them I don't think there would be any distinction whatsoever in the rate of return to which each would be entitled because one was in a position to borrow money at a lower rate than the other. You ask me which cost I would take in weighing the cost of money as an element entering into the proper rate of return as between the cost to the well established company and the cost to the company just launching into business. (Objection by counsel for Illinois Commerce Commission overruled.) I think it would be necessary to predicate the weight upon the reasonable value of the services. A company which commenced a project such as you have outlined would be well aware of the fact that a neighboring company was already in existence and operating; and it may be presumed that very careful studies would have been made of that company's experience before the project was undertaken.

Now, the mere fact that this second company is newly organized should not operate to produce rates that are not reasonable in the light of operating conditions and operating expenses. If the cost of capital for the second company is excessively high in comparison with that of the established company it would appear to me that the cost of capital to the extent that it is excessively high should be ignored. I don't believe I can give you a categorical answer which is based purely and simply on the difference between the cost of money in the two cases. I think it would have to be

determined upon the basis of what kind of a capital structure the new company was going to have and what its proposed or expected earnings were. There are very many considerations involved. I don't think I can give you any categorical answer. There are too many unknowns in the question. We don't know what the proposed earnings are. We don't know what the proposed operating expenses are unless you are assuming in this example they are to be exactly the same as those of the first company. If the capital investment, operating costs and risks, since they
1567 come from the same place to the same place, are the
same, and everything, including the capital structure, is the same, except one is new and the other is old, and except one is on an earning basis and other is not, and the well established company can get money at a lower rate than the one just launching into business, I would say that if the new company cannot secure capital at what is considered a reasonable cost, it ought not to go into business.

A company is entitled to a rate of return, as I understand it, on the basis of its needs. Those needs are based upon rates sufficient to assure confidence in the soundness of the utility, to obtain the required capital and to maintain its credit standing. If in view of all the circumstances surrounding the particular company it is found, as you have stated as a premise, that the cost of capital is reasonable, then my answer is that if all expenses and costs are reasonable, and in the light of all the circumstances, then the particular circumstances of the individual company should be the basis on which the rates should be established.

Just what circumstances the Commission would take into consideration in making its final decision is something I cannot prophesy, but I know it would be necessary for it to take into consideration all the circumstances. I have no basis for deciding the answer to your question as to what the Commission would or might do. I don't know whether it would be proper for me to answer as to what the Commission ought to do. I still think it involves a prophesy. I see you have asked in that question for my judgment. Well, this is a hypothetical case, I think you will have to admit that, and I don't know whether in the brief time I have in which to answer the question I could give that subject serious enough consideration to give an answer that would in all purposes be a just answer.

Yes, I have brought here a lot of data and charts and curves showing the cost of capital obtained through bonds, and in one place through preferred stocks, of electric utility companies. I have stated I brought them here because they were relevant and pertinent to an inquiry on rate of return. I have stated what the elements to be considered in arriving at a proper rate of return are in my judgment. You now want me to tell you whether I am talking about cost of capital to an established institution or cost of capital to an institution that is just being launched. Considering all circumstances, reasonable cost of capital, reasonable operating expenses, and an economically feasible project, the cost of the service under such circumstances should be the reasonable rate in view of all these circumstances. I don't know that I can get any closer to an answer to your question.

I have said that in order to prevent injustice the rates charged by others under similar circumstances and similarly situated was an element to be considered. I said it had an influencing effect. I should think it should be considered. It is something that has to be taken into consideration. I was speaking of the rates and not the rate of return.

When a group of men are considering the building of a natural gas pipeline, they are confronted with the problem of raising capital with which to buy that pipeline and the equipment that goes with it and the reserves that are
1568 necessary to sustain it. They are confronted with the necessity to raise that money as a business which is being launched. You ask whether or not I think the rate of return should be fixed on a basis of the cost of capital for that pipeline as it was being built, or what they could go out and borrow the money for at the time they had the pipeline in a completed condition as far as cost of capital is concerned. If we assume that it has a contract for a specific term with a distribution company, just like it would have had it been there for 10 years and was operating under those circumstances, it would seem to me in that case that the cost of capital to that company would be fairly comparable to that of a company that was already established.

In a rate of return inquiry under those circumstances, that element which I have denominated cost of capital would be one of the elements that would have to be considered. You ask me whether I consider the cost of capital to him as that cost which he incurred as he built his pipeline, which he has just completed, or as what he could go out and borrow money for to retire his securities or part of them. I think you have to deal with the facts as they exist. Just to make it more specific. If they borrow money to construct this pipeline, you would have to deal with the cost of borrowed capital as an element to be considered in determining a proper rate of return. I did not imply that you would have to accept the cost incurred in getting the capital to build the pipeline. You have to take it into consideration. If he went out and did the best he could and got it at as low a price as possible that is another thing altogether.

I don't know whether I can clear this up or not, but I will try in this statement. I think I have already stated that if the cost of money is reasonable, if the cost of operating expense is reasonable, if all the factors and circumstances indicate that the cost of capital is reasonable, then that would indicate that the cost of capital is a factor that should be considered in determining what constitutes a proper rate of return. I assume when you say cost of capital to an established institution that you are referring to what might be called current costs or historical costs. If I understand your question correctly, it is the cost of capital to the company that is going into business that I have been discussing. I don't know that in every instance it could be said that new capital being raised for the purpose of launching into a new business costs more than capital raised through the securities of an established business.

In connection with refunding issues I said that the average price of new capital indicated by Chart No. 6 was quite predominately influenced by refunding issues. That would be current capital costs to established companies. That is an element in it, at any rate; and if we assume, for the purpose of argument, that the capital cost for a new company is larger to some extent, my answer is that if it is to a reasonable extent it would have considerable influence in determining what the proper rate of return should be for that new company. As between the new company and the established company, if a reasonable cost, all things considered, is higher to the new company, it would seem a fair statement to make that the rate of return for the new company should be largely influenced by the cost of capital which it incurs, with all of the qualifications that I have previously made. That might conceivably lead to a higher price for gas for the new company than for the old one.

Yes, it is fundamental in a rate of return study that what you are attempting to find is a rate of return which will offer an inducement; but that has to be qualified. It may not be any rate that may be required to induce capital. It has to be a reasonable project. All the circumstances have to be reasonable. Other things being equal and confining it to this one element that is now under consideration, the inducement allowance should take that factor into consideration. I have already stated that one of the principles is that the return should be sufficient to assure confidence in the soundness of the utility, to obtain the required capital and to maintain the utility's credit standing.

Cross-Examination by Mr. Morgan Resumed.

It is conceivable, surely, that a rate of return which will induce investors to enter a given regulated business, or attract capital to that regulated business, if it has to do with an enterprise just being launched, might be different than it would be five years later after that same business had a record of earnings behind it.

You ask whether I think that men would be attracted to put their money into a business by the promise of a rate of return which would get their money into the business, if they thought that as soon as they got it in the business and got the business going, the regulatory body would turn around and take away from them a part of the return which they expected when they put their money into it. (Objection by counsel for the two Commissions overruled.) I think it is fundamental that investors, intelligent investors, realize that utilities are subject to regulation, and, therefore, it may be assumed that they have given consideration to the possibilities in the future of rate reduction; but it need not be assumed that the rate reductions referred to would be such as to reduce the rate of return below what would be a fair and proper rate of return. I mean, based on the company's cost of capital and with all other things taken into consideration, there is no apparent reason to assume that regulatory authorities would reduce rates below what is proper and fair. (Objection by counsel for Illinois Commerce Commission overruled.) If the investor's demands were not to be met, he would not be in the situation, presumably.

You ask me whether, in the light of my testimony concerning the comparative yield on refunding securities and the high proportion of refunding indebtedness that is represented in the transactions reflected by Chart No. 6, and my testimony concerning the predominance of high rated bonds involved in the transactions making up those curves, I agree that it would be dangerous to place any substantial weight on the bond yields reflected for the years 1934 through 1937, on Chart No. 6. I don't know that I have given any specific weight to Chart No. 6. I believe the facts in Chart No. 6 deserve complete consideration in the circumstances you have mentioned.

You ask whether or not, in arriving at an over-all rate of return for a natural gas pipeline company, which 1570 I have stated is not represented on Chart No. 6, I would have to exercise very special care in order not to be steered in the wrong direction by the course of those curves for those last four years. I hesitate to answer that by a simple "Yes", because I don't think it would be so. Certainly the chart indicates a trend in the cost of bond money; and to the extent that it does indicate a trend it might be reasonably imputed that the trend of money for established enterprises, which, of course, reflects market conditions, would likewise be reflected in the cost of money for even a new enterprise, because the cost of a new enterprise is based on market conditions.

I am familiar with the study entitled, "The Problem of the Rate of Return in Public Utility Regulation with Special Reference to the Long Lines Department of the American Telephone and Telegraph Company", conducted by the staff of the Federal Communications Commission. I have referred to it on numerous occasions and frequently consult it. I quoted from it yesterday in stating the ten elements to be considered in arriving at a proper rate of return, not from this volume but from another volume of the same study.

I am familiar with the source of the figures at the top of page 55 of the volume above mentioned. Those figures are taken from Moody's. In connection with the table shown at the top of page 55, there was a chart in Moody's just like my Chart No. 6 except that it covered a different period. This tabulation appears to cover a period two years less than the period covered by my Chart No. 6. It has an added column there, "Preferred Stocks". The figures are in the same general section of Moody's and are undoubtedly under the same caption.

You ask whether or not I agree to the following language appearing in that study of the F. C. C. on page 55:

"Table 1 shows that the annual average yield on all newly issued public utility bonds varied between five and six per cent during the period 1923 to 1930, inclusive, and declined to an average of 3.84 per cent for 1935 and 3.55 per cent for 1936. This comparison of the costs incurred in two relatively normal periods suggested a marked decline in the cost of secured capital. The data may be misleading, however, unless their composition is carefully analyzed."

I think you have to analyze all statistics, including these, if you are going to obtain any benefits from them.

I have, myself, stated in substance and I agree to the next statement you have read from the same study, as follows:

"In the first place, a much larger proportion of the bonds issued during 1935 and 1936 were for refunding purposes than was the case in the earlier period."

That is true also for 1937 and 1938.

You then ask me if I agree to the following statement from page 56 of the same source:

1571 "Table 2 shows that the total volume of issues during 1935 and 1936 was comparable with the volume during the most active years of financing prior to 1932, but that the proportions of refunding issues were greatly different. During the earlier period, utility bonds were sold largely to finance extensions and improvements, as is indicated by the fact that from 1923 to 1930, inclusive, the percentages of new funds varied from 60.6 to 90.8. In 1935, however, only 6.7 per cent of the total bonds issued were for new capital, and in 1936 the proportion was even smaller."

I agree to that statement.

I also agree that the following statement which you have read here is largely true:

"It is probable that, in general, the cost of capital to replace funds already committed to a particular enterprise is less than would be the cost of an equivalent amount of additional capital."

There may be exceptions, but I think I have already stated that in effect.

I also agree to this statement in the study from which you are reading:

"Refunding does not represent an additional demand for savings."

I agree also with the following statement read from the same source:

"Furthermore, when refunding takes place, a definite earning experience is available for the information of the investor, and the uncertainty is less than where the same utility proposes to expand its productive activities in order to serve new segments of the market."

I agree also to the following statement from that source:

"The change in quality of the securities issues has been even more important than the decline in the proportion of new capital. Table 3, which is limited to new and refunding bond issues of operating companies, shows the percentage distribution of bond issues by the Moody's rating first available at the time of flotation. The greater proportion of the issues were in the A and Baa groups during the years prior to 1929, but the shift toward the higher ratings has been so pronounced that 79 per cent and 65 per cent of the total volume were of Aaa or Aa rating in 1935 and 1936, respectively."

I agree to the next three paragraphs read from the same study, as follows:

"The preference of the investor for bonds of higher quality, and the ability of corporations with the best credit to refund, is in part responsible for the downward movement of the index of yield on newly issued utility bonds.

1572 "If this index were plotted on chart 4, page 62, it would fluctuate during 1926, 1927 and 1928 in a position between the yields on Moody's samples of outstanding A and Baa bonds. During the recent period of renewed financing, the index would fluctuate above and below the average yield on Moody's Aa bonds. The trend of this index of yield of offering prices of new issues illustrates the dangers inherent in the use of averages.

"Table 1, page 55, also includes Moody's index of yields on newly issued preferred stock. During much of the period, the volume of preferred stock financing was so small that the averages do not possess much significance."

That last paragraph has to do with the early part of a period mentioned here, which is prior to 1936, and to that extent I agree with that observation. There have been a considerable number of issues of preferred stock since 1936. They were probably largely refunding issues in order to obtain lower dividend rates.

I agree also with the statement from the same source above referred to, reading as follows:

"Nevertheless, it may be observed that the differential of yield on preferred stock over yield on bonds tended to average about one per cent."

Redirect Examination Interposed by Mr. Slaff.

I agree with the statement contained on page 61, which you have read, from the same source as that from which counsel for defendants has been reading, as follows:

"Regardless of the long-time trend of interest rates, it is apparently that during the past few years it has been possible for utilities, especially those with the best credit rating, to secure large amounts of new and refunding debt capital at very low prices, and there are indications that this situation will continue for some time in the future."

Cross-Examination by Mr. Morgan Resumed.

The statement Mr. Slaff has just read is no more than I have already stated from my charts here.

Questions by the Examiner.

All the data on Chart No. 6 is taken from Moody's except the F. P. C. compilation. The industrial bonds, railroad bonds and public utility bonds shown on Chart No. 6 are not the same bonds as those listed in connection with the previous charts. The bonds shown on Chart No. 6 are newly issued bonds and they are not the same at any two dates or during any period.

1573 *Cross-Examination by Mr. Morgan Resumed.*

You point out that at page 7871 I stated: "Chart No. 6 shows the average price of new capital as indicated by Moody's weighted averages of yields on newly issued domestic bonds of industrial corporations." The use of the term "average price of new capital" may be inaccurate. I have used the terminology that was found in Moody's manual and that would explain why I used that caption. Of course, as I pointed out before, the caption immediately following that has the effect of qualifying it, so that I do not think it is really misleading if you look at and study the chart. The terminology "average price of new capital", as I have just stated is a terminology which was devised by Moody's, and for which they have given a definition in their manual, and I have given that definition in my testimony. When I speak of the "average yield to maturity on newly issued bonds," I mean the yield to the purchaser of the security. The terminology "yield" is generally understood to mean the yield to the purchaser.

In my Schedule No. 7, pages 1, 2 and 3, and Schedule No. 8, pages 1, 2 and 3, I have the figures which are shown in curve form in the heavy line near the lower right-hand corner of my Chart No. 6, except that Schedule 8 goes beyond the chart. That schedule goes into 1939 and the chart ends in 1938. The back-up for that part of the curve or chart which is identified by the words "FPC Compilation Electric Operating Companies," is shown on pages 1, 2 and 3 of Schedule 7.

I picked electric companies in adding to Chart No. 6 for the reason that in so far as natural gas companies were concerned, it was understood that there was to be another exhibit prepared and it was thought desirable to have some relative information on this subject concerning electric utility bonds. I think electric and gas utilities exhibit very similar characteristics. The analogy is not primarily between pipeline companies as such and electric utilities; but it is an analogy between the natural gas industry and the electric utility industry. It is true we are concerned in this proceeding with natural gas pipeline companies as such, but natural gas pipeline companies are certainly dependent upon natural gas distribution companies for the disposal of their product.

As I have just stated, we have a separate section devoted to natural gas statistics and securities and it didn't seem necessary to repeat that information in this study. You ask in what exhibit I have made a comparable study of gas utilities. I don't know if it is comparable in every detail, but certainly, in general, Exhibit 186 gives a picture of the natural gas industry that is somewhat similar to that shown for the electric utility industry here. I am referring to all of Exhibit 186. I have made no detailed study of Exhibit 186, but from the testimony I heard concerning it, my understanding is it included pipeline companies, perhaps one or two fully integrated companies, perhaps one or two companies which owned pipelines and also producing fields. I am not trying to tie myself down specifically. As I stated, I am just trying to give you the general impression I got from listening to the testimony.

You ask if, as a matter of fact, I think gas companies engaged in the distribution of natural gas are closer in their relation to the natural gas business than are utility companies engaged in the distribution of electricity. If you mean physically closer I would say natural
1574 gas distribution companies are more closely related.

That would be true also of the artificial gas company. Very often the artificial gas company forms the initial market outlet for the natural gas pipeline at the beginning of operations. I know from this record that 90 per cent or more of all the gas that defendants transport and sell is sold to companies who distribute a mixture of artificial and natural gas.

From a financial standpoint I don't know that I can quite agree with your suggestion that it would be getting closer to the natural gas pipeline company if I had used a curve and data concerning gas distribution utilities rather than electric utilities. The general picture regarding electric utility bonds and securities is general information about a business that is similar in that it is a utility business. I think it is relevant, pertinent and necessary to show the facts and figures concerning the yields on bonds of both electric utilities and gas utilities. I didn't put the gas distributing utility figures in for the reason the exhibit on natural gas securities was intended to cover the field of natural gas pipeline companies; and I don't know that there is any closer relationship from a financial point of view between gas distributing companies and gas pipeline companies than there is between electric utility companies and gas pipeline companies.

You ask me if it would not be more logical, if I am going outside the pipeline companies and relying on this orientation line of testimony presented in Exhibit 185, to put in some curves and data concerning the bond yields of gas distribution companies rather than electric utility companies. My answer is I don't think so from a financial point of view. Not having attempted to do that I can't say whether I would have gotten a different result or not. I do know there is some evidence of record already regarding gas company bonds. I do not know whether the electric utility business is the most prosperous of all the utility distributing businesses. Only two commodities of that nature are being distributed, electricity and gas. If that is the comparison that you are making, I couldn't answer that question without making a more detailed study.

In connection with my discussion of Chart No. 4, I agreed this morning that the bonds listed in all four of these classes are preponderately electric utility bonds. It is true in many instances the companies also have gas properties and distribute gas. I did say they are preponderately electric. Only one gas company is shown in the whole list, Peoples Gas Light and Coke Company, and it has the lowest rated bond of the four ratings represented in the group. You ask me if that isn't an indication that there is a preference among investors for the type of security that the electric utility business can offer rather than for the type that the gas business can offer. I wouldn't like to make a yes or no answer to that. It does happen that natural gas company bonds have not fallen within the three highest rating groups; but, as to the investor's preference for electric utilities, I think it is fair to say that the electric utility industry is older than the natural gas industry. You state that you are not talking about the natural gas industry necessarily. If you are speaking of natural and artificial gas, it would appear to indicate that there was some preference for electric utilities and telephone utilities. Without a great deal of study I wouldn't like to answer your question
1575 as to whether or not electric and telephone utilities
are able to offer a higher rate or grade of securities than the gas distributing utilities. It might be there are many artificial gas company bonds which carry ratings of Aaa, Aa and A, but without having made any particular search I would not be able to say. They have not made this list, I will grant that.

Cross-Examination Interposed by Mr. Booth.

It is true that Sioux City Gas and Electric Company bonds are represented in that list. I stated that in many instances companies were not solely electric companies, but were engaged in electric and gas operations. In the Aaa list there are two companies that are engaged partially in gas operations, the Cincinnati Gas & Electric and Consolidated Gas, Electric Light & Power of Baltimore. Under the Aa rating there are two companies, the Louisville Gas & Electric and the Pacific Gas & Electric. I don't recall whether Consolidated Edison of New York is also engaged in gas operations. I don't know whether the financial standing of the Peoples Gas Light and Coke Co. may be partially affected by some of its financial dealings when Mr. Insull was in charge of the company, before he left in the late '20's or early '30's. Its bonds have a Baa rating. I understand that there was a connection with the Insull interest, but I haven't made a study of that particular situation.

Cross-Examination by Mr. Morgan Resumed.

The Commonwealth Edison Company was also connected with the Insull interests. Its bonds are in the Aa class. I have made no study of that Insull situation. The only difference, so far as their connection with Insull was concerned, between the two companies last mentioned in that Commonwealth Edison Company is an electric utility and Peoples Gas Light and Coke Co. is a gas utility. Mr. Booth's correction did not bring out anything that I had not already said. I stated some of these companies were distributing gas, but that they were predominately electric and telephone companies, with the one exception of the Peoples Gas Light and Coke Company which sells only gas.

In all of this mass of refunding that has been done in the past several years, I believe it is true that it was largely among telephone and electric utilities. I can't answer off-hand how many gas companies have refunded their indebtedness and taken advantage of this low rate that goes to higher class securities. I have not made a detailed study and would not answer definitely, but I would assume that there have been comparatively few.

The purpose of this refunding financing has been to obtain cheaper capital. It is a fair inference in the majority of instances that if they could have done so, the gas distributing companies would have gotten a cheaper interest rate by refunding. Of course, there are a great many considerations involved in refunding. Those same considerations, such as call prices, etc., obtain in the case of an electric or telephone bond.

The figures here deal also with bond yields to investors based on market prices, if we are discussing Chart No. 4, for example. In Schedule 7, pages 1 and 2, refer to the yield to the purchasers. That is not synonymous with the cost to the company, ordinarily. In the majority of
instances the cost to the company is more than the
1576 yield to the purchasers. In practically every in-
stance there would be the additional cost of financing in connection with their issuance. There is bound to be some expense, of course. In general, you have professional fees and underwriter's spread. The underwriter's spread varies considerably, from around two points to three points, depending upon the circumstances. Two points and up would be a fair statement of it. It might be as much as three. Two would possibly be the minimum. It all depends upon individual circumstances, but probably two per cent or thereabouts is customary. There is also the expense of printing and engraving and the payment of registration fees. By printing and engraving I refer to the printing and engraving of certificates, bonds and coupons. By certificates I mean the certificates of stock, or the securities themselves. There is also some preliminary printing to do. There are taxes and fees of one sort or another. The mortgage expense is also involved. I think that covers the field in general. I have said professional fees and services, printing and engraving. I think that covers the prospectus.

The professional fees cover legal services, accounting services and engineering services in general in preparing and presenting the prospectus and certificate of registration. Hearings before the Securities and Exchange Commission are involved. Also involved are engineering studies, geological studies, accounting studies and legal services in connection with natural gas companies. The geological study is special, but would apply to natural gas companies. I don't know just how many hearings would have to be had before the Securities and Exchange Commission. There is usually at least one. I assume there may be other hearings or informal appearances for all I know. I have not attended any of those. You are asking me something I can't answer definitely when you ask if these hearings are not held at Washington. I know that hearings are held at Washington, but whether all of them are held there I couldn't say. I don't know whether these hearings often extend over months. I would not like to make a general observation concerning the delay in the issuance of securities without more close connection with such matters.

I will grant that if there is a refunding operation and the bonds are printed and registered, the interest starts then ordinarily. The bonds that are to be refunded are also drawing interest until they are paid off. There is sometimes a double interest period in there. If the debt to be refunded carries a provision that the bonds can only be called by the payment of a premium, which is not an uncommon situation, that premium is generally considered a part of the cost of capital obtained in the refunding operation. You ask if all of these elements which have been mentioned here, when added together, often increase the cost of money over the yield to investors in per cent of the yield. I hesitate to say—to use the word "substantial". My recollection is, from reference to the study by the Federal Communications Commission, that, in general, on your bonds you could add approximately two-tenths of one per cent to the yield to purchasers to arrive at the cost to the company. That is the average situation. There may be instances when the cost greatly exceeds that, depending upon the company, the type of security, the type of debt, etc. I have agreed about the danger of using averages. We have to look behind averages.

1577 Schedule No. 8 shows the yield to purchasers of electric utility bonds sold in the period January 1 to August 31, 1939. That is the same study as that reflected by Schedule No. 7, except that it brings it on down through August 31, 1939.

Schedule No. 9 shows the cost of money and yield to the public of electric utility preferred stock sold in 1935, '6, '7, and '8. I don't know exactly what proportion of that preferred stock financing was refunding as opposed to new issues. It was largely refunding. This is brought on down in Schedule 10 to include the month of August, 1939. The issues are arranged alphabetically there. It does not show the cost to the company. It shows only the yield. The average shown here in Schedules 7, 8, 9 and 10 are weighted averages.

On page 7874 I stated in substance that the rapid decline in the price of new capital, particularly noticeable since 1934, suggested that the decline could be attributed not only to the course of the bond market itself but also to the quality of the offering. I was talking about bond yields and not the price of new capital on an overall basis.

Chart No. 7 has to do with wholesale commodity price indexes. It deals with the prices of farm products, foods, building materials, chemicals and drugs, fuel and lighting materials, hides and leather products, house furnishing goods, metal and metal products, textile products and miscellaneous. It is divided into the classifications of finished products, raw materials, and the composite of products. Although the classification semi-manufactured material is not shown on this chart, there is another such classification. These curves represent prices of raw materials, finished products, and all commodities. My figures indicate that the average monthly price for finished products index is 81.5 for the year 1938 and the first six months of 1939, and 79.8 for the last half of 1930 and the year 1931. In my judgment this chart has relevance to the subject of this inquiry, namely, the proper rate of return for defendants, in the sense that it is a part of a picture of economic conditions. Among the elements I mentioned to be considered in the subject of rate of return was that of general economic conditions. I think wholesale prices are indicative of general economic conditions. I didn't put in here the gross volume of commodities sold at wholesale because I think that it is impossible to cover every conceivable line of inquiry that might be indicated by any one of these charts. The answer is simply that we took indices that were representative. A comparison of the volume of commodities sold at wholesale, stated in terms of dollars, might be at least as good an index to economic conditions as a schedule of prices of commodities at wholesale. I am not denying that at all. I am just saying that this is what we have selected, and for the purpose we believe it is sufficient.

The two principal items of cost in connection with the operation of a natural gas pipeline other than the purchase of gas are materials for maintenance and labor. (Objection by Counsel for Illinois Commerce Commission overruled.) In dealing with the subject of commodities I have shown the price of commodities at wholesale. It is true that over in my next chart, No. 8, I deal with employment and payrolls, not on a price basis, but on a volume basis.

Employment is based on number of employees, and 1578 payrolls on dollars of payrolls expressed in the form of an index. The production, as shown on that same chart, has to do with the volume of goods produced. I mean it is volume in the sense of amount of production, but certainly not the addition of several units of quantity.

There have been changes in the wholesale commodity prices since the middle of 1939. I can give you some later figures. Schedule No. 11, page 1, price for July, 75.4; August, 75; September, 79.1. I have to skip October, although I have weekly prices for the week ending November 4, which is 79.3, and the week ending November 11, which is likewise 79.3.

Referring to Schedule No. 11, page 2, for July 67.8; August, 66.6; September 72.6; skipping again to the week ending November 4, 72.3, and the week ending November 11, 72.5.

Passing to page 3 the figures are: July, 79.2; August, 79.1; September, 81.9; skipping October; week ending November 4, 82.6 week ending November 11, 82.7. I think I may be able to give you some weekly prices in October for the last three weeks if you think that would be of assistance.

My revision of Chart No. 8, which is Exhibit No. 191, shows there has been a very sharp upward rise in industrial production between August and September. There have been rises during September in both employment and payrolls. Chart No. 8 portrays the number of factory employees. I would say that it represents an index of wage earners and not employment hours. It is an index of the number of employees. I have no data that indicates the comparative number of man hours to use for a curve indicating the man hours of work. You ask which I think would be the better index of the economic conditions, the number of hours work performed or the number of men who are employed. I believe from my studies in this connection that some discrimination was used in regard to accepting the number of employees as such. I mean, I believe that some consideration was given to length of employment period involved, and so forth. In other words, an employee who worked one hour in one day I don't believe would be included in this index to the same extent that an employee who worked the full day would be included. Some adjustment was made for that in my opinion. That is my impression but I would be glad to verify it and let you know what my findings disclosed.

As to whether this is a true index of the number of men employed, in the light of my last statement, that depends upon what you mean by true. I shall have to look into that matter and give you my finding. That is all I can say at this time.

If it be assumed that 100,000 units of some commodity are produced through the employment of 100 men for a week, each working, in order to get the work done, 40 hours a week, that would be 4,000 hours of work. I think there would be a difference in the economic situation if you put 200 men on the job and let them work half as long, because each man would be getting a smaller amount of pay.

I am willing to rest on the judgment and discretion of the United States Bureau of Labor Statistics as to the 1579 validity of the methods employed by them in setting forth what they believe is a fair and accurate employment index. The objective of that index, it must be assumed, is simply that of affording information for the knowledge of the citizens of the country. I don't believe you would have to know what the Department of Labor had in mind when they made the curve, unless you know what enters into the curve, before using it as a guide to economic conditions. I believe the curve speaks for itself; and I believe when we are presented with figures by a government source which gives them the appearance of representing economic conditions, I think we can accept those indexes without question.

Questions by the Examiner.

I have a bulletin with me issued by the Department of Labor, which accompanied the publication of this chart, describing just what they were doing or what they had in mind. The name of the bulletin is "Employment and Payrolls", and these bulletins are issued monthly. This bulletin belongs to our library.

Cross-Examination by Mr. Morgan Resumed.

You ask whether Exhibit No. 191, which is a revision of my Chart No. 8, indicates whether the economic conditions are better or worse at the present time than in the year 1925. It is assumed that the persons attempting to read these charts would have some acquaintance with business in general, and these figures have not been adjusted for a long-term trend. You would have to keep that in mind in interpreting the chart. It is common knowledge that when you use an index as of any year, you have to look behind statistics and see what it is. You want me to state what the chart indicates as to the comparison between the economic conditions of 1939, at the time these curves terminate, and the year 1925. I think that the common sense approach to this matter is essential; and I think that the chart manifestly shows that from 1925 to 1929 there was an increase in employment; and even though you do not have your long-term trend shown, I think the figures still serve to indicate what has been happening here in the past fifteen or twenty years.

It is not true that my appraisal of this chart would be to say that it indicates that economic conditions are better in 1939 than they were in 1925. I do think that a study of this chart, together with all the other charts in this section, would serve to indicate economic trends. I do not know that you can get away from the fact that the entire range of elements here points to the fact that economic conditions have to be considered, general conditions affecting all business should be considered, enlightened judgment must be used in each case. This would form the basis of enlightened judgment. The proper rate of return is a flexible concept and would naturally be so, because of changes in economic and financial conditions. All the way through you have that same relationship of the exhibits to the principles involved. I think it is implicit in the elements I have mentioned, that rate of return is dependent upon economic conditions except as they assert themselves in the cost of money.

In Chart No. 9 I am dealing with carloadings, steel ingot production, and building contracts awarded. I believe that refers to the number of cars loaded and there is an index based on that. There are other indices of carloadings which are based upon the number of cars, and while the

source in this instance is "The Annalist", I do not
1580 recall whether "The Annalist" mentioned the basis, but we would naturally assume that we were talking about the number of cars. As to whether the steel ingot production figures refer to tons or ingots, I think it makes no difference particularly. Whether I have that information here is another thing.

In the case of building contracts awarded, Standard Statistics publishes this information and it does not state in so many words the basis for it. We have here an index which is published by a responsible statistical organization for the purpose of being used as an index of economic conditions and that is why it is used here.

You ask whether these curves have more than a very remote relation to the subject of this inquiry. I think the same applies in the case of every one of these charts and schedules. They are an attempt to present background of economic information which indicates trends and to that extent they are valuable.

You ask whether or not there were thousand of carloads of scrap iron gathered up in this country, carried by rail to ports and loaded up on ships for Japan and Italy and other countries and carried away during the years 1936 and 1937. (Objection by Commission Counsel overruled.) I cannot say that was limited to the years mentioned there. In any case carloadings is another separate index, from which you could not impute the entire course of economic trends. You ask whether the fact that carloadings jumped up as a result of that activity could make any possible difference in the economic situation except as to those who had scrap iron. Inasmuch as the figures concern economic conditions in general, they are pertinent in the inquiry on the subject of rate of return. Among the things involved would be the number of people employed in loading the cars and unloading them, the traffic provided for the railroads and that afforded the ship owners, people employed in loading the ships and so on. Transactions relative thereto would be involved as well. You ask how these things have anything to do with arriving at a proper rate of return for defendants. So far as economic conditions are to be taken into account and general conditions affecting all business are to be taken into consideration, these are indices which give a background of economic information and, as such, they have pertinence in connection with the rate of return. In other words, you do not determine the rate of return for defendants by an economic vacuum. You try to reach out and get a picture of what is taking place and what has taken place and what may be likely to take place.

Naturally it is true that conditions of various industries will not all reach a peak at the same time. Nevertheless, it would be wrong to leave out steel ingot production just because it shows a drop in 1937 as compared with a rise in building contracts awarded. I think it can be said, of course, that both steel ingot production and building contracts awarded dropped toward the latter part of 1937, the difference being that steel ingot production dropped from a higher level; but since that time the pattern of the trend has not been so very inconsistent. The steel ingot production indicates trends in the steel industry; and I think it is a commonly known fact that when the steel industry is in a bad way the rest of the country suffers; and when the rest of the country comes back the steel industry comes back with it.

I think the rate of return for pipeline companies, that is, a determination of it, requires the exercise of
1581 enlightenment judgment, and that judgment has to
be founded upon economic and financial facts. You ask when the exercise of enlightened judgment would require an increase or decrease in the rate of return, when the steel ingot business is going down or when it is going up. (Objection by Commission Counsel overruled.) The steel ingot index is an isolated phenomenon of economic conditions. As I have just stated, in considering a proper rate of return you have to take into consideration all facts available that are indices of economic and financial conditions.

You ask why I didn't bring in a curve showing the status of the cattle industry and whether or not such an index would be just as pertinent as the steel ingot curve. It would be. If I had put that in it would probably have been just as pertinent; but you cannot put all the wealth of indices in existence into a chart if you can find some which appear to reveal trends as they occur. I would be inclined to feel that a curve showing the production of cattle in this country would show the same trends as the steel ingot production curve to a certain extent. I am inclined to feel that that might be a possibility. They might be the same, but without making an examination I could not say they are the same.

You ask whether or not, if such indices are the same, defendants should be entitled to more money or less money in 1939 than they were in 1931. (Objections by counsel to the two commissions overruled.) I am still of the opinion that you cannot isolate any one of these indexes and expect it to represent in and by itself the course of economic trends. I said the steel ingot industry index was one of the indexes. You ask whether a higher or lower rate of return should be allowed a natural gas pipeline company when economic conditions are bad generally than when they are good. There would have to be a great many facts known to make such a decision. You have got to see how the changes in economic conditions have affected the operations of the pipeline as to the cost of rendering the service, or producing and selling the commodity, or financing its operations, and those other elements I have said are proper to be considered in arriving at a proper rate of return. You also have to find out what has happened to the consumer. You ask whether I mean to say that the date of return should be reduced because the consumer may find it less convenient to pay. I mean that if, because of poor economic conditions, the revenues of a public utility are decreased and some attempt is made to increase rates, which the consumer is not in a position to pay, that the utility has got to suffer along with the rest of the business in the country. I mean the public has a stake in this besides the utility.

You ask what Chart No. 10 has to do with the proper rate of return for defendants. I think my answer to the last question is pertinent in this connection as well as the fact that here again we have another indication of economic conditions. You ask how I am to apply the difference in economic conditions reflected in Chart No. 10 in arriving at a proper rate of return for defendants. I have not arrived at any such determination, but, nevertheless, this chart certainly indicates something about economic conditions, as well as do the other charts in this section, and, therefore, I would say that it would have to be taken into account in determining a proper rate of return.

This index indicates that the national cash income is higher today than it was when the pipeline was put into operation in 1931. I don't think you could judge from one set of facts and draw any conclusions that ought to be derived from a great many sets of facts. The use to which the Examiner and the Commission would put 1582 this chart would be to inform them of economic conditions in general, so that whatever action they took would be taken in the light of known facts about economic conditions. This chart indicates that there has been, since the end of 1933, an over-all and substantial increase in the compensation of employees in this country. I am speaking here of cash income. You ask how that affects the operations of defendants. Increased wages might have the effect of increasing operating expenses of natural gas companies. It is a reasonably fair conclusion to state that it would indicate a trend in the direction of increased cost of labor, although it might not affect that particular industry. There might not be an increase in wages in that particular industry. As a general thing there is a competition in labor among all industries. I don't think there could be a substantial increase in wage scales without an increase in the wage scales of the natural gas pipeline business. I think an increase would eventually get around to the natural gas companies.

You ask whether or not I think it would be more helpful in arriving at a proper rate of return if I had dealt with wage scales rather than the aggregate compensation of men employed and the payrolls, as I have done with these exhibits. It might be that any kind of additional information would be helpful but we have just a limited space to compile significant indexes.

When I was dealing with wholesale commodities I gave the index prices. The trend of prices was reflected by the curves I brought in here. You ask if there is anything of the kind in here when we get over to labor. No, I don't see anything here pertaining exclusively to the natural gas industry. I don't know that I can agree with you that since the Commission must look to the future in determining a proper rate base, that it will be aided more in arriving at a proper rate of return if it has the trend of wage scales rather than the trend of payrolls; because if the labor cost is higher, it goes into operations and the rate of return is based upon a value which is over and above operating expenses. Of course, the operating expenses go on and on after the rate case is over. You ask whether a definite trend upward in the cost of labor per hour of a man's time is something that enters into the consideration of a proper rate of return. (Objection by Commission Counsel overruled.) I might say that not being an engineer I might not be as fully acquainted as I should like to be with the various kinds of employees engaged in the operation of natural gas pipeline companies; and just what wage scales, if I had them before me, that I could select, I don't know. I have, as a portion of this exhibit, an indication of the trend of wage scales. I believe I may refer you to Schedule No. 23. You ask where in that Schedule No. 23 are the wage scales indicated. In the column under the heading "United States." That gives you the picture for the country as a whole.

(November 29, 1939.)

Chart No. 10 covers all of the national income including income from direct relief, veterans' payments and payments under the Social Security Act. It is intended to portray the amount of income flowing into the hands of individuals and does not include so-called business savings or savings passed into surplus. That chart was introduced as bearing upon the general economic condition.

It reflects the fact that we had a depression which
1583 reached its depth in about 1933, that we had 1929
as the peak year in that period, and that since 1933 we have had a slowly but gradually rising trend through 1937, which was the best year since 1929, and that during 1938 there was some recession from which the country appears to be recovering in the year 1939. You ask whether that sort of situation, portrayed by this chart, points to lower or higher rates of return as proper in 1939 as compared with 1932. The opinion would have to be based upon all other available facts and not upon the information shown in one of these charts. You have to consider this chart in relation to other facts, both economic and financial, and it is very difficult to express an opinion based on what that opinion would be as far as this chart carries it. If you are weighing a commodity you put the commodity on one side of the scale and something on the other side in order to determine the weight. You want to know whether in weighing this element it points to a higher or lower rate of return for natural gas

companies in 1939 than in 1932. I think there are times when economic conditions are controlling factors in determining a proper rate of return and times when financial factors may be controlling. It isn't that I don't want to answer the question. If Chart 10 shows certain facts you must remember that is one side, one element of a situation. For that reason it is not reasonable to assume that every other element in an economic situation would be the exact opposite of this. Therefore, you couldn't make a decision depending upon this alone. I mean you can't limit a conclusion to studying one single set of facts in any situation.

You ask me what this chart has to do with a proper rate of return unless I can say it points to a higher or a lower rate of return. I haven't arrived at a rate of return in this case. I form no judgment on that point. I form no opinion on the subject and I haven't attempted to weigh the various elements, and this information has been submitted because it deals with economic conditions in general, and as a part of economic conditions in general it is pertinent to a discussion of rate of return. All of these charts were expected to be of some use. I brought this in as one of the total number of exhibits.

This information shown in Chart 10, taken together with all of the information appearing in Exhibit 185, is presented as a means and background of general economic information from which it is desirable to obtain knowledge of conditions upon which a fair and proper determination of a rate of return could be made. You ask whether I am referring in that observation to my statement yesterday, that when times get hard the regulated concern ought to take some of the losses. I don't recall my exact phraseology in the statement yesterday but I believe I said "regulated concerns." I believe I made the statement to the effect regulated concerns can't be expected to stand apart and not share in any of the losses occasioned by or incurred by business as a result of poor depressed economic conditions. You ask whether I think that when times get good they should be permitted to earn more money. I don't think they should be able to earn speculative profits. I think at all times they should be allowed to earn a fair proper rate of return, in good times and bad times. I don't like to tie my answer down to the statement that the proper rate of return depends upon the cost of money and these other nine elements that I read into the record. I would rather state it in my own way, that a fair rate of return depends upon the consideration of all facts, both financial and economic, in order to come to a conclusion.

1584 I would say that the sum total of all of the charts, tabulations and schedules included in Exhibit 185 point to better conditions in 1939 than those existing in 1933. You ask whether that points to a higher or lower rate of return than in 1933. My answer is that it points to a fair rate of return if it points to anything. I don't know what you mean by the statement that that is the most I can make out of it, but a fair rate of return is a fair rate of return. It might be a different amount or different percentage, but, nevertheless, it is a fixed concept; and that fixed concept does not change even though economic and financial conditions do change.

Questions by the Examiner.

The data carried into Chart No. 10 was compiled by the United States Department of Commerce and published in the Survey of Current Business. That publication does not in the monthly issues prepare charts, although occasionally in the introductory sense, when a new series is being introduced, they may submit a chart giving a picture graphically of the statistics. The Survey of Current Business comments on these charts. I can refer you to the comments on it if you would like to have them. I have here one issue for the month of November, I believe.

Redirect Examination Interposed by Mr. Slaff.

The Survey of Current Business is prepared by the Department of Commerce for the use of other people, regulatory bodies and other people who have use for it.

Questions by the Examiner.

The broad heading, "Business Indexes", and the heading under that, "Income Payments", appearing on page 19 of the November issue of the Survey of Current Business, are the payments that I used in my chart. We have a caption on page 19 called "Monthly Business Statistics", in large letters, and that covers the entire series of statistical data published in this magazine. "Business Indexes" would appear to apply to income payments, industrial production, agricultural marketings, world stocks; and there is another caption following that called "Commodity Prices", and another following that "Construction—Real Estate". So it would appear only those four are included directly under that heading "Business Indexes". Whether that should be considered a limiting factor is something I doubt very seriously, because it may be just an attempt to find a convenient terminology for a few indexes which did not fall under any other general caption. The fundamental purpose of these indexes is to enable business men to become thoroughly informed on business trends in general and financial trends. Yes, it always comes back to price insofar as price reflects changes in economic conditions.

Cross-Examination by Mr. Morgan Resumed.

You ask in which direction Chart No. 10 points whether to better economic conditions or not. The chart would appear to indicate that in 1939 conditions are better than they were in 1932 or 1933. You suggest there is
1585 nothing, then, from this chart that would make it necessary to apply the observations I made yesterday that when times are difficult or economic conditions are bad, the regulated company should take its part of the losses. I think that was a fair statement in and by itself. If you are asking whether we are talking about comparing economic conditions today, my answer would be that I have made no such implication.

Entrepreneurial income, as that term is used in this chart, is the income of small business enterprises, not incorporated—proprietorships, farmers. It refers to unincorporated proprietorships as opposed to those who are loaning money, collecting interest, or who own stock and get dividends. It is not entrepreneurial income in the sense that that term has been used here in the record as compensation for enterprise over and above risk premiums.

Chart No. 11 has to do with the natural income and cost of living in terms, first, of the income stated as dollars in the lower curve. The upper curve, "National Income Payments at 1929 Prices", represents the purchasing power of the income in dollars as compared with 1929. The chart indicates that nearly as much goods can be bought with the present income as could be purchased in 1929 with the income of that year. We are speaking about purchasing power in general. It means that if you have $10 you can buy nearly as much goods with it as in 1929. That would indicate that your income is not at the 1929 level; it has not reached that level yet; but in terms of purchasing power it is almost equal to the 1929 income. I am talking about the national income as shown in Chart 10. As a matter of fact, the lower curve of Chart 11 is based on such national income as shown in Chart 10.

The general interpretation of the words "purchasing power" is that all of the income in the country in 1939 would buy slightly less goods than all of the income in 1929. The cost of living curve has to do with the change in price level of certain commodities which I have enumerated. I enumerated the commodities which go into that cost of living curve at the top of page 7903. It was made up of foods, 33 per cent; housing, 20; clothing, 12; fuel and light, 5; sundries, 30. Fuel and light is 5 per cent of the total. I don't know how much of that is for electricity and how much is for coal or wood. I can't give you the details on that. The breakdown of the fuel and light may or may not be available to the public, but that 5 per cent does include electricity, gas, coal, oil, kerosene, distillate, wood, and we might extend the list of fuels, I suppose. I would not have the slightest idea of what percent of that total 5 per cent is represented by the cost of gas.

Chart 12 is based on "Standard Trade and Securities", published by Standard Statistics Company, and represents, according to the legends, the corporate earnings of 15 utilities, 120 industrials and all classes of railroads. There is no curve on that chart indicating the course of earnings of gas companies.

1586 The 15 public utilities listed on Chart No. 12 are:

- American Light & Traction,
- American Telephone & Telegraph,
- Columbia Gas & Electric,
- Commonwealth Edison,
- Consolidated Gas, Electric Light and Power of Baltimore,
- Detroit Edison,
- International Tel. & Tel.,

New England Telephone & Telegraph Company,
Niagara-Hudson,
Pacific Telephone & Telegraph Company,
Peoples Gas Light & Coke Company,
Public Service Company of Northern Illinois,
Public Service of New Jersey,
Twin City Rapid Transit, and
Western Union.

Peoples Gas Light & Coke Company is the only company that is confined to the gas business. It is a distributor of mixed gas. There are one or two others which handle both gas and electricity, including Columbia Gas and Electric. There are five telephone and telegraph companies included. Four companies, namely, Columbia Gas & Electric which I have already mentioned, Consolidated Gas, Electric Light and Power of Baltimore, Public Service Company of Northern Illinois, and Public Service of New Jersey, handle gas as well as electricity. So far as I am aware, the Columbia Gas & Electric group is the only one which has natural gas transportation and transmission facilities.

The term "corporate earnings" means the net earnings before dividends. My understanding is that that means net income before dividends. It is the revenue that is available for dividends.

The upper curve which I have identified as utilities does not have anything to do with the rate of earnings as compared with the capitalization. It is, as I have just stated, net income available for dividends. The net income available for dividends is stated in terms of dollars and not in percentage of the total capitalization. I show, however, in Chart No. 13 the relation of net profits to total invested capital for 21 leading utility corporations. Undoubtedly the earnings of these companies, if they are holding companies, are stated on a consolidated basis, so that the earnings would reflect operations of the system rather than of the holding company by itself. You asked how many of these companies are holding companies. I want to point out that that might not have any relationship to the curve. I believe Columbia Gas & Electric, International Tel. and Tel., Niagara-Hudson, Public Service of New Jersey, and probably American Light & Traction, are holding companies. I did not list A. T. & T. because you asked only for pure holding companies. It operates long lines.

I do not know what proportion of Columbia's total capital investment is represented by pipeline facilities. I have not the figurse showing the total proportion of that company's income from its transmission lines and production. My impression is that it has very extensive distribution facilities both in the gas field and in the electric field. I assume they own some street railway facilities and other holdings besides their gas holdings. I have made no special study of that company, but that is my impression.

I do not happen to have the figure in mind as to the proportion of the total income available for dividends of Public Service Corporation of New Jersey represented by revenues from gas distribution. I would be glad to
1587 find out some of those things for you. It is my under-
standing that company is predominately an electric distribution system. I believe that that is true of all of these other companies that deal both in gas and electricity; that they are predominantly electric distribution systems.

I don't think I have said this chart indicates anything with reference to the public's attitude toward risk. I mentioned that it was connected with the subject of investor attitude regarding risk. This chart shows that as compared with industrial and railroad companies, there have been fewer marked fluctuations as extreme as those which you will find in industry and railroad corporation earnings. That would help with reference to defendants in the sense that it shows that regulated companies in this group show fairly stable earning levels. In good times they don't rise to excessive heights, and in bad times they don't drop to excessive lows. That observation I think would be indicative of the industry. I certainly feel that Standard Statistics could fairly be relied upon to present in a chart what it considers to be the best available information indicative of the utility industry.

By "utilities" I mean electric, telephone, telegraph, water, gas—and by gas I mean natural gas and artificial gas and companies engaged in its transportation whether or not they are subject to regulatory authority. Maybe one or two others could be thought of. I include in the category of utilities, in making that observation that their earnings are more stable, the gas business. The upper curve there may or may not be an index of the course that earnings available for dividends in the gas business would take. I don't think it is intended to be specifically an indication of that sort. It is a general indication of utility earnings. The utilities have been selected by Standard Statistics, published with the caption " 'Public Utilities', Not Qualified," and for that reason is no more specific than the term "Public Utilities" specifically.

Questions by the Examiner.

Standard Statistics has bond ratings the same as Poor's and Moody's do. I do not happen to have the Standard's ratings on these bonds. I think Standard Statistics would have the same standards of rating as the others.

Cross-Examination by Mr. Morgan Resumed.

You ask whether I have made any comparison of the source of the incomes available for dividends among the gas distribution companies. I believe there are figures for natural gas distribution companies in Exhibit 186. To my knowledge, the figures for artificial and mixed gas distribution companies have not been put into the record as such. I know that more than 90 per cent of all the gas that defendants transport and sell goes to those who distribute mixed gas. I recall Mr. Smith's statement on his preliminary cross, that the figures shown in his Exhibit 186 do not include the figures for those who purchase more than ninety per cent of your gas, namely, those who distribute artificial and mixed gas.

The gas companies, of course, would be more related physically to the natural gas pipeline companies than would the telegraph or telephone companies. I think the physical relation is the primary way in which artificial and mixed gas companies are related to the natural gas pipelines. I was thinking in my answer of the attitude of investors. I may have gotten astray from the direct purpose of your question. I don't deny that there is a close financial dependence and relationship resulting from this corporate set-up.

1588 Much would depend upon the nature of the underlying contracts as to whether the natural gas pipeline company which must look to the distributor of mixed gas for its outlet is dependent upon the ups and downs of the distributors who purchase that gas. If you mean the extent that the distributing company goes into bankruptcy or something like that, it would have an effect. If the distributor's market falls off, the volume of gas which the pipeline can sell is directly affected, if there is a provision in the contract covering such a contingency. I am referring to the contract that I mentioned in a general way. I was saying that if there were a contract for the distribution and purchase of this gas that had fixed terms, the dependency would not be so acute unless provision were made in that contract. If that contract only covered a portion of the total valume, then there would be an absolute dependency except insofar as some demand charge or other was concerned. I am not very familiar with the demand charge that is involved in the contract of defendants. I have read something about it, but I mean I wouldn't be prepared to testify about the contracts.

My information as to the revenues of defendants doesn't go beyond the year 1937. If there was a falling off in 1938 and a pick-up in 1939, such circumstances would appear to indicate a direct dependency of the pipeline company upon the vicissitudes of the distributing company for its outlet.

Questions Interposed by the Trial Examiner.

In connection with Chart No. 10, the question directed to me asked in which direction the chart indicated; whether toward better or worse conditions. I believe that is the substance of the question. I answered that I did not understand that question; and my reason for saying that was because I could not tell whether the question related to a better direction in connection with rate of return or in connection with economic conditions. I would have to have that point straightened out before I could proceed to answer.

Cross-Examination by Mr. Morgan Resumed.

I am aware that such bulletins as Statistical Bulletin No. 36, entitled "Annual Statistics of the Manufactured Gas Industry in 1938," by Paul Ryan, Chief Statistician, are published; I am not familiar with that particular document. I have never had occasion to examine Exhibit 179. I seem to recall that such a bulletin was offered in evidence. This bulletin No. 36, about which you asked me, is of the same general character as Exhibit 179, except that it applies to the manufactured gas industry, as I understand it.

(At this point Counsel for defendants produced the document entitled, "Annual Statistics of the Manufactured Gas Industry in 1938, Statistical Bulletin No. 36, October, 1939, Paul Ryan, Chief Statistician" with the request that it be marked as an Exhibit. At the direction of the Examiner, the document was marked Exhibit No. 194 for identification.)

In the foreword on the first page inside the cover of Exhibit No. 194, in the second paragraph from the bottom, it is stated: "Companies selling mixed manufactured and natural gas are included in these data." On page 14, in table 6, are found the figures from the years 1929 to 1938, inclusive, showing the net income available for dividends and surplus in the manufactured gas industry in the U. S. In the light of the foreword, that would include those com-
panies which are distributing mixed gas. That is the
1589 same sort of figure that is reflected in my Chart No.
12 where I am dealing with the net income available
for dividends and surplus. The total amount of net income available for dividends and surplus in the years 1929 to 1938 inclusive are:

1929	$82,204,000
1930	83,119,000
1931	82,342,000
1932	68,332,000
1933	49,136,000
1934	35,280,000
1935	23,769,000
1936	25,314,000
1937	23,858,000
1938	23,030,000

You ask whether those figures indicate that the net income available for dividends and surplus of manufactured and mixed gas distribution companies was more comparable to the 15 utilities whose net income are reflected in the upper curve or some of the other curves on Chart 12 of Exhibit 185. I can't make an exact relationship here, because these curves are constructed on the basis of quarterly averages, not on annual averages. Oh, yes, on the basis that I have outlined, the chart indicates where they wind up at the end of the year.

The index number at which the utilities curve on Chart No. 12 stood at the end of the year 1929 was 142 or 143 based on 1926 as equal to 100.

(At this point, counsel for defendants produced a document described as photostat of Chart No. 12 with a broken line curve superimposed on it, with the request that it be marked as an exhibit. At the direction of the Examiner, the document was marked Exhibit 195 for identification.)

I have checked the figures on the second page of Exhibit 195, which you have just handed me, and find they are the same figures in the middle column as the figures which I read into the record from Exhibit 194. Taking the location of my 15 utility companies shown on Chart No. 12 of Exhibit 185 which appears to be 142½ at the end of 1929 as the beginning point or index number for the figures reflected in the middle column of Exhibit 195, I have traced along the broken line moving immediately to the right from that point, the course of that line, to see whether or not it reflects correctly the course of the curve as fixed by the figures in the middle column on the second page of Exhibit 195 and find that they seem to follow the computed indexes shown on the page attached to the chart. The course of the curve is different from the course of the curve indicating the net income available for dividends and surplus of the 15 utilities shown on the upper curve of my original chart 12 and winds up about 40, as compared with approximately 107 for my utilities curve.

(EXHIBITS NO. 194 and NO. 195 were offered and received in evidence without objection.)

Redirect Examination Interposed by Mr. Slaff.

For the year 1931, the index for the 15 utilities shown on Chart No. 12 would be 123 based on 1926 as equal to 100. The exact figure is 123.5 according to schedule 16, 1590 page 3. For the year 1937, it would be approximately 125, which is substantially on a par with 1931. So if we were using 1931 as 100 index, the 1937 figure would also be 100, approximately, as far as earnings available for dividends are concerned.

Referring to Exhibit 186, Schedule 2, which shows earnings available for dividends and surplus for the natural gas industry in the U. S. for the years 1931 to 1937, it appears that the net income available for dividends and surplus in 1931 was $50,816,000, in 1937 the figure was $74,623,000, so there was an increase during the period very close to 50 per cent. If I were using 1931 as an index of 100, the index for 1937 would be approximately 150.

Cross-Examination by Mr. Morgan Resumed.

Of course the figures supporting the net income are contained in the Exhibit to which I was referring. I see that in 1931 the total operating revenues of these companies was $368,000,000 and in 1937 nearly $447,000,000. Operating expenses and other revenue deductions increased from $284,000,000 in 1931 to $335,000,000 in 1937. Those would be the principal factors which account for the change in the net income available for dividends and surplus between the two years.

Redirect Examination Interposed by Mr. Slaff.

The source of the data there shown is the same, or comes from the companion statistical bulletin, issued by the American Gas Association dealing with the natural gas industry, as the one which Mr. Morgan put in evidence as Exhibit 194 on which he examined me previously.

Cross-Examination by Mr. Morgan Resumed.

In view of the note at the bottom of Schedule 2 of Exhibit 186, it is indicated that companies selling mixed manufactured and natural gas are not included in these data and distribution companies to which defendants sell gas are not included in the figures I have just read at the suggestion of Mr. Slaff.

You ask if the figures read into the record at the suggestion of Mr. Slaff are due to growth and not to increased earnings of the companies which were on an earnings basis in 1931. I cannot answer that question without studying these statistics a little further. It is my understanding that there has been a rapid growth in the volume of natural gas handled since 1931. It is in accordance with my impression that defendants were not operating in 1931, except in a preliminary way in the latter part of the year. I cannot say whether that was true as to Northern Natural and Panhandle Eastern. I do not know.

You ask if I can with any degree of safety compare the earnings of these pipeline companies in 1939, 1937, or 1938 with the earnings back at the time when they were not in operation. If they were not in operation in 1931, it would be necessary to pick up the first year in which they had full operation for the year. It might be possible that we would have to make allowances in using the figures for the natural gas industry for those facts, which are matters of common knowledge, that many of the great pipelines were built and put into operation at approximately that period; but I am not familiar enough with it. Your premise is correct I believe.

1591 Chart No. 13 is also based on studies by Standard Trade and Securities, published by the Standard Statistics Company, Incorporated. On page 2, schedule 17, it is stated that invested capital includes funded debt, preferred and common stock, capital reserves, and surplus. By "capital reserves" are meant contingency reserves. Undistributed profits would be included in surplus, I imagine. Capital reserves does not mean reserves for depreciation and things of that sort. By capital reserves is meant reserves appropriated out of surplus for special purposes, which may be returned again to surplus when the purposes have been met, if they have not been used by that time. I believe I have the figures showing the 12-year average from 1927 to 1938, inclusive, of the yields of the 21 utilities, 42 railroads, and 400 industries shown on Chart No. 13. For the 400 leading industrial corporations, the average for the period is 6.60 percent, for the 21 leading utility corporations, it is 5.9 percent, and for the 42 leading railroad corporations, it is 3.87 percent. Included in these averages are the depression years of course.

You ask whether in my view in appraising the yields from investments as an element entering into a proper rate of return in 1939 that years like 1931, 1932, and 1933 should be included in the 12-year average in this chart. I think if you are going to compare the three groups of corporations for this period, there is nothing unfair about using the average. It all depends on what is being ascertained. In other words, if you use an average for one group, you are entitled, in comparing that with another group, to use the same average for the other group.

You ask whether I think that those three years 1931, 1932, and 1933, which marked the depth of the depression in this country, should be used in calculating averages from 1927 forward. The investor that is going out today to make an investment, in my opinion, would look at conditions as they exist in order to determine what he would expect as a return on his investment, based on comparisons, and his expectations of current return, in other words, would not be based on a 12-year average, I don't think. It is possible that he would not be concerned with more than maybe one year, if at all. It depends after all upon the manner in which the investor studies the situation. You ask whether he would look only at 1938 or would take a glance at 1937 before he put his money in. It all depends on the investor. A true investor would probably either make a pretty detailed study of as much information as he could get hold of and digest, or turn his money over to or engage somebody to give him advice. He would demand today what he could get today. He could not demand any more. He could demand more, but he would not necessarily get it.

Yes, he could put his money in the bank and let it be loaned out at the interest rates I have portrayed in my chart here, or he could put it in government securities and refuse to put it into investments involving risks, unless he was compensated for his risks. You ask whether the indications are that he is not willing to put his money into investments on the earnings of today and the last few years. There are great quantities of idle resources to be sure; but the fact is, interest rates and yields on preferred stocks and so forth are not so high today. They are low enough to indicate that there is not a great demand for new capital at any rate. The fact that money rates in general are very low indicates that there is not a great demand for new capital.

1592 I don't know that you can say that people are running from risk. People are holding on to securities. Presumably there is a market for securities. It is not as though people are hoarding money. And it is true that people try to avoid risks in times of uncertainty. I don't believe that I said that people are unwilling to put their money to risks, because they are doing it. I have stated in my testimony in connection with this exhibit that there have been comparatively small transactions in common stocks. And I stated that as a reason why I did not include a common stock study in my exhibit 185. There was no demand for new capital.

You ask why there is no demand for new capital. Whether I explained it or not, I don't know; but the reason would be that business did not feel in a position to expand during the last few years. You ask whether it is unwilling to go into business for the compensation offered in relation to the risk involved. It may be that it would have been unwise to expand plants unless business could see a purpose for which they could be used. That is not a risk. That is common sense.

Questions Interposed by the Examiner.

You ask whether or not it is considered that there is a need for public utility construction which has not been made. There seems to be a division among the public utility men as far as I can gather from the press. I have read of plans involving the expenditure of $600,000,000 in 1940 for utility plant expansion. I haven't of my direct knowledge obtained facts which would lead me to a conclusion as to whether what I read is correct or not. I do not know of any public statistics that show the need of public utility construction, an accumulative need for public utility construction.

Cross-Examination by Mr. Morgan Resumed.

I have noted press comments; but whether I could lay my hands on them or not, I don't know. I mean just as part of the general information that you read as you go along from day to day. And furthermore, sometimes one figure you read will be different from another that you will see the next day; and it is pretty hard to form any conclusion from that sort of information.

I have read something about the release of the Federal Power Commission on the application of the Kansas Pipeline Company. I believe it is Order No. 39. I can't recall whether it was the release I saw or the order that I saw. I did read something about it. I don't remember having seen the statement in substance to the effect that a pipeline of that magnitude could not be financed by private capital and that witnesses on both sides had so testified. No, I do not recall that the release went on to say that the applicants would be given an opportunity to get a definite commitment from the R. F. C. and that the application would be held pending their efforts in that connection. My impression is that the application was left pending the receipt of a commitment for financing. What I was referring to was that the company, according to my understanding, failed to show that it had a commitment for financing. I don't know whether it has made that showing as yet.

1593. *Redirect Examination Interposed by Mr. Slaff.*

You ask if I know of any method by which the years 1930, 1931, and 1932 could be left out in computing a 12-year average. I do not. That 12-year average included those three years of the depth of the depression and also the so-called top of the boom period, 1927, 1928, and 1929.

Cross-Examination by Mr. Morgan Resumed.

It appears at page 8203 that you asked me this question: "The banks are full of money belonging to depositors who are not willing to invest it in the light of compensation promised for the risk involved. That is a matter of common knowledge in this country, isn't it, Mr. Knapp?" and I answered: "I believe that is a fair statement. That is a fair statement."

In Exhibit 185, Chart 14 is very similar to Chart 13, except that in Chart 14 the net profit is related to the total property accounts, less reserves, plus inventories. That is not the same kind of reserve that I was talking about a while ago when I was talking about capital reserve. The reserves referred to in Chart 14 are the depreciation or retirement reserves applicable to plant assets.

I don't think I would have any means of determining whether the level of depreciation rates or reserves had increased substantially. Of course, there is bound to be some normal increase, you understand, due to the fact of the passage of time. You asked whether or not in the past few years there has been a material change in the amount of annual reserves which are set up against depreciation and things of that character. I do not have a basis for answering that question. In my judgment, any changes in the proportionate amounts of the depreciation reserve to property accounts in the period covered by this chart would have no great effect. I did not mean to imply that the trends and directions of these curves would not vary materially if you were dealing with the property accounts without deducting the reserves.

The difference between the property accounts and the reserves—I am speaking on the mathematical difference—results from changes in both the property accounts and in the reserve accounts; and I think it is pretty difficult to say whether the net property account would be as fixed—

would follow as fixed a trend as the gross property account. You ask whether the annual allotments to reserves if left in the capital investment rather than deducted from it change materially the course of these curves insofar as their tendency or directions are concerned. Maybe not in the tendency, but I would have to get information from which I could make a definite answer. I cannot do it without making that study. I believe I could get the information from the Standard Statistics Trade and Securities, Volume III, Section J, and so forth, where they show a composite balance sheet from which these figures have been obtained. It is possible that they do show them less reserves. I had in mind the possibility that they might show the reserve separately.

I don't know that you can say a given company as a matter of common practice sets aside the same amount each year for accrued depreciation reserves. Sometimes a company will follow a consistent policy and sometimes it will not. We cannot answer that question without knowing the company and knowing its policy.

1594 You ask whether there was enough fluctuation in the percentages of the total capital investment set aside for a depreciation reserve from year to year to distort these figures. I don't see how they could distort it. We have got a base and we are relating net profit to a base, and the question of distortion does not arise.

Question Interposed by the Examiner.

Distortion is a common figure of speech and a relative one in statistics. In the sense that it was being used at the moment, I didn't think it should be used, because if you establish a base and relate something to the base, changing the base would not distort the curve. It would change the curve.

Cross-Examination by Mr. Morgan Resumed.

You ask if there is such fluctuation or variance in the practice of business in general, as it is reflected in this curve here, in the percentage of the total capital investment set aside to depreciation reserves or other kindred reserves as that the direction of these lines would be changed if I had used the gross property account instead of the property account less reserves. It is possible. I just don't know how the use of the gross property would affect these curves. The course of these curves is attributable in part to the change in depreciation amounts provided; it is due in part to changes in gross property conditions and retirements. It is due to changes in net profit. It is due in part to a great many things.

Those changes which occur from year to year in the gross property account would occur as certainly if we were using the gross property account as the basis of comparison as if we were using the gross property account less reserves, if the same information was used, of course. I do not know whether or not the fact that reserves are deducted each year in arriving at the basis of comparison between property account and net profits would change the direction of those curves through the period represented by the chart from what that direction would be had the gross property account been used.

Questions Interposed by the Examiner.

You ask if that graph would not be useless if companies by rearranging their depreciation policy changed the amount of the net profit. If all the companies made that change the year in which they made the change would not be strictly comparable to the previous year. I do not know whether Standard Statistics, or whatever the source of these figures are, would have made some comment about that unreliability. I do not know of any wholesale changing of depreciation policy of that type, if it has occurred.

Redirect Examination Interposed by Mr. Slaff.

If there were a change in depreciation reserves in the amounts added annually to depreciation reserves, there would be a compensating change in net profits, but whether it would compensate for the difference in percentage, I don't know.

Cross-Examination by Mr. Morgan Resumed.

You ask whether the figures shown in Exhibit 194, page 14, table 6, the last line of figures, "Utility Plant," are comparable to those used in the total property account in arriving at the curve shown on Chart 14. I doubt it very

much. I believe the figures shown in table 6 are gross utility plant. It is not so stated, but I believe that to be the case. I believe the figures under "Gross corporate income" are comparable to the figures used in arriving at my results reflected in Chart 14 as near as I could get to figures of net profit shown in Chart 14. If you divide
1595 the gross corporate income from year to year by the utility plant you are not getting a curve which is on the same level or same comparable level as the curves reflected in Chart No. 14. The level would be changed. If I were to restore to the figure "property accounts less reserve" the amount of the reserve, the curve shown in Chart 14 would be on a different level; but I don't know whether they would follow the same pattern or not. Inasmuch as there would be no change in the net profit figures as a result of this computation, it would appear that if you increase the base the per cent of net profit to invested capital will be reduced.

(At this point, counsel for defendants produced a document described as a photostat of Chart No. 14 with a heavy broken line curve superimposed thereon and requested that it be marked as an exhibit. At the direction of the Examiner, the document was marked Exhibit No. 196 for identification.)

I have Exhibit 196 before me. I see the legend there identifying that heavy broken line which is on this exhibit and which is not on Chart No. 14, of which this exhibit otherwise is a photostat.

1596 I have made a check of the curve identified as manufactured and mixed gas companies on Exhibit 196 and the figures supporting that curve on the following page with the figures shown on page 14 of Exhibit 194. There is a typographical error in stating the gross corporate income for 1930 and 1931. For 1930 it should read 123,473, and the following year it should read 127,304. I find the return ratio in the fourth column correct on the basis of figures shown in Exhibit 194. I find the tracing correctly locates the curve marked "Manufactured and Mixed Gas Companies" in Exhibit 196. This tracing shows a lower level in the percentage of the relation of net profits to the total of property accounts for manufactured and mixed gas companies during the period covered than is indicated for the relation of net profit to total property accounts less reserve plus inventories for twenty-one leading utility corporations. The relationship between the year 1929 and the year 1938 shows a difference in percentage of return ratio in the case of manufactured and mixed gas companies of between 6.76 per cent in 1929 and 3.43 per cent in 1938, or a decline of 3.33 per cent absolutely.

For the twenty-one utility corporations the relationship of net profit to total of property accounts less reserve plus inventories for the year 1929 was 7.6 and for the year 1938, 5.9, indicating a decline in percentage of 1.7 per cent absolutely. My results would indicate the decline for the twenty-one leading utility corporations, expressed as a percentage of 1929, of 22.4 per cent. The corresponding percentages of decline in the case of manufactured and mixed gas companies is 49.3 per cent.

(At this point counsel for defendants offered in evidence EXHIBIT 196.)

The manufactured and mixed gas figures shown in Exhibit 194 do not include inventories, I would assume, because the term and item "utility plant" shown in Table 6 is not qualified in any way. If it did include inventories, it would have to be qualified to be accurate, I think. If the item included inventories, as it is now shown, by removing inventories you would get a lower base and consequently a higher percentage. The fact that the figures which were used did not include inventories results in a higher percentage than if the inventories had been included in the base. To state it in my own words, if this figure does not include inventories, and you were to add inventories to it, the base would be increased and the per cent return would be lower than that shown in Chart 14 of Exhibit 196.

The figure for the twenty-one leading utility companies does include inventories. If I were to remove the inventories from the base in the calculations from which that curve resulted, it would raise the position of that curve on the chart because the base would be reduced, and if I were to remove reserves from the base for the manufactured and mixed gas companies, I would raise the position of that curve on the chart.

Questions Interposed by the Examiner.

The differential in absolute terms would be the same. In other words, when you take your reserves out and put your inventories in, all you are doing is shifting the vertical posi-

tion of the line; but I can't predict how much change will take place in the vertical position of the line. I know or believe it will change. Just how the reduction of the reserve would compensate for the addition of inventories, I don't know. There again, even though the annual retirement expense for the period of 1929 to 1938 is fairly consistent, but that in itself would not be an altogether complete basis for estimating changes in the reserve, because retirement may
or may not have equaled, that is, actual retirements
1597 charged against the reserves during that period may
or may not have equaled the provision.

(At this point the Examiner asked the witness W. C. Gilman, who had heretofore testified, questions through which he elicited the following information:

I assisted in the preparation of Exhibit 196. We tried to set it up with comparable data, but we just could not get from the American Gas Association, which is the only source we know of which compiles complete industry figures for the manufactured and mixed gas industry, the amount of the reserves for the industry at the end of each of those years. We made a check with respect to the question of whether the gross utility plant set forth in Exhibit 196 is with or without inventories, and were advised by the American Gas Association that the figures for "Utility Plant" in that exhibit do not include inventories. I made that check. The figure refers to gross utility plant account. I did not make any inquiry as to whether there was any separation of tangibles and intangibles.

Exhibit 196 was received in evidence over the objection of counsel for the Commission and for complainant, who were allowed an exception.)

Cross-Examination by Mr. Morgan Resumed.

I have no reason to change my position or to change the statement I made at page 7911 of the record while discussing Chart 15, in which I said: "I would like to refer again to previous testimony on bond yields as indicating that since 1921 public utilities have enjoyed, on the whole, about as favorable a market for their securities as other forms of enterprise; that since 1933 they have been able to obtain capital at lower costs than other enterprises, and that at least since 1935, in the case of newly issued electric utility bonds, they have been offered on the average at even more favorable terms than those obtained for public utility bonds as a class. Thus, the attitude of investors aids in confirming the favorable position of public utilities from the standpoint of comparative risk." I think I would be willing to rest upon that statement. As to whether it would be more accurate if I had said they have been able to obtain refunding capital represented by the highest grade of bonds, rather than to say that they have been able to obtain capital at a lower cost, I don't think there was anything which is not disclosed in my statement. I, of course, stated, "In the case of newly issued electric utility bonds, they have been offered on the average at even more favorable terms than those obtained from public utility bonds as a class." I can't find any reason to change that statement. I have already explained, I believe, in prior testimony just what I was talking about. I believe I had explained it at the time I made that statement in the record. I mentioned that the financial transactions were largely of the highest order of bonds. Whether or not I mentioned that it was largely refunding, I can't say offhand. I might have stated that.

I would like my answer, of course, to indicate the facts; and if any facts have been omitted in that statement, I would be glad to have your additional comments added to that statement. Yes, I want the answer read in the light of my testimony that it all had to do with refunding transactions and with the highest order of bonds for the most part. I wish to add that statement with reference to refunding. The fact that in the case of newly issued electric utility bonds they have been offered on the average at even more favorable terms than those obtained for public utility bonds as a class is due to the fact that the investing public regards that type of bond as more safe and freer of risk than public utility bonds as a class.

1598 In this section of Exhibit 185 some of the schedules, for example that on page 2 of Schedule 16 and page 4 of the same schedule, show the moving average of earnings as terminating on March 31, 1939. It takes some little time for that information to be published, possibly a month or two months, and that of course would be the explanation for my stopping those moving averages as of that date.

Since that time there have been published figures which would enable me to bring that on down to date. You ask what the tendency of the moving average of earnings since March 31, 1939, has been so far as disclosed by the published figures. It happens that the figures I have for page 2 of Schedule 16 are indicated as being estimates for industrial companies. I will give you those moving averages. For the year ended June 30, 1939, the average of the index, based on 1926 equals 100 per cent, is 60.5. For the year ended September 30, 1939, the average is 66.7. Those are higher than the moving earnings ratios have been since the year ending June 30, 1938.

Turning to page 4 of Schedule 16, for 15 utility companies the figures I have also appear to be estimates for the same two quarters; and on that basis the average for the year ended June 30, 1939, is 112.4 and for the year ended September 30, 116.5. There has been a progressive increase in the moving average in both these quarters.

Then turning to page 6 for the railroads, I appear to have the June 30 quarterly figure, which is not indicated as being estimated, so I would consider that as actual. Of course, prior figures were taken as actual. For the year ended June 30, 1939, the average for railroads was a red figure of 3.9. For the year ended September 30th, based on estimated earnings for the third quarter, it was a black figure of .8, so in a peculiar sort of way the moving average earnings of the railroads have been progressively upward since March 31. The deficit has been reduced. The red in June was not as large as it was in March, and they got into the black in September.

I would say that Chart 15 is another chart dealing largely with short-term interest rates. By rediscount rates of the Federal Reserve banks I mean rates which the Federal Reserve banks charged to member banks for making loans secured by eligible paper. You ask whether I know the facts as to the terms upon which the Federal Reserve banks will accept paper of a member bank. I note from Schedule 19 supporting this chart that the rates on all classes of paper from the beginning of 1922 to date would indicate to me that it was commercial paper that was involved in these rediscount operations. I don't have the information available as to what the terms are upon which the Federal Reserve banks will rediscount or what the requirements are to meet the rediscount rules of the Federal Reserve Bank. I do not believe the paper which they would rediscount would include capital loans. My impression in general is that it is confined to agricultural, industrial, and commercial paper. I can't give you the exact maximum maturity either; but it probably is not a very long maturity. It is probably less than a year. You ask if it isn't in fact 90 days. My memory may not be so good. I would prefer not

to answer specifically. My Schedule 19 shows that it used to be 60 to 90 days. That is what it used to be to the end of 1921. I have no positive figures as to the limit at the present time. You ask if I am clear that it does not include notes for the purpose of carrying on trade in stocks, bonds, and other securities, except bonds of the United States.
1599 My answer would be that the type of security is the same you have just mentioned: agricultural, commercial, and short-term paper. I don't believe that brokers' loans would be handled under such an arrangement as this.

These rediscount rates would have very little if any influence on the cost of capital to a natural gas pipeline company. Of course, a company might require some short-term funds in a period to tide it over, and it might affect it to that moderate extent.

I stated in my direct testimony that one of the deductions you make from this chart is the circumstance that the rediscount rates have moved downward with fluctuations from the year 1920 through the year 1938. 1938 is considerably lower than the year 1920. So far as I am aware, there has been no change in the rates shown on this chart since August of 1937. You ask what effect the declining rediscount rates should have upon the volume of discounts made through these rediscount operations. It would permit the banks to carry greater loans from Federal Reserve banks than otherwise would be considered by them to be profitable. You ask whether or not, as a matter of fact, they have borrowed more money at this rate of 1 per cent than they did when they were paying rates of 1920 which varied from 4.75 to 7 per cent. I don't have the exact figures before me, but I think the volume would be comparatively small because of the lack of demand by borrowers for money from banks. I am familiar with Volume III of Standard Trade and Securities Statistical Section. That is one of the volumes from which I have taken my data. On Page A-3, Section A of the "Banking and Financial Section," at the top of which appear the words "Condition—12 F. R. Banks," it appears that the monthly average bills discounted for the year 1920, when the rediscount rate was 4.75 to 7 per cent, was $2,522,000,000. In the year 1929, when the rediscount rate ranged from 5 to 6 per cent, the total volume by monthly average was $946,000,000. In 1933, when the rediscount rate ranged from 2½ per cent for a short period up to 3½ per cent and then back down to 2 per cent, the average monthly total was $271,000,000. In 1938 the rediscount rate had come down to 1 per cent, and the average monthly discounts for that year appear to be $9,000,000. The figure for September, 1939, would appear to be $6,000,000.

So, as the rediscount rate came from a rate ranging from 4.75 to 7 per cent in 1920 down to 1 per cent in September, 1939, the volume of business came down from $2,522,000,000 to $6,000,000. You ask what that indicates to me. It indicates something that I thought had existed, but not quite to that extent, that the volume of discounts have become quite low as compared with prior years, indicating that business was not borrowing money, and up until September, 1939, had not begun to resume the trend; at least I don't think it had from looking at those figures. That indicates that cheap money does not necessarily have the effect of causing an increase in discounted paper.

You ask whether or not I think it is safe to use a chart of this kind in the light of those circumstances, as any sort of a guide in an effort to arrive at a proper rate of return for natural gas pipeline companies such as the ones involved here. I think that this chart is informative, and taken together with the other charts in this exhibit is essential to a round knowledge of financial conditions. I do not think this chart would be misleading if used in conjunction with the other exhibits that are contained in Exhibit 185. I don't think that it is misleading if viewed in the light of the other supplementary exhibits.

1600 Chart 16 has to do with the rates charged by banks to customer borrowers rather than the rates charged to banks by Federal Reserve banks. That chart shows the almost uniform decline in the prevailing rates charged customers by banks in principal cities since the latter part of the year 1931, and indicates that the rates charged by New York City banks are lower than rates elsewhere in the country, averaging 2.24 per cent in February of 1939; that the rates charged by banks in eight other northern and eastern cities had declined by February, 1939, to 3.33 per cent; and that the prevailing rates charged by banks in twenty-seven southern and western cities had declined by February of 1939 to 4.09 per cent. I do not believe these three curves or a composite of these three curves would apply all over the country as far as interest rates are concerned. The curves themselves are indicative of that. It is clear that there can be a wide variance between New York City and the eight other northern and eastern cities, and there can be a wide variance between these eight northern and eastern cities and twenty-seven southern and western cities. You ask if conceivably there couldn't be the same variation in the rates of the twenty-seven southern and western cities and the remainder of the southern and western cities. That is not so likely, I don't think.

That chart does not indicate to me that money is available to natural gas pipeline companies for over-all capitalization purposes at lower interest rates than it was in 1931. I don't see how it indicates or how it might indicate that it is more difficult to get capital money now than it was when the interest rates were substantially higher than they are now. It might indicate that there is a great surplus of money in the banks which is unwilling to go into capital enterprises under present conditions and that it is finding a limited temporary outlet at very low rates of interest.

You have read to me from the same volume of the study by the staff of the Federal Communications Commission, telephone rate and research department, captioned in the middle of the cover page, "The Problem of the Rate of Return in Public Utility Regulation With Special Reference to the Long Lines Department of the American Telephone and Telegraph Company, Dated June 15, 1938," from page 46 of that study, under the caption, "Improper and Inadequate Measures," the following language:

"In numerous rate proceedings data have been presented which were apparently not pertinent with reference either to the general level of interest cost to utilities in general or to the fair rate of return to the particular utility served. Such data may in many cases be definitely misleading."

You ask me if I agree to that statement. If the data is isolated, it may be misleading.

You have read to me a statement that "One inadequate or misleading measures is the legal rate of interest in the community or state served by the utility." I haven't said anything about legal rate of interest. I have talked about the conventional or bank rate of interest.

I don't believe I have any quarrel with the observation you read on the following page:

"The prevailing rate of interest in the locality for secured loans on business and residential property is another test which has been referred to by the Supreme Court and may be regarded as a rough measure of reasonableness. However, it is evident that such prevailing rate of
1601 interest in the locality for secured loans on business and residential properties will be acceptable evidence

of the fair rate of return only in instances in which it is established that the employment of capital in the particular utility in question involves the same degree of risk."

You ask me whether I agree to the statement you read from the same source as follows:

"The price of short-term money is still another measure which has occasionally been used but which is obviously irrelevant as evidence of the fair rate of return to a utility."

I believe that when I was testifying and introducing charts on trends of United States Government bonds and 90-day time loans and 4 to 6 months commercial paper, that I specifically mentioned that these exhibits were not intended to be used as a measure of the proper rate of return, but that they were introduced to show that the declines discovered in bond yield averages for all types of companies were not an isolated phenomenon, but something that could be confirmed by reference to other indications of interest rates in general.

You ask me whether I agree to the statement of the authors of the language you have just read that it is obviously irrelevant as evidence of the fair rate of return. I think it would be if it were presented by itself as a bit of evidence, but it is not presented that way.

You ask me whether I agree to the following language from the same source:

"Indeed, the direction of movement of short-term money rates is likely to be a misleading indication of the recent or probable future trend of the cost of public utility capital."

I don't think that this exhibit bears that statement out. I disagree with that statement. You ask if I disagree with the following statement, which you have read from the same source:

"The supply of and demand for short-term money arises out of circumstances quite unrelated to the price of long-term money."

In general I think that is true. I believe I have already said that. You ask me whether I agree to the following language:

"Chart 2, page 48, shows the yield from 1927 to 1937, inclusive, on 60 to 90 day time loans, the yield on United States Treasury bonds, and Moody's index of the yield on forty public utility bonds. In 1928, for instance, the rate on 60-90 day loans increased rapidly, reaching a maximum of 8.94 per cent in September, 1929, at the same time that

Moody's bond index was falling or showing only a moderate tendency to rise. From the peak in 1929, however, until the middle of 1931 the rate on 60-90 day loans declined sharply to a low of 1.4 per cent at a time when Moody's average market yield on bonds stood at 5 per cent. The factors influencing the supply of and demand for short-term commercial paper and 60-90 day time loans are apparently entirely unrelated to the factors which influence the market price of long-term secured obligations."

1602 I still feel that my statement can stand; that the evidence here seems to indicate quite definitely that the trend of interest rates in general is following the same relative pattern. They may not be on the same level necessarily, but the pattern seems to be fairly consistent, at least for recent years. I do not agree with that statement entirely. I have not testified about current savings banks interest rates.

You ask if I agree to the language from the same source as follows:

"The yield on United States Treasury securities shown on Chart 2, page 48, is often regarded as being very close to the risk free interest rate, and as an indication of prevailing rate of time preferences. If that assumption is valid the yield on government bonds might be used as a base from which to measure the differential required in the fair rate of return to public utilities because of varying degrees of risk. It must be recognized, however, that the yield on treasury securities may temporarily reflect other factors than the market rate of time preference."

I think that statement is true. You ask whether I agree to the following language from the same source:

"In the interval from August, 1931, to January, 1932, the average yield on government bonds increased from 3.13 to 4.32 per cent; but it could hardly be contended that the basic interest rate increased more than one per cent in the five months, only to decline to 3.19 per cent one year later. Government bonds are frequently bought and sold by the Federal Reserve System to influence money rates, and as a result of this policy, as well as of surpluses in investment funds, it is possible that the yield on treasury securities may at times even go below the riskless interest rates—"

I think it may at times do that. The above quotation continues as follows:

"—the investors in such securities accepting a lower rate in order to achieve the extreme liquidity assured by investment in government bonds. In November, 1936, the average yield on such bonds declined to the extraordinarily low level of 2.29 per cent. Of course, irrespective of whether or not it is the most dependable available measure of risk free interest, the yield on government bonds is not a measure of the cost of capital to any particular utility enterprise."

I have testified that it is not a proper measure. I agree absolutely with the following statement from the same source:

"The price which must be paid for capital by a particular utility depends upon the investor's evaluation of the risk inherent in the operations of that utility."

You ask me whether or not I agree to the following language from the same source:

"Reference to the yield on high grade utility or corporate bonds in determining the fair rate of return for a particular utility is open to many of the same objections that are pertinent in the case of government bonds.

1603 "In the first place, unusual and abnormal influence such as those that have influenced the price of government bonds may carry over to and influence the yield on private secured obligations comparable in quality with government bonds. In any case, the average yield of a class of high grade bonds is not representative of the yield on bonds with different risk characteristics. The indices of security yields are acceptable evidence only to the extent that they reflect the circumstances and character of a homogeneous class of utility or industrial concerns."

Now it says here that "in the first place, unusual and abnormal influences such as those which have influenced the price of government bonds may carry over to and influence the yield on private secured obligations comparable in quality with government bonds." I agree with that statement, but if that influence has an effect upon private secured obligations, the fact still remains that the yield averages on such bonds are the only available measures to which reference can be made in making a study of financial conditions. The yields are what they are. It is true that you have got to exercise judgment as to the risk characteristics; and for that reason we have put in the bond yield averages of bonds showing different risk characteristics. Yes, I have done this to the extent of putting in utility bonds as well as industrial and railroad bonds, and I have described the character of the utilities that are represented in the bonds whose yields are shown in my evidence.

You ask what is meant by a homogeneous class of utility or industrial concerns. That would be a class of like, as I interpret the word "homogeneous," industrial and utility concerns. You ask what I mean by a homogeneous class of utility concerns. I think here the reference is probably to quality of bonds. I don't think the word "homogeneous" means alike, and it naturally could not have the meaning of being alike in every detail, either from a financial or operating standpoint. I think it would mean that all Aaa are to be regarded together. I mean you break down the yields by quality of rating and you get from that a series of curves which show the effect produced by risk characteristics. I thought you were asking me about securities.

You ask what is meant by the term homogeneous class of concerns, whether they be utility or industrial concerns.

Questions Interposed by the Examiner.

You ask me if I agree with the last statement that I requested to be read some time ago. Yes, that is correct, Mr. Examiner. I agree with that statement if I correctly understand the meaning of the terminology "homogeneous class of utility or industrial concerns." The data I prepared is based on such an identification. To illustrate it, we speak of public utilities, railroads, and corporations, and we have broken bond yields down into those classes.

You ask me what the over-all meaning of the term homogeneous is as applied to a class of utility or industrial concerns. I think public utilities are a homogeneous class of utility concerns. I think industrials are homogeneous in the fact they are industrials. If you would like to ask me more questions, I will be glad to answer them if I can.

1604 *Cross-Examination by Mr. Morgan Resumed.*

You ask if it would be quite logical to use the language I asked you to read over again, that "The indices of security yields are acceptable evidence only to the extent that they reflect the circumstances and character of a homogeneous class of utility or industrial concerns," if all utilities met the specifications of being a homogeneous class of concerns. In the case of public utilities, it is usually attempted to break those down by type of individual utilities, that is, telephone companies, gas companies and electric companies, and just what indices are being referred to I don't know, unless they are individually constructed ones. You ask if this doesn't mean that the security yields of other utility bonds or other corporate bonds in connection with the determination of a rate of return for a particular utility are only useful when they reflect the circumstances and character of homogeneous concerns, that is, they belong to the same kind of concern as that whose rate of return is under consideration. I think I can answer that in a way that might get to the point rather quickly by saying in every instance the particular circumstances surrounding the individual company must be taken into consideration in determining upon a fair rate of return. Now, then if we find that data is not available for a particular type of industry, the best we can do is to get data as nearly comparable to it as we can. This last sentence may mean that security yields or bond yields are acceptable evidence only when they belong to the same homogeneous class of concerns as the utility whose rate is under investigation. The more I think of it, perhaps, the more I think it does mean that, but at the same time I just questioned the use of the words "acceptable evidence" because if you don't have any other evidence, you have to accept what you find.

You ask whether, if I have the security yields of a telephone company, which I say is a utility, I don't think it is necessary to show the yields of gas company bonds because it is a utility also, even though it is a natural gas pipeline company which is under investigation. I believe Exhibit 186 has information concerning the yields of natural gas pipeline company bonds insofar as that information is available.

I don't know that I could agree with your suggestion that if there is a security that is closer to the natural gas security and more nearly of a homogeneous class with it than electric distribution bonds and telephone bonds, that would be more pertinent and more relevant in an inquiry such as this. You can take bonds of electric utilities, and if you assume all electric utilities are homogeneous, you can find a Baa bond that has a much different yield than a Aaa bond. All you have to do then is to examine into the rating of a security because both are electric utilities, but I know of no known indexes of gas companies as such or electric utilities as such. You ask me if it is my view that if they are both utilities, even though one be a telephone company and the other a natural-gas pipeline company with no distribution facilities, that they therefore belong to a homogeneous class of concerns. They are homogeneous in the sense that they are utilities. It might be that that is the only sense in which they are homogeneous. It might be that the only sense in which they are homogeneous is the use of that word "utilities" by some persons in describing them.

1605 *Questions Interposed by Mr. Slaff.*

You have read from the same source from which Mr. Morgan was reading a short while ago language commencing at page 50 of the study, as follows:

"Benefits Arising from Use of Objective Data.

"In formal rate proceedings, the evidence as to the fair rate of return has frequently, if not usually, been mere opinion testimony by 'expert' witnesses, unsupported by factual data or by other indications of the basis of the opinion. There has been a not unnatural tendency on the part of regulatory bodies to discount such evidence, even where it has been given by bankers or brokers whose business is the issue and sale of securities. In a discussion of opinion testimony in regard to so-called 'going value,' the Supreme Court has used the following language:"

"'Other experts, testifying to an aggregate, without assigning a proportion to the contributory factors, give estimates so vague as to be little more than guesses, one of them, for illustration, holding to the opinion that ten would be a fair percentage, yet unable to give a reason why the amount should not be less or greater.

"'From the testimony as a whole, one gains a definite impression that the opinions are derived for the most part from a professed experience and understanding of business conditions generally, and very little from any knowledge of the history and circumstances of the particular enterprise.

"'We cannot find that the Commission and the Court went beyond the bounds of legitimate discretion in putting aside these estimates as too uncertain to be followed.'"

That is the end from the quotation on the Columbia Gas case.

"It seems fair to say that this language would apparently be equally descriptive of most opinion testimony offered in past rate cases with respect to the element of fair rate of return. Such theoretical analysis as has been offered in rate proceedings is usually directed towards the establishing of one of a set of conflicting contentions. The same observation holds for the factual data which have at times been presented; namely, that it usually has been selected with a view to the particular propositions sought to be demonstrated."

1606 Schedule 21, Exhibit 185, deals with the gross sales of department stores in the U. S. and the Chicago Federal Reserve District. I used as a basis of comparison the average for 1923, 1924, and 1925 as 100. The schedule indicates that during part of the period, from 1923 down to and including 1938 the relative sales over the whole U. S. were higher and at other times they were lower than in the Chicago Federal Reserve District. You ask what is the general prevailing situation as between the whole U. S. and the Chicago Federal Reserve District. My examination discloses that the figure for the U. S. was slightly in excess of that for the Chicago Federal Reserve District in five of the years shown, namely, 1924, 1931, 1932, 1933, and 1934. In the other years, the U. S. total has been somewhat less than that for the Chicago Federal Reserve District, except in the year 1925 when they were the same.

That schedule indicates that conditions in the Chicago Federal Reserve District were about the same as those for the country as a whole during the period, although in recent years there seems to be some evidence in favor of the Chicago Federal Reserve district more constantly. Over the whole period, if there is any difference, it would appear to be in favor of the Chicago Federal Reserve District. That is the case during the past four years. No, you can't take these department store sales alone and get the whole economic picture. You have got to just select this as one of the several indexes which might be used for that purpose. As to whether it is necessary to weigh against these figures the difference in the tendency of sales of specialty stores as opposed to department stores and a lot of things of that character, I don't know how much refinement would have to be made of these figures. They are published by the Federal Reserve Board or banks as business indexes and purport to indicate the sales comparisons. I think this chart is quite pertinent to the subject of this inquiry.

Schedule 22 has to do with factory employment and pay roll indexes for the United States, the State of Illinois, and the Chicago Industrial area. The state of Illinois is included in that tabulation because it is the state in which the Chicago industrial area is located. It is true the pipeline extends into several other states. You asked me to ascertain whether or not the same type of information was available in any of the other states through which the pipeline passes. I did so undertake and found that Iowa is the only state in that group of states mentioned, that is the States of Iowa, Nebraska, Kansas, Oklahoma, and Texas, from which employment and payroll figures are given; and I find that in the case of the State of Iowa, the only data published were employment data, not payroll data.

I have some notes which I made on that employment data to which I should like to refer. There is a notation contained in 1938 Supplement to the Survey of Current Business, which is published by the Department of Commerce, at page 174, which purports to describe the employment and payroll indexes from information furnished by the State of Illinois, which has furnished the information for both the state and the Chicago Industrial Area; and nowhere in that description do I find mention of whether the employment index gives any indication of whether it is a full-time or part time employment.

I shall read you a sentence: "Based upon the 1935 Federal Census of Manufacturers, the employment index—" that is the one which I have used for the State of Illinois and also for Chicago—"represented 76.1 per cent of all wage earners engaged in manufacturing industries of the state; and the payroll index represented 70.1 per cent of the wage payments." The language I have quoted is from page 174 of the 1938 Supplement. From that I gather that this represents the number of employees, and not the number of man days. I do not know whether it means full time employees or not.

1607 The second portion of the schedule is an index on factory payrolls in terms of dollars. This index of the number of factory employees and the aggregate factory payrolls indicates something about the conditions in the area in which the natural gas transmitted by the defendants is consumed; that being the case, I consider that the information is pertinent to the subject of rate of return in this instance, in the sense that it is information on economic conditions. I do not believe it would have been more pertinent if I had secured some figures for employment in construction work and payrolls in construction work in the same territory. For the purposes for which I have stated that information is to be used, I do not think that the building industry or trades is more nearly related to a pipeline company and its operations than factory employment and payrolls.

With the thought that the prevailing scale of wages would be more pertinent and helpful than the aggregate payrolls of the factories located in the United States and in the State of Illinois and in the City of Chicago, I prepared schedule 23 as throwing some light on that subject insofar as I was able to obtain the required information. I do not know that there is information concerning the comparative wage scales of this country available in published form. There are indexes on wages. I forget the name of the Baltimore firm which publishes construction indexes. I think it is Handy, but I notice that even in that case, the information was not broken down by states. I am not acquainted with particular indexes of the Bureau of Labor Statistics concerning wages per hour, union wage rates, hours of labor, and information of that kind. I believe my answer applies also to the Bureau of Labor Statistics. My researches, however, encompass the publications of the Bureau of Labor Statistics.

To say I have not made any effort to get the actual wage scales except the effort reflected by schedule 23, does not do justice to the extent of the research that I undertook in order to get the information; but nevertheless, my research did not lead me to those particular figures to which you have reference. I could not find published figures anywhere except as above stated.

Going back to your question of a few minutes ago, I have here a bulletin entitled "Employment and Payrolls," issued by the United States Department of Labor, Bureau of Labor Statistics, in which there is a column called "Average Weekly Earnings," which appears to be in dollars, and it is broken down by industries; but the point I am making now that I recall the subject here, is that this is not broken down by states, and that is one of the questions you asked. That has to do with average weekly earnings. You ask whether I inquired as to whether there were statistics available as to the course of the wage scales in this country during the past several years. I think I made some explanation of that on direct testimony when I said that in an attempt to find something on wage scales I had discovered the figures published by the United States Bureau of Labor Statistics, but that they did not extend back of the year 1932. That statement is contained in note 1, schedule 23. They did not compile those data prior to that date. The only available source I could find for the country as a whole, as explained in schedule 23, was the National Industrial Conference Board computations which, while they are not as exhaustive as the U. S. Department of Labor figures, are in fairly close proximity in recent years. Then, as I stated, I attempted to find data by states, and among the states I have mentioned, the only one I could find was for the State of Illinois.

This data compiled by the Bureau of Labor Statistics
covered 89 industries. It was the same kind of data
1608 as that which I used in Schedule 23 in that it dealt
with weekly earnings. You ask whether I have made specific inquiry of the department of labor as to information on wage schedules, wage scales for different types of industry, or whether I have made any attempt to get an over-all figure of any sort on wage scales. Would you consider, if I may inquire, a weekly earning as a wage scale? You are correct in stating that in the year 1930, the weekly earning was almost on a par over the whole United States with the 1929 to 1931 average. The average factory worker in that year got $25.84. You ask how many hours he worked for that $25.84. I do not know that I can give you the number of hours, but it does say that it is a week's time or a week's earnings.

Of course, if you are going to employ labor you would make inquiries as to how much work you would get for a specified sum of money. I don't happen to know the prevailing work-hours in factories over the country in 1930. I do not know the exact difference in the prevailing hours in factories today, but they are probably less. It does not refresh my memory for you to state that it would be about 55 hours in 1933 and that it is now about 42 hours. I do know that hours of labor per week have been by law shortened very substantially since 1930. I haven't examined the law in detail, but I believe you are correct in stating that the working hours are due to be shortened again under the existing law in 1940 from 42 hours a week to 40 hours a week.

I could not tell you precisely how many hours the average factory employee worked for the sum of $26.12 in July, 1939. From the standpoint of a man who has to pay the cost of labor, it is very important to know what that cost is going to be before he can tell anything about the cost of production or the cost of operation and before you can appraise those indexes as indicative of costs to the man who pays the wages, you have got to know those things.

Redirect Examination Interposed by Mr. Slaff.

It is also necessary for the man who has to pay for the labor to know how much of the weekly wages for 1930 was paid to employees on a piece-work basis, as well as on other bases. That has been one common method of wage payment. I have no reason to believe that the practice has been done away with. If there has been a speed-up in the production process for piece workers and if payment per piece has not increased, then we would have a situation where there is not necessarily an increase in the cost per unit of production, despite a decline in hours worked. I think it would be a fair statement to say that regardless of that so-called speed-up of production by labor, there has been an improvement, an improved advance in the technology of industry and production methods in the last eight years.

Cross-Examination by Mr. Morgan Resumed.

You ask if you have got to know those factors of part-time and piece-work before you can appraise Schedule 23 as evidence in a serious proceeding of this character. These schedules were not put in for the purpose of showing the cost to industry of labor. They were put in for the purpose of showing the comparison of economic conditions; and are rather directed to what the employee receives than what the employer pays.

I would be willing to accept your statement that in this rate of return testimony the question has been raised as to the uncertainty of future operating costs and that some of the witnesses have testified that that is one of the hazards confronting the natural gas business. I have
1609 not heard many of the witnesses. I would like to say that for the purpose for which this schedule was intended, I don't believe that a study showing the tendency and the direction of wage scales over the same period of years covered by my schedule No. 23, which you suggest, would be of any material assistance. Then in line with your question concerning uncertainty in con-

nection with labor costs and operating costs, I would like to state that it is to be assumed that if such costs are reasonable that regulatory authorities will allow such costs to the utility concerned.

Schedule 24, "Gas, electric and telephone utility companies serving the city of Chicago, total operating revenues, years 1929 to 1938," I take as the base of 100 the average of the period 1929 to 1931. That schedule deals with gross operating revenues which indicate in the case of Peoples Gas Light & Coke Company and Commonwealth Edison Company there has been an increase in the gross operating revenues, while in the case of the Illinois Bell Telephone Company there has been a decrease in the total operating revenues. You ask why I did not use the net operating revenues instead of the gross operating revenues. I used the gross operating revenues because I felt that they were an indication of the volume of business that was being done by the utilities, and that is what I wanted to show.

You ask why I did not include the traction companies, if I just wanted to know the gross. Well, I believe in general that although traction companies used to be considered in the class of utilities years ago, that their condition is such nowadays that they are not generally included as such. They are regulated concerns, but they are different from the type of companies we have in mind here, as I have pointed out previously, in that these all furnish service to the home and are more likely to reflect the direct effect of economic conditions than in the case of traction companies from a gross revenue standpoint, because transportation is a vital necessity to so many people that economic conditions may or may not have quite as much to do with traction revenues as with these types of revenues.

You ask whether these figures indicate increased prosperity on the part of the Peoples Gas Light and Coke Company and Commonwealth Edison Company and a decline in that respect of the telephone company. I have made no statement about prosperity. I have merely attempted to show the volume of business that was being done by these companies; and since that volume is dependent upon the conditions in which the consumers find themselves, it seemed to me that that was the thing to which attention should have been directed. I thought I had the figure showing how much of the $37,976,207, gross revenues of Peoples Gas Light & Coke Company for 1938, is escrowed and held in abeyance, not subject to their use. The figure you state, $2,140,300 sounds about right. This would reduce the revenues for that year to $35,835,907 if those escrowed funds are not counted. That would be less than for 1930.

I have a figure for 1931 for the net revenues of Peoples Gas Light & Coke Company. It is $9,676,084. I believe these figures are on a corporate basis. The net figure for 1938 is $6,010,615. If $2,140,300 be subtracted from that amount, the result is $3,870,315 which is less than one-half of what it was in 1931. You ask whether that is the situation with reference to the other two companies when we take their net revenues as opposed to the gross operating revenues, or total operating revenues. I do not know the exact situation, but I am inclined to think that it is not similar.

My recollection is that Peoples Gas did not begin the supply of natural gas until October, 1931. On the assumption that the principal portion of gas purchased represents natural gas purchased from defendants, that item it would appear represented in 1932 approximately a third or more of the total cost of operations. For 1938, the gas purchased figure was $12,451,281 and total operating expenses including taxes and depreciation, maintenance, et cetera, were $31,965,592. There is also an item covering cost of gas produced in 1938 which was $1,384,422. I do not know what the comparable figure was for 1930 or for 1931. All the figures I have for 1930 are three items,—operating expenses, state and local taxes, and depreciation. I could get no break-down of operating expenses from published figures. I could get those figures if I was assured access to them. They are not published. If I can find them in the annual reports filed by Peoples Co. with the Illinois Commerce Commission, I would be glad to obtain those figures for 1930. The figures I have used were published in Moody's manual of investments.

You ask whether the company has made an adjustment on account of over-accruals for taxes in recent years. I have found in attempting to acquire this information that

Moody's referred to several years income figures as having been later revised; and my understanding was that the revised figures were contained in the annual reports of the company to its stockholders but I was not able to obtain such annual reports. My understanding was that these revised figures had to do with taxes. I do not know whether the Illinois Commerce Commission in the rate proceedings involving that company found that it was attempting to charge to operating expenses substantial amounts for the item of taxes to which it was not properly entitled. I have not become familiar with that.

You ask whether the figure for Commonwealth Edison Company included revenues for Super Power Company for 1938. I investigated that point and found that for 1938, there was a footnote indicating that the year's figures included the Super Power Company; but the footnote appeared on no other year, so I assumed it related solely to the year 1938. I am not acquainted with the revenues of Super Power Company for 1937. You have handed me a report on Super Power Company of Illinois, filed with the Illinois Commerce Commission for the year 1937, which shows at page E-9, total revenues to be $6,654,669.22. The revenues from the Commonwealth Edison Company for the same year were approximately $2,000,000.

Cross-Examination by Mr. Morgan Resumed.

You call attention to my statement shown at page 7924 of the record in which I stated: "I think it would be helpful to summarize it, to summarize my testimony, and in doing that it may be said that the period since 1929 has been attended by severe economic depression, and that this period has been characterized by declines in interest rates." You ask that if in the light of all that has been developed concerning the charts and schedules contained in Exhibit No. 185, it would not have been more accurate had I said that it was characterized by declines in interest rates on government securities, short term bank loans, short term Federal Reserve rediscounts, and refunding operations in the matter of bonded indebtedness, particularly with reference to the highest rated bonds. I would not say that sort of summary would be entirely accurate for the reason that the statement

applies equally well to yields on outstanding bonds of domestic corporations, including the three types,
1611 public utilities, industrials, and railroads, as indicated in Chart No. 5. Mr. Slaff has referred to the circumstance that in the same answer, on Page 7924 I stated that the period has been characterized by declines in interest rates and return on money to about the lowest levels witnessed in this country since 1900. You ask if I meant that bond interest rates and the return on money had reached these low levels or whether I would separate the two parts of the answer. I would not attempt to make any separation there. You asked if interest rates for all classes of bonds had declined to the lowest levels since 1900. If you are talking about C bonds as rated by Moody, I have not made a study of that class of securities, but my statement was based on my exhibits that I set forth here and as indicated in the exhibits, the basis was a company having some degree of soundness and credit, and all those things which go to make up a company that deserves a rating from Baa to Aaa. I think it is quite evident what I am talking about.

You ask whether, when I applied the observation I have just made, that the decline in interest rates has descended to the lowest levels witnessed in this country since 1900, whether I include in that statement anything but the highest class of bonds. I can only say this in answer to that: If an examination of Chart No. 1 is made, it will be found that where there is a decline in Aaa it is usually accompanied by a decline in Aa, A, and Baa.

You ask whether the A's and the Baa's have not been lower in the past than they are at the present time. I think the language here is quite plain, that I have been talking about a period of time, a period since 1929, and I have been trying to summarize what I could as briefly as possible about what happened during that period.

Questions Interposed by the Examiner.

You ask whether in that period, the decline I am talking about there brought interest rates down to the lowest level since 1900. I qualified that to "about", if it makes any difference. You ask whether or not whatever the low point is after 1929, it is lower than it has been since 1900. That would be the sense of my statement.

Cross-Examination by Mr. Morgan Resumed.

I have already stated that I was talking about a period and not about particular years like 1932 or 1933 or even 1931. You asked when it reached the lowest level in the case of the very highest grades of bonds. That lowest level, I think, could fairly be said to have been reached in the middle of 1939 for bonds of Aaa, Aa, and A. For bonds of Baa, the lowest level reached in 1939 was about 4.80 as compared with the low level of 4.50 reached in 1936, which was the lowest point up to that time since the period of 1920 on. In 1938, Baa bonds reached a point 6.50 or thereabouts. I think a fair statement would be that in the middle of 1939, they all reached approximately the same point together, despite the fact that Baa bonds seemed to be slightly higher in 1939 than they were in 1936.

You ask if the yields on A bonds were not also higher in 1939 than in 1936. If you are talking about a difference of 3/100ths of one point, all right, I would be willing to grant the statement that the A bonds were higher in 1939 than in 1936. There is not any question that the equity money and the return on equity money is not reflected in these curves. You ask if that is true of every chart and every schedule that I have in my exhibit. I have already stated that Exhibit No. 186 contains some data on equity
money. You ask whether I was talking about bond
1612 investments and not equity investments when I
stated that the returns on money had reached the lowest levels witnessed in this country since 1900. I think I will say in all fairness that I was using the terms synonymously.

You are generally correct in stating that the costly part of the capital is the part that is represented by equity securities or common stock. That is true today and it has been true for many years. When I made the statement: "During the period since 1929 earnings of public utilities have shown a greater degree of stability than those of industrial and railroad corporations, which is an indication that public utilities in general are less subject to risks confronting other forms of business enterprise," I was talking about utilities in general. You ask what risks my Charts Nos. 12, 13, and 14 show that public utilities in general are less subject to than other business enterprises. Well, any company that can show a fairly stable level of earnings over a period of years, I believe, would be classified as a company which was not subject to as much risk as companies which did have those wild fluctuations in earnings. No, I am not speaking of the risks of fluctuating returns at all. I am speaking of a condition which produces stable earnings and the risk inherent in these conditions. The income of the past does not always necessarily reflect the risks that confront a particular enterprise in the future; but a lot of us depend a great deal upon past experience and past records.

You ask if we must not look further than these curves in order to determine whether a particular regulated industry is freer from risks than other businesses. I would say if it were possible to do so, I would have compiled statistics about future conditions, but they do not exist and I have just given you everything I could which would make it possible to draw some conclusions based upon experience. It is conceivable that the present would disclose facts which present risks that are not reflected in past earnings; and I think that these charts indicate that as well.

Questions Interposed by the Trial Examiner.

I have a list of the 21 leading utility companies that appear on my Chart No. 13.

(At the direction of the Trial Examiner, the list was incorporated into the record as follows:

21 Leading Utility Corporations.

American Water Works & Electric Co., Inc.
North American Co., The
Pacific Lighting Corp.
Public Service Corp. of New Jersey.
Standard Gas & Electric Co.
United Gas Improvement Co., The
United Light & Power Co., The
Boston Edison Co.
Brooklyn Union Gas Co., The
Commonwealth Edison Co.
Consolidated Edison Co. of New York, Inc.
Consolidated Gas Electric Light & Power Co. of
  Baltimore.
Detroit Edison Co., The

Pacific Gas & Electric Co.
Peoples Gas & Electric Co.
1613 Peoples Gas Light & Coke Co., The
Southern California Edison Co., Ltd.
International Telephone & Telegraph Corp.
New England Telephone & Telegraph Co.
Pacific Telephone & Telegraph Co., The
Southern New England Telephone Co., The
Western Union Telegraph Co.

Redirect Examination by Mr. Slaff.

I remember that during the course of my cross-examination shown at page 8122, certain questions were put to me and answers made by me as just read by you. The effect of my answers was that since my testimony on direct I had made a study on yields on preferred stock and common stocks and that it might be desirable to present them as testimony; that such studies had not been prepared at the time I had testified before, that I had made studies which give recent indications of cost of common stock capital, so far as I could derive a cost for that kind of capital from market prices of outstanding stocks.

(At this point, counsel for the commission handed the reporter a document headed: "Yield at Market Prices of Electric Operating Utility Preferred Stock and Number of Times Dividend and Prior Requirements are Earned, Market Prices for Week Ended November 17, 1939, Income for Latest Twelve Months," with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit 197.)

Exhibit No. 197 is one of the studies that I referred to at page 8122. This study is a compilation of yields at market prices of electric operating utility preferred stock and number of times dividend and prior requirements are earned, based on market prices for week ended November 17, 1939, and times requirement earned, based on income for the latest twelve months.

This list contains 21 electric operating utility preferred stocks and includes all of such preferred stocks listed in Schedule 19 of "The Problem of the Rate of Return in Public Utility Regulation," published by the Federal Communications Commission June 15, 1938, for which preferred dividends and prior requirements were earned in excess of one and one-half times in 1938. This exhibit shows that the yields at current market prices for these preferred stocks can be classified in this manner:

For one issue, 4 per cent;
For three issues, between 4.01 and 4.07 per cent;
For four issues, between 4.25 per cent and 4.5 per cent;
For five issues, between 4.5 and 5 per cent;
For three issues, between 5 and 5.5 per cent;
For four issues, between 5.5 and 6 per cent;
For one issue, 6.09 per cent.

(EXHIBIT NO. 197 was offered and received in evidence without objection.

At this point, counsel for the commission handed the reporter a document entitled: "Earnings—Price Ratios of Electric Operating Utility Common Stocks and Per Cent of Gross Income Available for Common Stocks, Market Prices for Week Ended November 17, 1939, Annual Income Per Latest Quarterly Reports," with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit No. 198.)

I have before me Exhibit No. 198 which was prepared
under my direction. This exhibit represents a com-
1614 pilation of earnings—price ratios of electric operating
utility common stocks and per cent of gross income available for common stock—I would like to have that "s" in the word "common stocks" on the second line of the caption deleted—based on market prices for week ended November 17, 1939, and annual income from latest quarterly reports.

This list contains the common stocks of 14 electric operating utilities and the earnings-price ratios may be classified or grouped in this manner:

One issue at 4.5 per cent;
One at 4.98 per cent;
Three between 5.83 and 6 per cent;
One at 6.32 per cent;
Two between 6.7 and 6.8 per cent;
One at 7.06;
Three between 7.65 and 7.8;
One at 8.53;
One at 9.11.

And I might add that this list of common stocks includes all electric operating utility common stocks listed in Schedule 26, the schedule showing 1937 earnings, March, 1938, prices, in the publication entitled "The Problem of the Rate of Return in Public Utility Regulation," published by the Federal Communications Commission, June 15, 1938, and I might add that only stocks were included for which at least 5 per cent of the outstanding issue was held by the public.

(EXHIBIT NO. 198 was offered and received in evidence without objection.)

You have handed me a document entitled: "Schedule of Securities, Massachusetts Mutual Life Insurance Company," dated December 31, 1938, and asked me to refer specifically to pages 9, 10, 11, 13, and 14 of that document. That is the same type of document that Judge Morgan had with respect to the Equitable. It purports to contain a list of bonds and securities held by the Massachusetts Mutual Company. The caption for the securities or bonds listed at the pages I have mentioned "Power, Light, Gas, Water, Traction, Telephone, and Telegraph Bonds, includes within the caption bonds of the following companies:

Arkansas-Louisiana Gas Company,
Cities Service Gas Company,
El Paso Natural Gas Company,
Lone Star Gas Company,
Oklahoma Natural Gas Company,
Panhandle Eastern Pipeline,
Southern California Gas Company,
Southern Counties Gas Company of California, and
Southern Natural Gas Company.

Included among those companies are so-called pipeline companies. You ask whether those various companies are described in detail in Mr. Smith's direct testimony, and whether they are included in the gas companies which he described in detail. I find one exception, Mr. Slaff, and that is the Lone Star Gas Corporation, which is listed on page 11, but by referring to Schedule No. 5 of Exhibit 186, page 3, I find the company represented or known as Lone Star Gas Company. It probably is a different company. With that exception I find them all represented.

1615 *Cross-Examination Interposed by Mr. Morgan.*

I would hesitate to say that all those companies listed in the pamphlet you have there own some distribution.

Question Interposed by Mr. Booth.

I would not be qualified to state whether the Panhandle Eastern Pipeline Company owns any distribution facilities. I haven't made sufficient study and I don't have the facts in mind.

Redirect Examination Resumed by Mr. Slaff.

I cannot say, but I don't believe Mississippi River Fuel Corporation owns any distribution.

You hand me a booklet entitled "96th Annual Report of the Mutual Life Insurance Company of New York," and direct my attention particularly to pages 30, 31, 32, and 34, and ask whether or not there is a list in that booklet of public utility bonds held by that investor. Yes, this list purports to be a list of bonds owned by the Mutual Life Insurance Company. There is a separate section devoted exclusively to public utility bonds, beginning at page 29. Included in that section are the bonds of the Mississippi River Fuel Corporation, El Paso Natural Gas Company, Lone Star Gas Corporation, Northern Natural Gas, Ohio Fuel Gas, Panhandle Eastern, and United Fuel Gas Company. It would be my assumption that that investor regards those bonds as public utility bonds.

You hand me a booklet entitled "The Travelers Year Book 1939, 75th Anniversary". It appears to be a similar booklet to the one to which I have just referred and is for Travelers Insurance Company, Travelers Indemnity Company, and Travelers Fire Insurance Company. It contains a list of bonds held by several of the companies that you mention and also including the Travelers Insurance Company. It has a separate section devoted to public utility bonds beginning on page 37 and on page 38. This list is for Travelers Insurance Company. Within that separate category of public utility bonds, this investor includes bonds of the Lone Star Gas Corp., Northern Natural Gas Company, Oklahoma Natural Gas Company, Panhandle Eastern Pipeline Company, and Southern Natural Gas Company.

You have handed me another document which appears to be the 1939 Year Book of the Aetna Life Insurance Company. This booklet also contains a list of bonds held by that company. On page 11 appears a caption "The President's Annual Report." It contains a statement beginning at page 9 of bonds and stocks of the Aetna Life Insurance Company. There is a separate section on pages 35 and 36 devoted to public utility bonds. The caption is "Public Utility Bonds". Included in that section is listed the bonds of Panhandle Eastern Pipeline Company and Southern Natural Gas Company.

You have handed me a booklet entitled "The 72nd Annual Business Statement, 1938, Metropolitan Life Insurance Company, Containing a List of the Bonds and Stocks Owned by the Company December 31, 1938." At page 4 appears to be the balance sheet of Metropolitan Life Insurance Company as at December 31, 1938 and public utility bonds are included on the asset side of the balance sheet at $589,927,007.34. I would say it is a sizeable investor in public utility bonds. It has a separate listing of public utility bonds on pages 47 to 53 inclusive under the caption "public utilities". Under that caption, they list the bonds of the Mississippi River Fuel Corporation, Cities Service
1616 Gas Company, El Paso Natural Gas Company, Northern Natural Gas Company, Ohio Fuel and Gas Company, Panhandle Eastern Pipeline Company, United Fuel Gas Company, and Southern Natural Gas Company. My interpretation of this would be that investor regards those as bonds of public utility corporations.

Question Interposed by the Examiner.

I have not taken time to examine whether or not the investments in the bonds of the companies I have named specifically are in each case sizeable.

Redirect Examination Resumed by Mr. Slaff.

In the case of the Metropolitan, the following figures appear:

For Cities Service Gas Company, First Mortgage Pipeline, 3¾ per cent, the admitted asset value is the amount shown, $10,000,000; El Paso Natural Gas Company, First Mortgage Bonds, $1,988,000; Mississippi River Fuel Corporation, First Mortgage Pipeline bonds, $3,374,000; Northern Natural Gas Company, First Mortgage and First Lien Series A, $4,692,000, and for the same company, the same bonds, Series B, $614,000; Ohio Fuel Gas Company, identified as Notes, $4,289,691.26; and Panhandle Eastern Pipeline Company First Mortgage and First Lien Series A, $4,298,439.20; Southern Natural Gas Company First Mortgage Pipeline due in 1953, $3,000,000, due in 1952, $602,976.53; United Fuel Gas Company, identified as Notes, $4,289,691.26.

In the case of both of those note issues a note is appended stating they are guaranteed by Columbia Gas and Electric Corporation.

I was requested while I was on the stand in my direct testimony to bring various figures up to date. In the course of my cross-examination I have done so with respect to every instance where I was requested to do so. There is one set of averages that was going to be worked out which I have not put in. One item I might mention is the names of the twenty-one leading utilities which has already been furnished to the reporter.

With respect to Chart 13, I was requested to compute certain averages which I have done.

You ask if I could get an average for the period 1930 to 1938 for the different types of companies listed. The information on which these averages are based is contained in schedule 17, pages 1 and 2.

You requested information concerning the average percentage of net profit to total invested capital for the period of 1930 through 1938. Those figures are as follows:

For 400 leading industrial corporations, 5.34 per cent; for 21 leading utility corporations, 5.60 per cent; and for 42 leading railroad corporations, 3.15 per cent.

Cross-Examination by Mr. Morgan.

There were five or six pipeline companies in those portfolio lists to which I referred a little while ago. You ask whether or not a great many of them are holding companies that own distribution facilities and whether many of them directly own distribution facilities. As I have already stated, I would rather not answer those questions. I 1617 have compared the name appearing in the list of bonds in these pamphlets with the lists of companies shown in Schedule 5, pages 1 to 6 inclusive, of Exhibit 186, and on that basis made my statement. I understand that list in Exhibit No. 186 does not exclude distribution companies, but is confined to companies which own pipeline facilities or production, although they may own also distribution facilities.

You ask whether, without knowing any more about those gas companies whose bonds are listed in those portfolio lists, as to their distribution facility holdings, and their other characteristics than I have stated here, I would be willing to say that they and the telephone company whose bonds are listed here, and the telegraph company whose bonds are listed, constitute a homogeneous class of concerns. My answer is that insofar as they are all classed as public utilities, I would say that they were. You ask whether public utilities and homogeneous class of concerns to me mean one and the same thing. When you group things under classifications the line of distinction has to be drawn in order to make your grouping; and certain bases of homogeneity have to be assumed or determined upon in order to make the selection. Now, in the sense that all of the companies can be included under one group or another, they are homogeneous to the companies which are in the group in which they are included.

I am speaking generally and do not necessarily agree with your suggestion that if they are put under the same caption and called public utilities, they belong to a homogeneous class in the sense that that term is used in the Federal Communications Commission study that we considered.

(At this point, counsel for the defendants called the Examiner's attention to the fact that a small tract of land containing 23/100ths acre had been omitted from Exhibit 143 and that they had secured another affidavit including that piece of land. The affidavit was handed to the reporter with the request that it be marked for identification. The affidavit was described as one by Sibley Jines, dated November 17, 1939, covering a tract of 23/100ths of an acre in Beaver County, Oklahoma. The same affiant had made a previous affidavit. At the direction of the Examiner, the document was marked Exhibit 199. EXHIBIT 199 was offered in evidence, and was received over the objection of counsel for complainant and counsel for the commission, who were allowed an exception.)

1618 **CHARLES W. SMITH**, a witness for the Federal Power Commission called for cross-examination, testified:

(November 30, 1939.)

Cross-Examination by Mr. Morgan.

My title with the Federal Power Commission is Chief of the Bureau of Accounts, Finance and Rates. I was assigned to that position on July 1, 1936, but I had been retained by the Commission as a consulting accountant prior to that time. The division of rates was transferred to my jurisdiction about February, 1938.

The duties of my position are many and varied. First of all, I have charge of all accounting matters which come before the Commission, the duty of preparing systems of accounting, handling report forms, making accounting investigations in all sorts of cases.

Secondly, as to the Division of Finance, I make a study of all security issues which come to the Commission for approval, all mergers and consolidations, and all financial matters which come to the Commission generally, including rate of return matters such as we now have here.

As to the Division of Rates, the Division of Rates receives all the rate contracts, the rate schedules filed by public utilities as defined by the Public Utility Act and natural gas companies as defined by the Natural Gas Act; making studies of those schedules, making a full investigation in rate cases; making reports on investigations and the staff gives testimony under my jurisdiction.

In addition, we have a statistical organization in the Bureau of Rates which compiles statistics, particularly rate statistics.

Among the things that will be filed with the Commission and handled by my department are the reports of the natural gas companies concerning the volume of sales and revenues. The Commission only recently adopted a report form for natural gas companies and they will be required to file a comprehensive financial report for the first time for the year 1939. However, in response to Orders 51 and 53 of the Commission, certain selected financial data were filed by many of the natural gas companies. I believe that included in that data is volume of gas sold under each contract and the amount received for that gas sold under each contract. Those come to my department.

Immediately before I came with the Federal Power Commission, I was with the Maryland Regulatory Body for seven years, from 1929 to 1936. My duties with that Commission were pretty much the same as they are today except the duties were confined to utilities operating in the State of Maryland and under the jurisdiction of the Public Service Commission of Maryland. Of course, the utility companies included telephone, water, motor vehicle carrier, street railways, and so forth, whereas the jurisdiction for the Federal Power Commission is, as you know, limited to electric and natural gas companies.

I stated that while with the Maryland Commission I testified on many occasions in rate cases.

1619 I testified as to accounting and financial investigations which were made under my supervision, very largely made by myself, and as to the rate of return, including also a good deal of testimony concerning economic conditions and economic facts.

I might mention that the testimony given on behalf of the Commission in regard to the use of index numbers in the famous C. & P. Telephone case, which went to the Supreme Court, were introduced by me. These were telephone cases, electric cases, gas distribution cases, traction cases, motor transportation cases, and all kinds of cases, including one company which distributed natural gas which it purchased from the affiliated company, necessitating a study going back to the source of supply. In none of those instances did I recommend a reduction in the rate of return. I never gave an opinion as to the rate of return. I gave testimony as to the facts. It is my understanding it is the Commission's job to weigh the facts and make the determination.

In formal proceedings I have never recommended or expressed my judgment under oath as to what the proper rate of return might be. Of course, in the State Commissions you have a good deal of informal cases, a great many informal proceedings, and there I was frequently called upon to express an opinion as to rate of return. That was in connection with negotiated rates. I have never testified under oath as to my judgment what a rate of return in a particular case ought to be. I feel that is not my province. No, sir, the facts I have prepared in each case have not generally been in the direction of reducing rates. The facts I have prepared have always been facts.

I can't say if any rate reduction was ever made solely on the basis of testimony given by me. I can state I was in a number of cases where rate reductions were made. I testified in the C. & P. Telephone case, the Potomac Edison case and the Conowingo Power case. In those cases and in others rate reductions were made. Just how much my testimony had to do with the ultimate result I am unable to say. It is not true that in the testimony I have given in connection with those studies I have testified and approached the subject from the viewpoint of those opposed to the contentions of the regulated company.

I approach all these cases with the desire of getting the facts; and any fact which I think will enable the Commission to make a fair and adequate decision I would give, I don't care whether in favor of the company or in favor of the public. I never withheld any information from the Commission which I thought the Commission should use in making a determination. I will state this, however, while I was with the Maryland Commission particularly I had a small staff. I was investigating large public utilities with many times the force I had. I didn't go out of my way hunting for things in favor of the utility. Anything I came across in the ordinary course of investigation I brought it out. I considered my duty primarily to be to the public and to be sure the public's side was presented properly.

The side I represented was an impartial side. I didn't spend a lot of time hunting up things which may be in the company's favor, although I had many times found items in the company's favor and so related them. 1620 I would like to refer you to the Potomac Edison case where I disallowed very large sums from the cost of the electric plant, and I restored because of mistakes the company had made almost as much as I disallowed. That is the only way I can work as a professional accountant.

You ask if my work has been primarily from the viewpoint of an accountant. It is much more than that. I have been for twenty years preparing for this work involving the administrative process, accounting, economics and law. Specializing in that field for twenty years, I have studied subjects throughout that time which I hoped would train me for a competent administration in the field of administrative law. I have taken many courses in economics, and am a member of the American Economic Association, and I have constantly studied economics.

I feel the same degree of responsibility to both sides in preparing my case for the Commission. When it comes to a rate of return I have given impartial statements. In many cases I have had to do a great deal of research work. I will refer you to the question of labor rates which you spoke of yesterday. I probably have made the only thorough labor wage rate investigation in the City of Baltimore by going to the payrolls of contractors and taking off the amounts paid. That was given to the Commission impartially. It was presented to the Commission as a fact. My duty is to gather facts and give them to my employers. My primary responsibility has been to protect the public interests. I have never been in a case dealing with a large utility where the utility was not adequately represented. I have never testified for a company.

I have never initiated an issue of securities. I have had many consultations with public utility officers regarding security issues, plans and methods of financing. There have been occasions when I inquired how companies have been financed, wanting to know that, and I think I have been instrumental in helping companies to refinance by drawing their attention to certain market conditions and by raising the question. As far as security issues are concerned I have had a great deal of experience in making a study of security issues, the proper rates at which they should be issued and questions involving when securities should be issued.

I was discussing coupon rate, mortgages, mortgage provisions, exculpatory clauses, the whole field.

The regulatory body can not control the investor's attitude whatsoever. However, all the Commission would have to do is frown upon a security issue and that security issue would be absolutely killed. You know that it is a very serious matter, the approving of a security issue. Very frequently in my work we have had to discuss matters with the officers of companies to get them to make changes which we recommended in order not to have any issue at a proceeding, because it might do some damage to the issue itself.

I remember not long ago a well-known attorney, I can give you the name if you wish it, was in my office. I urged him to make some corrections about certain clauses in the indenture. He didn't want to do it, but he went to the bankers in New York and came back and said, "The bankers insisted on the very thing you have mentioned. Thanks to you we were prepared for it."

1621 In these days while it is true if the regulatory body frowns upon an issue of securities it will kill it, the fact they smile on it, to use the opposite figure, doesn't mean the company is going to pay the stated rate of interest when it offers the security for sale. You did find it quite frequently in the so-called golden-glow days in the '20's.

I would like to explain my last answer. It is very clear you don't understand what I had in mind. Back in the '20's it was the favored practice of utilities to advertise widely the fact a security issue was approved by a public service commission. When I was with the Maryland Commission we tried our best to stop that practice because we felt it was misleading. We approved some securities which were not Aaa, and we were afraid the advertising of the approval of the Public Service Commission, the "widespread advertising", would be misleading.

I have said that my dealings with the issues have been from the standpoint of a member of a staff of a regulatory body with a sense of responsibility primarily to the public, but I have also studied it from the standpoint of the man who has to have the money or who wants the money. My approach has been from both angles. After all, a person in my position has a responsibility to see that the company is soundly financed. That is the reason I think commissions are charged with the duty of regulating security issues, in order to do everything it can to help the company get the money and get it as cheaply as it can. I don't see any difference between the two viewpoints whatsoever.

I have never been employed by any private interest when my services and my talents might be utilized in developing and marketing an issue of securities. I have been consulted many times in that respect. I have done quite a bit of work on the side while with the Maryland Commission as a consulting accountant, consultant to financial houses, one financial house at least, and on tax matters, and I have written opinions on reorganization for one stock brokerage firm. I have been consulted about those matters. I have never been in the employ of any company for that special purpose only, for the sale of securities. I don't believe I said anything about that phase of my activities in my direct testimony.

You asked whether I was employed as a consultant on a compensation basis and asked something about a security that was pending before the Commission on whose staff I was serving. I have not been so employed upon a matter pending before a Commission; but before a Court, I received as much as $500 for one opinion on a reorganization matter which did not involve a public utility. The opinion concerned a plan of reorganization from the viewpoint of taxation. The case was in the court and it was a proceeding involving the reorganization, and I was retained to study certain phases in connection with it. It had to do with the entire method of reorganizing the company, because the method of reorganizing the company involved a big tax question, and the plan of reorganization of the company, the method of security issues, and so forth, was changed as the result of my opinion. The tax liability question frequently is one of the most major questions in proceedings of that sort.

Exhibit 186 was prepared under my immediate direction. I selected the character of the material. I suggested where and how it might be assembled, but I gave those under me considerable leeway as to where they could
1622 get the information, because the information is pretty hard to get at this time.

Schedule 1 of that exhibit is styled, "Natural Gas Industry in the United States. National Revenues from Sales to Consumers, Gas Sales to Consumers, and Number of Gas Customers." That has to do with the transactions of natural gas distribution companies. The figures representing the revenues of natural gas pipeline companies from gate rate sales are not reflected here. It is my understanding that the figures for natural gas sold to companies who mix it with artificial gas before it is sold are not shown. I would not like to state that this exhibit does not represent very much of the gas that is marketed by defendants.

In general, I am familiar with the record in this case. Of course, there is a great deal in this record that I am not familiar with. I have had a staff of auditors looking into the record of this company for a good many months now.

I believe you are right in that 90 percent of all of the gas transported by defendants is sold to the Chicago District Pipeline Company, and that in turn is handled by the Peoples Gas Light and Coke Company, Public Service Company of Northern Illinois, and the Western United Gas and Electric Company.

You ask whether it is true that all of these companies sell mixed gas. The reason I hesitated in giving an answer to your question,—if you take gas sales to consumers in M. C. F.'s for the year 1938 you will find it is 1,200,607,000 M. C. F.'s. Now, if you will turn to Schedule 3 you will find that the total natural gas consumption, according to certain governmental statistics which we were able to obtain, was 1,410,636,000 M. C. F.'s in 1937. I think by considering both schedules you can get a pretty good picture of the situation. One by itself, as I think you have indicated, would be inadequate. As far as the two defendant companies are concerned, the consumer data are not shown on Schedule No. 1. The source of the figure I gave for 1937 and 1938 is given in the schedule, "Monthly Summary of Gas Company Statistics, Annual Supplement," issued by the American Gas Association in March, 1939. I think probably that was a preliminary set of figures. Since my exhibit was prepared, I think the final figures became available. That is the reason that the final figures are not in that exhibit.

I don't believe I have checked the final figures as reflected in the October statistical bulletin, No. 37, which in this record is Exhibit 179, to see whether or not they check with my figures shown in Schedule 1. Checking the figures of my Schedule No. 1, under the caption "Revenues from sales to consumers", in the first column of figures for 1937 and 1938 with the final figures shown in Exhibit 179, the total revenues for 1937 were $443,219,000, whereas the total revenues for that year shown by Exhibit 179 amount to $443,408,000. For 1938, the figure shown in Schedule No. 1 was $419,474,000, whereas that shown in Exhibit 179 was $416,580,000. The difference in the 1938 figures is approximately three million dollars. I think you should use Exhibit No. 179 for the years 1937 and 1938 instead of the figures in Schedule 1 wherever there is a conflict.

1623 In Schedule 1 the gas sales to consumers in M. C. F.'s is shown as 1,316,140,000, whereas the pertinent figure taken from Exhibit 179 for the year 1937 is 1,314,907,000 M. C. F. For the year 1938, Schedule 1 shows

1,200,607,000 M. C. F., whereas Exhibit 179 shows 1,213,352,000 M. C. F.

In order to conform this schedule to the revised or final figures it would be necessary to change those figures and the figures in the succeeding four columns.

For the year 1937 the average number of customers shown by Schedule 1 was 6,859,300, compared to 7,066,000 shown in Exhibit 179. Those figures in Exhibit 179 show the number of gas customers at the end of the year. My figures show the average number of customers during the year. For the year 1938, Schedule 1 shows 7,033,700 customers, whereas Exhibit 179 shows 7,231,000 customers at the end of the year 1938.

To the extent that there are any changes, in order to be in conformity with the final figures it would be necessary also to recalculate the figures represented in the last five columns of figures in each of the three sections of that page for the years 1937 and 1938. I am not sure of the changes in the number of customers because my figures are average number of customers during the year figures while those in Exhibit No. 179 shows gas customers at the end of the year. The average shown here was taken from the bulletin mentioned at the bottom of the page.

There was an increase in the revenue of distributors selling natural gas between 1929 and 1938. I believe the percent of increase would be 11.3. Going to the column immediately below that, the percent increase of the total gas sales in terms of volume between the years 1929 and 1938 would be 22 percent. The average number of customers shown in the next column increased between the same years by 23 percent. It appears to be true that the first column of figures under the caption, "Revenue," when compared with the figures for the other two sections, the one dealing with gas sales and the other with the average number of customers, indicates that in order to get 11 percent increase in revenues these distributing companies have had to handle an increased volume of gas to the extent of 22 percent; and they have had to handle it for an increased number of customers by 23 percent.

You asked if they had to build a line and make an installation in the home or the place of consumption of every one of those increased number of customers. I don't know how much increase in fixed capital they would have to be making. You can build some lines into an apartment house and to a good many customers, and that is pretty much the custom these days, so I would like to have the exact figures. I do not like to deal in generalities when the exact figures can be had. It is bound to involve some increased cost. I don't think it would require the increased capital cost you imply, because I do have the specific figure on Schedule 2, it being $2,317,000,000, in round figures, in 1934, and $2,400,000,000 in 1937. Now take the number of customers during those years and you will find a substantial increase.

It is true we are comparing the number of customers in 1938 with those in 1929, but you asked me a question which involved a question of judgment as to whether or not there would be an increase in capital, and my answer is that I don't know to what extent there would be a corresponding increase in capital. Offhand, I think there would be some, but how much it would be, I don't know, because that would be a line of inquiry different from what I have shown here.

I think that it would involve an additional amount of 1624 capital cost and an additional operating cost. I don't think there is any doubt about it. Increased volume would be most costly, other things being equal. They would have to buy 22 percent more gas, that is true. The figures here dealt with gross revenue.

On the right hand part of the page, without stopping to adjust those final figures there in 1938 to the final figures in Exhibit 179, it appears that the trend of the average annual revenue per M. C. F. has been downward, so far as the total is concerned. It has been upward for domestic and downward for all other class of sales.

In the electric business, the consumption per customer has increased. The average annual revenue per kilowatt has decreased, of course. The average annual gas sales have decreased slightly from 1929. There has been considerable fluctuation in the interim. In 1938, it was 170.7 as against 173.7 in 1929. The year 1938 was generally an off year for gas utilities; not only for gas utilities, but for businesses generally. It was considerably under 1937.

The next column to the right, captioned, "Average Annual Gas Sales Per Customer" for domestic gas, shows a decrease from 62.5 in 1929 to 53.6 in 1938. Domestic is the highest priced gas. That is universally true.

The average revenue per customer has decreased from $65.97 in 1929 to $59.64 in 1938. Of course, the figure for 1937 was higher and I am not sure that 1938 is a proper figure to use for the purposes of this comparison. I believe the 1939 figure will be more in line with the 1937. The domestic was $41.65 for 1929 and $37.52 in 1938, about 11 percent higher in 1929 than in 1938. The average domestic consumer in the United States was paying about $3 a month for his gas in 1938. I don't know whether the average revenue per customer in the electric industry, electric utility and distribution business, has fallen off or increased as between those two years. The figures are available. They are published, I think, by the Edison Electric Institute.

You asked whether or not they have increased or decreased on the basis of revenue per customer. We have two factors. We have clearly an increase in the kilowatt hour sales, and we have a decrease in rates. I don't know what the net effect is. I would guess that the effect is an increased total bill; but it is an easy matter to verify. If anyone has a bulletin of the Edison Electric Institute they can get the exact figures and clear up the matter at once. I didn't think you were going along that line of inquiry or I certainly would have had it with me.

You asked whether I think that the trends reflected by my Schedule 1, whereby the volume of gas sold, which in turn must also be bought, and the number of customers served, has increased by more than twice the ratio of the increase in the gross revenues, is a healthy trend over that period of 1929 to 1938. Part of it is healthy and part of it is not. The increased number of customers is a pretty good sign. The street railways would like to have an increased number in customers, for instance. The falling off in the consumption per customer, of course, is an unhealthy sign. Yes, generally speaking, the street railway gets just as much from one customer as it does from another. The revenue per customer does not vary a great deal to offset the increase in the number of customers.
1625 Although an increased number of customers coming at the time of the peak is a pretty expensive thing for the street railway industry. That is because of the additional equipment it must have. An increase in the number of customers, if it were in the off-hours, would be more than welcomed by the street railways. At other times, an increase in the peak load would be expensive.

You asked what else I can see that looks healthy, except the increase in the number of customers that have to be connected up and served in order to get this 11 percent increase in revenue. The exhibit shows that the business is not a moribund business. Revenues are not going off. The revenues are actually increasing. That is a pretty healthy sign. That is a good sign. It has not increased proportionately. I don't think you ought to expect it to increase proportionately, for an industry as old as the gas distribution industry, an industry which, I believe, started in 1816. In other words, you would not expect the same rapid growth after 100 years' experience or so as you would for the electric industry, which is a new industry. I dare say 100 years from now, or 50 years from now, that the growth in consumption of kilowatt hours will likewise fall off on a percentage basis.

You asked if the natural gas industry is rather new to a lot of people right now. The natural gas industry and the pipeline industry are quite new, and I think it is a little different from what we have here. It is true that these natural gas pipelines have taken gas for the first time to hundreds and hundreds of cities, and I think it is on the increase. I think it will be patterned somewhat after the experience of electric utilities.

You asked what has been the trend in the manufactured gas industry as to domestic consumption and revenue per customer from the distribution of artificial gas or manufactured gas. I don't know. I know that it has been put in evidence in this case, but I can't recall the figures offhand. It is my understanding, as a matter of common knowledge, that they have fallen off. When I mentioned the fact that the gas business was about 100 years old, I was talking about the gas distribution business. The present users of natural gas have not been using natural gas for 100 years. You cannot apply that 100-year observation to the natural gas business in many hundreds of towns in the United States. That is exactly the point I wanted to make. The point is that the natural gas pipeline industry is a relatively new industry. I am afraid if you apply standards derived from the manufactured gas industry, which is 100 years old, that you will be misled.

It is true that Schedule 1, which has to do with this new industry, this natural gas industry, also shows that since 1929, a perceptible falling off per customer has been experienced in commercial consumption and in commercial revenue; but they also show an increase of total revenue, which is a very important figure. I don't know by how many the distribution companies have increased in order to reflect that increase in revenue from 376 to 419 million dollars; but I imagine the distribution companies have increased substantially as far as natural gas distribution is concerned, and I think many hundreds of towns have been added to the picture.

1626 Turning to the page of Schedule 2 in my Exhibit 186, the reason I did not include the year 1938 in that schedule was that those figures have been published since the exhibit was prepared. They ought to be considered. The figure showing net income available for dividends and surplus for 1938, according to Exhibit 179, is $62,399,000. The fixed capital for that year was $2,441,840,000. There is a falling off then of more than $12,000,000 in net revenue available for dividends, with an increase in the fixed capital figure of $27,000,000. By fixed capital I mean investment in plant. It has nothing to do with the sum total of the securities issued or with the surplus. It relates to investment in distribution properties and lines, pipes, compressor stations, and so forth, per books.

You asked whether or not that would be the original cost or the adjusted value originally charged to plant account and less reserves set up. As an accountant, I cannot answer that question, because when you mix original cost and adjusted value it covers anything in the universe. It covers a lot of book figures.

Redirect Examination Interposed by Mr. Slaff.

It would save the Federal Power Commission and me a lot of headache if they would do away with original cost and adjusted value.

Cross-Examination by Mr. Morgan Resumed.

The figure includes the original cost as reflected per books, with no reduction for depreciation. It is the gross figures of the plant account. I am referring to the figures from 1934 to 1937.

Redirect Examination Interposed by Mr. Slaff.

Since the figures for 1938 should be taken into consideration, the figures for 1939 should also be considered. Of course, you should consider the most recent information available.

Cross-Examination by Mr. Morgan Resumed.

We can't go back and compare fixed capital in 1938 with fixed capital in 1929, as we did the data dealt with in Schedule 1. We do not have the information. At least, I do not have it, and I could not find it. It is my impression that there is no available information.

From 1931 to 1937 the operating expenses have increased substantially; namely, from $284,000,000 in round figures to $335,000,000 in round figures. During that same period taxes have increased from $29,800,000 in round figures to $41,100,000 in round figures. That represents an increase of about one-third. Profits went up during that time, available for dividends and surplus, about 50 per cent. If you go back though, from 1938 to 1931, the increase for net available for dividends was a much smaller percentage, roughly about 25 per cent; while the taxes went up 33 per cent. The comparisons should be made with the most recently available figures.

You asked why the revenues for manufactured gas for the years 1929, 1937, and 1938 are in so much straighter lines as plotted here on Chart 1 than the revenues of the total gas industry or from natural gas. I believe it must be due to the larger amount of natural gas used for
1627 heating purposes. Artificial gas is confined more nearly to the kitchen. People will eat at all times of the year. There is a marked seasonal fluctuation, both in the revenues and in the volume consumed, of the natural gas. That is shown also in Chart 2.

In Chart No. 3 the broken line, which has been labelled "Industrial Activity" is the volumetric quantity. The quantities are stated in terms of products and not of dollars. I think that is true also of manufactured and natural gas sales. I feel sure that the person compiling this would not make such a grievous error as not to have them on the same basis. You can't compare dollars with volume. I took that chart from some American Gas Association publication. I noted there that the term "natural gas sales" was qualified to include domestic and commercial sales.

You asked whether I would expect the curve to run in the same direction if it were confined to gas sold for industrial uses. I have anticipated that question in reviewing these charts for the purpose of getting ready for cross-examination; and I am prepared to give you pretty generally the way the curve would look if it included industrial sales. It would be different if confined to industrial sales. If another curve were superimposed here which dealt with gas used for industrial fuel only, the course of that curve would be different. There is a wide variation in the volume of gas used for industrial purposes. The industrial index fluctuates more widely than the index of domestic and commercial sales; and reacts more directly to business conditions and to industrial production. It is termed a more sensitive index, to use a technical term.

1926 is the base year for this index. All three indices are chained together to 1926. You can tie these indices together for any one year. You can take 1910, 1905, or 1915, and they would be exactly in the same line when you tie them together. In other words, when you use a base year, you bring all that together. That is, you use that as a base year. Then they diverge from that point, either forward or backward. In 1926 I put them altogether but they did not stay together long. They began to diverge.

You asked what purpose I think this chart serves in this inquiry. It sheds a little light on the natural gas industry, particularly from an economic viewpoint. It shows that the natural gas industry is growing faster than the manufactured gas industry and has not been attended with the severe decline connected with industrial activity. I think it is a healthy sign, in other words. I don't know what accounts for the course of the curve. The curve shows there has been a growth in the volume. As to the underlying causes, I don't know whether I would be able to give them to you properly. If we were dealing with only the natural gas companies that were in business in 1926, and we were tracing the volume of the business of the particular companies who were in business in 1926, the curve would not take exactly the same course; but that would not be a proper curve. I don't think it would even if you were dealing with the companies which were in existence at that time. As far as the economic situation is concerned, it might be far from the truth. It is like taking one store and saying that is an index of department stores generally. It might not be so. You have got to include the entire industry to get a proper perspective.

You asked if going to the question of stability, we ought to be dealing with the particular companies that 1628 were in business in 1926, to see how stable they have remained. If you are dealing with particular companies, yes, but if you are dealing with the industry, no. The stability of the industry means in an economic sense whether the industry is expanding or whether it is moribund. As to the title, I would like to say that the title was not selected by me. It is copied from the publication of the Gas Association and it is a correct portrayal—whoever devised these graphs did a good job of showing, as far as the industry is concerned, a picture of its growth and development.

The chart itself shows that the conditions have not remained the same in the industrial field and in the manufactured gas field and in the natural gas field, over the period the chart covers. It shows that the volume of gas handled has changed. That is an important feature. I cannot go along with you in the idea of taking one business or company or two or three companies and tracing them. You will find as far as the electric business is concerned, that the electric business I look upon as a very healthy business generally. However, as far as some individual companies are concerned, the reverse is true.

You asked how much new capital has been put into industrial enterprises, not including the natural gas pipeline companies, from the year 1926 down to the present time. A great deal of capital was put into industrial enterprises between 1926 and 1929. Since that time there has been very little capital flowing to any business. The curve of industrial production since 1929, when the downward trend starts, is dealing with the production of capital as it existed in 1929. In the natural gas business, more capital has been put in. However, to continue the comparison, if you had put more capital into industrial activities, the picture would have been even worse than is shown here. The industry in general could not absorb any more capital. The gas business did absorb more capital, particularly the pipeline companies. If the other industries had put more capital into production facilities, they could have produced more, but they would not have, and the picture would have been far worse than it is. In other words, if the industries in general had expanded their plant, the picture would have been very bad, because expansion was one of the difficulties I think we faced in 1929, and further expansion would have been awful. You know what happened after 1929. Large amounts of plant were shut off, reorganizations took place in order to get fixed charges down, depreciation and things of that nature. Just the reverse of what you are indicating.

Questions Interposed by the Examiner.

That would not have affected the dotted curve, but if you relate this to capital, then the picture would have been much worse than shown here. There has been an expansion of industrial goods during the period.

Cross-Examination by Mr. Morgan Resumed.

I am not talking about return now. I am talking about industrial production related to capacity. The industrial curve reflects nothing as to its relation to the actual conditions. It does not indicate anything as to any particular branch of industry.

1629 You asked how many pipelines have been built in this coutnry since 1926. I would say most of the large lines. I don't know whether the New York State Natural was built since 1926. I don't have the dates that the lines were built. I know that a substantial volume of pipeline construction was taking place during that period, as shown particularly in the Federal Trade Commission reports, and that is the source of my information. I am not in position to name dates for any company, except perhaps the companies involved in this proceeding. I know there is such a company as the New York State Natural. I know we are investigating it at the present time. I have a staff of men on the job. That line, I will say, was built since 1926, generally speaking.

I don't know when the Mountain Fuel Supply Company's line was built. It is at Salt Lake City and has long transmission lines. It produces in Wyoming, Colorado, and Utah and has transmission lines going from Colorado, Wyoming, to Salt Lake City and Ogden, approximately 442 miles of 16-inch and 18-inch pipe transmission lines. I don't think that line was built prior to

1926, and, generally speaking, most of these lines were built since 1926. You find a chart here which was intended, or, rather, Schedule 3, shows the importance of the interstate movement of natural gas from 1926 to 1937. Generally speaking, I think that answers your question. I want to agree with you, but I can't give specific years or periods, because I don't know.

I don't know when the Montana-Dakota Utilities line was built.

I don't know when the Pacific Gas and Electric Company's transmission line was built.

I don't know when the Stan-Pac line in California was built. I don't know whether it was built since 1926 or not.

My answer is the same as to the Southern Fuel Supply Company's line.

I know the Montana Power Company acquired its line after 1926, but I don't know when it was built.

My answer is the same as to the Houston Gulf Gas Company's line.

The Canadian River Gas Company's line was built since 1926.

I don't know about the Lone Star Gas Company's line out of the Texas Panhandle, or the Northern Texas Utilities' line out of that field.

I don't know about the Arkansas Louisiana, but it built a large extension since 1926.

I don't know when the West Texas line from the Amarillo field down to Lubbock and other south plains cities of Texas, part of the Canadian River group, was built.

I wish I knew; I would be glad to answer if I did, but I can say that I know that there has been a large increase in pipelines since 1926. I am not able at this time to identify the lines.

1630 I don't know when the Colorado Gas and Fuel Company, from the Hugoton field, was built.

We have the rates filed of several hundred companies. I could not possibly carry them in my mind. That is one of the unfortunate circumstances of holding the hearings in Chicago. I could answer the question in a few minutes back in Washington, if I had my papers.

I don't know when the Kansas Pipeline and Gas Company built its two lines.

I know a good deal about the Interstate Pipeline Company, but I don't know the year of the construction of the line.

I don't know when the Memphis Natural was built, or the Consolidated.

I think the Michigan Transmission was built since 1926.

I don't know when the Cities Service line out of the Texas Panhandle was built. I believe the Northern Natural and the Southern Natural were built since 1926.

I am afraid to answer as to the Panhandle Eastern. I think it has been since 1926, but I cannot tie my reasoning down to any particular point. My recollection is that all of the pipelines out of the Panhandle have been built since 1926.

I don't know with reference to the El Paso Natural or the Mississippi Fuel.

Part of the Columbia Seaboard line over on the east coast was built since 1926, I know.

I think Colorado Interstate was built since 1926.

The pipelines just named represent a large proportion of the total pipeline outlets for natural gas in the whole country. And, of course, you should include the two companies involved in this proceeding. As to why they should be included, since only the gas sold [illegible] natural gas distributing companies west of Chicago would be included on the chart, they, nevertheless, should be included because we have just said that all the pipelines just named provide a large proportion of the total pipeline outlets for natural gas.

If you remove from the volume of gas represented by that curve, from the year 1926 down to date, that which represents gas distributed in towns to which those pipelines named above took natural gas for the first time since 1926, you would have an entirely different curve. Under such circumstances, I assume the curve would follow pretty much the same as the manufactured gas curve. It would be an assumption, because when you eliminate all this increase in business and take the same companies I think it would follow along the general line of manufactured gas more than anything else we have on this chart.

I am not familiar with the bulletin of the United States Department of Interior called "Natural Gas", by F. S. Lott and G. R. Hopkins, chapter preprint from Minerals Year Book 1939, review of 1938, with final statistics for 1937, issued by the Bureau of Mines. You have handed me a document which meets the description you have just recited. You have asked me to read the first two paragraphs on the first page of that bulletin.

1631 "The natural gas industry experienced a moderate shrinkage in demand in 1938 after four years of rapid recovery from the depression low of 1933. Total marketed production had increased 55 percent from 1,555,000,000,000 cubic feet in 1933 to 2,408,000,000,000 in 1937. However, because of generally adverse business conditions in 1938, marketed production is estimated to have declined to 2,263,000,000,000 cubic feet or 6 percent below 1937.

"Capital expenditures in the production and transportation branches of the industry were much lower than in 1937, as existing facilities were generally adequate for the requirements of current markets. Since the period 1928-1932, when many long distance gas lines were constructed, managements have emphasized expanding the volume to utilize excess capacity and improving load factors, but at profitable rates. There appear to have been two restraining influences in the last two or three years upon the extension of pipelines to new markets. One is the activity in many localities of groups sponsoring competing fuels. The other is the stagnation of capital markets for durable goods, which has almost eliminated public financing as a means of raising money for new gas enterprises."

You asked whether I know what is meant by the observation in the statement I have just read that one of the two restraining influences in the last two or three years upon the extension of pipelines to new markets is the activity in many localities of groups sponsoring competing fuels. The only thing I know is that since the Natural Gas Act was passed there are certain groups that are advocating the use of coal in contradistinction to natural gas for industrial purposes.

You asked whether I am familiar with the fact that there are groups who are in favor of legislation requiring the use of coal for industrial purposes as opposed to natural gas. I am not familiar with anything specific along those lines. I know the coal associations generally are trying to do their utmost to expand the use of coal. We have a Bituminous Coal Commission which is deeply concerned with the economics of the coal industry, and we have had some legislation on the subject already, as a matter of fact; but as to how far they are going and what their specific recommendations are, I don't know.

I don't know about the bill which you say is now pending in Congress concerning which hearings are now being conducted, based on a report by a conservation committee headed by Frederick A. Delano, which was filed with the President and by the President transmitted to Congress, and in pursuance of which a bill has been introduced to set up a commission to exercise drastic powers over the usel of fuels in this country. I don't know that the groups who are interested in this question are advocating an enforced raise in the price of industrial gas to take it out of competition with coal.

The petitions that I have read from the coal interests have been to the effect that the Federal Power Commission should not grant a certificate of convenience, should not permit a natural gas company to invade certain markets or certain areas where coal is now being used for industrial purposes. I don't know anything specific on the organized activity in the interest of raising the prices of natural gas used for industrial purposes, since the enactment of the Natural Gas Act.

1632 I believe the railroads are another group who are sympathetic with the same activities. They naturally would be, of course. The railroads transport a great deal of coal and they don't want to lose that business.

I am familiar, generally speaking, with Moody's Manuals. That is a work from which my staff and I have drawn freely in preparing the statistical data used in this case. You have just read a paragraph from A-58, in the 2nd blue portion of that manual, captioned, "A Nation-Wide Survey of Public Utility Progress." The particular volume is Moody's Public Utility Manual for 1939, under the caption, "Domestic Consumption". The language you have read is as follows:

"The trend of domestic and commercial consumption combined has been steadily upward for the past decade, increasing 51 percent from 1919 to 1932, declining 4.5 percent in 1933, increasing 2.9 percent in 1934, 9.1 percent in 1935, 9 percent in 1936, and 7.5 percent in 1937. The gain in sales and revenues continued through most of the depression as a result of the extension of pipelines to densely populated areas which were previously served only by manufactured gas. The most notable examples were the Detroit line which connected the City of Detroit with the Texas Panhandle and the Hugoton Kansas fields and the

Chicago line which pipes gas from the Panhandle in Texas to the City of Chicago. In the latter case the gas is then mixed with the manufactured product and distributed throughout the entire city. While we have no figures indicating the experience of domestic sales, exclusive of business gained because of the extension of pipelines, figures from individual companies and individual states indicate declines in both sales and revenues were experienced during the depression. Per capita consumption by domestic and commercial users has dropped quite steadily as the number supplied with mixed gas has increased."

You asked whether I think those are reliable figures and observations. I can't answer the question as to those percentages. I would have to make the same study to verify them. I am willing to make the statement that Moody's Manuals are reliable in that connection, but as to that, the many percentages you have quoted, I just can't answer.

You asked if I would be willing to accept Moody's statement there that there would have been an actual falling off in those states and communities where natural gas was being served but for the added volume resulting from these pipeline extensions that are referred to as having occurred. I don't quite understand what you mean by falling off. Falling off in the manufactured gas, or the gas in general. It is awfully hard to follow what you have read at this distance, not having it before me.

(Counsel hands witness the volume.)

It is under the heading, "The Natural Gas Industry," shown on page A-55. A sub-heading, "Domestic Consumption" at A-58. The sentence I believe you want me to consider is: "While we have no figures indicating the experience of domestic sales, exclusive of business gained because of the extension of pipelines, figures from individual companies and individual states indicate declines in both sales and revenues were experienced during the depression." Well, I know of no reason why I
1633 shouldn't accept it, but I have not made such an
investigation as would enable me to verify the statement. I repeat my statement that generally Moody's is a reliable service. That is consistent with what I said in my statement that the curve showing the volume of domestic sales of natural gas would probably follow the same course as the artificial gas sales. The statement in Moody's is not directly in contradiction of the course of that surve.

Moody's statement says there has been a falling off for consumption of certain customer's in certain states, but it does not go to the total volume of natural gas distributed, which is contained on Chart 3. I think we are dealing with two different things.

In the statement, "While we have no figures indicating the experience of domestic sales, exclusive of business gained because of extension of pipelines, figures from individual companies and individual states indicate declines in both sales and revenues were experienced during the depression", nothing is said about customer consumption. It says both sales and revenues decreased during the depression. That is exactly what happened to manufactured gas. That is not talking about customer sales.

I do not wish to modify my answer in any respect or my comments on this curve in any respect in the light of what Moody says about this.

No, I did not take the pains to go back and check the data which I took from Moody's and used in Exhibit 186 and in Exhibit 185, which was also prepared under my direction. That statement would not be entitled to just as much authenticity as would the figures we used. This is a different kind of study. You know, Moody qualifies his statement there considerably. He refers to the absence of data. He refers to a survey made of some companies in some states. It is greatly qualified. It is far different from the financial figures which are given, such as the ratings of stocks and bonds, which is an absolute fact; the market price of which is an absolute fact. I mean, there is much more reliability to those matters contained in Moody's Manuals than there is to Moody's conclusions as to a survey of a business. I mean, they are different things. No, I am not saying I would want to go back and check this before I made the statement. I said, generally speaking, I would accept Moody's. I repeat this, but I said the statements are not entitled to the weight the financial material is generally entitled to and generally receives.

If I were to plat on that same chart there or a similar chart a curve showing the volumetric production of the air-conditioning industry, sales of air-conditioning equipment, and so on, I think such a curve would be indicative of the stability of this business as compared with industry in general. I know that the sale of that sort of equipment has had a distinct rise, but you said compared to industry in general. It would give the best comparison I could possibly have as to industry. After all, you have to have some standard, some yardstick. We have a yardstick of industry in general and we have air-conditioning applied alongside of industry in general. As far as comparison between the two, I don't think I know of anything you could get which would be better over the period of time covered by the chart, whatever it might be.

1634 I think the fact that this line ran in an upward direction far above the curve of the industry in general would indicate that as compared with business in general the air-conditioning business was a very healthy business. Of course, now, for stability you have to have a long period. You can compare the two and tell whether the air-conditioning business is more stable than industry in general very easily if you have a sufficient number of years. I think the chart here in 1905 and 1940 would be ample by any stretch of the imagination. I do not think 1926 to 1938 would be sufficient for the air-conditioning industry. I don't think it is sufficient for the natural gas industry; but I think it is probably the best period you could get for that industry. It is the only period we have so far as the main bulk of it is concerned. But you can in that short period of years determine the stability of that industry by comparing the volume that is handled through a lot of new pipelines which were constructed with industry which was in the throes of the worst depression the country ever had for a reasonable period of the future; not for a long period, of course.

Yes, I know that industry during the period covered by this curve, since 1929, has been in the worst depression it has ever known. I know that the natural gas business has been largely built during that period, and that makes me appreciate the natural gas business very much. I think it is a splendid thing for the natural gas industry. I am referring to its growth in a period of depression, when everything else was going down, the natural gas business went up. Its stability over a long period of years can not be thus demonstrated. The reasonable period in the future can be judged from wealth in the present and nothing else. The present is the best indication of the future that you can get.

Schedule No. 3 was given for the purpose of showing the importance of the natural gas in interstate commerce as a commodity of interstate commerce, and also indicates that a great deal of the natural gas industry, from the passage of the Natural Gas Act, will be subject to regulation. Originally, I believe the purpose of the exhibit was to use it in connection with the proposed legislation setting up the Natural Gas Act, although I have used it here for a different purpose. I had nothing to do with the passage of the Natural Gas Act, of course. The original purpose of the exhibit might have been to contribute toward the enactment of the Natural Gas Act but it has more pertinence than that. I think it gives a very good picture of the importance of natural gas as a commodity of interstate commerce, and I think it is important for us to realize the effect of regulation on the natural gas business. You asked whether it shows anything about the effect of regulation. It will show that a great deal of the natural gas business will be brought under regulation. I think it is important to know that fact. It shows natural gas consumption in Column C, which is an important figure.

When I was on the stand before you asked me if I knew what two states had quit producing natural gas between the interval of 1930 and 1931. Those two states which were dropped from the column as between those two years were Iowa and North Dakota. The reason they were dropped was that the total production of both Iowa and North Dakota was only about 100,000 M. C. F. per year. They never did produce very much, as far as I can learn; but whatever they were producing they must have quit, or they wouldn't have been dropped. They got to such
1635 a low point so that it was no longer of any consequence. 100,000,000 cubic feet would not be of very much importance in that industry as a whole. That is not an unusual thing to have happen to a gas field. I think it is one of the natural characteristics of a natural gas field, to become exhausted sometime. They always quit sooner or later.

Schedule No. 4, for the years 1928 to 1937, shows the natural gas transported to the State of Illinois. I think that refers to the gas that is brought into Illinois and there distributed. In other words, it does not include gas which goes through the state in a pipeline. I don't know as to the particular importance of that in arriving at a proper rate of return. I thought it shed a little economic light on this question. I don't attach a great deal of importance to the schedule. However, if I left it out, more than likely someone would ask to have it put in, and that is why so many of these things are put in there. I have had a great deal of experience in testifying as to rate of return, and I try to anticipate these things.

You asked if I thought you might have asked me to put it in. I thought you might have asked me about the gas which comes into the State of Illinois. I thought it might be of interest. I have had questions by examiners and others relating to information similar to this. I think it is a picture of gas which goes into Illinois and where it comes from.

I have included in this exhibit special charts or schedules at the suggestion of members of my staff. I don't think of anyone else who has made such suggestions.

I recognize that the revenues to natural gas pipeline companies selling at the city gate at wholesale are not included in the figures shown in Schedule No. 1. These are only the figures pertaining to distribution companies. I do not have available figures which would show the same character of information for natural gas pipeline companies selling gas at wholesale at the city gate. I would refer you again to Schedule 3, Column C, which is the nearest approach to that problem I could get. I think those figures include the total consumption of natural gas. I think it includes all natural gas and not just those companies whose purchasers distribute natural gas alone to the exclusion of mixed gas.

Schedule No. 3 does not give the figures as to revenues. It deals with volumes. I say that is the nearest approach I can get in answer to your question. We have filed with us the total quantities of gas that are sold by these pipelines at the city gate and total revenues received from the sale of that gas for one period; namely, June 30, 1938. We expect starting from that date on to compile statistics of the kind you mention. We aren't in this long enough to have as yet reliable statistics. We know the price prevailing today of all those transactions which are interstate commerce, including all of those who are transporting gas in interstate commerce from the Texas Panhandle field. I have made no comparison of the prices received by the other companies which are transporting gas from the Texas Panhandle field to the prices now being charged by defendants. I don't know whether they are higher or lower. I think that comparison is one of the things to be considered by the Commission in adjusting rates. I don't think it has

anything to do with the rate of return specifically. This is an effort to regulate the rate rather than the rate of return. I am not sure I am the witness to give you the information. I certainly think a complete rate case includes a good deal of information about the price of
1636 gas. I have no doubt in due course information of that nature will be presented. We have the information if you want to compile it in schedule form. It is a pretty difficult job with a small staff.

Returning to Chart No. 3, it appears there that, throughout the year, there is greater fluctuation in domestic than there is in industrial and commercial use of gas. Over a period of years domestic is more stable. As a matter of fact, these uses to which gas is put for domestic and commercial purposes go on when times are good and when they are bad. The curve showing the volume of gas used for domestic and commercial purposes is the least sensitive to business conditions, because people will eat and the hotels and restaurants will cook and serve food even if times are not so good.

The industrial curve is very sensitive to business conditions. You asked if in that sense it is not rather difficult to draw a conclusion from the course of the curve showing total volume of gas used for domestic and commercial purposes in comparison with the curve showing the course of industrial production during a period of extreme business depression.

This morning I tried to correct that by showing you how the trend of the total volume of gas, including natural gas and industrial, went from 1929, the last year before the depression. I will give it now if you want it. Chaining all of them together, 1929, that is, the natural gas, domestic, commercial, and industrial, because that was the last year before the depression, then if we include the industrial volume with domestic and commercial, we find in 1930, 1931, and 1932 the trend went downward reaching a low point of about 108 in 1932; it was almost the same for 1933, then it shot straight upward, reaching a figure of 165 in 1937, much higher than the manufactured gas index, a much higher figure than the industrial activity index, a much higher figure than the natural gas index of domestic and commercial sales.

There isn't any question that there is a greater volume of natural gas being handled in this country than there is artificial gas. As a matter of fact the trend also was upward. The curve represents the volume and trend. A curve is given for the purpose of showing trend over a period of years. It is based on the volume of sales for the industry. I think by chaining it together in 1930 and using an index we make a correct comparison. This is an index as we have computed it, and not the absolute volume.

You asked if I think it is unsafe to use a curve showing the total volume of gas sold for domestic and commercial purposes, which I have stated is liable to be more stable during the year than industrial gas even, and to compare that with the curve of industrial production, during the period of the depression. I don't think so. Certainly the compilers of the chart didn't think so or they never would have put it out. I think it is a proper comparison.

Going to Schedule No. 5, I have included in that schedule a list of 31 companies. I have selected those companies for this list on a basis of two characteristics, one in the alternative. They had to be either transmission and production companies or transmission or production companies, one or the other, and to have an annual gross or net revenue of two and a half million dollars.
1637 That isn't quite accurate. In other words, they had to have production and transmission, or transmission without production. I excluded those which had production without transmission. I included all of the pipeline companies in the country which had those common characteristics that we could get except a few companies which were predominately engaged in some other business and which had some pipelines but whose securities we thought would not be in the same class as the securities of the companies I have listed here. I may mention Pacific Gas and Electric, the Montana-Dakota Utilities which you mentioned this morning. The Montana Power Company has some transmission of natural gas.

You asked if Montana-Dakota Utilities has most of its assets tied up in natural gas operations. Not to my knowledge, but I am not sure. My dealing with this company thus far has been in connection with the electric business. I am not prepared to say at this time what proportion of its business is natural gas, if we have a record of the proportion. We did not have any information which was available, but in the nature of its business I know it does have substantial electric business. It is written up in

Moody's Manual. I think it had a lot of difficulty about some financing a few years ago.

These companies all have those common characteristics I have mentioned. There are two of them which, upon reconsideration, we probably ought to eliminate. One of them I mentioned at the time I gave my direct testimony; namely, the South Penn Oil Company, and one that I think was referred to as being one of the largest natural gas companies east of the Mississippi River. Subsequent investigation on my part discloses that it is primarily an oil company; and the oil business is so large in comparison with the natural gas business, I think we ought to exclude it. That company has a very large percentage of its total revenue from oil. You will recall I had some question about that at the time I gave my direct testimony. The other company is the Indian Territory Illuminating Company. I don't think that that one should have been included because I don't think it has any transmission to speak of. It has gathering lines and sells its gas in the field. It is a production company, producing in 50 Oklahoma fields and several fields in the Texas Panhandle. It sells to 12 utilities at various points in Oklahoma and to three utilities at various points in Texas. While it does have gathering lines, I don't think it has any transmission to speak of. It has some oil business also.

On Schedule 5-A, I have listed here only seven companies. I show in that schedule all the bonds which were held by the public of the 31 companies shown in Schedule 5. Then we give the market values for those particular bonds, debentures, and notes, wherever I could obtain a market quotation. Those seven constitute the group, out of the 31 companies listed in Schedule 5, that have bonds outstanding in the hands of the public.

The Houston-Gulf Gas Company produces gas in Texas, and it purchases gas from 12 companies and individuals operating in six Texas counties. It sells gas for industrial use, and has a pipeline extending from the fields in south Texas to Houston, Texas; 482 miles of line. It sells all or a substantial amount of natural gas requirements to 18 communities, including the City of Houston. It produces gas in five Texas fields, according to its report to the Federal Power Commission. I don't know whether these five fields are in different counties. That company is
1638 part of the group of companies known as the United Gas Corporation and it is one of the Bond and Share

companies. The United system produces gas in a great many fields in Texas, Oklahoma and Louisiana. I think the Houston-Gulf Gas Company is tied into the system. You asked if in case of an emergency it would have access to the reserves back of the whole system. It buys most of its gas today, and does not produce it. I think it buys it largely from the United and other members of that system.

The $4,238,000 of First and Collateral Six Percent Mortgage Bonds, maturing in 1943, are undoubtedly senior to the Debentures, due at the same time. In showing there the times fixed charges earned in 1938 these senior bonds are grouped with the debentures. We would get a different result if we were to calculate the times interest on the First Mortgage Bonds. I wish we had the figure. We could not get it at the time this figure was prepared. We had the earnings and the income statement. We took the total interest requirements and that was covered 1.30 times. We did not have the interest in the income statement broken down. There may be some difference between the interest in the income statement and the interest on these particular items. It is simple enough to calculate interest on $4,238,000 at 6 percent if those bonds were outstanding in that amount all the year. This 1.30 does not apply to the First Mortgage Bonds; it applies to the two issues, and we show that very clearly.

A purchaser interested in buying some of those First Mortgage Bonds would concern himself about the coverage for the First Mortgage Bonds only. He would be interested in stuying the general financial structure of the company. I did not prepare this part of the exhibit. It was prepared by others under my direction.

You asked if I am sure I did not have available the amount of the interest on the issue of First Mortgage Bonds. In the report which they prepared for me, they did not show it; and I assume it was not available, because in other cases they have shown that information.

You have handed me Moody's Public Utilities Manual for 1939, which has been mentioned before. It gives on page 2073 the times charges earned as 1.30, the same as we have shown on this chart. The point I make is that to be sure of your figures you just can't take these figures here and make a computation. We have the debentures here. But, you get other interest deductions of $220,000. These bonds may not have been sold at par; they may have been sold at a discount. The effective rate may be far different from the six percent. As soon as you try to interpret this kind of a situation, dealing with those figures, you may go astray, and you may go astray badly. Moody shows the times charges earned. That is exactly what we show in this schedule. I am not sure that the data is there from which you can find the times interest earned on the particular issue, because we have other interest charges there which amount to $220,000. I don't know what they are, I don't know how they rank. That is in addition to the debenture interest of $120,000. They may be prior, they may be afterwards; but there is nothing there on which you could make any assumptions to arrive at any other figure than the 1.30, which we show. The investor would more than likely try to get the correct information from some source. He would be foolish if he made any interim calculation based on that calculation.

1639 Moody lists the bond interest right here in so many words, but you can't tell what the bond interest includes; interest on this and what? It does not give the effective rate of interest. The latter must take into consideration any discount. Again, which is more important, it shows $220,000 of interest in that statement which I can't classify. You can assume that interest comes after the bond interest, but that will be an assumption. As an accountant I would not make a computation such as you asked for and certify to it because there would be too much guess work involved.

You asked if I can't turn over to the second page and see exactly what it is. Not to my knowledge. I would be glad to look if you will hand me the record. (Document handed to the witness.) This gives the details as to the bonds outstanding; outstanding Series A at the end of the year, $4,238,000; retired, $6,672,000; and gives the date, April 1, 1930, and due interest date, and describes the sinking fund provisions, and so forth. That is not the information which I would need to make a statement and certify to it as correct.

I would say if any member of my staff did that, he would be wrong, as Moody would be wrong, instead of doing it as contained in the statement you have shown me. He didn't do it, Moody didn't do it; and undoubtedly Moody had a great deal more information on the subject than set forth in the data here. Yes, Moody stated the earnings here. Ordinarily, the bond interest does not include amortization of debt. It is described here as interest; but in the income statement amortization is included. That is what I am afraid of. No, I can't take the information here and figure out the earnings times bond interest. You gave me an income statement to review, and you asked me to figure the interest in the income statement. I asked you if you can tell me if there is any amortization in that account. If you can't tell me, I would not know. All I can do is to follow Moody's method and arrive at 1.30; and with the qualifications I have mentioned the best it will show is that as to the First Mortgage Bonds, as far as the First Mortgage Bonds are concerned, that is times interest earned on those bonds. I have not shown that.

You asked if anybody who knows enough about it can take these figures and tell what the earnings times interest on the bonds would amount to. I can give you an answer, if you are willing that I should make certain assumptions. Since you say you do not want me to assume anything, I can't do it. I must refuse to do it because it would be unprofessional for a man of my reputation to do anything like that. I have certified to many statements in my accounting career, but I can't certify to anything like that without making some assumptions.

I would have to assume that the interest shown there is all interest on the bonds, no amortization; that the interest is on the bonds outstanding all the year, and solely on the First Mortgage Bonds; and none of the other interests shown in that statement comes ahead of the interests on the First Mortgage Bonds. You suggest that the volume shows exactly what I say I have to assume. It does not show that at all. It does not show it for the $220,000 interest. It shows it to be bond interest. It says bond interest, debenture interest and other interest. It would be an easy matter for me to make that assumption. If you will tell me that is correct, I will accept your word for it for the purpose of the computation, but I can't say it is correct.

1640 This is the statement for the year 1938: Gross income, $770,143; that the bond interest was $254,280. Assume that that represents the bond interest on the bonds which Mr. Morgan referred to, and assume that all the other interests of $340,000 properly come after that bond interest, and assume that there is no discount in that figure of bond interest; then the bond interest was earned slightly over three times. It was earned 2.54 times. Yes, that is very different from 1.30, but I never said that the 1.30 was the earnings on these bonds. I resent any implication that I made any suggestion of that nature. I can't do any more than to emphasize my statement that it is more important to the man who wants to buy a bond to know what the earnings times bond interest are.

In the next column we show the percent of funded debt to capitalization, December 31, 1938. It includes indebtedness at the end of the year, what is commonly known as long-term debt. In that case it would include bonds and indentures, and income notes, if any such were outstanding.

First going to the quality of those First Mortgage Bonds, the important thing is to know what percentage of the total investment was represented by those bonds. That is true if we are dealing with the bonds alone.

You asked whether in appraising the bonds from the standpoint of an investor who you say is interested in getting his interest, and who is concerned about the percent of indebtedness represented by the issue of bonds and about the earnings times interest on the whole issue, he would not have to have the percent of the total investment represented by the issue of bonds as well as the earnings times interest. No, he would have to have the relationship of the funded debt to plant or total securities outstanding in order to rate the bond, compute the yield, or anything like that. In other words, he would want all the characteristics of a bond which Moody takes into consideration in rating bonds; that is, the ratio of the bonds to plant, or ratio of bonds to outstanding securities. An investor would want to know that in passing upon the quality of the bond and in determining how much he is willing to pay for it. It is true that earnings times interest and the percentage of total investment represented by the issue in which the bond falls would enter largely into what he is willing to pay for it; but they are both relative to other facts. The are both mighty important points to be considered by any investor. Neither one of them is shown on this exhibit. The ratio of First Mortgage Bonds to plant, per books, the gross plant, without the deduction of the reserves, is roughly 25 percent.

I wouldn't say that the investors who bought the bonds at the quotation I used in computing the yield required a

yield of 5.13 at the time they bought them. That is the yield they got; bearing in mind that the bond was selling at that time above the call price, which is always a factor to be considered very seriously; because that bond could be called at 101½; and the investor might lose right off the bat if he paid 103 for the bond. That was the yield that was in the prospectus and was based on the 1938 earnings. I used the 1938 earnings because you use the most recent earnings when you take a market value as of a recent time; and 1938 was the most recent earnings which we had for which we could get comparable figures. This exhibit was prepared about September 30, 1939. I don't know that the earnings for a large part of 1939 were then available
1641 able and published in sufficient detail. Yes, I note that Mr. Knapp in his computation in the last two exhibits brought in here did use very recent information concerning earnings for 1939 in making up his exhibit. They were four electric utilities; and those statements he compiled after the direct testimony in this case. And then again, there is something else which I ought to mention here, and that is that a part of this exhibit, and undoubtedly a large part of it, was compiled before September 30. What we did was to compile the exhibit as far as we could go, and at the last day, before getting ready to have the exhibit reproduced, we put in the computation for that date.

I am not prepared to say that the man or men who bought the bond or bonds involved in the transactions on September 30, 1939 had published information available to him, showing the earnings down to a comparatively recent date. It is true that business in general has had a considerable step-up so far as earnings are concerned in 1939 over 1938, and I think I testified to that effect. If I had used the 1939 earnings, I would not have set up a higher yield when the bond is selling about call price. I stated on direct what the call features of the bonds were that were shown on Schedule 5-A. As to the bonds shown here, it would not make any difference in the yield shown. The yield we show here is the actual yield, based wholly upon market prices of September 30.

When it comes to the earnings price ratio you are talking about common stock undoubtedly, not bonds. This 1.3 times interest earned has to do with the fixed charges. If it be confined to the interest on the prior issue of bonds and on the indentures, the ratio would be higher but I can not say that that would be the correct thing to do. If it had been the correct thing to do, Moody would have done it that way. The very fact that Moody did not show it indicates to me that there must be some reason for the failure to show it that way, because the information is important. I think that that emphasizes the reason why they show it that way.

You asked if it does not show the debenture interest in plain words. It shows the total fixed charges earned, 1.30, and it also shows the interest on the debentures and the interest on the bonds. And using the same assumptions that I made in calculating the ratio of earnings to the interest on the bonds, I could find the ratio of earnings to interest on both issues. It would be over two times. That is with all the assumptions which I have previously stated.

If I computed the total percentage of the fixed capital represented by the two issues instead of by all of the funded debt, I would get a lower percentage than 43.8. I would get about 33⅓ percent. And with more than two times coverage of interest on that issue and prior issues, and only one-third proportion of the entire capital represented by the two issues, these debentures sold for a yield of 5.9. That is true with the qualifications I have given. The market price on September 30 was sufficient to yield 5.9 to maturity. These debentures were selling above the call price. These debentures sold for 102 and the call price was 101½.

Passing to the Oklahoma Natural Gas Company, First Mortgage Bonds, three and three-quarter, 1955, sold in August, 1939, the total outstanding was $17,000,000 all sold to the public. No, I do not know what the earnings times interest on that issue are. I would not know unless I had
a pro forma balance sheet prepared to show all the
1642 facts, because being issued in 1939 the most we can
show is times fixed charges in 1938. I would not calculate a pro forma balance sheet from such information as is given in the prospectus filed with the S.E.C. I will accept it, but I would not make a calculation on it. Bear in mind that the pro forma balance sheet has been condemned by itself because of abuses during the 1920's. The American Institute of Accountants has warned all accountants to be most cautious in preparing anything of that nature. If we had the figures I might accept them, but I would not certify to them. It has to be upon a pro forma basis be-

cause it deals with the future and dissemination of things in the past. You have to be on the ground floor in order to make a proper kind of study and to be sure you are right.

You asked if in getting down to earnings as applied to First Mortgage Bonds, we are not dealing with the first call on those earnings. My answer is, sometimes, and sometimes not. There may be senior securities underlying those securities frequently. I don't think there are in this case. I don't think it is true in this case, but there are cases in which it would be true. Yes, they might be First Mortgage Bonds and still have senior securities. For instance, in railroad financing First Mortgage Bonds are frequently subject to senior securities, subject to what we call underliers, which are senior on certain properties and on certain earnings, as especially in the case of mergers.

They are First Mortgage as to the earnings of the particular company who issued the First Mortgage or some predecessor. It may be a predecessor, especially in the railroad business. It might not be a First Mortgage Bond with a superior indebtedness standing ahead of it, but it might be called a First Mortgage Bond with underliers standing ahead of it. I have found that situation many, many times in my dealings with financial affairs. I have found First Mortgage Bonds with a superior indebtedness ahead of them; for example, First Mortgage Bonds in railroads, with underliers ahead of them on specific property and specific earnings, many times. That is not an unusual thing at all.

In order to find out what the earnings times interest is and what the percentage of coverage in the matter of property concerned is, first, I will study the statements in the prospectus. After that I would get the proper information from such reports as are filed with the Federal Power Commission. When these reports come in I can make the calculations easily. This is the first year, 1939, and anything we can find out is information on the subject.

You have handed me a prospectus and asked that I tell you what the earnings times interest is. If we don't find a pro forma statement here in the prospectus, I certainly can't make a calculation here on the witness stand. But I would like to read something here from page 6, which is this comment: "Gross income, being the balance applicable to interest and debt retirements before income taxes, etc." Then we have a note: "Excludes estimated Federal and

State normal income tax, Federal Excess Profits Tax, aggregating, $237,000." Then in a note to that, which goes on, it shows that qualification all the way through; it says: "See page 47 for information." You are asking me to do something which requires careful consideration. You stated you asked me to do it only because I said I could take the prospectus and find out earnings times interest. No, I said that is ordinarily given in a prospectus; but I don't see that there is any statement of that here, or a pro forma income statement, such as we prepare in all security issues. If there were, I would be glad to accept the statement here.

1643 You asked if there was any way I could figure out earnings times interest on that First Mortgage Bond issue. Yes, I can do it if you will let me go down to the company's office. I can do it and I can do it easily. I have prepared many such statements.

As to how investors would do it, they ordinarily would take someone's word for it. He would get the information from some stock broker, some investment house. It is compiled in a good many places. It is compiled very frequently in Moody's. I said it would be very important for the investor to know those things before he bought the bond, but I did not show them in this instance because it was not available to us, at the time we made this statement.

If it were a matter of fact that the earnings times interest on that issue of bonds was 4.74, the bond buyer would indeed be interested in knowing that. He would be more interested in knowing that fact than he would be in the fact that the earnings times all fixed charges, including those junior to the issue that he was interested in, were 1.91. He ought to have both figures.

I can add something to that, which would perhaps shed some light on the thing. These bonds are rated Baa, you notice, by Moody's; and they were yielding a 3.55 percent as of September 30 when bonds were selling somewhat off, Baa generally in the electric utilities were selling at 4.39. Those bonds were selling below the Baa public utilities generally.

You asked if that was a direct answer to some question you asked me. That is just bearing on the question you asked.

The funded debt shown here, 56.87, is not the funded debt of particular bonds. Right there I think I better stop a moment and speak about the natural gas industry's reserves. We have reserves, depreciation and depletion reserves in natural gas which are very important which must be considered. It is customary in most instances to publish the debt ratio to total property, and yet that has been seriously questioned in regard to natural gas companies, because depletion is so heavy.

In this particular case the retirement in reserve is $11,000,000 of a gross property base of $57,000,000. Under the $57,000,000 there is a very large item of $13,000,000 of franchises, gas contracts, and intangibles, so when you get back to a debt ratio, a debt ratio standing by itself with nothing else is not as informative as it might be. The other information given here is much more informative than the mere 56.87 or some smaller figure, the ratio of $17,000,000 of bonds to the gross plant, book plant of $57,000,000.

Questions Interposed by the Examiner.

It would reduce this figure considerably, of course, if you take these things off.

Cross-Examination by Mr. Morgan Resumed.

You asked if I set them up that way in my exhibit here. We took Moody's statements. I could be very critical of this company if I wanted to, of some of the items contained in the statement. I could restate it in my own state-
1644 ment by deducting the reserve. I think for natural gas companies you probably ought to do it, but I haven't gone that far as yet.

Questions Interposed by the Examiner.

You asked what the Examiner should do with respect to each one of these companies in that event. I think if you make any conclusions on it you have to consider the reserves, particularly those reserves which are due to the exhaustion of the natural resources. The exhibit gives simply what is contained in Moody's. It does not give those facts. It applies particularly to the bond indebtedness. It is not the intention to submit such information. When I am pressed by the Judge as to ratio I think I may call out the pertinent figures and then you will have them in the record. I have given the figures for the Oklahoma company.

Cross-Examination by Mr. Morgan Resumed.

The bond investor would be interested in knowing the figures for earnings times the interest on the issue of bonds in which he is contemplating making an investment. That information is not in my exhibit. That is not near as important as the yield. The yield is the real important figure on this exhibit.

I have said that in appraising that bond before he bought it at that yield he would be very interested in knowing the earnings times interest and the percentage of total fixed capital represented by the issue of bonds. He can get that indirectly by looking up the classification for the bond. Moody's ratings, for instance, take most of those things into consideration. It takes into consideration this item of intangibles, which I have spoken of. I think the significance of this chart, as I understand it, must be tied up with my statement in direct testimony of the dearth of satisfactory information appertaining to pipeline companies. We have to reason by analogy. I show the rating of Oklahoma Natural Gas as Baa, 3.55. I stated before you can go to Exhibit 185 and see Baa under Oklahoma Natural Gas Company, and find that the yield of Baa bonds is 4.39.

In the case of Panhandle Eastern Pipeline Company, whose bonds are rated at A, you can go to Exhibit No. 185 and you will find that Class A bonds were selling at about 3.41 in August. That was before bonds went up in September, and you will also note that the bonds of Panhandle Eastern are selling above call price.

I think that is the way you have to use these things in arriving at a determination. All the information must be considered. It is not an isolated fact.

No, I don't think the big investors would be more apt to be governed by Moody's rating on the bond than he is by the earnings times interest on the issue and prior issues and the percentage of the total fixed capital represented by the issue and prior issues. The small investors, average size investor would. The large insurance companies have their own investment departments. The other investors rely a great deal upon Moody's ratings. I have no idea whether big investors or small investors bought these bonds here. The Houston bonds and the Oklahoma Natural Gas Company bonds are both Baa. One sold at

a yield of 5.13 and the other at a yield of 3.55. I think the fact that the Oklahoma Natural Gas bonds had earnings times interest in the ratio of 4.74, while Huston
1645 Gulf had only three times coverage, entered into that difference. I do think the percentage of total fixed capital represented by the issue entered into both of those transactions. And I anticipate that the Oklahoma Natural Gas bonds, to continue, will get a rating of A.

Questions Interposed by the Examiner.

The Oklahoma Natural Gas bonds are rated Baa and were selling on September 30 at 3.55.. By referring to Schedule No. 4 of Exhibit 185 you will find that Baa public utility bonds were selling at an average yield of 4.39 in August of this year.

Cross-Examination by Mr. Morgan Resumed.

Passing now to the bonds of Panhandle Eastern Pipe Line Company, First Mortgage, Series A, four and a half, 1952 bonds, that may be a typographical error there. Those might have been 4 per cent bonds instead of four and a half. I would be glad to look that up. They are refunding bonds, I understand. I do not know what the figures are in that instance as to earnings times the interest on the issue of bonds. The same explanation as to why I haven't got it here would be the same as that for the other two issues considered. But that wouldn't affect the yield shown, in my opinion, though. It wouldn't affect the yield on the date on which I show, namely, September 30, 3.63, and when the bonds were selling above call. It would substantially affect the price that the original purchaser paid.

I am not saying that the man who buys the bonds afterwards would not be interested in that at all. My statement, whether it is 3.33 times or 5 times or 10 times, the fact does not change the figures shown in the last column. If the purchaser had bought the bonds at a different price that would have changed the figure in the right hand column. I think you mean that the times interest earnings affects the cost of money to the borrower, and it does. It affects the price that the investor will pay and in that sense affects the yield. It is true

we haven't this information on this exhibit as to that Panhandle Eastern bond; but that is why I am afraid you are indicating that yield would be different. I am clear that if I had the information this yield would not be any different than we show here. It might be true that we would have some explanation of the yield
1646 that we haven't got here. It would help to explain the yield. Also, the correct percentage of the total investment represented by the bond issue would help to explain the yield. In the case of Panhandle Eastern, the ratio of bonds to fixed capital was about 40 per cent, and giving effect to the assumptions that I spoke about when we were talking about the Houston Gulf Gas Company bonds, the earnings times interest on that issue of bonds would be about 4.63. There again I must repeat that the bond is selling at higher than call price. The yield is about the same as public utility classification of A bonds, when you consider selling above par, and that the price was as of September when bonds generally were selling off. That yield does not indicate the cost to Panhandle of the money raised by that bond issue. It is indicative of what the Panhandle Eastern could finance at today by taking into consideration the usual cost over and above the yield to investors. I don't know what the actual cost was to the Panhandle Eastern at the time it issued those bonds. I am familiar with the document you show me, "Security Issues of Electric and Gas Utilities, 1935, 1936, 1937, and 1938, Report of the Securities and Exchange Commission, Washington, D. C." The cost to maturity was 4.46 for the bonds issued in March, 1937. There we are comparing different periods of time. There is two years' difference, and in the meantime the bonds have gone from 4.23 yield to the public down to 3.63 and are selling above call. Those conditions make all the difference in the world. That makes a difference of .23 between the cost to the company and the yield to the investor.

Passing now to the Southern California Gas Company, First Mortgage, four per cent, 1965, $15,000,000 issue, and First Mortgage four and a half per cent, 1961, $12,500,000 issue, we have grouped the two together because they are both secured by the same mortgage. As far as I know, they are both the same indenture and one supplements the other. No, I do not know what the earnings times the interest was in the case of these two issues.

I know the earnings times fixed charges was 5.29, which, of course, is a very nice ratio. I don't think it would make much difference if the ratio were higher than that, because there is a limitation upon the earnings ratio after it gets beyond four and one half or even four per cent; the effect of the increase diminishes greatly. I have no reason to question your statement that the times interest coverage in that case was 6.43. It appears to be true that the total per cent of fixed capital represented by the two issues of the bonds was about 20.83. It turns out that these two bond issues are all of the funded indebtedness of that company and the following company. Those two companies are very large distribution systems. They are more than that. They have distribution and they are large companies, the Southern California Gas Company being very large. The latter company transports and distributes natural gas to and in Los Angeles, San Bernardino, Ventura, Kern, and Fresno Counties in California. That is a great metropolitan area in southern California. It gets its gas from some fields down there in Kettleman Hills and around in that section, not a great distance from Los Angeles. Yes, it produces gas in Buena Vista Hills field, Kerns County, California. It purchases gas from a good many companies. The company transported 21,000,000 M.C.F. in round figures of gas for 29 companies in various parts of its system. It has 770 miles of twenty-six to four inch transmission lines, according to statements filed with the Federal Power Commission. A very, very large per cent of its revenue is received from retail distribution. It is transporting this gas for 29 other companies for hire. It is not unusual at all in the gas business. It purchases gas and transports it along with its own gas to its own retail market, but it transports it for others, according to the statements to the Federal Power Commission. The company produces and purchases
1647 about 93,000,000 M.C.F. and 21,000,000 M.C.F. of
that it transports for hire. It makes whatever disposition of this 21,000,000 M.C.F. it transports for these other 29 companies that they want made of it. It delivers it for them. I don't know whether there are 29 distributing companies within the areas served by that company's pipeline. It is a distribution company. I know the company reports to the Federal Power Commission on the Commission's Order 51 that it transports a total of 21,-

000,000 M.C.F. for 29 companies at various points within the state of California. That is as much detail as I can give. I have said that was not unusual practice among natural gas companies. I have in the file of the Commission many reports showing that they transported gas for others. I can't name the other companies offhand. That is one of the questions which we ask in our questionnaires and get a lot of affirmative responses. I am unable to say whether any other gas pipeline ever transported gas out of Texas for hire.

The next bond is Southern Counties Gas Company of California, First Mortgage four and one-half, 1968, $11,500,000, Aa rating. The times fixed charges earned in 1938 appears to be 3.58. It may be, as you say, the times interest involved in that particular issue of bonds, is about 3.89. I have given, as I said before, times fixed charges earned. 37.24 is the total per cent of the fixed capital represented by the issue of bonds. That company also is engaged almost exclusively, so far as its revenue is concerned, in the business of selling gas at retail.

That leaves one other company, Southern Natural Gas Company. It has two bonds, First Mortgage four and one-half, 1951, $12,939,000, rated Baa, and an Adjustment Mortgage six per cent, 1960 maturity, rated B. I think the first mortgage series are superior. The company got into difficulties and was reorganized and the adjustment mortgage bonds came out of the reorganization. Under the column "Times Fixed Charges Earned" they are grouped together in the exhibit. I do not know what the earnings times interest on the first mortgage series of bonds was. I haven't the information on that just as was true in the case of the others. The gross fixed capital in round figures, $30,000,000, and the amount of the bonds is $12,000,000. That would make about 40 per cent of the total fixed capital represented by the bonds. Yes, you would have to add to that issue of bonds $616,000 not placed with the public in order to get the real coverage, which would be about 40.5 per cent of the total fixed capital. Of course, that company went through reorganization a few years ago and again its bonds are showing a yield of 3.90 although they are rated Baa. The public utility Baa went to 4.39 in August. I haven't the data to show what the percentage of coverage is. The fact that it is engaged in an intensive load building campaign and has prospects of additional developments doesn't give its bonds a speculative value as well. It might give the securities as a whole some speculative value. The company has been in difficulty, undoubtedly. There are better hopes for it after the reorganization, but it has a line going from the Monroe and Richland field in Louisiana over to Atlanta, Georgia, and another line in Georgia going off the main line to Selma and to Columbus, all pretty long transmission lines. I think a yield of 3.90 for that particular company is certainly a good yield.

You ask if, in the light of the circumstance that those Southern California Gas Company and Southern Counties Gas Company of California bonds are based on an income derived almost 100 per cent from the sale of gas at retail as opposed to the selling of gas at wholesale on a gate
rate, we couldn't get closer to the natural gas pipe-
1648 line situation if those companies were eliminated
from the exhibit. I think you could find other companies somewhat closer. As you have stated, these companies have large retail distribution. It must not be forgotten, however, with their large investment in transmission properties, if anything happens to producing and transmission companies, they would be in a serious condition because of the large investment in such properties. It affects the over-all rating. This is not a pure producing and pipeline company such as the companies we have here under consideration. I think it is true that they have a very large proportion of their total investment in facilities which are convertible to manufactured gas facilities. If those two companies be eliminated it changes the average. I really think a comparison ought not to be so much with the average as with the individual companies. Averages are so frequently misleading. For instance, there is a serious question in my mind as to whether any such bonds as the Adjustment Mortgage bonds of Southern Natural Gas Company should be included in any average showing the yield on bonds of natural gas companies because of the circumstances surrounding their issue. You have questions in all these companies which make it necessary to weigh each individual company.

I refer again to the Oklahoma Natural Gas Company. The Oklahoma Natural Gas Company I believe was in a holding company system up until 1936. It had a little disturbance there when the stock was distributed to individual stockholders. I want to give the Examiner the information that if you take just one average and use that exclusively you are not likely to get the right answer in determining a proper rate of return; a great deal of judgment has to be applied. The real evidence of the investor's appraisal is, of course, in the last column, the yields. What information the investor had which enabled him to make the investments, of course, that is a different question. He undoubtedly would have Moody's rating and would rely considerably on those unless he had the services of an investment counselor or an investment department such as you have in insurance companies. As to the appraisal by the investor of the yield that he ought to have on his money and the security he should have on his money in the form of earnings times interest, you asked if I wouldn't be more apt to get at the actual thinking of the investor along those lines if I had used 1939 earnings instead of 1938 earnings. You mix a couple of things. I want to go along with you but some of the language you use would put me on the spot if I gave you a direct answer. Certainly, the investor's appraisal as to security of interest and security of principal relates directly to the times interest earned and to the relationship of his security, the security outstanding, of which he owns a part or all, to the plant and to other capital of the company. Yes, he buys it on the information as of the latest time he can get the information, and he will frequently attempt to make a forecast. That forecast is not speculation; it is based upon economic studies. You ask if he had available to him published figures as to the earnings in 1939 whether such would be of more help and would be apt to lead to the more correct result, in weighing this element in considering a proper cost of capital. I repeat, the most recently available information is the best information on which to base your judgment. The disturbance to which I referred a moment ago in connection with my discussion of the Oklahoma Company occurred when the holding company distributed the stock to the stockholders. All those things help disturb the securities temporarily until they become stabilized. Any major transaction affecting securities will have some effect upon them. The fact that these securities were selling on the market at a yield of 3.55, selling above call, shows that the investors consider these securities as good.

1649 Schedule 5-D has to do with preferred stocks rather than bonds. This page of the exhibit shows the Total Outstanding Poor's Rating, Times Dividend Requirements

Earned 1938, Times Fixed Charges and Dividends Earned 1938. The difference between the times dividend requirements earned and the times fixed charges and dividends earned is due to the circumstance that the great bulk of fixed charges, like bond interest, and so on, is ahead of the preferred stock. The column Schedule 5-D headed "Times Fixed Charges and Dividends Earned" includes the interest charges not only on first mortgage bonds but on debentures, notes, and all other interest charges that come ahead of the dividends and the preferred stock requirements. I should say that all these interest charges are senior to the preferred stock charges. That is the normal situation. In this instance, as in the case of the bonds, we use the earnings for 1938 rather than the earnings for 1939 as a basis of comparison. I don't know which of these issues of preferred stock were new capital issues as opposed to reorganization or refunding issues. I haven't that information. I should think it would be available for the recent issues. Whether available for some of the older issues or not, I don't know. My exhibit doesn't show just when the issues were put on the market. Ordinarily, Moody's Manual shows when the securities were issued. I didn't think it was necessary to have that information worked up because the current yield is the important thing in this chart regardless of when the securities were issued.

Schedule 5-F has to do with transactions in the common stocks of some of these gas companies. From that I have eliminated two companies which I have said ought not to be in this exhibit, namely, Indian Territory Illuminating Oil Company and South Penn Oil Company. It appears that on the common stock of El Paso Natural Gas Company the earnings per share were $3.30 for the year 1938. I do not know what the earnings per share for the year ending July 31, 1939 happen to be. I haven't anything with which I could check your figures on that. The term that corresponds in common stock transactions to yields on bonds is price earnings ratio, plus one other thing, the dividend payment. The price earnings ratio is not conclusive because the dividend payment of the corporation has an effect upon the market value of the security. A good many investors buy for a short term. If the earnings are large for a short term and dividends are not paid out they do not benefit from the increased earnings in the way of dividends; so the dividend policy must also be considered. If the earnings per share for the latest twelve months published prior to this transaction here, namely 12 months ending July 31, 1939, had been 3.77 instead of 3.30, the price earnings ratio would have been changed. It would be higher. There again you must not overlook the fact that the equity stock of El Paso Natural Gas Company selling at 40⅝ is greatly in excess of the book amount of 12.36 for common stock for natural gas companies. That isn't a particularly favorable situation. It has a great deal to do with the market value of the stock, tending to keep it down. We included the Houston Gulf Gas Company because we show in Schedule 5 that certain of the common stock of that company was owned by the public and Schedule 5-F ties in with Schedule 5. Its stock did not have any market value in 1938 of which we could find any record.

Going on to the Interstate Natural Gas Company, total shares 952,953, I do not know what earnings per share for the year ending July 31, 1939, happen to be. In order to arrive at the investor's reasons for paying the amount he did for that stock it would be nice to know that; it would be
worth having. As a matter of fact, it would be worth
1650 having up to the very date of this quotation, although
there is a great deal of diversity of opinion as to just what average you should take into consideration in computing earnings and also in computing prices in establishing your per cent of earnings to quotations. The investor would try to get up to date information, the very latest data available. This particular per share earning in the case of the Interstate Natural Gas Company was 2.13.

Now, in the case of the Manufacturers Light and Heat Company we did not have any available data as to the quotations. The 3.96 we use here was earnings per share. That is all right. Without the quotations you cannot compute it. I believe we used the 1938 earnings per share figures in the case of Oklahoma Natural and in every instance. I believe it is true that we used transactions in the months of September and October, 1939, in arriving at our price earnings ratio. We related the price in September and October, 1939, to the earnings in 1938. The average, 7.33, was a weighted average based upon the amount of stocks outstanding as reflected by the books. The weighting was in proportion to the total amount shown as outstanding in the second column of figures. Having used an amount paid for the stock in a market transaction as a basis of arriving at the price earnings ratio, it certainly would have been one acceptable method, and perhaps a better method than was used here, had we arrived at the market value of all the outstanding stock by using the market price in order to get the weighted average of these price earnings ratios. I don't know what the result would be. I repeat, I don't think that you can use averages with such a small sample to any advantage in a case of this kind. You have to study the individual companies.

You ask why I put the averages in here. It was put in by one of my men who prepared this schedule. If I had been preparing it originally I think I would have left it out. I think it is far more important in this schedule to consider the rating of these securities, all of them rated rather low, with no A securities, no B, Baa, Aa or Aaa.

If in using the earnings for 1939 instead of the earnings for 1938, in arriving at the price-earnings ratios, based on prices in September, 1939, and in using the market value of the stock instead of the book or stated value of the stock to obtain the weighted average, the result turned out to be 10.31 instead of 7.33, it makes a considerable difference in the average presented in this exhibit, and it would make a difference in the price earnings ratio. As I told you before, we cannot get away from the statement that I made in my direct testimony. There is a scarcity of reliable information. The cream of the stocks of the pipeline companies is not shown in the schedule. It is a pretty poor schedule, as a matter of fact, to use for rate of return, but it is the best we could get. The difficulty is that the stocks are held by holding companies. I wouldn't say that they are not offering them for sale to the public because the public is afraid of them. I don't know. Public financing is resorted to in the matter of equity capital in the electric business but not in the gas industry at the present time. It and the gas industry both are in the same category at the present time. There is very little equity money being issued here. I think one of the reasons why holding companies are holding on to the securities is that a good many of them are paying handsome dividends; they are good investments. If you go back to the 20's, I don't think the pipeline companies were in demand or the securities of the pipeline companies were in demand, but nevertheless we have a different picture today. We see one thing which is somewhat unusual.

1651 We see a lot of bank loans, running for several years, to natural gas companies. Ordinarily you do not find it to that extent in the case of electric utilities. Banks apparently think they are safe loans. The Northern Natural recently procured a six million dollar bank loan. It is a rather outstanding feature of the natural gas industry, which is one of the unusual financial features, as a matter of fact, in the industry. I don't think you can go back to the time of 1926, when you indicated pipelines were rather in their infancy, and make comparisons with the present time. In my direct testimony I mentioned the fact that if you excluded the South Penn Oil Company the figures of 7.33 became 9.14. I said several times recently this afternoon that I don't think any average should be used in any event. I have also said that the best common stocks of the industry were not represented herein Schedule 5-F.

Schedule 6 has to do with bonds that have been issued since January 1, 1935, through September 30, 1939. It deals with yield to the public and the net cost to the company as of the time the original issues were sold. The yield to the public is absolutely the best market appraisal that you can get at the time sold. This exhibit shows the yield to the public at the time of issue, and that as of the latest date available. At the time I prepared this exhibit I did not have all of the proforma earnings that were used in the prospectus prepared in connection with the issues because a great many of these issues were sold privately. As to some of the others, undoubtedly we did have information from the Securities and Exchange Commission. It is a matter of concern and importance, of course, to the investor who purchased these issues to have the information of proforma coverage, that is, earnings times interest, and coverage on all fixed charges. You ask if it would be helpful if it were added to this exhibit. It would be additional information, but this exhibit was put in for the purpose of showing some trend back to 1935, showing the facts as to financing and as to yields. It did not occur to me that anyone would want the interest coverage at the time of issue back in 1935, 1936 and so forth. I don't think that would be helpful even in examining the trend or as explaining some of the factors that enter into the trend. Come to think of it I don't think it would be of any benefit whatsoever. I think it would be just surplusage. Yes, I think the price that was paid by the investor at the time he bought the security was influenced by that. I know it was, but at the time of the sale of these securities the coverage in 1935 is not so important as what the yield was on those securities back in that time. That is the important thing. I tried to show in the other schedule information as to coverage. You ask that if it be assumed that in 1935 a security was sold on a yield of 4 per cent, that the coverage shown by the information contained in the prospectus of earnings was three times the interest on the issue, and if in 1939 it develops that the yield was 3.8 but at that time the proforma coverage was 7, whether you would have to take into account the difference in the coverage in appraising the trend. My answer is no. That is, Schedule 6 shows the yields by ratings. Schedule 5-A shows the yields by ratings also. The biggest factor between 1935 and 1939 is the money market, the change in economic conditions, which are reflected in the yields themselves. That is what I think is the big factor. Certain coverage had something to do with it. It is not as influential in the trend as the other factors which I mentioned. The rating is the important thing in making comparisons. For instance, going back to Exhibit 185, we show Moody's Bond Yield Statistics. Bonds are classified according to ratings. Those statistics are used tremendously, and yet we don't have any information as to coverage. We find information as to ratings. That is about the only way we can tract these things through a period of years.

1652 I don't know when Moody's rated the bonds of Southern California Gas Company. It is not likely that they rate them before they are issued. In fact Moody does not rate them before they are issued. While an investor did not have the benefit of Moody's ratings at the time he bought these securities, he may have had a pretty good knowledge and information about it. Our office can tell pretty well what a rating will be before the security is even issued. You ask if the investor would concern himself with how Moody was going to rate the bonds rather than about the coverage. You bet your life he would, because that affects the price considerably. If he thought these bonds were going to be rated Aa by Moody, he would not begin to pay as much as if he thought they were going to be rated Aaa.

Here is a bond sold in July 1936 with a yield of 4.18 and another bond with the same rating sold about 8 months later with a yield of 4.23. You ask what kind of a trend that indicates. It shows a big difference in the time. 1936 was a very fine bond market. The bond market went off in 1937. Of course, the coverage had a great deal to do with the rating; and the coverage is always influential. I am speaking of the purpose of this exhibit. One of the significant purposes of this exhibit is that it shows the yield at the time of issue. By going to Schedule 5-A you can see the yield today. We find a lot of securities shown on this page were refunded, during the period covered by the schedule, at reduced prices, and in some cases at a greatly reduced yield. The coverage enters substantially into the rating because the rating considers, among other things, the security of the principal, the security of the interest; and coverage is one of the best indications of security of principal and interest.

That is the reason that that factor is considered by Moody and those who rate bonds as one of the important things which investors want to know about. I have said many times in my testimony this afternoon that coverage is a very important factor, particularly up to a certain percentage, up to about four times. Beyond that the effect of it diminishes very rapidly, and in some cases it is almost imperceptible. I don't think it is important as far as this case is concerned. You ask whether I think it would be helpful in determining the trend of bond yields over the four years covered by this schedule, either upward or downward or otherwise, if we had the proforma coverage, which I have said investors probably considered at the time they bought those bonds. As I understand your question, I don't think the coverage at the time these issues were made would add anything to the case. Yes, the proforma coverage had something to do with the price that was paid.

We show here the net cost to company; and in the case of the Southern California Gas Company there is a difference of .2 per cent in yield to the investor and cost to the company. In the case of the Arkansas-Louisiana Company there is a difference between yield of 4.18 and a cost of 4.62, or a difference of .44 per cent. In the case of the Panhandle Eastern bonds the yield was 4.23 and the cost 4.46, a difference of .23. In the case of Oklahoma Natural the difference was .35. I don't have the cost figures of the next Oklahoma Natural issue. We could not get them. We looked for them, but we could not get the cost to the company. In the case of the Southern Natural, the yield is 4.50, the cost 4.85, a difference of .35, and in the case of El Paso Natural the difference is .42. In the case of
1653 Northern Oklahoma Gas Company the difference is
.85. I don't think this cost to company, as that term is used here, reflects all of the cost of that money to the company, as a matter of fact. We followed here the usual method of giving the maturity. The sinking fund provi-

sions sometimes change the result. The issues in the great majority of cases during that four-year period have been refunding transactions. There is often a premium to be paid to the holder of the retired bond in order to get that bond, but that does not affect the cost of this new money. That is the cost of the old money. That should not be considered in the cost of the present money. If he is to get the benefit of the reduced rate of interest he has to pay the premium to do so. He pays it because he wants to terminate the old contract, just because he has old bonds outstanding and wants to issue new bonds and bring the old ones in. It is not a part of the cost of the new money, it is a part of the cost of the old that he has to pay for terminating that contract. He has to pay that cost where he wants to terminate the old contract and get the new money, whereas, if he did not have anything like that, the new money would not cost any more.

There is duplicate interest for a period of time, that is, from the time the new issue commences to bear interest until the old issue can be retired. I would not consider that a cost of new money either, because that does not affect what the investor would pay for the new bond. The fact that the company has to pay duplicate interest does not at all affect the investor's attitude toward the new bonds. That is what the company has to pay to get rid of the old contract. You ask if that is not actually a cost to the company. I look upon that more in the sense of a penalty that the company pays to terminate the old contract. I will agree with you that the set of figures on net cost to the company shown here does not include all of the cost. I will say that with good bonds issued today that the added cost of floating securities is less than it was back in 1936. I think this is due chiefly to the activity of the Securities and Exchange Commission. I think that four-tenths of one per cent would cover both the cost of printing and legal fees, and all those expenses, as well as the differential due to some of the sinking fund provisions. I would say that four-tenths of one per cent would be ample.

Now, in the case of the securities of the Northern Natural Gas Company, that bond sold, with practically no sinking fund provisions, at 3.25 yield, which is not very far from the cost. The cost would be slightly above that, but not very much. In that case four-tenths of one per cent would be exorbitant, but speaking generally of the sale of securities in the market with those usual sinking fund provisions, requiring early maturities, I would say that four-tenths of one per cent would certainly be adequate. I think the case of Oklahoma Gas, which it appears ran to .85 above the yield, was some time ago, in 1936. It would make a difference. The cost is less today than it was a few years ago. You know, the Securities and Exchange Commission and the Federal Power Commission, and other Federal agencies which have supervision of these matters, have been scrutinizing most carefully the cost of floating securities, scrutinizing the fees which have to be paid, so the cost has trended downward during the last few years. You ask whether these hearings over in Washington, the preparation of testimony and going over there to have it presented at hearings, runs the cost down. Considering all of those things, two-tenths of one per cent is what you might say is the cost of floating good bonds today, and that is floating them by underwriting, and so forth. Of course, in some instances, such as up in Massachusetts, where securities are sold by public bid, pursuant to orders of the Commission, there frequently the costs are cut down even below one-tenth of one per cent.

1654 Passing on to Schedule 7, we have some preferred stock transactions during the same period of four years which are set forth here. There are two transactions; I am sure the second is a refunding transaction. I am not sure about the first one. One was issued in 1936 and one in 1939. The 1936 issue was called for redemption on October 7, 1939. The funds for the purpose were obtained from the sale of $5.50 prior stock, according to the note on the schedule. You ask what I gather from the circumstance that in four years, January 1, 1935 to Sept. 30, 1939, only one gas company brought out an issue of preferred stock, and that at least one of the two issues, if not both of them, were refunding transactions. I know that there is not a great deal of preferred stock outstanding in the hands of the public in the first case. As a matter of fact, that is about my only knowledge of the subject. I would not say that preferred stock really has no place in the financing of natural gas pipeline companies considering the way investors regard the amortization feature in connection with bonds. It is true some authorities claim preferred stocks have no place in any picture of financing. I would not go that far. There are some who argue that certain sections of the Securities and Exchange Holding Company Act prohibit preferred stocks, because, they claim, the company shall have but one class of stock. There are many arguments about that question. I am still pursuing the middle of the road on that proposition. I think it has a place and can be used. Even if those in the business do not use it, they can use it to a reasonable extent, and it is being used somewhat. I don't say that they should use it. I say it would be perfectly logical if the companies involved in this proceeding should issue a reasonable amount of preferred stock at a reasonable cost. It would not be safe to assume that defendants' or any other pipeline company would do it in the light of what they have been doing during the years, because of the inter-company ownership of securities.

We haven't any common stock transactions, new issues of common stock, during that four-year period. You ask whether I would assume that common stock could be issued and sold on the market at a price earnings ratio proforma bearing the same relation to the cost of raising such capital that I have said the cost of capital raised through bonds has to the yield to the investors on bonds, namely, four-tenths of one per cent. I would say the cost of floating equity securities would considerably exceed the cost of floating mortgage bonds. You ask what would be the relation in the case of a company who has securities on the market, such as those shown in Schedule 5-F, between the price earnings ratio and the cost of money obtained through the flotation of equity issues. You are now getting to the point where we have to consider each individual company. You can't deal with generalities because the cost fluctuates considerably among various companies. Just considering it on the position of companies we have here, or that we find throughout the industry here, which I term an artificial condition, I repeat again that we do not have the abundance of information on natural gas companies that we have on other utility enterprises. I would like to answer your question, but I have to have a pretty good basis of assumption on which to give an intelligent answer.

You ask what per cent of the total capitalization of the natural gas pipeline industry as indicated by these 29 companies that we have left in from Schedule 5, is represented by first mortgage bonds. Schedule 5 shows on page 6 that the total bonds, debentures, and notes of the companies we have under consideration, outstanding, are 1655 $418,882,597 out of a total capital structure of $1,038,250,901, or roughly, 40 per cent. Now, when we come to individual cases you will find a tremendous variation. The variation is enormous. I have studied the patterns a great deal. Just to pick one at random, the El Paso Natural Gas Company; total bonds and notes, $9,000,000 out of a total capital structure of $12,000,000. That company's securities are held by the public and by institutions. It is a good one to take. Three-quarters of the capital structure are in bonds and notes. That appears at the bottom of page 1 of Schedule 5. Yes, there is a premium of $3,486,000 shown there. If you add that it becomes around $16,000,000. Still, there is more than 50 per cent outstanding in debt securities. The Cities Service Company shows $43,000,000 of debt securities out of a total of $73,000,000. Let us take any one you want. My point is that they vary all over the lot; you can't say that there is a representative average. The average is about 40 per cent. I am willing to make an assumption of 40 per cent of debt securities. I think that is reasonable. That 40 per cent includes bonds, debentures, notes, and so on. The bond yields I have presented as a guide and to which I have referred had to do with first mortgage bonds, generally. You ask if they do not constitute more than 20 per cent of the capitalization. They do in the case of the Cities Service. So many of these securities are held by affiliates I don't think I can answer it by companies. I would rather give my opinion evidence that I think a good sound pipeline company could issue bonds up to the extent of 40 per cent. I would like to emphasize in that connection one point which I haven't mentioned yet, but which I think is very important in connection with the soundness of securities, and that is that adequate depreciation and depletion expense must be allowed and taken by the companies in its expenses, because that goes to the safety of the investment.

You ask what percentage of first mortgage bonds do I find in these figures which I have presented in evidence. My statement is that it varies considerably. You take the Arkansas-Louisiana Gas Company and also the Canadian River Gas Company and you will find right there there is great variation. I do not show the yield on Canadian River Bonds. The stockholders own those bonds. I have no doubt but that a sound pipeline company could issue 40 per cent bonds, and would have over four times the interest

coverage, and I think that is an important thing. I think that a good pipeline company could issue bonds at the very maximum of 3.75 per cent cost—a good pipeline such as we have under consideration here. I mean 3.75 per cent cost to the company. From Exhibits 186 and 185 it can easily be shown that that would give a yield of 3.5 per cent, which I think is high. I have no doubt in the world that it could be done, and that would give interest coverage of 4.68 times, which certainly would be adequate. You ask what is the earning that I am using in order to get at that ratio of 4.68. The earnings would have to be somewhere between 6.2 and 6.5 per cent. I am not necessarily assuming a rate of return of 6.2 to 6.5 in order to get that coverage, but I say the company could easily finance under that price, possibly considerably less, but not any more. You are correct in that the earnings are to be fixed by the Federal Power Commission, assuming that it has jurisdiction to fix the rate of return. Certainly a prospective investor would take due notice of the pending proceedings. There is no question about that at all. You can reason by analogy, when you come to the interest coverage, if the earnings are sufficient to earn the interest coverage four times, I think, you could easily issue bonds up to 40 per cent. You ask on what basis I think this 6.2 per cent would have
1656 to be applied in order to get four times coverage. I
would say that your bonds would be 3.75 on 40 per cent bonds. Your preferred stock, 20 per cent, yield to the public of 5.75 plus .35 for cost of issuing, which is undoubtedly high, but it is certainly a fair figure, and the price earnings ratio of 8 per cent on common stock plus a ten per cent cost of floating the stock, which is certainly ample. Now, I have been very liberal in those figures. I have given the outside figures.

(EXHIBITS 189 and 190 were offered and received in evidence without objection.)

1657 E. D. OSTRANDER, a witness for complainant called for further examination, testified:

(December 1, 1939.)

Direct Examination Continued by Mr. Booth.

There are a few things I think perhaps should be cleared up at this time. At page 7784 Mr. Slaff asked whether Standard Statistics Company published the list of fifteen bonds used in the average of yields on municipal bonds. I find that at page B-114 of Volume 3, Statistical Section, of Standard Trade and Securities Service, a list of bonds formerly used in the index is presented. That page to which I made reference is in a publication or a section of Standard Trade and Securities Service dated in 1936. In 1937 the average of yields on municipal bonds was revised on the basis of a new list and it was worked back to 1934 on the basis of a new list. I wrote Standard Statistics Company and they have sent me the present list. If you want a copy of that in the record I can hand it to the reporter and have it copied in if you want it.

I might add I believe there was some question as to whether that was a weighted or simple arithmetic average. I am informed it is a simple average.

At page 7785 the Examiner asked me how the yields on government bonds as shown at page 5 of Exhibit No. 180 were prepared. At that time I believe I said it was based upon bonds not due or callable within eight years. I find in a recent revision that was given in the December, 1938, Monthly Bulletin of the Board of Governors of the Federal Reserve System that they are now using U. S. Treasury bonds not due or callable within twelve years and that is true back to 1926, but prior to 1926 it is still the eight-year basis.

I talked to one of the men in the research department of the Chicago Federal Reserve, and he informs me that this yield of U. S. Treasury bonds is a weighted yield. That is all the information I have on that point. I have nothing further on that particular point. With respect to the figures which I show on page 5 of Exhibit 180 I observe that the 1932 figure for yields on U. S. government bonds should be 3.68 instead of 3.66, as shown there.

If I recall correctly I was also asked something about how the bond yields shown on page 8 of Exhibit No. 180 were prepared. I made some discussion of that at the time. That refers to Standard Statistics Company's bond yields by class of rating and by industrial groupings. My information from Standard Statistics Company is that it is a simple unweighted average, not weighted. There are some other comments there. I don't know whether you want to have those in the record or not. You can put the letter in too. It is quite agreeable with me. I would like to indicate I wrote two letters to Standard Statistics Company, one about the municipal bonds and one about the corporate bonds. In this letter, which I understand is to be copied into the transcript, the first two paragraphs of the letter refer to the municipal bond yield information and the third paragraph refers to the corporate bond yield shown on page 8 of Exhibit 180; just so there will be no misunderstanding.

1658 "Standard Statistics Company, Inc.
345 Hudson Street, New York.

"November 17, 1939.

"Mr. E. D. Ostrander, Supervisor,
Rates and Research Section,
Illinois Commerce Commission,
160 North LaSalle Street,
Chicago, Ill.

Dear Sir:

"Enclosed is the list of municipal bonds used in our index. This list was revised in 1937 and extended back to 1934. The record of this revision may be found on pages B172, B179, B184 of the Volume 3, Statistical Section of Trade and Securities.

"The yield is a simple, unweighted, arithmetic average. Since January, 1929, the monthly average is obtained from the four or five weekly observations by using the simple arithmetic average.

"Our index of bond yields by class of rating is based upon the yield to maturity of a representative list of bonds in each group. Bonds having any extraordinary yield, thus called bonds, short term maturities, bonds, selling above call prices, are excluded. A simple unweighted average is obtained from the resulting representative list.

"Trusting the enclosed information will prove useful to you, we remain

"Yours very truly,
Richard Doyle,
Economics Division."

"List of Municipal Bonds

1939.

Baltimore	4s	1958
Boston	4s	1957
Cincinnati	4½s	1955
Dallas	4½s	1957
Denver	4½s	1956
Los Angeles	4½s	1957
Memphis	4½s	1956
Newark	4½s	1959
New York	4½s	1981
Philadelphia	4s	1966
Pittsburg	4½s	1950
Providence	4s	1960
Richmond	4½s	1964
St. Louis	4s	1950
San Francisco	4½s	1960"

1659 Now, at page 7827 I indicated that the rate of turnover of bank deposits should also be considered as well as the mere volume of bank deposits, but on checking over the transcript I feel perhaps I did not tie the two things together very well.

To state it very briefly, the slower the rate of turnover of deposits the greater the idleness of the funds, or the greater the amount of funds the bank might have available for reinvestment. That is particularly true, as any given bank, any individual bank whose deposits are turning over very rapidly would probably keep itself in better position than the bank whose deposits were turning over very slowly.

There is one other thing, at page 7836, beginning at line 12, I said:

"When the member banks acquire U. S. securities, no immediate expansion in deposits and reserves results unless the member banks borrow in order to buy securities."

That statement is not correct. I don't know how that got in there. I have no doubt I said it but I want to make some correction in it.

When member banks buy U. S. government bonds it doesn't increase the reserves. It may affect the division of total reserves as between required and excess reserves, but the total reserves are not affected. When banks buy U. S. government bonds it does affect the volume of deposits, contrary to what I said earlier here. When the banks use their own funds to buy government bonds it is the same thing as extending deposit credit to the government, if they are buying new issues, the government in turn will spend that money and it becomes deposits somewhere else in the banking system, so ultimately it does become deposits, an increase in deposits. I wanted to make that clear. Of course, that same inaccuracy is indicated along about lines 19 and 20 on page 7836.

There was one other matter. At the time the direct testimony was given Mr. Morgan asked me some questions about this money market testimony. After thinking it over I got the impression he was asking me if this represented a rehash from something else. I answered at the time that I believed everything I had put in and said it could probably be found in the reports of the Board of Governors of the Federal Reserve System. I am referring to my statement shown in the record at about page 7838 at which time Mr. Morgan asked me if the affirmative statements that I had been making about Exhibit 183 were contained in the sources and merely abstracted or paraphrased by me, or whether they were my own interpretation of what the figures taken from the authorities show, to which I answered "I would say partly both." To avoid any indication I was not being completely frank I want to say testimony very similar to this and an exhibit almost identical to this were put in the Peoples Gas Light and Coke Company case before the Illinois Commerce Commission by another person who at that time was a member of my staff, he, another member of my staff and myself working up the material. For the purposes of the present case I largely brought the statistical material down to date, although I did attempt to shorten it in some cases a little bit.

I believe that is all I have at this time except I handed to Mr. Booth a copy of the corrections of a more routine nature.

I left residence at the University about November, 1929. I had not finished my degree at that time; that is, I was lacking a thesis. I continued on that and finished it up in 1931 and received a degree in 1931. I went directly from the university as a student to the Investment Research Corporation of America at Detroit. You ask what was the scope of my duties while I was with Dr. Edie over there at the Investment Research Corporation of America. I can best explain that by indicating briefly the nature of the organization. We had a group of men there that were called industry men. It was their duty to study industries generally. We had a group of men we called company men and they devoted their time primarily to specific companies within an industry and then, of course, we had the economics division, with which I was associated.

Our duties in the economic division were to collect and prepare the information on economic conditions, prepare forecasts of economic conditions in general, and in more specific lines where possible, for use by these other men. That is, they would predicate their opinion somewhat upon our opinion as to the general outlook. Obviously you can see that the two are related.

Now, getting down into more detailed work, I do not recall very specifically all the things I did, of course, but I can enumerate some of them. I did quite a bit of work with industry profits and with the studying of price earnings ratio. In fact, we constructed an index of industry price earnings ratios extending back to 1900. I also worked with other economic series in attempting to analyze them and project them by statistical means, such as the curves of automobile production and registration, and we also kept some figures in series on the condition of the Federal Reserve System, including both the Federal Reserve Banks themselves and the member banks.

We had two men, I believe, who were devoting their attention primarily to public utilities. I worked with them as well as the other men in the organization in discussing various aspects of our research. My work was of a statistical research character, I would say.

When I went with Mr. McKinsey my work was primarily public accounting. I am not a certified public accountant. I have never engaged in the private practice of accounting. I have kept books, but I have not been an accountant in the sense you have indicated. When I was with Emery, Peck & Rockwood, of Chicago, my work was more in the nature of investment work. I mean I had more call upon accounting knowledge there than statistical knowledge. We dealt with financial statements more than economic statistics.

Of the ten years since I left the University I have spent six of those years with the Illinois Commerce Commission. You ask what kind of position I first had with the Illinois Commerce Commission. I went in there as a member of the staff of Dr. Raver, Dr. Paul J. Raver, who was head of the research division there. I think I might have been referred to or was referred to as a financial analyst, a title that I hold no particular brief for. Thereafter, beginning, I believe, about the first of July, 1935, I was designated as assistant supervisor of the section, and those changes in title relate partly to budget problems over there. I mean, when the new group was organized there was no direct provision in the budget for such a section and such a title, you see, and it was not until 1935 that that was organized along those lines. And then on March 1, 1937, I was made supervisor of the section at the time that Dr. Raver was made executive officer of the Commission. 1661

My title is now Supervisor of the Section of Rates and Research. I work with Mr. Kleinman many times, but not under his direction particularly. I am not a member of his staff. He is in the Division of Accounts and Finance, I believe he calls it.

I have devoted a great deal of my time to statistical research in various fields. I have studied the statistics of the revenues of the Illinois public utilities. I have made rate analyses and comparisons and studies in relation to accounting and statistical procedure, and reports of utilities. I believe the monthly reports of the utilities to the Illinois Commerce Commission come to my division. The annual reports come to Mr. Kleinman's division, but we make a great deal of use of them. Generally speaking, I am familiar with the nature and scope of those reports. I often have occasion to refer to them and to use them in my statistical studies, particularly those of the electric and gas companies. When I say rate analyses, I am referring primarily to analysis of the effect of proposed changes or revisions in rates in terms of revenue to the company, or looking at it from the other end, in terms of bills to consumers. Part of it means the taking of a rate schedule and stating it in terms of dollars. We sometimes apply that, of course, to what we call consumer analyses to measure the effect in revenue. By rate comparisons I mean simply a comparison of charges under one rate as against charges under another. Oh, yes, I think that has something to do with comparing the rates of one concern with the rates of another concern. We resort to that sort of thing in connection with our work on rate comparisons. We do that just to get the level of rates in different localities. I think that is important as a part of rate making studies, to know what rates are being charged by others.

I have never compared the city gate rates of the natural gas pipeline companies that deliver gas or sell gas in the State of Illinois with the rates of other pipelines. I have not gone so far as to compare the rates of these pipelines which sell gas at the city gate in the State of Illinois with the rates of other pipelines which receive gas from the same source, namely, the Panhandle field in Texas. My reason for not doing that is not that I do not think it is important. I think it would be interesting and worth while information to have. I just simply have never done it. You ask whether I think that would be worth while information to have in connection with a rate study of any particular pipeline such as defendants. I don't think it would be of great value. I mean the rates of this company are a problem somewhat separate from the rates of other companies. The only purpose or use that might be made of such information is just a broad background or basis of forming judgments. I said such a comparison was important from the point of view of knowing what the level of rates is in different communities. It is a matter of information. I do not think it is as important from the view of public information, of course. It is important for the Illinois Commerce Commission in the sense that they might look at one and if there was a vast difference inquire as to what reasons there might be in justification for that.
1662 I mean, you can only use those comparisons as the broadest sort of starting point. Whether or not I think it important or proper is not the reason why I did not do it or would do it. I mean I just did not do it, that is all. I never gave it much thought as far as that goes.

The amount of work I can do is distinctly limited, and this case has already taken up too much of my time as it is.

For my own information I would like to know whether Chicago is buying gas cheaper or higher than any other city to which gas from the Panhandle field is being sold. I do not know whether or not the price paid by the Chicago area utilities for gas coming from the Panhandle field is lower than the price paid by utilities in other localities for gas coming from the same field.

You ask whether or not if, it should turn out from further testimony to be offered in this case that the price of gas sold by the Natural Gas Pipeline Company to its distributors at wholesale is the lowest price at which gas produced in that Panhandle field is sold, I think it would be an important factor to consider in connection with arriving at a proper rate at which defendants should sell their natural gas. I think I can answer that along the same lines that I have already answered some of your questions. If I were setting about to form an opinion as to the rates of the company, if I had information as to these other rates to which you have referred, and if it showed that the other rates were much different from the Chicago rates, that would be of interest to me as a starting point to ask why those differentials are there—whether they are based upon justifiable reasons, or are something that is due to some other factor that is involved there; but in a proceeding of this kind it seems to me that you cannot try the rates of all the other companies that are dealing in natural gas.

You ask me to state just what I start out doing when I enter upon a research in connection with the problem of a fair rate of return. I start to collect information on various subjects that have been indicated to be elements to which some consideration should be given in forming a judgment as to a fair rate of return. You ask what elements I think should be given consideration.

I do not know whether I can recall a complete list, or I do not know whether I have arrived in my own thoughts on the matter at a complete list. One factor that has been mentioned by the courts is risk. In connection with that there are a number of subsidiary factors or points to be considered as matters upon which judgment can be formed as to the amount of risk. For example, the territory served. The nature of the product might have some bearing upon the risk. The nature of the operation. There are probably a number of other things that I do not recall offhand.

Courts, I believe, have mentioned cost of money. Financial history of the company. General level of interest rates. Economic conditions. There are probably others, but I just do not recall them now.

I have devoted my time to other phases or other elements and have not given consideration to the element of risk in my preparation to testify in this case. My testimony has no relation to risk particularly that I can see in connection with rate of return. Personally, I think risks should be considered. You ask whether I recognize that it is a fact that the present interest rates, present volume of idle money, or money not invested in industrial enterprises, the present volume of investments in the very highest order of securities, such as government bonds, short-term bank loans and corporate bonds of the highest ratings, indicate 1663 that the investing public is more concerned with safety and security of investment than return on investment. I do not believe I could answer that question categorically. I mean, there are lots of factors to consider as to why this thing is where it is. It is not a matter solely of risk; it is a matter of what is available. What is available is one of the factors. You ask whether I agree that there is a tendency to demand more compensation for risk at this time than in past years, relatively speaking. Frankly, I have not made studies adequate to enable me to answer that question.

This Aaa bond is called A-1 Plus by Standard. Moody's B bond is called B in Standard's, if I recall correctly. I have not studied the spreads between the yields on those two classes of securities at the present time as compared with recent years. I have not studied the spreads between the yields on A-1 Plus bonds and any of the other lower grade bonds. I have not made a check to determine whether there is a wider spread between the yield on the A-1 Plus bonds at the present time as compared with the yield on those lower classes of bonds, beginning with B, than a few years ago; but I would judge that it is probably a fact. That is attributable in part only, I think, to the fact that as you leave the A-1 Plus bonds and go in the direction of B bonds you are getting into risk considerations and risk elements. Without making a more comprehensive study of it, I hesitate to say that there is a marked tendency to avoid risk or to demand higher relative rates of return for risk as compared with rates of return on safe investments at this time than there was a few years ago. I mean there are a number of factors besides risk. Risk is a relative thing. The compensation demanded for risk may vary because of the degree of risk varies, and so forth. When I put this material together I do not think I had in mind the attitude of the investor toward the element of risk. I think I summarized somewhere this exhibit on interest rates to show it was merely intended to show the trend of interest rates of various kinds. I am not appraising this data. Obviously I have not formed a judgment as to the proper rate of return and therefore there has been no occasion to interpret it. I was asked to put in some information on interest rates. I do not know how else you can measure interest rates. These data are there for whatever weight and consideration other people want to give to them.

You ask whether I expected Mr. Kleinman to reach a judgment from my evidence rather than to reach that judgment myself. I have not even read Mr. Kleinman's testimony except that I am familiar with a brief section with regard to some risk factors. I do not know what rate of return he testified to. I don't know what use [illegible]. Kleinman made of my material or if he made any use at all of it. There might have been a tacit understanding that Mr. Kleinman would consider interest rates as a factor; and he might look at what I did or was going to do; but I don't actually recall that we had any formal understanding about the matter at all. The only thing I knew Mr. Kleinman was to do was to have some material in connection with risks of some sort or another on the general subject of rate of return testimony. That is all in the world I knew about it, not that it makes any difference; but I did not work with Mr. Kleinman before he gave his testimony.

I suppose Mr. Booth distributed the work that was to be done in presenting this testimony on rate of return as between Mr. Kleinman and myself. In part, I prepared what Mr. Booth told me to prepare. I mean, I testified to 1664 different things here. I can't recall that directly, because part of this work was done last spring with the thought that I would go on the witness stand right at the first. As I recall, Mr. Booth or Mr. Olmsted asked me to prepare some material on interest rates and some material on financing by natural gas companies, and submit information on money market factors. The other thing to which I testified was something I developed and suggested I would like to testify to; that is, the matter of those mathematics and this amortization problem. I suggested that to Mr. Booth.

I was told Mr. Kleinman would do something on rate of return. I did not know how he would go about it. I assumed that he would express a judgment as to what the rate of return ought to be; but I did not know actually that he would. I think I knew since that time by his testimony; but I didn't know actually what per cent he would actually name, if he named one. I did not know that. I don't know whether I was asked to determine affirmatively what the proper rate of return was. I don't think it makes any difference.

Last spring I believe I prepared some summary data from my studies on public utility financing, a copy of which I think went to Mr. Hedrick, with the thought that that might be included, but I decided later to withdraw it. The material I presented, with the exception of Exhibit 182, was prepared at the general direction of Mr. Booth, who told me to prepare something on interest rates. I think that is substantially accurate. Sometimes it is hard to draw a line when you are in a conference and discussion as to where the originating source was. I mean, we are not too formal over there on these things.

My testimony on cost of money was used in former rate cases. You ask what kind of capital money was involved in our studies on rate of return over at the Illinois Commerce Commission. I think the three principal types were bonds, preferred stock and common stock. Of course when we come to common stock we have a somewhat different problem than we have when we have the others. I do not have anything to do with the approval of securities up there. You ask how many financing issues have been referred to the Illinois Commission in the past four years. There have been a considerable number of them. I am only familiar in a general way with it, because it is usually listed in the Commission's annual report, for which I am responsible. As to volume, they have had largely to do with bond issues. In terms of number of issues I think that is true also. There has been stock issued for various purposes. I don't recall all the issues. I cannot tell you whether any new issue of common stock for the purpose of raising capital has been submitted to the Illinois Commerce Commission for approval during the past four years. Had such an application been submitted I would be apt to know something about it in a general way. Just how precise my knowledge might be I cannot say at this time. You ask whether or not I can ascertain whether there have been any issues of common stock referred to the Illinois Commerce Commission for approval for the purpose of raising capital in the last four years, 1936 to 1939, inclusive. That is going to be a tremendous job, of course. You suggest that I ask the secretary. He won't know. In order to answer your question I would have to make a detailed study involving weeks of work on my part.

You ask whether I think in connection with the overall
financing of a gas company that it is important to
1665 know whether or not there have been any applica-
tions for the approval of issues of equity securities
for the purpose of raising new capital. I think I have a general idea, if that is what you want. I am willing to say I am reasonably confident that the amount of new capital issues involved during this period has been very small, if that is satisfactory. I am not granting anything now about what that might mean or what the significance of that might be. Those are just the bare bones of the facts; whatever interpretation may be put on them is something else. I think there have been some, particularly by the smaller companies.

I was going to say that these compilations of the Commercial and Financial Chronicle on utility financing, new utility flotations, are split into refunding and new capital. But their classification is very bad from an economic point of view. It is reasonably sound from a corporate point of view, subject to numerous errors. But unfortunately, those statistics have gained wide circulation, and people look at them as being an authoritative index on the volume of new capital. But analyses have been made to show that they are pretty bad from an economic point of view. That is the point I am bringing out here.

I testified in a number of cases, as I stated on direct, with respect to such factors as cost of money. I think I have mentioned in my direct testimony all the cases in which I have testified on the cost of money. In every case in which I have testified, with one exception, I have testified as a witness on behalf of the Illinois Commerce Commission. In that one exception I testified as a witness on behalf of the City of Cleveland. I don't know how the case got to the Commission. The city had passed an ordinance and the company appealed to the Commission.

You ask whether I remember what my studies in connection with my work with the Journal of Land and Public Utility Economics revealed as to the kind of financing that has been going on in the past four years as between refunding and new money transactions. That study shows obviously that a very large portion of the total represents refunding financing. I want to also say that up until the last few quarters of my studies I predicated my figures pretty largely upon the Commercial and Financial Chronicle's compilations. After I became aware of how bad those compilations were from the point of view of new capital, I abandoned the practice of showing that index number, in which I showed the index of both new and refunding and total. I avoided that practice, and I avoided, if I recall correctly, statements of too categorical a nature as regards the volume of new capital financing versus refunding financing. I mean, I avoided being too precise about it; although I will still grant the great bulk of financing in recent years by public utilities has been of a refunding nature, for reasons which I think are apparent, but which I will not go into now. I would be inclined to think that that is true of other classes of business besides the public utilities. I haven't made the detailed studies, but I would suspect that that is true.

You ask whether or not it is more or less costly to raise additional capital by an issue of securities or to refund the existing indebtedness through the issuance of new securities. I think I know what you are trying to get at. It probably will require quite a dissertation to answer it. I recall, for example, this; quite a number of companies have brought out a number of different issues, I mean this
1666 year maybe an issue and next year an issue, and so
on, several times during the past several years. Now, I recall one case specifically where there were a couple of refunding issues, a new capital issue and then a refunding issue. The new capital issue was among the lowest cost issues for that particular company. I think in order to appraise that you have to realize money market conditions change during the period, too. I mean, as of a given instance of time what difference there might be as between the volume of new capital financing versus refunding issue for a given company, what differences, if any, would

depend possibly on fortuitous factors with regard to the elements to be taken into the computation. I don't know whether I make myself clear. I am trying to be as brief as I can. You ask what would be the difference in the cost to the company raising the original capital as compared with raising the same amount of capital in a refunding issue. I think again of this one instance. I just don't believe that the cost would have been very much different at that time for that company regardless of whether it was a refunding issue or a new issue, subject to the method by which you might measure cost. I mean when you measure cost on refunding issues there are various ways you can look at it, depending upon what you are going to include in the costs.

You ask whether, to apply the question to a natural gas pipeline company, I would agree that that part of the indebtedness represented by bonds would cost more through a bond issue at the time the pipeline was about to be started than it would after it was put on a going basis, everything else being equal. That involves, of course, a lot of assumptions, but I think if I understand you correctly probably it would cost a little more for the company to get money when it starts out than it does when it has been in business a number of years. I am not going to argue that question. The significance, of course, is something else. How you would treat it, and talking about taking into consideration the amounts involved and the changes in the money market and other developments in the investment field generally, and so on, I don't know how you would appraise it. You ask what is the comparative cost as between a refunding issue for the purpose of taking up an existing indebtedness and the cost of obtaining additional money for the purpose of making extensions and expansions by the same industry and at the same time. The thing I was talking about a moment ago depends upon the statistical methodology of comparing costs and it depends on certain of these fortuitous factors, the amount of the call premium, the amount of duplicate interest, and so on. I mean as of a given point in time and as of the same company, it is conceivable that company can afford to raise new capital and could raise new capital where they could not afford to refund an issue, if I make myself clear. That is on account of the cost involved in duplicate interest in paying off the premium of the old indebtedness to get possession of the bonds and other various refunding costs which I term somewhat fortuitous.

You ask which will sell at the lower yield to the investor ordinarily, an issue of bonds solely for the purpose of taking up an existing issue of a company which has an earnings history already accumulated, or an issue to raise additional capital for the purpose of making expansions with the hope of increasing the earnings. I frankly don't know that there would be any significant difference between the two. My studies have shown over the past several years that given companies have done just that, except that the refunding issue, of course, and the new capital issues were not exactly together in point of time. There might have been a lag, an interval of time between the two; but on
1667 the basis of that I don't think there has been any distinction of significance between the yield to investors on a so-called new capital issue and a so-called refunding issue.

You ask me to assume a company with $20,000,000 of capital, with $8,000,000 of bonds, and earnings times interest on the bond issue of 5 to 1. You then ask if that earnings times interest ratio would be a very important factor from the standpoint of the investor if he were considering buying a bond issued for the purpose of refunding that indebtedness. I should say the investor certainly would look to the interest coverage as one of the factors. I would not go as far as one of the company witnesses did before the Illinois Commerce Commission in which he said that because of their refunding, because of the lower interest rate and consequent improved coverage, an investor would want the issue, which is tantamount to saying if the company is now earning its interest one time, that is, earning its interest once, and obviously if they put out issues carrying half the interest they would earn the interest twice. I would not say that that is a factor which would induce the investor to go into the refunding issue. One of the factors in which he would be interested is the earnings times interest ratio in relation to that series in which he was considering investing his money. He would be interested also in the over-all picture. There are a great many other factors, of course. You ask me to assume that $8,000,000 of bonds is to be refunded by an issue of securities and that the earnings of the company show that the earnings times interest on a new issue of securities is 5 to 1, and ask whether or not that circumstance would enter into the price which an investor would pay for the bonds. Obviously, it seems to me investors would look at the interest coverage of an issue they were about to buy as well as look at a lot of other factors. That is only one. Just how they would weight it and appraise it is something else again. There is no denying they would look at that and consider it. It would have an influence on the price. I mean the amount of interest coverage requirements so far would have an influence.

You ask me whether, in the event that same company decided to expand with a view of increasing its revenue and at the same time as this refunding operation wanted to get $4,000,000 of new money to put into additional extension and expansion of facilities with a view of increasing its earnings, that second issue of bonds, in determining the earnings times interest, would have to be weighed in connection with the interest requirements on the refunding issue. I think an investor would give consideration to the fact that it is the second mortgage, certainly. He would take into account the whole financial position of the company. He would consider there was interest ahead of his and he would look toward the over-all charges upon the same. If there were debentures after his second mortgage, even though his claim is technically senior to debentures, nevertheless the company might by virtue of the debentures get into difficulties that would be embarrassing to the second mortgage, even though he might in reorganization come out with no reduction in his principal amount. Investors look at all those things. The earnings times interest would have to be figured on a basis of the earnings times interest on both issues in that sort of situation. If the first mortgage interest is being covered by a very nice margin the effect upon an investor as regards the coverage on his second mortgage is much less than if the first mortgage interest is not already being earned by such a good margin. The weight to be given there is something different from the fact that the weight would be given. You ask that if the earnings times interest ratio on the first issue is 5 to 1, the earnings times interest ratio in relation to the second issue would necessarily be less than 5. I don't think that is necessarily so. You just can't dovetail these things together as precisely as we are trying to do here. There is a presumption
1668 that the new capital being put into the business will also earn money. As a matter of fact, very frequently the financing is accomplished in this fashion. The funds used to construct the properties are advanced from

the treasury funds of the company and the treasury is replenished some little time later by the proceeds obtained from the so-called new capital issue.

As a matter of simple arithmetic, if in taking into account only the prior issue, the earnings times interest is 5, the earnings times interest would be less than 5 on the later issue. The arithmetic would be the same whether or not the second issue was tacked on to the open end of the prior issue. If the extensions were to be made with the hope that they would increase the revenues, any figures concerning the increased revenues at the time would necessarily be proforma, unless you have the situation I gave a little while ago where a new capital issue is raised for the purpose of reimbursing the treasury for capital expenditures already made. If we are doing this financing today, the earnings times interest is known because we have the earnings history right in front of us for the past year. I have already said, not taking into account certain factors that as a matter of arithmetic the earnings times interest ratio would be lower if we take in the $4,000,000 additional for the purpose of making extensions to be started as soon as we get the money. As a practical matter the company might project estimates of future earnings as a result of those extensions. The only way we could get that earnings times interest ratio back up to 5 would be to take into account some of those future earnings that are yet to be demonstrated as a fact.

You ask whether an investor would invest his money at a lower yield if the historical earnings sustained the relation of 5 to the interest than if a part of the earnings was yet to be demonstrated by extensions to be made in the future. It seems to me it is a matter of degree. I mean, I am willing to grant possibly for a short time a large addition to the funded debt would cause some decrease in the coverage ratio, but how large that would influence the investor is another matter. I have no particular objection to trying to answer the question. I think it is rather an interesting problem. There are many difficulties in trying to arrive at an answer. I am not just sure where we are. As far as I can recall I was attempting to distinguish between people giving weight to something and whether or not that would be an influencing factor. I think you have to look at these things from a reasonable point of view. If a company had a huge increase in its funded debt for the purpose of getting a great deal of capital, and if it were the investor's opinion the probabilities of earning on that additional capital in such an amount, I mean, if such amount exceeded the reasonable requirements of the company, he would give it more consideration than he would otherwise. If, as the thing stands, he has plenty of protection, if as the thing stands before the refinancing for the new financing he has good protection, then, he is not going to be concerned about a slight change for a short period because he will have to convince himself first that the company requires this additional capital and can employ it in a profitable fashion in its business.

Questions Interposed by the Examiner.

You ask me to assume that there are two investments available for a person who has money to invest; that the companies are identical, that is one has a total capitalization of $20,000,000 and the other has a total capitalization of $20,000,000; each has an outstanding issue of bonds in the sum of $8,000,000; the only difference up to that point is he can get several bonds of the first company and he can't get any of the bonds of the second; but the second company is floating an additional issue of $4,000,000 and he can acquire several of those bonds. With respect to the first issues he knows that the earnings times interest ratio
1669 is 5 to 1. He doesn't know what the earnings times
interest ratio is with respect to that of the second company after the additional issue. In the way of a price matter, as in which company he would be more inclined to invest, I just cannot make the categorical sort of answer that would on its face seem to be called for. There are so many factors that it is pretty hard to isolate one of them and say that that would be controlling. I do not think the distinction is so important as the tenor of things would seem to indicate, because there is always a thought certainly that the additional funds will earn money. There is always the question of the availability of the other issue. That is, here is a large insurance company that wants to buy a million or two or three millions of an issue, and the public cannot do that with the market conditions existing. They have to turn to new issues. Sometimes they are willing to pay a good price for them because they can get the quantity they want. I have known of bankers to so testify

in rate cases. I don't know whether that satisfies you or not.

I am willing to grant you that under the No. 2 situation, where there is new money raised, there is the possibility of a dilution in the times interest earned figure that the investor would consider, but there is a possibility of a reduction, at least for a while. I do not just like to say or to chop these things off too abruptly. You cannot be too absolute about them. They are considered, certainly; I would not deny that at all. How far they go in influencing an investor to make up his mind, I do not know, because there are so many other things.

Cross-Examination by Mr. Morgan Resumed.

You ask whether I think it is important to know whether it would influence an investor before I take those refunding rates of yields as a guide in fixing a rate of return for a company in a rate proceeding. I think some consideration should be given to that, if it is such a great possibility, and I think I have already said that that distinction, as a matter of fact, seems not to have been one that is an appreciable measure, looking at the actual facts of this period.

I have stated that the great bulk of the financing in the last several years has been of a refunding character. That refunding has been largely in bonds, debentures, and notes. They have been principally bonds or debentures of the higher rating groups, say from Baa on up. You ask as among the four classes listed by Moody where has the principal part of the financing been done. I haven't made such an analysis. I really don't know. I think there are some figures in the record on that.

(At this point counsel for defendants handed the witness a copy of Dr. Dorau's Exhibit #152.)

You have referred me to page 37 of Exhibit 152. I imagine that this correctly reflects what it purports to reflect in the way of factual information. From this exhibit I would say that the comparative volume of Aaa and Aa financing to the total is much larger during recent years than it was during the four years preceding 1929 or preceding 1930. If the A bonds be included as among the higher rated bonds, the bulk of the financing during the past four years has been in those three classes of bonds, Aaa, Aa, and A. A relatively small amount has been in

Baa and the lower ratings of bonds. You ask whether that circumstance should have any bearing on the weight that ought to be given yields in a rate of return study. I think one should examine the reasons for that and take those into account, whatever they might be. I mean the reasons for the increased relative volume should be taken into account. There might be several reasons for it. You ask whether it is reasonable to assume that the yields on
1670 the type of bonds that have been involved in these transactions would be smaller than on other types of bonds of lower ratings. I think that is a fact, that the yields are lower on the high grades than on the lower grades.

You ask that if we are examining a general curve dealing with the subject of bond yields, knowing that those transactions were largely refunding transactions and largely of the higher grades of bonds, it would be very important to take those factors into account in weighing the bond yield as an element entering into a rate of return study. I think that this shift in proportion here must be taken into account in appraising any data that purports to show the average yield on new issues. Just as I pointed out in my articles on financing, I believe you perhaps noted a number of times, both facts; that it is largely refunding financing, and largely refunding financing of the higher type securities. Those facts are pertinent to any interpretation of the average rate of yield on new financing over a period of time. I don't mean, though, that it does not have as much pertinence to bond yield averages of all types. That is something else. I mean yields on bonds such as I have shown here, and I have shown them down to the very lowest grade. You ask if we averaged the yields on the types of bonds which are involved in most of the transactions with the yields on the relatively small proportion of bonds of lower ratings and higher yields, whether we would get a true picture of the average yield on bonds. If I took the average yield on all new public utility bonds floated in 1938, and took the average yield on all public utility bonds floated in 1928, and compared those average yields, one of the reasons for the difference might be due to the difference in the composition of the material upon which the basis of average was made. I don't think there is any argument between us except as to the manner of stating the facts. I get a true picture as regards the average of what was done in one period as against another; but in comparing the things averaged, if it extends over a period of time, it becomes pertinent to go behind the statistical computation and see what was being averaged. Of course, there is no argument about that. I don't quite see your suggestion that that must be taken into account in appraising the trend of these bond yields over a period of years. I say that the change in composition must be taken into account in appraising the change in the average based upon all new capital. Now, you are going from that to bond yields on outstanding issues of all classes, and so forth. That is different. If you came to me and said, in 1938 the average yield on all new public utility bonds floated was 3 per cent; and in 1928 the average yield on all public utility bonds floated was 6 per cent; I would say, in order to explain that, of course, you have to look, among other things, at the comparability of the composition of the total as of the two dates; and the fact that it was predominantly high grade financing at one time, and less high grade at another, would be one of the factors that caused the decline.

You ask me as between bonds and preferred stocks what is the relative position of preferred stocks in the securities picture as compared with the period prior to five years ago. The volume has decreased. I would say that there has not been a great deal of preferred stock financing in the past few years. There have been some very important issues, however. You ask what is the relative percentage of the total capitalization represented by preferred stock in the new issues of securities during the past five years as compared with the period prior to the last five years. If I understand you correctly, I will say that to the best of my knowledge, without actually having gone into a very precise study of the problem, the percentage of capital stock financing to the total public utility financing during the past few years is probably less than it was prior to 1930, probably quite a bit less. I don't know the precise figures on it. I really don't know whether the preferred stock is a larger proportion of the total now than it was five years ago. I know that some preferred stocks have been refinanced, but that would not change the picture. If I recall correctly, some preferred stocks were replaced by
1671 bond issues, which would tend to increase the proportion of bonds, relatively speaking, and decrease

the proportion of preferred stocks, but beyond that I don't know. You ask if the practice of resorting to preferred stock in the issuance of securities during the past four or five years is resorted to more less extensively than prior to the past five years. I think there has been less use of preferred stock, if that is what you mean.

Common stock is what is commonly referred to as equity capital. The proper term is equity securities. There have been relatively few common stock issues. I have an idea as to the comparative cost of raising capital through common stock issues and through bonds. By and large, common stock money costs more. In so far as there is such a thing as cost of money on common stock it would be higher. If there is to be an over-all refinancing of a company's securities, the common stock would be one of the things that would have to be dealt with. If we were trying to arrive at the cost of financing on the basis of certain proportions of bonds, preferred stock and common stock respectively, as constituting what a witness has termed sound financial structure, the cost of raising the capital represented by the common stock would be one of the elements that would have to be considered. I think it would be just as important to determine the cost of raising capital by common stock for the amount represented by common stock as it would to ascertain the cost of bond issues for that proportion to be raised through the issuance of bonds. The full information concerning bond yields, after all allowances have been made for the proportion of bond transactions that have involved refunding and high-grade bonds, and for all of the other factors that enter into the weighing of the yields on bonds, does not give sufficient informtaion to arrive at the cost of the over-all financing of a given industry. A judgment would have to be formed as to the cost of the equity capital. This matter of cost of equity money or common stock money is quite a different thing from the cost of bond money, but with that observation I would say, yes, it is necessary to arrive at the cost of the equity capital. Bonds are contractual obligations in which you have definite prospects, definite promises, definite expectations, and by arithmetic you can arrive directly at a figure that we call cost. You cannot do that in the case of stocks.

You ask if it is more difficult to arrive at the cost of equity capital than it is to arrive at the cost of bond capital or a funded capital represented by first mortgage bonds. I think the point is that you cannot actually get what you call cost of equity money. You can attempt to appraise it and arrive at a judgment along those lines as to what a reasonable cost figure it. It involves a rather extensive study over a period of time. No such figures are readily available in the same form that bond yields are available. You ask why not go the whole way and exercise judgment about the cost through the issuance of bonds then, if the cost of equity capital has to be a judgment or opinion figure. I think one has to exercise judgment as to how far one goes in putting information in. As long as information on certain things is available, I see no objection to putting it in. If other information that requires a great deal of assumption in order to arrive at it, and a great deal of work in order to obtain it, is not put in, I do not see anything particularly startling about it. I think that by and large common stock money probably has what we might term a cost that is higher than high-grade bond money. I think high-grade common stocks probably sell at a better basis than the poorer grade bonds. It is all a matter of degree. Some common stocks sell on a very good basis.

1672 I am not sure that I know of any method of appraising the relation between the bonds and stocks as regards cost. I recognize that there is a difference between the yield to the investor and the cost to the company in the event of the issuance and sale of a bond issue. From my experience on new financing in recent years, the difference between the yield at which the securities were sold to the public and the cost of money to the company on the new capital basis averaged around two-tenths of one per cent. That is what I found in these articles on financing in recent years. In individual cases it goes to four-tenths of one per cent, certainly. I was talking about the average.

We do not have common stock yields in the sense that we have bond yields. You ask what we have in connection with common stock transactions from which we can arrive at something related to bond yields. There is a dividend yield which you can study, and also an earnings per share or dividend per share. There is also what is known as price earnings ratio. By the latter term is meant the market price of the stock dividend by the earnings per share on the stock. That is the simple one. You ask what would be the spread between the price earnings ratio on stock sold in isolated transactions such as occur in stock markets, for instance, and the cost of financing through the issuance and sale of a whole issue of common stock. I am not just sure.

It seems to me you might be able to work out something if you had enough data to find the relationship betwen the price paid by the investor for common stock and the proceeds to the company. In the same way, there might be expense in the case of common stock just as well as in the case of bonds.

You ask me whether I agree with the language you are reading from "The Problem of the 'Rate of Return' In Public Utility Regulation With Special Reference to the Long Lines Department of the American Telephone & Telegraph Company," dated June 15, 1938. You read first from page 79 under the caption, "Adjustments for Expenses of Marketing Securities" the following: "In the case of both bonds and stocks it is clear that the yields at market prices do not represent the total costs that the corporation would ordinarily incur in selling new securities on the market.". I have just stated that in substance, I believe. You then read, "The amounts realized by the corporation are less than the market prices by the amount of the expenses involved in issuing and selling the securities, and the percentage cost to the company is correspondingly increased over the yields at market prices. In the case of bonds, this differential is well recognized, but for common stock financing it appears that some further discussion should be devoted to this point." I might interject here on this one thing, that the amounts realized by the corporation are less than market prices because of expenses, and so on. There are once in a while some unusual exceptions to that. I believe I mentioned one this morning where a company sometimes could do better than market on a new issue because of the fact that someone might be willing to pay that premium in order to get a large amount or all of it, or something like that. I am speaking of bonds—just as an illustration.

You continue the reading, "The necessity for a margin over the earnings-price ratio on common stock seems clearly to exist, except in those situations in which a corporation could sell additional stock at the average market price. However, it seems probable that few corporations could ordinarily sell any substantial amount of new stock at the full current market price." I think I am generally in agreement, bearing in mind that the word "substantial" is used there. I might observe that when I was in the 1673 investment business we often did sell stocks at the current market. I mean, our inventory. We carried an inventory of stocks that were quoted on the market and we sold those at the market. Not only that, but we sold them without commission, I mean to the investor. If you put the whole issue on the market at one time there would be no market for the issue to be depressed. You say if you put the whole issue on the market then you assume that there has not been any of the issue outstanding to have made the market. However, if it is assumed that for the past few weeks there have been market transactions in a given stock and then today who holds it dumps the whole issue on the market, it would certainly not bring in as much money as if sold in isolated transactions.

You now ask if I agree with the following language from the same source from which you have been reading: "Offering of a large amount of additional stock on the market will tend to depress the price, since the delicate balance between demand and supply is easily upset, and corporations rarely attempt to sell any large stock issue directly on the market, it being apparently expected that, due to the resulting depression of the market price, this method would result in more expensive financing, over-all, then if the stock were sold in other ways." You ask if that does not mean that we have to make allowances for the price-earnings ratio that is evidenced by isolated scattered market transactions in appraising the cost or arriving at the cost of financing through the issuance of equity securities. I might agree with your point as to what you have to do. I do not think this evidences that. Let us look at it a minute. This talks about putting a large additional amount of stock on the market. I presume that is talking about an organized stock exchange, an organized stock market. I assume that. I would agree with that if you attempted to go and sell a great volume of stock through brokers on the New York Stock Exchange that it would tend to depress the price of it, certainly; but it says right here that that is not the method followed. The distribution is made through other methods, through bankers and brokers who would distribute the stock, and they would do it at or very close to the market. I know that it has been done in some cases.

You ask if it is not true, as stated in the source from which you are reading, that "If the new stock is sold through underwriters, it may be assumed that some fee or commission will be charged." I think that is true. You then continue reading from the same source:

"When new stock is offered directly to present stockholders, the offering prices are customarily less than market prices, apparently on the theory that some margin must be allowed in order to assure the absorption of the stock.

"Furthermore, in determining the fair rate of return, it does not appear that this necessary 'margin' allowance can be restricted solely to additional stock to be sold in the future, if reasonable costs of new capital are to result. Potential investors, willing to buy the stock at a certain earnings-price ratio, would tend to ask higher returns, if they were to become aware that, as soon as the corporation had their money, the earnings would be reduced until such time as still more new common stock money was needed.

"The conclusion that the allowed return should include an additional allowance over and above the precise earnings-price ratio on common stocks represents a direct reflection of the market conditions apparently in contemplation by the Massachusetts Department of Public Utilities, when it remarked that:

1674 " 'In determining what amount of dividend is necessary to attract capital at such a price (that is, a price at least as high as the average amount per share paid into the company's treasury by the stockholders) regard must be had for the fluctuations likely to occur in the market price by reason of new issues being placed upon the market.'

"Certain investigators have interpreted the Massachusetts doctrine respecting return on common stock as requiring a limitation of such return to levels just sufficient to maintain average market prices close to par value or issue price, and at least one fairly recent decision apparently lends some color to this view. However, as early as 1925, that Commission clearly recognized the actualities of the situation when it remarked that a corporation's shares of stock will not sell in large quantities at par unless small quantities sell in the stock market somewhat above par." And the Commission added:

" 'Hence it follows inevitably that the company must earn such an annual dividend as will maintain the price of shares of its stock above par in the stock market. Such a dividend demanded by economic necessity is, in substance, what courts call a fair return.'

"The magnitude of this 'marginal' factor with respect to both bonds and stock has been studied by reference to the terms of actual security floatations regarding which the data as to costs of financing could be obtained. These studies are presented in the following chapter."

"The preceding data on costs of common stock financing cover a very limited number of cases. Nevertheless, all the data on this point which could be unearthed during the time available for this study has been analyzed and it is believed that such data suggests certain definite conclusions. It appears that a strong, well-established utility, with good credit, could market reasonable amounts of new common stock, under ordinary market conditions, at a total cost not exceeding 12 per cent of the amount realized by the company. This would allow for a discount of 10.7 per cent from market prices to cover: (1) If the issue is sold through underwriters, discounts and commissions to underwriters (estimated at 5 to 7 per cent), other expenses of the issue (estimated at one-half of 1 per cent), and a margin between market prices and offering prices of 2 to 3 per cent; or (2) If the issue is sold directly to stockholders by means of rights, a margin between market prices and subscription prices of 7 to 8 per cent, other expenses of issue (one-half of 1 per cent), and underwriting costs of about 2.5 per cent of the amount received by the company. A margin between offering prices and market prices on issues sold through underwriters may not be necessary, but such a markin has nevertheless been provided for. A similar comment applies to underwriting costs in the case of stocks sold through rights to stockholders.

"While these allowances appear to be ample in the case of stock issues of reasonable amount to care for new capital needs, such as are assumed in the study of experienced capital costs of selected companies in Chapter VIII, there may be a question whether a margin of 12 per cent would be sufficient in the case of a wholesale recapitaliza-
1675 tion, or 'reproduction' of the capitalization, over a relatively short period, such as is assumed in the analyses of current over-all costs in the best investment situations in Chapter VII. Accordingly, 15 per cent was used in the calculations of the latter chapter to cover costs of common stock financing."

(Counsel for the two Commissions objected to the character of the cross-examination by Company Counsel on the ground that it is not directed to the direct examination and tends to delay the proceeding by the reading of long quotations into the record. The Trial Examiner ordered portions of the objections made by Commission Counsel physically deleted from the record over objection to such procedure by Commission Counsel. Portions of the following questions by the Examiner were objected to by Counsel for the Illinois Commerce Commission.)

Questions Interposed by the Examiner.

In my exhibit on natural gas companies' financing I may have mentioned common stocks and preferred stocks that they issued. I don't know whether I stated anything about cost of the common stock or not.

You ask whether an allowance to the effect that a number of statistics are presented to the Examiner regarding the present price earnings ratio of common stock—whether there should be further considered an element which is called, in the study from which counsel has been reading, a total cost; and whether from my investigation in connection with this and other cases I am prepared to say whether that total cost should approximate 12 per cent of the amount realized by the company. I believe that I would say that if in this case or any other case statistics were presented to you purporting to be earnings price ratios on common stocks, that you should make a careful appraisal of those figures. In all probability I do believe that you should allow something in addition to those figures for the fact that the companies might not receive the same proceeds as they would if they obtained market prices. You should consider also as of any given time the earnings price ratio may not be a very reliable measure of the cost of money. You would have to look at it over a long period of years, because the price of the stock reflects not only the interest element, but in times of rising prosperity it reflects hopes; in times of declining prosperity it reflects despair; and the instantaneous ratio is looking to the future so much that you can't take that as a measure of what the investor has in mind. He is discounting the future; and the rate at which he is discounting the future is probably more important than the nominal rate at the moment.

As I understand it, this figure is not the cost of money; this 15 per cent is not the cost of money. It is the so-called financial cost, discounts, commissions, and so on. As of any time of financing I don't think it would particularly affect the amount of that cost. You ask whether I have any idea what that amount today is. I couldn't say whether this 15 per cent is right or not, without making a more detailed study than I have made. In looking this over some of these figures look a little high, and some of them look a little low.

Cross-Examination by Mr. Morgan (*Resumed*).

I know what they are talking about in the volume from which you have read when they use that term 15 per cent there. (Objection by Counsel for Illinois Commerce Commission overruled.) You ask whether that 15 per cent as the term is used there refers to the allowance that must be made over and above price earnings ratio as indicated by market transactions in order to arrive at the probable cost to the company of raising equity capital through common stock issues.

(Counsel for the Illinois Commerce Commission objected to the above question and instructed the witness not to answer on the grounds that it is highly improper cross-examination on the part of Company Counsel and the Trial Examiner. The instruction not to answer was then withdrawn, although Counsel for the Illinois Commerce Commission presented his objection to the impropriety of the question.) I am going to have to study the whole report and give my opinion as to something that is contained in it. That is an awful burden and I am not anxious to take it. This report has been published several months and I haven't had an opportunity to look at it. (Commission Counsel then thereupon requested an opportunity to state his objections but the Examiner characterized his objection as "captious." The question was then re-asked by the Examiner and the witness thereupon made the following answer.)

My interpretation of this 15 per cent figure is that it is not a figure that is added on to the earnings price ratio figure; but it is a figure that for the purpose of some calculations made in this study they have used to increase another figure by, namely, the earnings price ratio; in other words, they would take 115 per cent of the earnings price ratio. I don't know anything about what sort of earnings price ratio they were taking, but I am just giving you my conception of what the arithmetic is. In other
1676 words, if you add 15 on to the 10 it would bring you to 11½ per cent.

Redirect Examination by Mr. Slaff.

I thought I had said before that for certain purposes the member of the staff that was preparing that portion of Chapter 7 used that figure of 15 per cent.

Redirect Examination by Mr. Booth.

I didn't say that I disagreed or agreed with that statement. I haven't made an adequate study to come to a conclusion on that point.

Cross-Examination by Mr. Morgan (Resumed).

I don't believe you have asked me to agree to it. I think I did make some comments on some of the elements that go into that 15 per cent and stated some of them looked a little high and some of them looked a little low. I think the burden of the inquiry has been as to the process of arithmetic rather than the equity of anything for the purpose of this proceeding.

Questions Interposed by Mr. Slaff.

You read from page 87 of the same report from which Mr. Morgan was reading a little while ago, the following language: "The conclusion reached from the preceding analysis is that during this recent period the effective cost of capital obtained through bond issues of large size typically includes .16 per cent for cost of financing. For the purpose of adjusting yields to investors at market prices to the basis of current cost to the company, two-tenths of one per cent appears to be a sufficient margin to represent cost of financing in the great majority of situations." You ask if that is substantially what I testified to earlier before the recess. I testified to two-tenths of one per cent as being the spread on new financing in recent years between the yield rates at which securities were offered to the public and the cost of money on those same new issues to the issuers. I wasn't talking necessarily about market yields on other securities.

Cross-Examination by Mr. Morgan (Resumed).

I was talking about bonds very largely at the time. I might include some debentures. I was not talking about common stock transactions. You ask whether I agree with the conclusion reached by the committee as to the spread between the bond yield to the investor and the cost to the company of the bond proceeds. It appears in my studies I have come out to very closely the same answers on this point as were stated in the paragraph. I am just noting now for the year 1936 I computed the cost of money average of 3.73 and an average yield of 3.55, there being a difference of .18. For 1937 the difference on the corresponding basis is .17 and for 1938 the difference is .16. I testified to two-tenths of one per cent in rounding it off a little bit. It comes to about two-tenths of one per cent.

The first page of Exhibit 180 appears from the caption to deal with prime commercial paper, prime bankers' acceptances, time loans and call loans. You ask if this page shows that the interest rates in transactions involving those securities have declined in recent years. I don't recall just for sure but I think it does show those interest rates have gone down in recent years. You ask whether the terms upon which that kind of paper is accepted by investors or banks changed during the period through which the interest rates have been going down. I don't know whether they have or not. I don't know what they would be. As I understand it, some of these are unsecured loans and some are secured. Whether there has been any change of any significance there, I don't know. You ask what type of unsecured loan is found in transactions of a character referred to in page one of this exhibit. Prime commercial paper is, I think, ordinarily unsecured. I am not so sure about the bankers' acceptances. They might be secured in some cases. The time loans may be, but those 90-day time loans are usually brokers' loans and there ordinarily is some hypothecation of securities behind those. Call loans, I don't know offhand.

1677 You asked whether the specification as to whose paper it is is the same as it was a few years ago when the interest rate was 3½ to 4½ percent. I don't know precisely whether it is or not. Just to take call loans, for example, I don't know whether they have changed the list of brokers to which they made loans.

I think probably there must be individuals who borrowed on commercial paper in 1925 who could not borrow on commercial paper now. It might be just the other way around, maybe some borrowing now who could not have done so in 1925, because of changes in the individual borrowers that we are talking about there.

You asked if I didn't know that this kind of paper is now being accepted only from those whose paper is of the very highest order. I think that has been pretty generally true all along. This refers to the prime commercial paper as of any date. It has been the highest type of commercial paper and not only true now but true ten years ago. I don't know whether the requirements to qualify as prime commercial paper have been greatly changed since the 20's. It is possible.

You asked what in my judgment does this type of interest rate have to do with the cost of an overall financing of the capital structure of a natural gas pipeline company. I think, as I said on direct, this information, as well as all the rest of this exhibit, was merely indicated to show interest rates, trends thereof, and just how this would go precisely to the rate at which any company might refinance is a rather indirect relationship to this extent; that is, in the whole money market over a period of time influences in one segment tend to spill over into the other segment, so to speak. What I mean is money tends to seek a level and if the rates are out of line in one place, money will tend to go to that end drive it down, and so on. In other words, these being short-term rates they are for short terms subject to different influences than long-term money rates are, I presume, but I think over a longer period there may be some similarity in trends, and certainly if high grade bonds were yielding five or six percent now people would be less willing to buy commercial paper at the lower rates, which would tend to have the effect of raising the commercial paper rates. There is some inter-relation in the money market between these types of loans. It is a limited one, and subject to a lot of influences, but that is above the best explanation I can give on that.

The congestion of money in the banks at the present time, concerning which I have testified, which is lying there idle, might have something to do with the interest rate that is prevailing for this type of paper. I don't think you could say flatly that it is entirely possible that these interest rates indicate an unwillingness of those who have money to invest it in long-term securities. It might be conceivable. I think it is the real indication of something else. Of course, you want to understand that some of these investors, particularly those who do have the money available, have some limitations upon what they can invest in, technical limitations, legal limitations and so forth.

The demand for new capital has been definitely reduced. That, of course, reduces the fields open for investment by the people who have the funds to invest.

1678 You asked whether I think that in order to use this page 1 of Exhibit 180, that we must go back of the figures there and look into the character of the borrower, the supply of money and the attitude of the owner of money toward making other types of investment than those reflected here, before we can properly appraise the value of that tendency in the interest rates in relation to the raising of long-term money. I have tried to state clearly what relation this might have to other interest rates. I do not know that I can expand on it any more than I have. I have attempted to bring out what inter-relation there might be in the money market among the several kinds of interest rates prevailing at any one time.

You asked what I think it indicates as to the trends of money costs for long-term money. It does not indicate anything directly. I tried to explain that a while ago. It is an indirect relationship. If it indicates anything at all, I don't think we would have to take into account a number of other factors than the mere figures. The figures themselves indicate on the face of them. I have not set out in there the yield on long-term money.

One of the objectives in this proceeding is to arrive at the cost of long-term money. In order to give whatever weight should be given to the cost of money as a factor in rate of return, it would be necessary to arrive at some judgment as to what the cost of money might be. It doesn't necessarily follow that that is why this tabulation and the other tabulations contained in Exhibit 180 are here. They are here to show the trend of interest rates. That is a factor that has been mentioned, just as well as the cost of money. Whatever weight the Federal Power Commission gives to this is up to them. I don't know. They may throw it out altogether. If you are interested in the trend of interest rates, you ought to take several different kinds of interest rates.

You asked whether or not the interest rates shown on page 1 of Exhibit 180 indicate that the interest rates on long-term money are going up or down. I cannot say any more on that than I did a while ago with respect to the inter-relation of the interest rates on one type of obligation to the interest rates on another type of obligation, as regards trends over a period of time.

I expected those who have the responsibility of weighing this evidence would give it whatever consideration and weight that should be given. If they want to know something about interest rates, as a factor in rate of return, here it is.

Questions Interposed by the Examiner.

You asked what I meant when I said a while ago that this information on short-term interest rates has only an indirect relationship. I am talking about the inter-relation of various kinds of interest rates and yields. The point I was trying to make, at the risk of being too brief here, is that if rates of interest were out of line in one direction, money would tend to flow there and drive those down. What I mean is, you would not find high-grade securities in one field way up here and high-grade securities in another field way down here for a long period of time. They would tend to equal out, because money would turn from one to the other. There is a certain amount of competitive factors in the money market with regard to securities.

1679 If long-term bonds decline in yield steadily over a period, you would naturally expect some decline in the short-term rates. I mean, the two would not get out of line too far over a period. That is, within a given year, of course, short-term rates are more sensitive; they may jump up and down within a short period, different from the direction and scope of long-term interest rate movements.

Cross-Examination by Mr. Morgan Resumed.

I did not put in this page 1 of Exhibit 180 on the theory that it indicates that interest rates, such as are involved in this inquiry, are lower than they were a few years ago. I am not saying what it ought to be used for, beyond information as to the rate of interest. I brought it in here because I thought it was pertinent to the matter of the trend of interest rates. I am not using it.

Page 2 of Exhibit 180 deals with interest rates charged to customers by banks in principal cities. This differs from the interest rates reflected on page 1 in that it has to do with direct loans, rather than commercial paper in circulation. These are over-the-counter loans rather than open market. These interest rates are lower now than they were in 1920.

You asked if I think the borrowing of money in an over-all sense is now being done by the same class of borrowers as was the case in 1920, when the rates were 6.71 in New York and more than 7 percent in the other cities reflected on this page of the exhibit. I would say they are probably the same classes, broadly speaking; that is, they are businesses and individuals. I think possibly the people who were borrowing back in 1920 were harder pressed and probably did not have the credit standing that some of these people do today.

You asked if a great deal of lending of money by banks in 1920 and for many years after that was not to a type of borrower from the standpoint of financial responsibility who would not be extended credit at all by the banks at the present interest rates. I would hate to say that it was or was not. That is a pretty big question to ask a man.

Questions Interposed by the Examiner.

You asked if it is generally known in banking circles that bank requirements are more stringent today upon that type of borrower than formerly. That may be. I do not know. I would hesitate to say that that was true. It seems to me there is more to it than appears there. The appraisal of the difference in that thing is a pretty difficult task. You have got to consider the standing of the prospect of the thing and of the man. Perhaps borrowers cannot show today that they can employ the money profitably, and other things like that. There are a great many factors to be considered, and just what the reasons are is pretty difficult to say.

Cross-Examination by Mr. Morgan Resumed.

You ask if I am not willing to admit that it is more difficult to borrow money at a bank across the counter at prevailing rates today than it was in the '20's. I just think that is too broad a generalization to be answered cate-

gorically. The difficulty is relative to a number of things. I just simply cannot make any better answer to the question. For some individuals it may be much harder, for others it may not be as hard as it was in those days. For
a given situation it may be easier to get it now, be-
1680 cause the banks are more in need of loans. Money
was pretty tight back in 1920. I dare say there were borrowers in the '20's who could get money much more readily than others. That is always so. All those who could get money at 7 percent in the '20's probably could not get it at 2¼ percent today. You are tracing down individual borrowers, and you just cannot do that sort of thing here.

I do not know that I can give a definite answer as to whether that is true as to the whole class of borrowers whose interest commitments make up the averages that are set out on page 2 of Exhibit 180. The 2.24 percent interest rate as of February of this year is an average. You ask if some of them are getting it for less and more of them are getting it for more. You cannot tell from an average, ~~particularly a weighted average,~~ what the dispersion above and below the average is with respect to individual borrowers.

I have read the Federal Reserve Bulletin. I probably looked at the September, 1939 issue of that publication. You have handed me the September, 1939 issue of the Federal Reserve Bulletin. You have read to me the following language from that issue.

"In New York City, although the average rate is around 2¼ percent, about 60 percent of the money lent to commercial borrowers is at rates between 1 and 2 percent and less than 15 percent at rates above 3 percent. About 20 percent of the borrowers pay low rates between 1 and 2 percent or about the same number reported in each of the rate groups shown in the chart.

"In the seven other northern and eastern cities, about 30 percent of the funds being lent for commercial purposes is at rates between 1 and 2 percent and 60 percent at rates from 2 to 5 percent, with but a small amount at higher rates. Only a few borrowers get the lowest rates and about 60 percent pay over 5 percent, the most numerous paying rates of 6 to 7 percent."

You ask what is the reason, in my judgment, for some borrowers getting money at between 1 and 2 percent and others, 60 percent of the whole number, paying 6 to 7 percent. I think the largest factor in the difference, belonging to the same general class and so on, is a matter of risk or a matter of the lender's appraisal of the risk. These lowest rates that you mention here certainly could not contain much compensation for risk.

You ask whether there has been any variation in the size ~~of the loans~~ during the period covered by this chart. I do not know as to what the information is as to size.

Page 4 of the same exhibit has to do with discount rates of the New York and Chicago Federal Reserve Banks. You ask whether there is any material difference spread between the rates in these two cities. Right at the present time the rate in New York of the New York Federal Reserve Bank is 1 percent, as compared with 1½ percent in Chicago. I think that reasonably uniformly in the past the Chicago rate has been a little more than the New York City rate.

1681 You ask if I know the conditions upon which a member bank can borrow money through the rediscount operations of the Federal Reserve Banks. There are different ways. I do not know all the precise routines and so on; but the Act, as I recall it, sets down certain statutory requirements, broadly, as to what can and what cannot be discounted. It is short-term paper. These particular rates apply to short-term paper and agricultural loans and industrial and commercial loans and what not. But these, I think, are relatively short-term. I think possibly in the case of some agricultural loans they might go up to as much as six months, but ordinarily it is 90-day paper. I don't think they will accept loans or will accept for rediscount paper that is based upon the financing of security transactions. I think it has to be commerce and trade or agriculture.

The member banks are not permitted, except by indirection, to borrow money through this procedure, for the purpose of lending it to customers who would use it in the acquiring of securities. They might have some eligible paper that they could take down and discount. They might use those dollars. I don't know whether they could or not, but it is conceivable they would use those dollars to lend, mix them with the general funds and then average them out. That would be by indirection. I don't think they can.

You ask whether these rediscount transactions have a remote relation to the cost of long-term money through the issuance and placing of securities. I do not like to argue about the word "remote". It is still a very indirect relation. There are other things here. For example, banks can also borrow by discounting their government holdings. So this thing consists mostly of potentialities. I believe I said on direct that the banks are in debt only a few million dollars to the Federal Reserve, whereas back in the '20's they operated on a large volume of debt to the Federal Reserve. These things are not very effective now, as I stated on direct.

I think I said there was something like five million dollars being obtained through the rediscounting of paper by member banks through the Federal Reserve in 1939 as against one or two billions at the end of 1928. So the banks practically have no debt to the Federal Reserve as a whole. Of course, as regards an individual banker, if he is in debt, this thing is just as important to him as to anyone else. I mean to an individual banker it might be very important; but in the economy as a whole it is not important.

You ask whether it is my view that the yield on government bonds is significant as bearing upon the cost of long-term money. It is no more significant than any other interest rate. The point is that it is one of many rates of interest yield and should be considered along with all others, of course, but over a period you still have this same indirect effect. I mean, if yields on government bonds were to fall very sharply, less and less people would be willing to buy at those prices. They would want more and they would, therefore, turn to other sources, namely, corporates and other investments, and tend to drive those down. That is the point I have been trying to make all the way through here.

You ask if government bonds, as a matter of fact, are not sold on a sustained market. There has been some support from the banking system for the prices and market on government bonds. How far they go I do not know. I think it is commonly recognized that the Federal Reserve 1682 System has participated in effecting this cheap money policy of the government in recent years. There is no argument about that, and if you will look in one of my other exhibits, you will find how much the holdings of the Federal Reserve System are with respect to the U. S. government bonds. For long periods there it does not change in total volume at all. There was some change in the fall of this year when the market broke. There was some increase in the amount of Federal Reserve holdings of U. S. government securities along about September when the market was breaking. It has since gone down a little bit. I mean, they have since liquidated a part of the holdings, I think.

I think I remember seeing something in the daily press that the Federal Reserve System for the time being was withdrawing its support. Just what it was precisely I do not know. I do not know just when this support was resumed, but I think as a general proposition the support was resumed and the decline in prices was immediately checked. Just what the time was, I cannot say.

You ask whether I don't think it would be extremely dangerous to rely on the yields of government bonds under those circumstances as indicative of the trend of interest rates on long-term money. They are perfectly reliable as the measures of the trend of interest rates on long-term government money, and going back to the same proposition again, over a long period of time if governments fall you could probably expect other high grade liens to fall too, because of various strata in the market, of people who have different ideas as to what they want on their money. If one sort fell below that they would go to another, and so on.

(December 2, 1939.)

(At this point counsel for defendants produced a letter from Mr. C. J. Peterson and stated to the Examiner that it was in response to a request by the Examiner or by counsel for one of the Commissions in explanation of the ideal cross section offered in evidence as EXHIBIT 16. Counsel requested that the letter be read into the record. The letter was dated November 29. At the direction of the Examiner the letter was read into the record. It follows:

"When I was up in Chicago, a short time after I had been on the stand I furnished copies of the logs used in my cross section of the Panhandle field to the Examiner for the Federal Power Commission. I believe these were handed to the Examiner by Mr. Garver.

"These logs, beginning at the left hand edge of the cross section, were numbered from left to right Nos. 1 to 14, inclusive. In checking up these logs the other day I find that one of these logs I furnished did not belong to the cross section. This log which was handed in in error was Log No. 10 and is the Stubblefield Shell Jordan No. 1 well, located 330 feet from the south and east lines of the Southeast Quarter of Section 104, Block 4, I. & G. N. Survey, Carson County, Texas. The log which should have been given the Commission is Timms Jordan Brown No. 1 well, located 330 feet from the southeast corner of the Northeast Quarter of Section 104, Block 4, I. & G. N. Survey, Carson County, Texas.

"I presume this matter should be corrected and I am enclosing herewith eight copies of this Log No. 10 which should be substituted for the Log No. 10 which I formerly submitted."

1683 Counsel then requested that the log referred to in the letter be substituted for Log No. 10 formerly submitted by Mr. Peterson in his Exhibit No. 76. At the direction of the Examiner, the log produced was marked Exhibit No. 200 and was received in evidence without objection.)

You ask whether I know the names of the fifteen cities whose bonds were included in Column 2, page 5 of Exhibit 180. I put those in yesterday. The City of Chicago apparently has no bonds in the list.

You ask whether I know the comparative amounts of government bonds held by banks now as compared with 1929. As of March 27, 1929, all member banks of the Federal Reserve System held $4,454,000,000 of United States government direct obligations; as of December 31, 1929, the corresponding figure was $3,863,000,000. As of December 31, 1938, as shown in Exhibit No. 183, Table 7, the holdings by all member banks of direct obligations of the United States Government were $10,882,000,000.

On page 6 of Exhibit 180, in the caption I refer to the Annalist Average of Yields on ten high grade railroad bonds, 1857-1939. The Annalist is a weekly financial magazine published by the New York Times Company. By the term "high grade", as used in the caption, I understand that to mean the most choice or the best long-term bonds available in the railroad bond field as a whole. It is the top of that particular market, I would say. It is the top of the bonds of that industry.

When on page 7786 of the record I stated that the purpose of that exhibit was to present the longer-term picture of yields on what might have been considered fairly high grade type of long-term corporate bonds. I don't believe

I intended the word "fairly" to detract from the quality. What I had in mind was bonds considered by investment circles generally to be the higher grade bonds. I dare say a number of them probably would be found in the group of Moody's Aaa bonds, more particularly in the public utilities list at the moment than the railroad list. The list of bonds going to make up these figures has been reduced from 10 to 7 this year.

The reason for that I know only in a general way. I speak broadly from my own interpretation of what the situation is. I feel it is probably due to the fact that the number of bonds in the railroad field now considered of such high grade and also meeting the statistical requirements in the average is probably getting so small that they found it desirable from a statistical point of view to reduce the number to seven. I have some extracts here somewhere from the Annalist where they talk about that a little bit, if you want to look at that and read something into the record from it. I don't know whether or not the three eliminated were the bonds of three railroads which run out of Chicago.

You state that the railroads whose bonds were eliminated are: The Chicago, Burlington & Quincy Railroad Company; Pittsburgh, Cincinnati, Chicago & St. Louis Railroad Company; and New York Central & Hudson River Railroad Company. At your request, I will check and determine whether they are the three railroads and also whether all of these railroads run out of Chicago. I think they all have terminals and railroad tracks and trains running out of Chicago.

You ask if the yields of these high-grade bonds shown on page 6 of the exhibit have declined over the past several years. In this particular series the decline is not uniform certainly over the past decade, we will say, or fifteen years,
even, in that in 1939 and probably also in 1938, the
1684 averages in this particular series are higher than
they were in 1936 and 1937. There have been only those two years when the yields of those series of railroad bonds were lower than in 1938, unless we count 1935 when they were practically the same. It may well be that some of these bonds had earnings times interest in series of the prior issues of sometimes eight and ten times.

You asked whether or not if we compare the yields of this series of bonds with the yields of the 40 bonds used by Moody's as a part of the 120 bonds that are so commonly used in statistical studies, we would find them to have the same yield. Moody's list of 40 bonds, if there are 40 in there at the moment, would undoubtedly have a higher yield than this series on page 6 here.

On Chart No. 5 of Mr. Knapp's Exhibit 185 it appears that as of August, 1939, the yield was about 4.41 on the 40 railroad bonds. You ask then if this page 6 of my Exhibit 180 is not just another illustration of low yields on the very highest type of the class of bonds under consideration. I think the question is a little bit argumentative. I would say probably that for high-grade railroad securities the yields presently are not so low in relation to other high-grade yields, so the primary purpose here was to present a longer run picture of yields. It is an illustration of comparatively low yields on securities. These are lower than the yields on the poorer grade of securities, definitely. And they are also higher than the yields on the high grades in other lines. It is one of the few lists with which I am familiar that goes back as far as 1857. I do not know right now whether I could name another very readily. I believe there are others.

It is true that these low yields reflected by this chart have to do with the highest grade of securities in the railroad field.

The Annalist has some figures dealing with high-grade public utility bonds also. These are dealt with on page 7 of this same exhibit.

The term "high-grade" on that page means what it does in the tabulation shown on page 6. I think it likewise means that the bonds chosen were those that in the opinion of the Annalist were the cream of the crop. They are not representative of all utility bonds.

You ask if allowances would have to be made for that circumstance in the use of these yields for any purpose looking to the arrival at a proper rate of return. I think, as I believe I said yesterday, that insofar as interest rate yield figures are used by anyone in any fashion in forming a judgment as to fair rate of return, he should look not to one series alone; he should not look alone to high-grade securities; he should not look alone to low-grade securities. He ought to get a fairly informative picture so he would have some judgment in his own mind as to what prevailing levels were in various fields. I think there are really two things involved. The yields of the highest grade of securities are sometimes said to reflect money rates, whatever the economist may say that means, whereas on the lower grade you get a reflection of credit. Now, if one is interested in the money rates as such, presupposing that his interest is directed toward obtaining an elimination of extraneous factors, such as risk, then he would want to look at the high-grade, particularly, I think. But that is only one of the various factors there.

1685 You ask whether this yield continued on through September and October at this same level of yield at 2.85 that prevailed in July and August. I think I brought that down to date on my direct. I have a figure here for the week ended September 23, 1939, of 3.26 per cent, and that was about the peak that it reached, because the bond market reached its worst point about the end of the third week of September. Whether this is the worst point or the best point is all from the point of view.

The bond prices reached their lowest point on September 23, 1939. For the week ended October 14, 1939, the corresponding figure was 3.10 per cent. Of course, that is over a month ago now. I do not have here with me any later information, I believe. I would say it probably has not got down to 2.85.

All these figures are taken from current market quotations and not from yields to investor at the time of original issue. I do not know what percentage of the total capital of the companies included in this list of ten high-grade public utility bonds was raised or represented by the issues involved here.

That would not necessarily be an important factor to know about these bonds before the yields are utilized for any purpose. This is defined as high-grade now. Presumably they have been selected on the basis of whatever tests the compiler used. He probably has taken some of those things into account in arriving at the definition of high-grade.

The property coverage as well as the earnings coverage has something to do on whether or not a bond is high-grade.

You ask whether I would expect bonds of this character to be a very high percentage of the total capitalization. I should not think it would be anything like 75 per cent. It is probably less than 50 per cent. I do not know how much less than 50 per cent it was. I do not have a list of the bonds covered by this page 7. I have written the Annalist and they have not favored me with a reply. I do have an extract, a sheet from the issue of the Annalist of February 1, 1939, in which they have an article entitled, "The Annalist Average Net Yield on Ten High-Grade Public Utility Bonds," in which they present that thing for the first time, I believe, and they do publish a list there.

The first issue is Bell Telephone First and Refunding 5s, 1960, Series C. It does not say what Bell Telephone Company. I asked the Annalist about that in a letter to which I have had no reply. I checked through Moody's Manual to see if I could find a Bell Telephone Series 6, 5 per cent, due in 1960, and upon the basis of this check I would think the bond referred to here is Bell Telephone Company of Pennsylvania, as it has such an issue. The next issue is Cincinnati Gas & Electric First 3½s, 1967.

(At this point the Examiner directed the reporter to incorporate the names of the companies listed and, in pursuance of such direction, they were listed as follows:)

Bell Telephone First and Refunding 5s, 1960, C.

Cincinnati Gas and Electric First 3½s, 1967.

Consolidated Gas, Electric Light and Power, Baltimore 3¼s, 1971.

Dayton Power and Light First and Refunding 3½s, 1960.

1686 Duquesne Light First 3½s, 1965.

Edison Electric Illuminating, Boston First Sinking Fund 3½s, 1965, A.

Illinois Bell Telephone First and Refunding 3½s, 1970, B.

New England Telephone and Telegraph First 4½s, 1961, B.

New York Edison First and Refunding 3¼s, 1963, D.

Pacific Telephone and Telegraph Refunding Mortgage 3¼s, 1966, B.

Page 8 of Exhibit 180 has to do with all of the bonds listed in Standard's Bond Investments, which contains a pretty comprehensive list of bonds. My exhibit is based upon Standard's list. The bonds that actually go into the averages here are a reduced number of bonds because of the eliminations made from the list for statistical reasons.

You ask what justification there is for eliminating any bond for statistical reasons. Bonds selling above call price should be eliminated, because the yield to maturity on such a bond is not a wholly representative indication of the rates on such a lien. Special features, such as conversion features, possibly influence market price of a bond.

You ask if it is also necessary to exercise some degree of selection, either to select those to be used or those to be thrown out, in dealing with statistics. I think you have to set up your specifications in a thing like this, yes. You ask if that is what I meant when I said "they attempt to get figures that are representative yields and are not distorted by some particular momentary situation." That is something else. I think it is referring generally to their processes of selection. There are reasons why they do certain things.

I used the explanation A-1 plus, A-1, A, B-1 plus, B-1, B, in my section dealing with public utility bonds. These ratings correspond generally to Moody's Aaa, Aa, A, Baa, Ba, B, in the same order.

You ask what significant fact do I get from reading across the first six columns of figures to the right of the year 1925, under the captions A-1 plus, and so on. I think it shows that as the quality falls the yield rises. I think the most important factor entering into this is the differences in the investor's opinion as to the amount of risk in the various grades of securities. If the degree of risk is higher, then as of that time it is the ordinary thing for the investor to ask for greater compensation. These yields are based upon market prices, or sometimes they may use bid prices or other prices that do not actually reflect actual sales, but the general idea is yield to investors here.

The average yield for the year as shown here for the year 1925 on B bonds was 7.92 per cent. The corresponding figure for the A-1 plus bonds was 4.92 per cent, an absolute difference of 3.00, or 61 per cent of the yield on the A-1 plus bonds. In 1938 the yield on the A-1 plus bonds was 2.88, the yield on B bonds was 7.93, an absolute difference of 5.05. Stating that in terms of percentage of the yield on the A-1 plus bonds the result is 175 per cent. The spread between the yields on the two ratings of bonds increased quite a bit as between those two years.

You ask whether that indicates a higher premium for safety or corresponding additional demand for risk compensation. I think two things are involved here. One thing is that there may be some increase in the investor's request as to the amount of compensation he wants
1687 for a given risk. It may mean also, and I think this
is probably very important, that those who have the great bulk of the investment funds are restricted by the nature of their operations or the laws under which they operate or the principles under which they operate to

investments of the highest grade. That has tended to drive the low yield down.

I think that during the cross-examination at Washington at the last session there were some extracts from the New York insurance law read into the record. Some laws of New York with regard to investments of mutual savings banks and the like. That is an illustration of what I mean that some investors are restricted by the laws under which they operate. I believe that there are some statutory requirements there set up which are predicated upon the idea that bonds that can meet this test will be high grade. That does not always follow; but that is the motivating force. I was just reading this morning in one of the insurance company's pamphlets we have around here where the insurance company was setting forth how they were restricted to higher grade securities. No, that is not a new law.

In view of the absence of additional high grade financing, most of it being refunding rather than new issues—there has been keener competition among those investors for those high grade securities. That has been one of the factors which has influenced the yield drop on them.

I would not accept as a generalization your statement that there is a pronounced disposition on the part of those who have no legal restrictions, and who can do as they please with their money, to seek safety of investment rather than compensation for risk. Some people are investing today in very risky securities, just as they always did. Some people are seeking safety, some of them are taking chances, and so on. I think it is generally true that at any time in the market you will find people investing for different reasons and for different purposes. You ask if we will find the same percentage of people who are investing money in 1938 and 1939 who are willing to go out and put their money at risk for the compensation promised at this time as was true in 1925. I think probably today the percentage of speculative money is somewhat less than then, because a lot of speculative money has been lost.

It is true, there is a lot of money in the banks which belongs to private individuals. It is largely staying in the banks. You ask if the yields are about the same in 1938 as they were in 1925 on B bonds and B-1 bonds. The B average of public utilities bonds for the year 1938 was 7.93, which was only one-hundredths of one per cent higher than in 1925. The B-1 was 6.98 as compared with 6.74, a difference of twenty-four one-hundredths of a point. The overall yields on those two classes of bonds were slightly higher in 1938 than in 1925. I don't know what the risk premium is in there. The yield on the high grade bonds is lower in 1938 than in 1925. The yield on the high grades is, of course, materially lower than it was in 1925. I can't separate that figure between the so-called pure interest and between the risk premium and between all the other factors which Dr. Dorau gave as being elements in the total figure. I can't split it up. Whether anyone has changed over the period in relation to the other is a debatable point.

You ask what course the yield since January, 1939 has taken with reference to A-1 plus bonds. The yields on the A-1 plus public utilities as shown here on page 8 of the exhibit, beginning in January, 1939, have a slightly downward trend. That continues into July of 1939; so the trend would be downward to July. It was up very slightly in August, up quite a little bit more in September, and probably down a little bit in October. I don't have the figures.

1688 In September, 1939 the yield on the B bonds was 6.61; the yield on the A-1 plus, 3.17, an absolute difference of 3.44. And the difference, stated in terms of percentage, as we expressed it in the other instances, is 108 per cent of the spread as of January, 1939.

You ask if there is the same tendency to demand higher yields as I go from A-1 plus through the other grades to B bonds in the railroad classification. That seems to be true, in the early years; and also in these later years. I think that there is a step-up by grades of bonds in the yield both in the utility and in the railroad bonds. I don't want to give too much validity or weight to these ratings as such that these investment services put on the bonds. By and large they are fairly indicative of quality; but there are notable exceptions, of course. You state that you are asking about what this exhibit shows. Yes, insofar as the yields on various qualities of railroad bonds are concerned, as the quality goes down the yield goes up.

Comparing the yield between A-1 plus and B bonds in 1925, the absolute difference is 2.73. That is 57 per cent of the yield on A-1 plus bonds. In 1938 the spread between the yields on A-1 plus and B-1 railroad bonds was 4.99, or 140 per cent of the yield on A-1 plus railroad bonds. Going back to 1925, it turns out that the spread between the yields on A-1 plus and B-1 bonds was 48 per cent. Comparing the yields on railroad bonds of the B-1 rating and of the A-1 plus rating, for the period indicated on the sheet as October, I find an absolute difference in the yields of 3.75. That is a percentage of 103.

Passing to the industrial bonds, I find the absolute difference between the yields on A-1 plus and B-1 industrial bonds in 1925 to be 2.56, and in 1938 to be 2.86. The percentages are 51 and 91 respectively. In September, 1939, the absolute difference is 2.15. The percentage is 70. (Objection by Counsel for Illinois Commerce Commission overruled.)

Exhibit 183, Table 1, deals with a number of banks and amount of bank deposits in the United States. It appears that there are about half as many banks in 1939 as there were in 1923. You ask if I think that is a matter of importance in a study of this kind. I do not think it is of great importance. I think there are certain conclusions that might be drawn from it. It might be used in some ways in connection with the interpretation of a trend of the volume of deposits. It might be used in some ways in connection with the availability of credit in various areas. I mean, the fact a great many banks have closed up out in certain sections of the country may make it more difficult for the people in that section to obtain credit and other banking facilities, and so on. I mean it is sort of localized.

You point out that the table shows that the bank deposits have increased from 42 billion dollars to 55 billion dollars and ask if that doesn't show that we have banks enough to take care of these increased deposits. Those are the deposits of those banks and the deposits in any closed banks are not reflected in those figures.

On June 30, 1939 the volume of deposits in banks now doing business was $55,988,000,000. It is an increase over some of the earlier figures. I don't know that it is the absolute peak. 1928 appears to be the absolute peak; but when compared with 1923, the first year shown on the
1689 chart, there is a substantial increase of about $13,000,000,000. That is a great deal of money even in these days.

Yes, I said at page 7822 of the record that the outstanding factor influence has been the large volume of idle funds that has accumulated in recent years. I still stand by that statement. I said that these idle funds are reflected in the banking system in two forms; namely, deposits in banks and excess reserves of the banks themselves. The one doesn't precisely include the other as you indicate.

The deposits in the commercial banks represent funds of depositors. The funds of which the excess reserves are made up, those are bank deposits in the Federal Reserve banks and the sources of the funds may be somewhat the same, or to a large extent the same, but they are different items definitely. It may be that the reserves which the member banks deposit with the Federal Reserve banks are often the same funds that are on deposit with them so they won't keep so much cash on hand. They may keep some of their own funds. You can't tell. These deposits with the Federal Reserve are cash deposits. The deposits in the banks themselves, a great deal of them, are merely credit money, you might say.

You ask if it isn't true that we can't take the two and add them together and get the sum total of idle funds without analyzing to see how much of the reserve of the member banks are included in the Federal bank reserve. I wouldn't attempt to add them together because they operate in different ways.

You ask my theory as to why these idle funds have accumulated in the banks and why these deposits are so much higher than they were a few years ago, notwithstanding the sentiment that seems to be somewhat abroad that we have had hard times and have them now as compared with former years. As I stated on direct the principal factor contributing to the increase in the member bank reserves has been an increase in our monetary gold stocks, because those reserves are after all hard cash. One of the big factors in the increase in deposits has been the deficit financing by the United States government which has resulted in credit expansion and that has involved the creation of deposits.

You ask if the idle funds of the depositors which are lying in the banks are there in my judgment for that reason. They are there because whoever has the title to them feels for the time being that is where he prefers to keep them. That is the form in which he prefers to keep that money rather than in some other form, subject, of course, to the limitation of opportunities of using them in the ways he thinks are compensatory to him.

You ask if I am in agreement with the suggestion that he is not willing to put his money into the industrial activities for the reward that is promised him at the present time and under present conditions. That may be part of it. I mean some people who have these idle deposits prefer to have them idle rather than underwrite the risks they would have to underwrite in order to get the rate or get the expectation of the rate they might want. Another factor is the absence of feasible opportunities. I mean, you have to draw a distinction between what is a risk and what is just plain fool-hardy. Risk is essentially uncertainty and if a project is definitely on its face not economically feasible then it isn't a matter of risk, there is no uncertainty there. On the contrary, you are pretty certain the thing is doomed to failure. There is that distinction.

1690 You ask whether it isn't a fact that in order to attract capital to risk investments it is necessary to offer what the investor conceives of as proper compensation for the risk involved. (Objection by counsel for Illinois Commerce Commission overruled.) I certainly think in order to get an investor to buy something he has to be satisfied with the terms. You can't force it down his throat. It is not mandatory that the investor buy things. It is still a free country, as far as I know.

You asked me this question, "If at present the situation is that we have large volumes of money which are lying idle, as you have stated, and if one of the reasons why that is true is that those who have money to invest at this time are not willing to put it to risk for the compensation that is promised under the present conditions, in order to get that money into investment, will it not be necessary to offer more than the present level of returns on investments if the idle funds are to be put to work." (Objection by counsel for Illinois Commerce Commission overruled.)

I think about the best answer I could give to that is to break it down somewhat. I am answering also in the light of the two "if" clauses in the question, and that is this: We assume also that part of the idle funds represent funds of people who by preference will invest in, say, government securities, but if they also have a preference for a rate of interest higher than that currently available on government securities, they would not invest. That is, I think, the general idea of the question, and to that extent I would probably agree to breaking it down in that fashion.

If investors have these two preferences of types of investment and also rate of interest and they cannot get the two together, they are more apt to just pass it up altogether, or something like that. I think that is a distinct possibility, considering individual investors.

You ask whether or not I have said earlier in my cross-examination, and also in my direct, that the tendency of these figures which I have brought in here in my several exhibits indicates that there is a disposition to seek safety as opposed to risk. I do not think I stated it quite as broadly as that. I think that may be just one factor. I think equally important, and perhaps more important, is simply the lack of available investments.

I mean available investments that offer reasonable possibilities at all. I think the banks would be glad to extend and expand their commercial loans if the proper kind of opportunities were available; if the demands of consumers, and so on, for goods and services could be increased such that they would make this additional business feasible at all, and, therefore, create a demand for commercial loans, the banks would probably be glad to make those loans. They have the funds available to do that.

You ask if the banks would be favorable to making the loan if there was greater compensation for the risk involved in the loan. I just do not go along fully with that, because I think in any time, even in the so-called good days in the nineteen twenties, there were probably a great many demands for loans turned down because the bankers decided the project for which the loan was to be used was not feasible at all; and that same situation would exist today, as far as that goes. That is what I tried to point out a while ago, the difference between risk on the one hand, and the outright unfeasible venture on the other. I think I have stated in substance that one of the things that is
responsible for the accumulation of idle funds in the
1691 banks is the circumstance that the owners of those
funds or the banks which control them are not willing
to put them into risk at the compensation at present offered. I said also here again today that some of the investors are not willing to accept the rates that are currently available on the types of securities in which they ordinarily invest. They prefer to leave the funds idle. That is one of the factors.

You ask how we are going to get those idle funds into investments unless we increase the compensation for the risk involved. I think the answer is still the same that I gave a while ago, that first you have got to bring about a revival of demand for investments. I mean, the two things, the demand on the one hand and the supply on the other, must be considered together. If you take commercial loans, again, if there were substantial increase in the demand for commercial loans, and if those loans were of the character in which banks invest, you could still have quite an expansion there without a material change in rates charged on those because of the existing level of rates, but if the demand were great enough eventually you might get the rates to go up again.

By demands for investments, I mean the request by people who are engaging in business for funds with which to expand their activities.

You ask what is going to induce them to request that money and to want it. The opportunity to employ the capital profitably. I cannot connect that up with your suggestion that they must have an opportunity under circumstances that will yield them more than they are offered under the present conditions. We are talking about the entrepreneur and that is the man who is borrowing the money. Now we are going back to the man who is lending him the money. There is plenty of occasion to use capital in this country at a price probably. I know that the government is building projects of one kind or another all over the country. A lot of those are justified on a social ground rather than economic ground, however. Yes, school houses and other improvements are being built all over the country that involve the issuance of securities. And the government is putting up the money in a great many of those instances. I don't know the proportion. (Objection by counsel for Illinois Commerce Commission overruled.)

You have asked me to look at Moody's Public Utilities Manual of 1939, to the second portion, of what might be termed the blue section, under the caption, "A Nation-Wide Survey of Public Utility Progress". I find here in this volume of Moody's a map or chart that has the title, "Location of Federal and District Power Projects in Relation to Utility Holding Company Systems." It indicates by symbols throughout various sections of the United States, the map of which is shown here, the location of various federal and state and district power projects. There are quite a few of them. Beginning on page A-33, there is a list here that carries the caption, "Government Sponsored Power Projects," that begins about a third of the way down the page and apparently continues for approximately two pages, including foot notes and also including some PWA allotments for electric power projects in various municipalities, apparently, and information of that character. (Objection by counsel for the two commissions overruled.)

You ask why private capital is not doing that. I think probably there are a number of reasons why government money is being used. I do not profess to know all of them. One that I feel is possibly rather important is that some of these projects involve overall things that private
1692 industry, under our present system, could not economically participate in. They could not pay out on them. I mean, wherever gains are of a social nature, or wherever a project consists of several things,—power, flood control, rehabilitation, and so on,—where in order to make the project as a whole feasible it has to cover these various things, some of which private industry could not go into as we do business today, then you get something that is a function of government, as I see it. Now, that is one of the contributing factors as to why these things are being done, probably.

Another reason is that the people involved in some of these projects might not be able to get the funds at a rate that would permit them to undertake the venture. That is the other side of the picture. But there are two things involved there, at least two; probably there are many more if we were to make an exhaustive study of it.

If we turn the second reason over and eliminate those projects that are purely of a governmental nature and get down to these that are being financed by the government because private industry cannot get the funds with which to do that same work, they might not be able to get the funds at all. I do not think I said that they cannot get the funds at the present level of returns. Some of these little bit of towns might not be able to get money at all from private sources, if you want to carry it to that extreme.

You ask if one of the reasons that is given for the large amount of money which the government has found necessary to expend in projects of this character is not that private capital is unwilling to do it. (Objection by counsel for the two commissions overruled.) Well, the term "unwilling" of course, is something we might argue about; but assuming by that that they are unwilling to do so because they do not see that the return would be compensatory, I can also point out that is the very nature of the situation, for reasons I stated a moment ago in connection with projects involving more than what we might say business is interested in, or of a nature that private capital is not interested in. I note on page A-34 that one of the allotments is to the City of Springfield for an addition to its municipal electric system there. I don't know whether you would be apt to get private capital to go into a municipal system, which is competing with private systems. So there are various reasons why private capital is unwilling to do some of these things. No, it is not an unusual thing for a municipality to issue bonds and sell them to private capital. I think the City of Springfield does have municipal bonds. Whether they are on the power plant or not, I do not know.

Springfield might be further illustrative of the first point I was talking about, in that they completed a few years ago a big municipal project down there, including a lake, a resort place, and parks, and so on, and connected with it was the power plant. Whether or not private capital would enter upon that sort of enterprise is doubtful. Oh, yes, many bonds issued by cities, even for the purpose of acquiring or building extensions to municipal utility plants, have been floated in private circles. Sometimes they are purely revenue bonds. Somtimes they are guaranteed by the whole faith and credit of the municipality, and its taxing power. Yes, they are still being floated.

You point out that at page 7776 I stated I had devoted
many years to the study of accounting, statistics and
1693 mathematics, finance, money and banking, economics,
public utilities, and similar fields. Then you ask my opinion as to whether or not it will be necessary to offer more inducement in the form of compensation for risks to that part of private capital that is not now invested because it is not willing to take the risk for the compensation offered, in order to get that capital into industry. (Objection by counsel for Illinois Commerce Commission overruled.)

I again have to answer as I have been answering. It is not merely a question of risk. It is partly being able to show the investors that there is actually an opportunity here for employing money. The project has to be feasible, in the first place. Then you appraise the risk after that. I mean by that an opportunity to employ capital in enterprise and make money on it. Of course, we can always put capital to use in an unsound venture; but we have to show that conditions require that additional capital be embarked upon some enterprise for some purpose, and that it is going to be something that the public is going to pay the bill for; that there is a demand for it. I think there is a distinction there between those two things.

Yes, some capital has ventured into risks during these depression years.

You asked why money that is lying idle in the form of idle deposits and the excess reserves of the member banks with the Federal Reserve banks isn't out at interest. A very important reason, I think, is the lack of opportunities for the kind of investments that banks can make; the investments that are attractive to banks; and I think that lack of opportunity has resulted in the decrease in interest rates on bank loans.

You ask if I think it is the lack of opportunity rather than the lack of desire to get into industrial enterprise. That goes back to the other part of the question. Lack of opportunity must be thought of in terms of feasible opportunity. I think I have explained that they must be attractive enough to induce capital to come in.

You ask whether I think the figures shown in Tables 2 and 3 in Exhibit 183 are indicative of the financial or economic condition from year to year during the years 1923 to 1939. They have some significance in connection with the interpretation of the other pages in the exhibit; very broadly speaking. You can't accept these figures as being an exact measure of the turnover. It is intended to show the trend. Statistically it is a pretty difficult thing to handle, so I would not want to bind anybody down too closely on this thing. I am only trying to give some quantitative measure in connection with this matter of the turnover of bank deposits. This, being a ratio, it would be influenced by two factors. It would be influenced by the amount of deposits, and by the amount of bank debits.

In 1939 the deposits were $38,000,000,000, and in 1928 $35,000,000,000. In 1935, I see $32,000,000,000. In Table 3 it appears that the turnover in 1928 was approximately at twice the rate as in 1939. You ask in which year was the effective capital the greater, in 1928 or 1939. I don't think

I know what you mean by effective capital. I don't think you can measure the effectiveness of capital by the turnover. The turnover is not intended to measure that. It is intended to measure the idleness rather than the effectiveness. I don't know what you mean by effectiveness.

1694 You ask if there is any difference in a million dollars which is turned over 43 times and a million dollars which is turned over 22 times. It has some bearing upon the ability of the banks to make loans. It has some bearing upon the liquidity, and so forth.

I am trying to present these figures on pages 2 and 3 as an indication, first, of the idleness of funds; and second, to indicate that the volume of funds could be probably turned over more rapidly than they are now being turned over; and that they would naturally support a greater volume of economic activity than they do now.

(December 4, 1939.)

I prepared Exhibit 181.

I have here information concerning the financing of nine of what I call natural gas systems. You ask if any of them are engaged in natural gas operations. Some of the top companies are holding companies that probably have no direct operations themselves. You ask how I went about selecting these particular nine companies. I took everything I could, everything that I thought was financing by natural gas systems, with the exception possibly of a few small instances, and with one exception wherein I was not able to get at the time information that satisfied me as to the nature of the financing. I don't mean that this list includes all of the natural gas systems operating in this country.

By "everything" I mean all the new financing in this line that came to my attention in the various sources I consulted.

By the expression "in this line", I mean in the natural gas industry generally. There may be facts to which I do not have access.

The period of time covered by this exhibit is beginning with the year 1936 and continuing down to as late as I could get information at the time I was preparing this exhibit. I can't be too dogmatic about it because some may have escaped my attention. I know financing goes on about which the public does not have information.

By natural gas system, I merely mean companies or a system of companies, thinking now of holding companies and subsidiaries, which are concerned with natural gas operations to an extent that they would appeal to me as being natural gas systems.

You ask whether I don't regard Natural Gas Pipeline Company of America and Texoma as constituting a system, in the sense that I have used that term. I don't know offhand where I would draw the line as to the top companies in the picture. It is my understanding that defendants do not distribute gas in their own names, certainly.

By the expression "in their own names", I mean, some gas might be taken directly off of the pipeline, and might physically be delivered to a consumer, but they perhaps don't do it in their own name. I don't know that that is the fact. I know enough about it to say that it is conceivable. I don't say that it is true. I said it is conceivable, and I am thinking of the interruptible gas sales here in the Chicago area. I am not sure just what the physical facilities are by which these deliveries are made, who owns those actually.

1695 Yes, I know the facilities of defendants terminate at Joliet. I was possibly thinking more of the Chicago District Pipeline Company than I was this; except also I believe there is some industrial business down near Streator, around in there, which is—I don't know. I believe that a reasonable person reading the record ought to be able to come to a conclusion as to what is being said.

Questions Interposed by the Examiner.

My contention had to do with the actual basis of my selection in answer to Mr. Morgan's question as to how I went about selecting the companies I discussed in Exhibit 181.

I do not have any facts in mind as a basis of my statement that defendants were not distributing natural gas in their own names. I was merely attempting to explain my thought processes. Perhaps I went too far in that regard. I think that there are situations in Illinois where deliveries are made direct from the pipeline to a customer, or substantially in that fashion, and billings are made by the distributing company. It is a very fine point.

Cross-Examination by Mr. Morgan (Resumed).

You ask if that was in connection with defendants' system. That is in the state of Illinois. The basis for my thought that such a thing was conceivable is based upon what has happened, or what I recall as having happened, or is still happening in Illinois. In selecting the nine companies shown in my exhibit, I did not have in mind the thought that defendants might be distributing gas in somebody else's name.

You ask whether or not I stated near the bottom of page 7798 of the record that this exhibit represents my interpretation of the facts and figures which I gathered from sources named in my testimony. I gave here at page 7798 the number of various sources from which I took the information. I might have copied some things verbatim, or some facts verbatim, and I might have paraphrased in other cases.

You ask if these prospectuses I have mentioned here are the documents to which reference has been made in the testimony here and which have been filed with the Securities and Exchange Commission. There is one document that was filed with the Securities and Exchange Commission in connection with the flotation of securities.

You ask how I got hold of them. I asked the bankers for them. You ask whether or not they are circulated among the public after they are finally approved by the S. E. C. I don't know anything about this approval business that has been argued here. I get these prospectuses in this fashion: New issues of securities are mentioned in various ways; newspaper advertisements, newspaper stories; they are listed in the Commercial and Financial Chronicle; they are mentioned in S. E. C. releases. When I see anything on which I wish to have the prospectus, I direct the librarian of the Illinois Commerce Commission to go to or to write to one of the underwriters and obtain a prospectus. I have a pretty large file of them over there; I think all public utility prospectuses, or certainly most of them during the last few years. To digest them in detail is an impossible job for one person. I consult parts of them frequently. Usually; I have no difficulty in getting them when I ask for them. Once in a while there is some difficulty. I don't know how many copies are printed. I don't know what they

do in the way of circulating them. I have said that I
1696 have been able to get most of them. That is the reason I consult these prospectuses. I don't go over to the S. E. C. and get certified copies of them before I use them. I could not consult them if I did not have them, of course. I also used Moody's Manual. I am not sure I used Poor's. I know I have stated that I used it. We don't keep Poor's in our Chicago office; we do have it in the Springfield office. The extent, if any, to which I consulted Poor's, would be very limited. Once in a while, when I want to look at Poor's, I will go down to the Chicago office of the Poor Publishing Company to consult it.

Moody attempts to give quite a bit about some companies, and they give very little about others, because many companies probably won't supply much of the information that they want to have. I am not always able to ascertain from Moody's the relation of earnings to interest on a particular issue of bonds. In some cases we can, and in some cases we can't. It depends on the particular issue; it depends on how you define interest. If you mean nominal interest, you may get a better idea than you would on interest that includes amortization, and so on. I don't know whether others frequently consult these two manuals for those purposes or not. I consult them for whatever purpose I want to consult them for.

If I was interested in the relation of the earnings to the interest on a particular issue of bonds, I might consult Moody's to try and find out. If I thought I found out from that source, I would use it.

I was discussing open-end mortgage provisions in my testimony here. (Objection by Counsel for the Illinois Commerce Commission overruled.) I will try to explain what I mean by that. I don't want to be held to having made too technical or too legalistic definitions. I am trying to give a practical conception of what I mean by an open-end mortgage. And that might be subject to many additional qualifications and additional statements in case I were pressed as to why I didn't say this or didn't say that about it. Now, many of the mortgage securities presently outstanding are issued under mortgages that contain provisions whereby under the conditions set forth in the mortgage more securities of the same general character can be issued. It would permit the issuance of additional securities under the same mortgage, under the terms contained in the mortgage with respect to the additional issue. I mean "conditions set forth in the mortgages" that the issuing company is not free to go out and choose the uses to which it would put the money raised through bonds issued in pursuance to those open-end provisions. (Objections by Counsel for the two Commissions overruled.) I don't know all the different conditions and terms they put in mortgages. They vary from mortgage to mortgage.

You ask if that restricted the uses to which the company might put the money if they want to raise the money through that mortgage. (Objection by Counsel for Illinois Commerce Commission overruled.) Those provisions are there for whatever purposes the language there indicates is involved, I suppose.

You ask whether there is a restriction on the company's use of money that can be raised through bonds that are issued under that open-end mortgage. (Objection by Counsel for Illinois Commerce Commission overruled.) I can only answer by saying that a mortgage indenture sets forth the rights and duties of the parties involved in the contract, whatever you want to call it. Yes, I think that is an answer to your question.

You again ask whether or not this expression "subject to the provisions contained in the Mortgage", to which I referred to a while ago, is a restriction that is put in the mortgage upon the use to which money raised through the issuance of bonds coming under that mortgage can be put.

1697 (Objections by counsel for the two Commissions overruled.) As I conceive it, the mortgage indenture under which a security is issued is a document containing the rights and duties of the various parties to the contract. There are conditions. I am just refraining from characterizing the conditions, because I cannot do that. If bonds are issued under an existing mortgage they must be issued, unless there is some new agreement, according to the terms and provisions of the existing mortgage. Of course there are supplemental indentures from time to time.

You ask if I read the prospectuses of some of these companies. I did not read any of them from cover to cover, certainly. The principal thing I got from them was the amount of proceeds derived from the issue and the sinking fund provisions; that was the principal thing. As to the order in which I consulted various sources, I cannot say.

The order in which I listed them here is just the order in which I happened to think of them.

I think I said on direct testimony that I also sometimes consulted the bankers directly in an attempt to get additional information from registration statements.

You have exhibited a document to me. It looks familiar, yes, sir. I will compare this with my copy. I think your copy is the same as the one I have. It is a copy of the prospectus of the Arkansas Louisiana Gas Company.

You ask me to read Paragraph numbered 1, the "1" being in parantheses, on page 14 of that prospectus. It reads as follows:

"The aggregate principal amount of such additional bonds which may be so authenticated and delivered (other than bonds authenticated under the deposit of moneys as hereinafter set forth) and the aggregate amount of such deposited moneys which may be withdrawn shall not exceed an amount equal to the sum of $2,500,000 plus 66⅔ percent of the amount, if any, by which the cost or fair value, whichever in any instance is left, of property additions (consisting of additions to, or renewals and replacements of, properties useful in the transportation, distribution or sale of natural gas or in the manufacture, transportation, distribution or sale of manufactured gas, or additional properties useful for the foregoing purposes, but not including oil, gas or mineral leases or rights of royalties or oil or gas wells), subject to the lien of the Indenture, exceeds retirements of such property (as the term retirements is defined in the Indenture), for the period subsequent to July 1, 1936." (Motions to strike and objections to the whole line of testimony by counsel for the two commissioners denied and overruled.)

1698 I believe I have here a prospectus of Panhandle Eastern Pipeline Company. I have two of its prospectuses in my file, one of which seems to correspond to the document you have handed me. That is the prospectus relating to the issuance of $24,000,000 of the company's First Mortgage and First Lien Bonds, Series A, four per cent, due March 1, 1952, such prospectus carrying on its face a date of March 30, 1937. (Objection by Commission counsel overruled.) On page 15 of this prospectus, the paragraph before the last reads as follows:

"The term 'fixed property additions' will not include, among other things, (1) the first $4,000,000 in cost to the

Company and/or one or more qualified subsidiaries of fixed property additions purchased, constructed or otherwise acquired by the company or a qualified subsidiary subsequent to March 1, 1937, or (2) any gas production property, viz.: gas acreage, gas wells, gas or gas and oil leaseholds, and other works and properties used in or useful for the production of natural gas."

(At this point the Examiner directed the reporter to incorporate in the record from page 12 of the prospectus of Panhandle Eastern Pipeline Company the first paragraph under the title "Issuance of additional bonds" and the first sentence in the sub-paragraph below: "The Mortgage and Deed of Trust to be dated March 1, 1937, between City Bank Farmers Trust Company and James M. Kemper, Trustees (hereinafter in this prospectus referred to respectively as the 'Corporate Trustee' and the 'Individual Trustee'), securing the First Mortgage and First Lien Bonds Series A, will limit the issuance of Bonds thereunder to $35,000,000 principal amount of bonds, except as stated in Paragraph (III) on page 13 hereof. It will provide that First Mortgage and First Lien Bonds Series A, in the aggregate principal amount of Twenty-four Million Dollars ($24,000,000) shall be issued thereunder forthwith on the execution and delivery of the Mortgage and Deed of Trust. The balance of the Bonds issuable under the Mortgage and Deed of Trust, viz. $11,000,000 principal amount, may be issued thereunder from time to time in series (other than Series A) when and as determined by the Board of Directors of the Company, but only on the following terms and conditions:

(1) Additional bonds may be issued only in an aggregate principal amount not exceeding sixty per cent of the cost of fair value (whichever is less) of any unbonded fixed property additions of the Company or a qualified subsidiary.") (Objection by counsel for the two Commissions overruled.)

Returning to page 1 of Exhibit 181, I start with the Arkansas-Louisiana Gas Company. That company is engaged in producing, purchasing, transmitting, selling and distributing natural gas. I don't know whether these constitute all the phases of the natural gas business. You ask if that is a broader field than these two companies under consideration cover. As far as I know, the two companies under consideration have some production. They also purchase some of their gas. They also transmit part of the gas. The question of distribution has been argued already. Yes, the major portion of the Arkansas-Louisiana Gas Company's revenue is obtained from direct distribution of natural gas to residential, commercial, industrial, and other customers in a few more than one hundred communities in the three states of Arkansas, Louisiana, and Texas. They also conduct some wholesale operations.

You ask if in that particular they resemble defendants.

I think both companies do some wholesale business.
1699 They both own production and both companies transmit gas. I don't know what other points of comparison might be involved. (Objection by counsel for Illinois Commerce Commission overruled.) You ask if the Arkansas-Louisiana Gas Company is not a network. They serve more than 100 communities in three states. They presumably have pipes running from place to place. It might be characterized as a network. I would have to check that geography before I can agree with you that they are located in northwestern Louisiana, southwestern Arkansas and northeastern Texas.

I don't know how many gas fields they produce from unless I have stated it here in this exhibit. I don't know anything more about the gas fields, that I can recall right now, than what I have stated here in the last sentence of the first paragraph of page 1, of Exhibit 181, in which I say the natural gas supply is obtained principally from fields located in Louisiana and Texas. I do not show the names of the fields from which the gas is obtained. I think the source of supply and the extent of the supply would be taken into consideration by the bankers who are floating the issue certainly, and presumably they would consider it in arriving at their terms. I mean the price which they paid, the terms at which they buy and at which they attempt to sell it.

You ask whether I was able to get those facts from the prospectus and why I did not include the information. I think one has to exercise some judgment. I stated on direct the purpose of these short summaries was not to make an exhaustive analysis but to bring some amount of orientation as to where the companies operate and what their operations are like. I could have copied the whole prospectus and so on but that is not very reasonable it seems to me.

You ask whether or not, in the light of my statement that a banker would probably be interested in the source of supply and the extent of the supply in determining the terms under which he would be willing to buy the bonds and the price he would pay for them and for which he would offer to sell them, I would be handicapped in appraising the figures shown in the exhibit unless I have such information included along with the figures. You want to take in an awful lot of territory. I don't see how I can answer that question very well.

I have brought here figures showing the prices that were paid, the rate of interest that was charged, and other figures concerning several financial transactions of the Arkansas-Louisiana Gas Company. I have said the bankers would look into the source of supply and the extent of the supply of natural gas behind that natural gas system. They certainly would consider it. Beyond that, going to the weight or anything else, I can't tell you how their mind would work on that in relation to that. You ask if they were not considering that or giving those facts any weight, why did they take up their time with it. My thought as to that, whether they observe any weight, they don't know what it is in the first place and can't tell whether they are going to give any weight to it. Yes, I stated a while ago, it would probably have something to do with the amount they would be willing to pay for the issue under consideration.

You ask that if I bring in the figures without bringing in this one element that must be considered in arriving at what they are willing to pay does not render the picture incomplete. (Objection by Counsel for the Illinois Commerce Commission overruled.) That exhibit certainly is not complete as regards its containing all the information that is available with respect to these companies and the nature of their operations. You ask what else the banker would concern himself with besides the source of supply and the extent of the supply in connection with extending credit. That is a fairly long list. He would consider the whole picture of the company's operations, its contracts, its markets,
1700 the length of the pipeline from the source to the market. He would look at the adequacy and the reliability of the source of supply. In order to look at this information, he would have to look at the supply as it exists. (Objection by counsel for Illinois Commerce Commission overruled.) I think I said he would look at the company's whole operations. I am doing the best I can.

Cross-Examination by Mr. Slaff.

You ask if the bankers would not look at the indenture. They would probably have a great deal to do about the drawing up of the indenture. You ask if they would consider who the officers and the directors were before extending credit. Sometimes credits are extended upon the basis of personality as well as other things, if that is what you mean. I stated on direct that they would consider a vast wealth of material which I did not attempt or purport to set out in my Exhibit 181.

Cross-Examination by Mr. Morgan Resumed.

You ask if it is not necessary to have more than I have in this exhibit in order to properly appraise the figures which I have brought in here as indicating the cost of money. I don't know how far it is necessary to go with respect to this matter of forming judgments. Certainly, the ultimate facts are what they are. If you are going to make an exhaustive analysis why there was a slight differential between this and that you would never get through with your research in order to form a judgment. I have stated that there is a great deal in these prospectuses besides that which I have carried into this exhibit. You ask if the information carried in the prospectuses is of a character which must have taken a lot of time and involved a lot of expense to prepare. I have heard complaints to that effect.

You ask if it is not reasonable to say that that information was prepared and the time and money was utilized in preparing it because the investors who were considering the extension of the credit would require that information. I think it was prepared because the law and/or rules or regulations under which the SEC operates lay down those requirements. You ask whether the investment bankers would require that information. There were not any prospectuses like this before the SEC Act of 1933. The issuing companies did not give anything like that much information to the investor prior to that time. (Objection by Counsel for Illinois Commerce Commission overruled.) I said the investment bankers prior to the SEC did not hand out to the investors anything like the amount of information that is presently contained in the prospectuses.

At a matter of fact, I doubt if the investment bankers exercised the same diligence to inquire into the facts that they do now. (Objection by Commission Counsel overruled.) I don't know the facts. I am trying to give you the best sort of answer. I have a basis for an opinion. It is substantially true that at this time information as to the character of operations, as to whether the operations are integrated, as to the number of customers served directly, the source and extent of the supply, the distance of the field from the markets, the indicated life of the field, and a great many thing of that character is required by the investment bankers in connection with security issues at this time. The investment banker requires everything he thinks is pertinent in regard to the operations of the company. I could go over each one of these one by one, and perhaps on most of them I would agree that the bankers would check them up.

I have given the scope of my information as to the Arkansas-Louisiana Gas Company. I would not go so far as to say I did not read any other part of the prospectuses; I certainly have not taken the time to go over them in detail.

You ask how the figures which I brought in here
1701 can be used in appraising the elements which enter
into a proper rate of return for these two pipeline companies in the absence of the additional information. I assume what I am being asked concerns the thought processes of people in forming judgment; I think people must be assumed to be reasonable; and I assume, in forming a judgment, the whole history of our economic picture is one in which we have acted upon such knowledge as we have. And the thought I am trying to get at is this: The degree to which one goes in running down all the clues and bits of evidence in connection with a thing like this is a matter of judgment. I don't know how to go any further on it, because, after all, we talk about securities, and people have opinions about securities; but many of them have no idea of all of the details of operation of the companies whose securities they are talking about.

Redirect Examination by Mr. Booth.

You ask if I am showing the facts as to the bond yields of these various companies listed in the exhibit. I was trying to present a story here of what these companies have done and as I have said, for purposes of orientation, I have brought in a little bit of description about the company. If I did not put that in I would have been asked why I did not.

Cross-Examination by Mr. Morgan Resumed.

I don't know to what extent the banker might have gone in comparing one company against another in forming their judgment on a given company.

You ask if the figures concerning the Arkansas-Louisiana Gas Company's financial operations are to be of service in this inquiry, it is going to be necessary to see whether those elements which were considered by the bankers in connection with that company obtain with reference to the two pipelines under consideration. I think I have answered a number of times, but I will try once more. It seems to me that the position is that these figures can't be even looked at unless it is shown that every thing, all the minute details with respect to the operations; that a comparison is made, checking one off against the other, to arrive at an opinion as to each little difference, and so on and so forth. If that is the criterion upon which this sort of material must be prepared, none of it could ever be prepared as a practical matter. Look at Dr. Dorau's exhibit. If that sort of analysis were even attempted there it would be an impossible job. We have got to be reasonable in these matters. That is all I mean to say.

You ask if the fact that the Arkansas-Louisiana Gas Company got money at the figures and on the terms shown in my exhibit 181 means that the defendants could get money on those terms. That doesn't follow as a matter of cause and effect.

Redirect Examination by Mr. Booth.

Yes, they might get it for less.

Cross-Examination by Mr. Morgan Resumed.

Certainly, in order to arrive at the cost to these two pipeline companies of raising their present capital by overall financing transactions, it would be necessary for these companies to present to their investment bankers or to others through whom they hope to obtain the funds, a full and complete statement of the nature and character of their operations. I think their judgment as to the market price that might be obtained for that type of security would have some bearing or would be influenced in part by what they know about the market price of other issues.

1702 If they consulted the figures on the Arkansas-Louisiana Gas Company financing, I don't know the degree to which the investigation would go for the purpose of determining what was back of the figures for Arkansas-Louisiana Gas Company. Certainly, in 1936 and 1939 when the bankers undertook that financing, they must have made a study of that company. The degree and the details as to how much of a comparison between the Arkansas-Louisiana Gas Company and the defendants is a matter of judgment. How much further you can go on that, I don't know. The facts about one issue are not wholly unrelated to the facts as regard other issues in the market at a given time. I think my statements with reference to the Arkansas-Louisiana Company would apply to each of the other companies in the exhibit, in reply to cross-examination concerning those other companies.

Cross-Examination by Mr. Slaff.

Similar questions affecting the figures applying to other companies would result in the same general character of answers. The summary statements about the other companies are of the same general tenor. I intended them to have, and they have, the same general purpose.

Redirect Examination by Mr. Booth.

I know that exhibits showing bond yields of public utility companies have been submitted in a number of cases. I know that that is done, but whether it is the ordinary thing to do, I don't know. You ask if I know of any case in which the complete history of the operations of each and every corporation which has issued securities included in the table of bond yields, has ever been submitted at the same time. I am not familiar with that end of it, no. I know that Mr. Gilman submitted an exhibit showing the bond yields of companies that he called natural gas companies.

Cross-Examination by Mr. Morgan (Resumed).

The Cities Service Company covers quite a bit of territory. I do not seem to have anything in here with respect to the source of supply. This company's financing was of a private nature and I therefore had no prospectus on it. Whether or not I omitted to take that out of Moody's information as to the source of supply, I don't know. I would not object to putting in the information about the source of supply. I would be glad to look in Moody's and see if they show anything about it. I can't answer the question as to how many sources of supply it has. You ask if I do not know it is composed of a network of pipelines that are connected to each other in different places so that gas can be transported or transferred freely from one part of the system to another. I don't know the purpose except to get gas to customers. I assume in a system that goes among a number of different communities there might very well be a number of inter-connections for interchange purposes, but I don't know.

According to my exhibit, the company sells gas to local distributing companies operating in Kansas City, St. Joseph, Springfield, Independence, Sedalia, and Joplin in Missouri and Kansas City, Leavenworth, Atchison, Hutchison, Ottawa, Topeka and Wichita in Kansas and Bartlesville, Oklahoma.

You ask whether I know anything more about the facts concerning the El Paso Gas Company than is shown in this exhibit. I have the prospectus on El Paso. I don't recall but I probably looked at a little more than I have got in here, but I don't recall it from memory. I state that it produces gas in Lea County, New Mexico. I don't know
whether Lea County is a very large county or not. I
1703 am not familiar with the geography down there. I
do not know that that is a very large gas field. I don't know whether anybody else is taking gas out of that field except that company.

You ask which is more comparable to the defendants, the Lone Star Gas Company or the Lone Star Gas Corporation. My memory is that the Lone Star Gas Corporation is a holding company and I do not believe it has any direct operations of its own. I am speaking from memory. My recollection is that its subsidiaries participate in all of the four principal phases of the gas business, namely, production, purchasing, transmission, and distribution. I can't visualize Moody on this company's operations any too well, but I will say that it is disjointed, without attempting to disparage the company; as I recall, they have operations in Iowa and also quite a bit down in Texas, so the extent to which there is inter-connections in the system would be limited more probably to their Texas operations, where, as far as I can remember there may well be inter-connections. I do not know that they own gas reserves in 39 different gas fields in the States of Texas and Oklahoma.

You ask what sources I have consulted concerning the operations of Northern Natural Gas Company. That came from Moody's I am pretty sure, because this is also what we term private financing, and we had no prospectus on it. You ask if I know in what fields it produces gas. It seems to me that comes either from the Hugoton Field in Kansas or the Panhandle Field in Texas, possibly from both. I am speaking now from memory. You ask if it doesn't take gas from both those fields and from the Otis Field in Kansas. I have some sort of recollection in regard to the Hugoton and Panhandle Fields. The Otis Field just doesn't click with me at the moment. I will be glad to check up on that if you want me to.

You ask whether my statistical study bears out the observation that in all of these bond transactions of natural gas companies where there is a reliance upon the production as a part of the resources behind the bond issue, the latest maturity of bonds included in the issue bears a date substantially short of the indicated life of the field. My exhibit does not give that information. (Objection by Counsel for Illinois Commerce Commission overruled.) If you mean studies outside this exhibit, I cannot say whether you are right or wrong. I have not made a study of that.

During the noon hour, I checked with our files the eight prospectuses which you handed me just before noon to see whether or not I had them in my files. I have checked them and I have them here. (Objection by Commission Counsel prospectus overruled.) From the prospectus of the Public Service Company of Colorado dealing with the bond issue in the amount of $40,000,000 of First Mortgage Bonds, 3¼ per cent Series, due 1964, dated November 27, 1939, I read at page 23 as follows:

"Property additions must consist of electric, gas or steam property located in Colorado, Wyoming, Nebraska, Kansas, Oklahoma, New Mexico, Arizona or Utah, acquired or constructed subsequent to November 30, 1939, but (among other things) shall not include any natural gas wells or natural gas leases or natural gas gathering and transmission lines or pipes or other works or property used in the production of natural gas or its gathering or transmission up to the

point of connection with any distribution system owned by
the company, except any natural gas transmission line
used for the transmission of natural gas for distribution by
the company when such natural gas transmission line
1704 connects any distribution system owned by the Com-
pany with a source of supply of natural gas (either
gas wells or gathering lines or other transmission line) or
when such natural gas transmission line connects two or
more municipalities served or to be served with natural
gas by the Company."

On page 16 of the prospectus of the Central Illinois Public Service Company $38,000,000 First Mortgage Bonds, Series A, 3¾ per cent, dated December 8, 1938, I see the caption "issuance of additional bonds." Under that caption, I see the following language: "Additional Series A Bonds or bonds of other series may be issued under the indenture without limitation as to principal amount, for any one or more of the following purposes, subject to the conditions and restrictions with respect to the authentication and delivery of bonds to be contained in the Indenture," then follows a colon and three paragraphs set out underneath.

On page 17, in sub-division 3 under that same sub-caption in the third paragraph the words "bondable property" are used. (Objection by Counsel for Illinois Commerce Commission overruled.)

I notice on page 16 in the third line of the last paragraph thereon the two words "bondable property" are in quotation marks, followed by the following words in parentheses "as defined in the Indenture." I would take it that refers to property that as defined in the indenture may be made subject to the terms and conditions of the indenture. It might refer to the original issue of bonds as well as the additional issue. The paragraph beginning with the words "bondable property" on page 17 reads as follows:

"'Bondable property' (as more fully defined in Section 3 of Article II of the Indenture) which may be used as the basis for the issuance of bonds will consist of additional permanent property constructed or acquired by the Company after December 1, 1938, and used or useful, in the electric, gas, or water business, except that bondable property shall not include oil or gas wells and leases, field gathering pipelines and natural gas transmission lines, other than lines interconnecting gas distribution systems." (Objections by counsel for the two commissions overruled.)

I have the prospectus here on Central Power and Light Company of August 17, 1939. I have not seen the mortgage indenture referred to in the prospectus. I have seen the indentures of none of these companies whose prospectus I have here. (Objection by Commission Counsel.)

On page 28 of the prospectus last mentioned, I see the caption "issuance of additional bonds." In the second paragraph, page 29, I see a sub-paragraph with the words "bondable property." The term "bondable property" has the same significance or meaning in this prospectus as it had in the one from which I just read. That short paragraph reads as follows:

"'Bondable property' (as more fully defined in Section 3 of Article II of the Indenture) will consist of additional property, plant or equipment constructed or acquired by the Company on or after August 1, 1939, and used or useful in its electric, gas or water business, except that bondable property shall not include, among other things, automotive transportation equipment, office furniture and equipment, oil or gas wells and leases, field gathering pipelines and gas transmission lines, other than lines interconnecting gas distribution systems."

On page 17 of the Kansas Power Company prospectus, issue of $5,000,000 First Mortgage Bonds Series A, 4 per cent, due in 1964, dated July 14, 1939, I see the caption "issuance of additional bonds". Under that caption on the following page, I see the first paragraph starts out with the words "bondable property". I think the term "bondable property" as used here has the same sig-
1705 nificance as in the last two from which I have read.

That would be on the basis of a certain amount, depending upon the original investment, less this composite accumulation up to that time. That paragraph under the caption "bondable property", page 18, reads as follows:

"'Bondable property' (as more fully defined in Section 3 of Article II of the Indenture) will consist of additional property, plant or equipment constructed or acquired by the Company on or after July 1, 1939, and used or useful in its electric, gas or water business, except that 'bondable property' shall not include, among other things, oil or gas wells and leases, field gathering pipelines and gas transmission lines, other than lines interconnecting gas distribution systems." (Motions to strike and objections by counsel for the two commissions denied and overruled.)

The prospectus of the Idaho Power Company at page 19, contains the sub-caption "Issuance of Additional Bonds." In the sub-paragraphs below that I find a paragraph beginning with the term "property additions". I would expect that term "property additions" to refer to the property additions to be made as a result of the issuance of additional bonds. That short paragraph reads as follows:

"Property additions must consist of electric or gas property, or property used in connection therewith, but cannot include securities, materials and supplies, property used principally and primarily for the production or gathering of natural gas, or any power sites and uncompleted works under Idaho State Permits (see subdivision 'Stations Under Construction' under caption 'Property' herein). In determining net property additions, all retired funded property must be deducted from gross property additions except to the extent of certain credits with respect to funded property which has been released."

The prospectus of the Missouri Power and Light Company, dated December 15, 1936, on page 17 contains the sub-caption "Issuance of Additional Bonds" and on the next page 18 about three paragraphs down from the top, I find a paragraph beginning with the words "property additions" which term, functionally, means the same as in these preceding prospectuses from which I have just read. That paragraph reads as follows:

"'Property additions' consist of additional property acquired after November 30, 1936, located in the state of Missouri or in any other state, if connected with the properties in the state of Missouri, properly chargeable to fixed property accounts and useful in the electric, gas, heat and water businesses. Property additions, as defined, do not include good will, going value, franchises, contracts, securities, choses in action, oil or gas leases or wells, or any property of the nature excepted from the lien of the Mortgage as specified under caption 'Security for the First Mortgage Bonds.'" (Motion to strike and objections by Counsel for Illinois Commerce Commission denied and overruled.) At the top of Page 17 of the prospectus of Public Service Company of Oklahoma, dated February 18, 1936, I find the caption "Issuance of Additional Bonds." About two-thirds down the page, I find a paragraph beginning with the words "bondable property" which term has the same functional meaning as in these other prospectuses in which that term was used. That paragraph reads as follows:

"'Bondable Property' (as more fully defined in Section

3 of Article 2 of the Indenture) which property may be used as the basis for the issuance of bonds will consist of additional permanent property constructed or acquired by the company after January 1, 1936, and used or useful in its electric, gas and water business, except that bondable property shall not include oil or gas wells and leases, nor
1706 gathering pipelines and natural gas transmission lines, other than lines inter-connected with distribution systems." (Motion to strike by Counsel for Illinois Commerce Commission denied. Objection of Commission Counsel overruled.) On page 17 of the prospectus of the West Texas Utilities Company, dated June 6, 1939, I find the caption "Issuance of Additional Bonds." Near the bottom of the page, I find a short paragraph beginning with the words "bondable property" which latter term has the same functional meaning as in the other prospectuses from which I have read. That paragraph reads as follows:

"'Bondable Property' (as more fully defined in Section 3 of Article 2 of the Indenture) will consist of additional property, plant or equipment constructed or acquired by the company on or after May 1, 1939, and used or useful in its electric, gas, or water business, except that bondable property shall not include, among other things, automotive transportation equipment, office furniture and equipment, oil or gas wells and leases, nor gathering pipelines and gas transmission lines, other than lines inter-connecting gas distribution systems."

I have not read the other prospectuses in my office to determine whether or not restrictions or limitations of the same character are rather widely used in prospectuses. You ask whether or not I have found from my reading of prospectuses in the past dealing with the issuance of securities by electric light, gas and water utilities, and by integrated gas companies or other gas companies, it is a rather wide practice to include in the prospectuses reference to that character of restriction or limitation in the indenture. (Objections by counsel for the two commissions overruled.) I know from my study of prospectuses, or from my familiarity with them, that it is the customary practice to contain therein extracts or summaries of material that paraphrase the various terms and conditions that appear in the indenture under which the security is being issued.

You ask whether I find it a wide practice to impose restrictions in the indenture as reflected by the prospectuses which I have just read against the investment of funds to be raised by the issuance of additional bonds under that mortgage in natural gas production facilities and natural gas transmission lines. I again state, as I stated before, that it is common practice in prospectuses to put in extracts, summaries or paraphrases of some of the principal terms and conditions contained in the indenture under which the bonds are issued. That which has been read in the record the last few minutes is prevalent in the mortgages, in the indenture, and I imagine it is extracted and summarized frequently in the prospectuses.

Redirect Examination by Mr. Booth.

I would not want to go so far as to say that the definition of the term "bondable property" which I have just read into the record is common in these prospectuses which I have read. It is common to show in there the definition of some of these terms; but as to certain types of mortgages, telephone company mortgages, they might not make any mention of gas wells. I made no study of how the term "bondable property" is defined public utility mortgages generally; in electric and gas company mortgages generally speaking.

Cross-Examination by Mr. Morgan (Resumed).

You ask if as a statistician I do not know that these restrictions are not put into these indentures by the company. (Objection by Commission Counsel overruled.)

The point is, I have heretofore testified that I cannot characterize the terms and conditions contained in the mortgage as constituting restrictions necessarily. I cannot answer that question without changing my testimony to that effect, it seems. They may be terms and conditions that are in there at the request or the suggestion of the underwriters or the bankers. (Objection by Commission Counsel overruled.)

You ask if that doesn't indicate to me as a student
1707 of finance that the bankers and underwriter are not
willing to have the mortgage impaired by the addition of properties of that character read into the record from the prospectuses setting forth the restrictions. (Objections by counsel for the two commissions overruled.)

All I can say is that I know that the terms and conditions are contained in the mortgage. Why the bankers might request them to be put in would depend upon the circumstances in each case, upon the legal problems involved too, because after all lawyers are the ones who draw up these mortgages. It might very well be a legal question. After all we are talking about mortgages here. The question is what can be put under a mortgage. There may be a legal requirement there. If I recall correctly, some of these referred to the exclusion of leases. I don't know, I am not a lawyer; but from what I do know, perhaps a lease or any similar right is not actual property, like property owned in fee, and can't be put under a mortgage. I think that is a matter of law and other things.

I haven't read the mortgage of the Texoma Natural Gas Company. You ask what purpose would be served by putting a restriction of that kind in a mortgage indenture. (Objections by counsel for the two commissions overruled.) I cannot recite these terms and conditions to which you have referred to as restrictions any more than I have already indicated.

Cross-Examination by Mr. Slaff.

With respect to the prospectus of Arkansas-Louisiana Gas Company about which counsel questioned me before noon, that document on page 6 contains this statement: "Ralph E. Davis, Inc., Engineers, have made a survey of the gas reserves of the company and have also surveyed reserves of others considered by such engineers to be available to the company. The letter addressed to the company summarizing the results of this survey is quoted below." Below that on page 6, and continuing on page 7 on through to page 8, is quoted a letter from Ralph E. Davis, Inc., Engineers, Pittsburgh, Pennsylvania, directed to the board of directors of Arkansas-Louisiana Gas Company and signed "Ralph E. Davis, Inc., Engineers, by Lyon F. Terry, vice-president," which contains a discussion of the gas reserves available to this company.

Cross-Examination by Mr. Morgan Resumed.

You asked me to look during the noon hour and see whether or not Northern Natural was taking gas from any other field than the Panhandle field and the Hugoton field. I have before me copy of Exhibit 162 which contains the statement: "The company's gas supply is obtained principally from the Panhandle field in Texas and the Hugoton and Otis fields of Kansas, as follows:" Then it sets forth the amounts received from the three fields specified and from other fields. They run, roughly, for the year 1938, 22,000,000 M.C.F. from Panhandle; 13,500,000 M.C.F. from Hugoton; 3,000,000 M.C.F. from Otis; and about a million M.C.F from other fields.

In my direct testimony, I testified concerning some assumptions given me at the time and shown at the top of page 7800 of the record. I did that arithmetic as the result of a line of thought that I embarked upon reading the testimony of Mr. Delafield with respect to the inclusion in his eight per cent rate of return figure of 5¼ per cent for risk premium. I turned the matter over in my mind and wondered just what that might mean in the way of arithmetic. You ask if it was my thought at the time I did that arithmetic that part of the risk premium ought to be treated as an accumulation for the purpose of amortizing the investment. I don't treat this as an amortization of investment.

1708 I have added together the amount of the risk premium and the amortization percentage to get a total percentage. You ask if I reached the conclusion that the investment would be amortized in eight and a half or nine years. I did not look at it in that way at all. You ask what use I expect that eight and a half or nine years to serve here. I think it is an attempt to measure the effect of the risk premium of 5¼ per cent, or any other percentage, as far as that goes, as an offset to possible capital loss. I don't think that is treating the risk premium as a part of the amortization of the capital. I am not sure that I know how that circumstance would affect the proper rate of return. (Objection by Counsel for Illinois Commerce Commission overruled.) I was trying to appraise that figure of 5¼ per cent in arithmetical terms, in the sense that I was trying to find out that if he considered that factor together with the amortization, in how many years would it take the two together to amount to the original sum.

You ask why I added that to the amortization reserve unless I was going to use it as a part of the means of returning the capital investment to the company. I think you might consider the risk premium as being an offset to capital loss. If it is supposed to compensate for capital loss, then you might take it as a measure to offset it. It is a pretty difficult thing to express in words, but I think that is the general idea I had in mind. I don't mean capital loss depletion. I mean actual loss of investment. I do not think that the thought occurred to me at the time that there should be no compensation for risk after eight and a half years. I do not recall. (Objection by Counsel for Illinois Commerce Commission overruled.) You ask again why I figured out how long it would take the two accumulations together to accrue the amount of the investment. I am going on the testimony given by others, or it is my impression that your witnesses indicated that this was a risk premium, and it might compensate for the possibility of loss, or compensate for risk, in other words. It was not on the theory also that as soon as the risk premium, together with the amortization, would accrue an amount equal to the capital investment that there should not be any further allowances for risk premium. (Objection by Counsel for Illinois Commerce Commission overruled.) You ask what I mean by amortization. (Objections by counsel for the two commissions overruled.) It is my understanding of accounting that amortization of properties and depreciation of properties is one of the costs of doing business that should be provided for and set up on the books of any company. It serves to recover the capital cost of the property consumed in the rendition of service. I am not saying that this gives you the time at which the capital cost is returned. You ask if I think that any part of the rate of return should be applied as return of the capital. (Objections by counsel for the two commissions overruled.) Certainly, from an accounting point of view, at least, I would not treat the rate of return as representing a return of the capital.

I have said that I made that calculation in an attempt to appraise risk premium. Now, I will try to carry that a little further. If you conceive that the investor asks a risk premium because he is afraid that he may not get some of his capital back, then you could consider the risk premium as an offset to the loss of capital, and you have got to take the two things into account in order to try to measure his net gain or loss. I do not mean net risk over a period of time.

1709 You ask if I mean, as the years go by, between now and the end of 1954, that for every year that passes the risk is reduced because defendants have had the risk premium in the years that have passed. (Objection by

Counsel for Illinois Commerce Commission overruled.) Not precisely. Let me see if I can make some other sort of an illustration. If we assume an investor starts out today with an investment of $1,000,000 and has to be paid back $100,000 of it each year for 10 years, then each year as he gets back part of it, the amount of the investment that he has at risk is reduced. It doesn't mean the amount of risk on the remaining investment is reduced at all. It might be reduced, or increased, or might stay the same. I just said the risk on the remaining unpaid amount may be the same, more or less. That doesn't reduce the risk he still has at stake.

Yes, I have stated that the full amount of the capital invested would be accumulated at the end of eight and a half or nine years by adding the amount set aside for the amortization to the amount represented each year or from year to year by risk premium. No, I don't think it follows that an adjustment should be made at the end of eight and a half or nine years in the compensation for risk if the risk remains the same at that time. I have tried to say the rate of risk might go up or down ten years from now or eight and a half or nine years whatever it is. That is, the investment may be more risky then than it is today. The risk as of that time would have to be appraised and the fact of this accumulation would not be given weight as regards the amount then invested in the properties.

Questions Interposed by the Examiner.

You ask if the amount that would be then invested in the property subject to risk premium should be the total amount invested less this composite accumulation. No, it would be only less the amount that had been returned through operating expenses, something of that nature. I wouldn't deduct the risk premium from the investment in order to find the investment. I think the thought I had in mind is, it would be applied not to the investment the investor would have in the company but to a calculation of the net loss or gain that the investor may incur. That would be on the basis of a certain amount, depending upon the original investment, less this composite accumulation up to that time, from the investor's point of view.

Cross-Examination by Mr. Morgan (Resumed).

That would amount to all of the original investment at the end of eight and a half or nine years. No, I am not saying there would not be anything for him to earn on. I mean there is still something there to earn on. (Objections by Counsel for Illinois Commerce Commission overruled.) I think the confusion here is in confusing two different things. I am talking in this calculation about the investor. I am not talking about the rate base or fair value, whatever you want to call it.

You state that you are trying to find out what is going to result at the end of eight and a half or nine years because I have taken the risk premium and accumulated it, either in a straight line or charging interest on it so as to help make up the total capital investment at the end of that time, assuming the risks are the same on whatever rate base is proper. I didn't have that in mind. This goes to risk premium, not rate of return over-all, but merely the risk premium to the investor as such. You ask whether it would change the amount that ought to be allowed for risk premium for whatever risk turned out to exist as of that time because that accumulation had been made as a matter of arithmetic. I am not clear. I didn't tie it up that way in my own mind. I am not clear on this point.

Redirect Examination by Mr. Booth.

I would not know what the rate of return would be eight and a half years or nine years from now as affected by this calculation.

1710 *Cross-Examination by Mr. Morgan (Resumed).*

You ask me to assume that all the conditions are exactly the same when this accrual has been accomplished at the end of eight and a half or nine years and that the risks are the same, and then ask whether or not there would be any change in the risk premium at that time because of having used the risk premium to help accrue the amount of the capital investment. I think I expressed that as far as I am concerned, as far as I am thinking on it, it would not change the risk. The risk premium might change. It would not change because of the arithmetical calculation, because the changes that come about in time have a given degree of risk. The amount of compensation demanded at one time might be different from that demanded at another for the same degree of risk. I don't know how that sort of thing might work. I don't want to get involved in it.

I do not think the risk would be more or less because of that accumulation. I did not have that in mind. It seems to me the amount of risk that might exist at that time would have to be considered then as the conditions then existing might require. I do not know that I said that this accumulation of risk premium and the interest on the risk premium if I used the sinking fund method should not have anything to do with the amortization allowance. I said I did not consider the risk premium as consisting in amortization.

You ask if in computing the amount of accruals for return the return of the capital invested, I would consider the risk premiums or any accruals to risk premiums as reducing that amount. I may be placing the incorrect interpretation upon your question. If I understand it, my answer is, it is not my thought this accumulation of the two funds together is intended to affect the rate base or the amount allowed for amortization. (Objections by counsel for the two commissions overruled.) It is not intended to affect the amount of the risk premium; but it is intended as an attempt to appraise that risk premium. I tried to give two or three examples of what I had in mind.

You ask me to assume a riveter who works on a steel construction at riveting; that his scale of wages for riveting work in the shop is $10 a day; that if he be working on a building where he goes out on the end of a steel beam eighteen or twenty stories from the ground, that by reason of the risk involved in his position, the scale of pay is $20 a day, that he goes up there and works every day for six months without falling off and killing himself, you ask if that circumstance would affect the risk of going up the next day in the least. I don't think so, and I don't think it should change the scale of his wages.

You ask again why this calculation is in the record in the light of my last two answers, and you ask what I mean by "appraising the risk premium" in my former answers. I am trying to find out what the investor's net loss or gain might be as a result of this risk premium. Obviously, if he receives one risk premium his net loss or gain is different than if he receives another risk premium. I have tried to illustrate that by the example of taking the million dollars today and taking back so much of it over a period of years.

Let's see if we can illustrate that in this fashion by something in the bond field. If an investor paid $110 for a bond today and if it were a 5 per cent bond, and if a year from now he sold the bond or if it were recalled at 105, then his gain would be zero. You ask if I think that is what this testimony and this accrual demonstrates. (Objections by counsel for the two commissions overruled.) I don't understand the antecedent of the word "that" that is
1711 used here. I don't just connect it up with this risk
premium eight and a half to nine years from now. I am not clear on that. I stated in my direct, or in answer to a question you put to me at that time, that I did not do anything about this but the arithmetic. Yes, I did state this afternoon that this represents my conception after I read Mr. Delafield's testimony. I thought it had something to with the interpretation of this risk premium, yes. I have tried to make clear what I have in mind. As I said before, I am trying to show, or trying to measure it from the investor's point of view. It does not go to the matter of the company's aspect of the problem, as I see it.

I don't know what weight is to be given to it or what argument is going to be made from it. I say that this risk premium was intended to protect investors. (Objections by counsel for the two commissions overruled.) It is an investor's requirement. I don't know how you would go from that to rate of return on fair value. That is, what use one might make of the evidence as to risk premium demanded by investors, coupled with rate of return. I am not entirely clear as how you would take that step.

It is my impression that the rate of return is based on the rate base in rate cases. In using $1,000,000 here, I have not necessarily assumed $1,000,000 rate base. You ask what this $1,000,000 is. I think we went into this shortly after I gave my direct testimony. My purpose here is to do some arithmetic and if you are going to do arithmetic, you have to do it with figures, and the matter of the labels you put on them is really not part of the arithmetic, as I see it, necessarily. This $1,000,000 is merely an original sum I have called the "net investment."

Questions Interposed by the Examiner.

I say here in the title "When a return of 8 per cent is allowed on the total investment, "which is $1,000,000. That is not necessarily stated for the purposes of this illustration as a rate base. To be right honest about it, I have tried to use language here which would avoid argument about what the rate base is. My interest here is in the mathematical process. If you are going to argue about those words, you just cloud the issue, it seems to me. The $1,000,000 is the thing on which the return is allowed for the purposes of this calculation.

Cross-Examination by Mr. Morgan (Resumed).

I intended to show here if we have a million dollars and paid it off at the rate of $100,000 a year and also paid $80,000 a year of so-called return, that the results would be to really pay more than 8 per cent on the net investment, the sum. By net investment, I mean the amount that I started out with, less accrued amortization. In other words, I treated the reserve as a measure of the annual payment. I attempted to explain at the last session when I gave this testimony that the way I have used "reserves" might not coincide precisely with the way accountants use it in accounting statements. I can find that if you want.

You ask if this part of Exhibit 182 is offered on the theory that the rate of return at the present time should be influenced by what is going to happen in the future with reference to accruals for amortization. In any rate case, as I understand it, estimates are made as regards depreciation, how much it is going to be, the method used, and so on and so forth. I can't go beyond that.

1712 Yes, if 8 per cent is a proper return then 8 per cent is a proper return, notwithstanding column H to page 1 of Exhibit 182. You ask whether or not column H on page 1 of Exhibit 182 is intended to show what amount should be set up as an accrual for amortization. I don't understand what you mean; but I would like to emphasize that this exhibit here is something which I am very much interested in and which I am going to submit to a magazine for publication if they will accept it, provided, of course, something is not developed here which shows I am wrong. In that event, of course, I would not publish it.

It is merely a mathematical analysis of what is involved in that rate-making formula. I have already said that if 8 per cent is the proper return that it is the proper return notwithstanding this calculation here—and notwithstanding anything else, too. I don't think that this exhibit was intended to deal with rate of return. I am trying to illustrate here, considering all the three pages of the exhibit together, the mathematical assumptions upon which the matter of amortizing something on a sinking fund basis, together with a return on the total amount, are predicated.

Page 1 cannot be taken or considered without relation to the other pages. (Objection by Commission Counsel overruled.) The exhibit is integrated. On page 1 the annual allowance for amortization, as I have used the term here, is set up on a straight line basis. On page 2 it is set up on a sinking fund basis, using a 2 per cent rate of interest in the sinking fund. Page 3 corresponds to page 2, except that 8 per cent has been used for the sinking fund rather than 2 per cent.

Questions by the Examiner.

I arrive at column J on page 3 subtracting column C from column I. That produces a stabilized rate of return of 8 per cent in column K.

Cross-Examination by Mr. Morgan (Resumed).

You ask if the use of the sinking fund method of computation for accumulating an amortization reserve is based on the idea of an undepreciated rate base. (Objection by Commission Counsel overruled.) If I understand the question clearly, it has been my conception that when the amortization allowance that is to be put into operating expense is determined as a sinking fund annuity, then the rate of return is applied to a sum that does not provide for the deduction for amortization accrual. The purpose of this exhibit is to illustrate the mathematics of that procedure.

The figures shown in column K on page 2 are obtained by dividing column J by column G. You ask if I have not deducted the amount of the accrual every year in arriving at the 12.59 per cent return shown in column K. I have deducted the amount of the interest accrual from the return on the full investment without deductions for amortization reserves in arriving at column J; but in order to get to column J I first allowed the full 8 per cent every year on the original amount without deduction for reserve that I show to accumulate here. No, I do not allow it and then take it away. For the purpose of demonstrating the mathematical principle here I make the deduction, certainly. When the accrual is by the sinking fund method I don't do that.

1713 (December 5, 1939.)

You ask if, under the rate making procedure as I understand it, it is not true that the practice has been where a straight line method of accumulation or amortization reserve has been used that the rate base fixed as of the time of the hearing remains the rate base until the regulatory body takes another look at it. (Objection by Commission Counsel overruled.) My conception is that the rate base determined as of any instant of time in any rate proceeding is merely one of the facts arrived at or one of the tools arrived at to assist the Commission in fixing rates as of that point of time. Now, when you project into the future you don't have the same problem before you. I mean rates are not determined over and over again each second or each minute. They are determined once and for the purpose of this instantaneous determination certain conclusions are arrived at, but those bases might change in the future. I think the facts might change is what I am trying to say. They do change. There is no determination of rate base except as to the instant of time, at whatever time the Commission sets forth in its order.

You ask if the fact that there was an allowance in the earnings of an annual amount to accrue for the purpose of retiring the capital or returning the capital, as the case may be, raised the question as to whether or not that accrual could not be put to use and thus be made to earn a part of the total amount of the capital to be returned; and if that is not what gave rise to this sinking fund idea of accruing that reserve. (Objection by Commission Counsel overruled.) My thoughts are not clear as to this matter of earnings including something for capital. As far as that goes I have not had opportunity to make a search to see if there is anywhere anything set forth as to how this thing did arise.

My testimony in Exhibit 182 is intended to demonstrate mathematically what is inherent in my opinion in this rate making formula that is under discussion here. I have set up here in column B on page 1 of Exhibit 182, $100,000 a year. At the end of ten years that amount accrues the whole million dollars that I started out with. You ask if the sinking fund idea does not proceed on the basis that the $100,000 a year, while it is a book entry so far as the books are concerned, in fact represents a part of the total amount received by the company from the rate payer, and the company ought to contribute the amount of the earnings on that $100,000 to the return of the capital in making up that one million dollars. I am not clear. The $100,000 a year representing accumulation of capital. That is what I am making out of it.

You ask the difference between the straight line basis and the sinking fund basis. The difference is the amount allowed under the sinking fund basis when projected over the period upon which the amount was determined does not accumulate to the full amount that was being amortized.

On page 2 I set up $91,327 a year instead of $100,000. I find at the end of ten years it only aggregates $913,270. That doesn't return the million dollars and that is not a true amortization as I conceive it for the purposes of this calculation. This calculation is in two parts.
1714 The two parts are inter-related. That is the whole burden of my testimony, that they are inter-related, and that is why they are applied in the way they are applied. The Examiner points out that on a basis of $91,327 I come out with only $913,270 at the end of the ten years and asks where I get the rest. The rest of it is in two places. As a matter of arithmetic the figures in column C added to the figures in column B give the total. Also the difference between columns I and J, when added to the amounts in column B, give the total. The sum set up in column C represents the accruals of compound interest, figuring at 2 per cent on the $91,327 for the first year, that is, the three columns, B, C and D are a compound interest calculation, using on page 2 a rate of 2 per cent for the purposes of this exhibit.

I have not assumed for the purposes of this exhibit that the 2 per cent is the risk-free rate and that 8 per cent used on the following page is the rate including the risk compensation. (Objection by Commission Counsel overruled.) You ask why I use the 2 and 8. I use those rates to illustrate some arithmetic. You ask whether I did not know that one of your witnesses had testified that for a sinking fund the 2 per cent was a safe rate for the risk-free compensation. I don't see that it makes any difference. That is not the point at all. It had no bearing upon the calculation at all. You ask why I picked out 2 and 8, 2 being the rate that Mr. Delafield said ought to be used and 8 being the lowest rate that your witnesses have said ought to be the proper rate of return in this case. I see now what you mean. I might have known that some one testified to the 2 per cent and I did know there was testimony on 8 per cent rate of return. I merely wanted to get figures that were not too far afield from some of the ideas presented in this case.

This $1,826 set up in the second line of column C, page 2, is 2 per cent on $91,327. I have used an annual basis of accrual. The next year I accumulated in column C $3,689. That is a little more than twice $1,826, due to the circumstance that the interest is compounded in this calculation. By going through that compound interest calculation from year to year I accumulated in column C $86,730 and that amount added to the $913,270 makes up the million that I started out with. It takes the amount of that interest accrual in column C as a matter of arithmetic to add up to the million dollars. My testimony here is intended to explain that that is included, of course, somewhere else; but you have not allowed me to explain the two points of the problem.

You ask if in fixing the $91,327 a year, the annual amount to accrue in connection with the return of the capital, I have deducted from the million dollars, before dividing by ten, the number of years over which I am going to accumulate the fund, just the amount of that accrued interest. I didn't arrive at any such process as that. As I say here in a footnote, $91,327 set aside at the end of each year for ten years, compounded at 2 per cent, will equal a million dollars at the end of the tenth year. You ask if I did not arrive at that by accruing the interest and deducting the accumulated interest from the total amount to be returned and dividing by ten. You are getting over into the second part. If you want to discuss the two parts I am perfectly willing to do that;
but I do not see what you say follows necessarily.
1715 I am not clear on that. You ask if I do not see that

the amount $91,327 set up every year is absolutely fixed by the accrual of that interest there in column C. The amount in column B is fixed by three factors: Rate of interest is one factor; the time is the second factor; the amount being amortized is the third factor. By applying these three factors we get $913,270 to be amortized through actual accruals, not including interest. I do not get $91,327 by dividing $913,270 by ten. I get the $913,270 by adding the ten figures in the column above it.

You ask how I knew how to start out with $913,270. By reference to the standard interest annuity tables is the answer. I don't think that that is just working backwards and doing the very thing you asked me in the question before the last. The end result may be the same, but that is not the way I arrive at that. It is true that after I arrive at it the amount is less than a million dollars. If it is less than a million dollars I must add something to it to make it a million dollars. The point I am making is that in setting up this annual accrual of $91,327 I have set up accruals which return less than the amount of the capital if I consider those figures alone. That is one phase of this method and in order to understand it you have got to relate it to the other phase. When you are ready to consider that I will discuss it.

In my testimony yesterday in which I stated that the practice is that when the sinking fund method is used in accruing the amortization reserve, the rate of return allowance continues to be based on the amount I started out with. If I said that I misspoke myself. You point out that I said: "If I understand it clearly, it has been my conception that when the amortization allowance that is to be put into operating expense is determined as a sinking fund annuity, then the rate of return is applied to a sum that does not provide for the deduction for amortization accrual."

The confusion there is that I am talking about a rate-making formula that is applied as of an instant and time. It is not a projection into the future. The purpose is to fix rates today on the basis of the facts before the deliberating body today, and just as a mere matter of the mechanics of the thing they take today's figures and the so-called amount of amortization is figured as being one thing. The amount of return or the so-called return is fixed on another basis. Now, neither the amount then determined as the amortization is the true amortization, and the amount then determined as the amount of the return is not the true return. Neither one of them stands alone. Throwing them together they can be justified, and that is why they are thrown together. That is why one is paired against the other.

Now, my mathematics is intended to demonstrate that the throwing together does result in an equitable justification of the two independent processes when, but only when, on the basis of mathematical principles the interest rate percentage used to fix the amortization and the rate of return percentage are the same. That is inherent in the mathematics of combining these two related factors and arriving at an overall equitable result.

If I did not tell you what I have just said yesterday I misunderstood your question. You ask if there was 1716 anything about the question, "The use of the sinking fund method of computation for accumulating an amortization reserve is based on the idea of an undepreciated rate base, isn't it?" that I did not understand. I think I was interpreting differently than you were. You say the idea of an undepreciated rate base. What I am talking about here are concepts used as of a given particular time to arrive at the result as of that time. Now, you cannot go beyond that for the purpose of this mathematics.

You ask me if at the end of the third year another look were taken at the situation presented by page 2 of my exhibit here, although the sinking fund would have been applied in accruing the return of that million dollars, if the amount on which the rate of return would be calculated in the light of my statement yesterday would still be one million dollars. I do not think so. You ask what I meant then when I told you yesterday that when the amortization allowance that is to be put into the operating expense is determined as a sinking fund annuity, the rate of return is applied to a sum that does not provide for the deduction for amortization accrual. I think the difficulty there arises that your last question has shifted the base, and when you shift you have got to get all your terms uniform. Now, if I start out today with certain assumptions I project those all the way through the period. Now, if you come down here three years later and start out with a different figure and reproject your sums over some other period, that involves another calculation. The arithmetic of a sinking fund method is that some additional sums are involved in addition to the so-called annuity.

Questions by the Examiner.

As I understand it, the amortization annuity, considering it as a sinking fund annuity, is determined as the sum required to accumulate with interest over the period to the amount being amortized; and when the rate determination is made that is a mechanism used to determine what as of that point and time is a reasonable estimate of the amortization factor to be added to the other costs in order to arrive at the total amount of revenue required by the company, and in order to fix rates to produce that amount of revenue. You ask how my last answer differs from the answer to Mr. Morgan's question. (Objection by Commission Counsel overruled.) The point is Mr. Morgan used the expression "capable of earning." The capacity of this thing to earn is not involved in the fairness of the process and I have attempted here to demonstrate why, because allowance for it is made somewhere else.

Cross-Examination by Mr. Morgan Resumed.

You ask what has been done in the development of this sinking fund principle to the end that you can see how what I have done differs from it. I don't know what regulatory commissions have actually had in their mind when they fixed sinking fund depreciation. I cannot tell whether what I have done is something different from that which has been done because I do not know what has been done. You ask why I am preparing this study with a view of having it published as something original if I think there is any doubt about it being distinguishable from that which has been done in the past. I am doing so because I am attempting to analyze the principles here.

I had in mind a while ago that you asked me what
1717 the reasons were that others had in mind when they
did this sort of thing. I do not know what they had
in mind. I am pretty sure that the mathematical process has been applied and my purpose is to demonstrate that unless these two percentages are the same the process

is being applied along lines different from the principles in the mathematics.

Redirect Examination by Mr. Booth.

I have not felt it necessary to make an historical study for the development of the sinking fund method and its use in rate proceedings in connection with the preparation of this exhibit. I have not made such a study.

Cross-Examination by Mr. Morgan Resumed.

Passing over to Table 2 on the right hand side of the exhibit I have set up there in column 1 $80,000 per year, which is 8 per cent, the assumed rate of return, on the entire one million that I started out with. That adds up to $800,000. Over in the next column, which is column J, in the second line I have deducted from that $80,000 exactly $1,826. In the next line, I have deducted from $80,000 exactly $3,689. When I get through with column J I have deducted from the $800,000 exactly $86,730. When I set up the $91,327 annually the payments alone at the end of ten years accrue only $913,270, but of course, the accrual involves the interest too. No, I have not deducted from the million dollars. I started out with this $86,730 and arrived at the result of $913,270 in that fashion. Yes, I started out with the theory that the million dollars was to be returned to the investor and the additional theory that the investor would get the rate of return on the million dollars or such parts thereof as have not been returned from time to time. Yes, you are right that I did not accumulate in my annual accruals enough money to return the million dollars by exactly the sum of $86,730, without taking into account the interest. The amounts that I show in column B here are less than one million dollars by the amounts that are shown in column C. I did not arrive at my result by deducting from the total amount set aside in the form of annual accruals the amount shown at the bottom of column C.

You ask if when I get over here to column J, notwithstanding my statement yesterday afternoon, I have not deducted from the total amount set aside in the form of annual accruals the amount shown at the bottom of column C. (Objection by Commission Counsel to the form of the question overruled.) That goes to the statement that I made yesterday which I have already explained this morning, that it apparently did not convey the idea I had in mind. I have attempted here this morning to elaborate on what I did have in mind. It seems perfectly clear to me. I have indicated here that I don't think I can answer the question in the form you have asked it. As indicated here on the exhibit, in order to arrive at column J, and for the purpose of the computation, I deducted from $80,000 in the years after the first year the amounts shown in column C and those are the interest accruals inherent in the sinking fund determination of amortization.

You ask if the sum total of it is not that when I get through I reduce the $1,000,000 to be returned by that $86,730 and I reduce the amount allowed as earnings by just exactly that amount in my column J over there. No, the sum total of it is that I have returned all of the original investment and in addition paid an average of 12.59 per cent there instead of 8 per cent which was the assumed percentage in the first place. That is 12.59 per cent on the net investment.

Questions by the Examiner.

1718 The difficulty goes to the fact that apparently what I said yesterday was not clear; and I have attempted to clarify it this morning.. Therefore I can't answer on a different construction from what I said yesterday as to the thing I had in mind. The difficulty, you see, is we are shifting bases here, Mr. Examiner.

You ask if I can't answer it by relating it to my answers of yesterday and clarifying it again. I thought I clarified it once. The thing I had in mind in my answer yesterday at page 9233 of the record was that the mere mechanical process was gone through at the time of the determination of a particular set of rates in any rate procedure. Now, I projected that into the future to see its effects and that is what I am trying to do here; but the bases may change in that projection. They do change in my opinion.

Cross-Examination by Mr. Morgan Resumed.

You ask if the rate shown in column I isn't exactly 8 per cent if I use in this computation the undepreciated rate base or the undepreciated amount of $1,000,000 with which I started out. I apply 8 per cent to the original million dollars to get this $80,000 as so-called return; and my testimony is that it is not true return over the period. It happens to be, as a matter of arithmetic, the return in the first year, but the arithmetic, carrying it on, attempts to analyze what this $80,000 does mean, and what the amortization annuity does mean, because those are parts of a whole. This relates back to another problem in simple annuity calculations in which the two things are treated as a whole. Here they split up differently from the division made in the ordinary annuity problem; and that is where a lot of confusion arises.

I have used what purports to be the sinking fund method, although in Table 2 I purposely, in order to illustrate the thing, applied the principles erroneously and in Table 3 I come to my interpretation of the correct application. As a matter of arithmetic I applied the sinking fund method of computing the amortization reserve first on 2 per cent in Table 2 and on 8 per cent compound interest bases in Table 3. (The witness begins to answer a question which the Examiner allowed company counsel to withdraw over objections of Counsel for the Illinois Commerce Commission.)

In making the observation as to the figures shown in column K, Table 2, that it winds up with an earning of 12.59 per cent as appears right here in the exhibit, that amount is obtained by dividing the figure in column J by that in column G. You ask if G is the depreciated rate base from the first year throughout the ten-year period. Not necessarily. That is not the way to look at it. That is not the way I am looking at it.

You ask how I got this $908,672 on line 1, column H. This was intended to be column G less column F, but there seems to have been a rounding off of a dollar there. It does not click exactly.

You ask if this 12.59 per cent is not 12.59 per cent on the depreciated rate base. I am not using rate base in this exhibit. It does not appear in this exhibit. You ask if it isn't the earning on the million dollars depreciated annually by the amount of this accrual over there. It says so right here; yes, certainly, that is the average over the period, the average rate of return on the net investment.

1719 You ask what my understanding is of the procedure sometimes used in rate making whereby the rate of return is applied to an undepreciated rate base and the annual depreciation expense determined on the sinking fund basis. My understanding is that for the purpose of that particular determination at that point in time, two different computations are made in order to arrive at an overall whole. You ask if my counsel did not ask me, as appears at page 7808 of the record, this question: "'Are you familiar with the procedure sometimes used in rate making, whereby the rate of return is applied to an undepreciated rate base and the annual depreciation expense determined on a sinking fund basis?" to which I answered: "Yes, I am"; and if my counsel did not then ask me the question: "What is your understanding of that method of procedure?" and if I did not answer: "As I understand it, when the annual allowance for depreciation expense or amortization is determined on a sinking fund basis the rate of return is applied to an undepreciated rate base in order to ascertain the amount of the return." Yes, I so testified. You ask if I have done that in arriving at the figures shown in column K of the exhibit we have been discussing. As I understand it, I used that process to arrive at these figures and then I have carried them on to column K and analyzed it.

Questions by the Examiner.

You ask what I mean by that process. At page 7808 of the record, line 13, I started with my conception of that procedure and having obtained those instantaneous values or sums resulting from that procedure, I proceeded to project and analyze those sums. That is the basic underlying principle by which I arrived at the initial sums with which I started and then I am continuing it to analyze those. I said here on direct that "When the annual allowance for depreciation expense or amortization is determined on a sinking fund basis the rate of return is applied to an undepreciated rate base in order to ascertain the amount of the return." Now, I determined with respect to a million dollars as a starting sum the two factors mentioned there in just that manner, if I understand the matter, and then in this exhibit I have proceeded to continue those things on and try to analyze their significance in relation to the basic principle of rate making.

Cross-Examination by Mr. Morgan Resumed.

You ask if I had stopped with columns A, B, C, and through to I, inclusive, my exhibit would not have been in conformity with the procedure I described at pages 7808 and 9233 of the record. (Objection by Commission Counsel overruled.) Your question involves so much I don't know where to stop on the thing. It involves an entire re-explanation of the whole process. (Objection by Counsel for Illinois Commerce Commission overruled.) I think here even in columns A to I, inclusive, I go beyond the instantaneous principle and analyze it over a period of time. You ask if I do not go beyond the procedure which has been followed in the sinking fund method of accruing amortization reserve as this exhibit has been carried out. I don't go beyond the procedure in order to arrive at my starting sums. Then I go ahead and analyze those. Those two columns, J & K, are a part of my analysis of the procedure as I understand it and I can't segregate these things out to that extent.

1720 Table III is also a sinking fund computation as far as the determination of the annual allowance for the amortization on an 8 per cent sinking fund basis is concerned. You ask if it differs in that I use an 8 per cent interest rate for figuring compound interest in order to arrive at the amount to be set aside in column B each year. I don't think that is the correct statement of the procedure. I use 8 per cent not to figure the compound interest that results from it; but I use the 8 per cent as the basic factor in determining how much the amount in column B must be. You have to determine column B first. I used 8 per cent in determining the amount to be set out annually in column B. That results in the setting up of a less amount by the difference between $91,327 and $69,029. I arrive at B first. The amounts in column C are not determined from B. They are obtained from column E which carries forward both columns B and C.

You ask if I have in arriving at the result over in column K used as the basis of computation to which I apply the 8 per cent assumed return the depreciated and not the undepreciated amount which I originally started out with. I don't wholly agree with that at all. In order to get column K I relate what I would call the true return to the net investment; but in order to get the true return I have first to get this 8 per cent overall. Thinking now in terms of investment rather than rate base, the purpose of column K is to test the original 8 per cent and the original amortization assumption with which I start off. That is the way the testing comes about, I think. I am not using the term rate base in this exhibit.

The $490,290 shown as the sum of the figures in column J is divided by the average net investment over the period in order to get the 8 per cent shown at the foot of column K. You ask if that is the average depreciated investment. It is the average based on the net investment. You ask me if in Table III as well as Table II of Exhibit 182 I have used the sinking fund method of accruing the amortization reserve and have in arriving at my final result over here in column K used a depreciated rate base and not an undepreciated rate base. My answer will have to be "No" to that question as stated.

Cross-Examination by Mr. Slaff.

Following the question and answer that were read to me by Mr. Morgan from page 7808 of the record, the following questions were put to me and I made the following answers on direct, beginning in line 18, page 7808, of the record:

"Q. Will you state what you mean by the determination of the annual depreciation expense or amortization allowance on a sinking fund basis?

"A. That method of determining the annual depreciation expense or amortization allowance consists simply in finding that sum, called an annuity, that would accrue to the full amount to be depreciated or amortized if the annuity were set aside in a fund and compounded at the rate of interest used to determine the required amount of the annuity.

"Q. If the return were allowed on an undepreciated rate base but the annual depreciation expense were determined on a straight line basis, what would be the effect as regards the rate of return earned on the depreciated rate base over a period of years?

1721 "A. In that case, as regards any given rate base, the rate of return on the depreciated rate base would increase year by year.

"Q. That is, if the rate of return were originally fixed at, say, 6 per cent the rate of return in subsequent years on the depreciated rate base would rise progressively above 6 per cent, is that correct?

"A. Yes, sir.

"Q. If the annual depreciation expense were determined on a sinking fund basis and by use of an interest rate of, say, 2 per cent, and if rates were fixed so as to provide a rate of return of 8 per cent on the undepreciated rate base, what would be the result in subsequent years as regards the rate of return on the depreciated rate base if the annual interest accruals on the depreciation or amortization reserve at the rate of 2 per cent were deducted from the mount of return?

"A. Under those conditions the rate of return on the depreciated rate base would also rise year by year but less rapidly than in the case of the previous example.

"Q. If the annual depreciation or amortization allowance were determined by the use of a 6 per cent rate of interest and a rate of return of 6 per cent were allowed on the undepreciated rate base, what would be the result in subsequent years as regards the rate of return on the depreciated rate base?

"A. Under those conditions the rate of return on the depreciated rate base would remain at 6 per cent in subsequent years if the annual interest accruals at 6 per cent on the amortization reserve were deducted from the amount of return.

"Q. Can you state as a general principle that when the annual depreciation or amortization expense is determined by use of a rate of interest equal to the rate of return, the rate of return on the depreciated rate base will remain at the same percentage throughout a period when the interest accumulations on the amortization reserve are deducted from the amount of the return.

"A. Yes, that can be demonstrated."

That which I have just testified was what my Exhibit 182 was intended to demonstrate and in my opinion that is what it does demonstrate.

Redirect Examination by Mr. Booth.

The document you hand me is headed "National Association of Railroad and Utilities Commissioners Report of Special Committee on Depreciation Principles and Methods Submitted to the National Association of Railroad and Utilities Commissioners at Its Fiftieth Annual Convention in New Orleans, Louisiana, November 15-18, 1938". On page 8 there is a heading that carries the number 10, and the heading, which is in italics, reads as follows:

1722 "If the sinking-fund method is used on connection with an undepreciated rate base the sinking-fund interest rate should be the same as the allowed rate of return."

Then, the material following in regular type reads as follows:

"In the event the sinking-fund method is used with an undepreciated rate base, the so-called interest on the sinking-fund depreciation reserve should be removed from operating expenses and treated as gross income deduction for the purposes of the rate proceeding. The sinking-fund interest rate should be the same as the allowed rate of return in order to compensate for the fact that no depreciation is deducted from the property. If the sinking-fund interest rate is less than the allowed rate of return, the combined depreciation and return allowed will be excessive in an amount equal to the difference between the sinking-fund interest rate and the rate of return times the depreciation otherwise deductible in determining the rate base."

The theory expressed in the language I have just read is in part certainly the theory of my Exhibit No. 182. The men who were on the committee which made that report were as follows:

Cesel R. Colbert, Wisconsin, Chairman;
John C. Damon, Securities and Exchange Commission;
W. D. Dittmer, Illinois;
Herbert J. Flagg, New Jersey;
A. B. Greene, Florida;
E. H. Merrill, Utah;
J. Donald Murray, West Virginia;
W[illegible] Norfleet, Federal Communications Commissions;
Harold E. West, Maryland.

Question by the Examiner.

You ask me to identify those names for you, Mr. Examiner. I know Mr. Colbert was for a time on the staff of the Wisconsin Commission. I don't know whether he is still there or not or what his capacity is. Mr. Dittmer was supervisor of rate investigations of the Illinois Commerce Commission. I do not know any of the other gentlemen mentioned there.

Cross-Examination by Mr. Morgan Resumed.

As I understand it this is just a report of a committee. It is the 1938 report. Ordinarily committees report every year so the probabilities are they have made a report to the 1939 convention. I don't know whether this is a recommendation or what it is intended to be. It is just a statement of thoughts on the matter, I suppose. I don't know whether that paragraph was repeated by report or not for 1939. You ask whether or not the National Association of Railroad and Utilities Commissioners sanctioned that report. I don't know whether or not it ever took any action with respect to the report.

1723 You ask whether as a matter of fact that is a recommendation varying the procedure that has usually been followed in proceedings where the sinking fund method of accruing the amortization reserve was resorted to. (Objection by Commission Counsel overruled.) I don't know what the purpose of the statement is. I don't know what it was put in there for. All I know is that I was handed a document and asked to read it. I did not refer to it in compiling my Exhibit No. 182. I think I had seen that report before I prepared the exhibit. I have seen it some time. I certainly had no recollection of it at the time I prepared Exhibit No. 182. In other words my Exhibit No. 182 was prepared independently of that report. I think over all it agrees with my exhibit. I would hate to say it agrees entirely. I am referring to the paragraph I read. It looks to me they are stating the same thing I am trying to analyze mathematically here.

You ask if my position simply is that the rate of interest that should be applied to the annual accruals for the purpose of amortizing the total investment should not in any way be related to the earning which could be accomplished by applying that fund to investment at a risk free rate of interest. (Objection by Commission Counsel overruled.) I am trying to recall the answer I previously gave to that question. My point is as I understand the mathematical principles where under the rate-making formula which we are discussing can be justified, the sinking fund rate of interest should be the same as the rate of return percentage, and that sinking fund rate of interest, therefore, has no more relation to the ability of the annuity to earn money than does the rate of return itself.

You ask what is the difference in the practical working out in calculating the amortization reserve on a sinking fund basis using the allowed rate of return as the compound interest rate and accruing it on a straight line basis, and reducing the rate base every year in advance of a hearing as to whether it ought to be reduced. This analysis does not go to what the regulatory commission does in subsequent years. It goes to the mathematics inherent in a projected analysis of what the regulatory commission does as of a given time, trying to project that to see what the interpretation of the procedure is.

You ask if I don't get exactly the same result if I apply the straight line method of computing the amortization reserve and then apply the rate of return to the rate base that I start out with less the amount of the accrual every year as I would accomplish if I followed the procedure outlined in Table 3 of Exhibit 182. I don't know what you are referring to, what results you want me to compare. I will have to know what result I am supposed to compare. You ask if I apply the rate of return to the depreciated rate base, and accrue the annual allowance for amortization purposes as I have done in Table 1 of my Exhibit 182, I get to exactly the same result as to the earnings that are allowed as if I had used the procedure shown in Table 3 of that exhibit in the ultimate washout, namely, 8 per cent on the undepreciated rate base.

In Table 1 I arrive at amortization in the amount of $100,000 a year or $1,000,000 for the ten years. Now, an 8 per cent return on the net amount of the investment, year by year, would give the amounts of return shown in Column I, which total for the ten years $440,000. Consequently in Table 1 I arrive at a total of $1,440,000 for amortization and return, and in Table 3 I arrive at a
1724 nominal or so-called amortization in the aggregate
sum of $690,290, and at the so-called amount of the

return over the ten-year period of $800,000, the total for the so-called amortization plus the so-called return, thus aggregates $1,490,290. Also on Table 3 I would arrive at $1,000,000 as the true amortization, and at $490,290 as the true return, again giving me a total of $1,490,290 for the two items, and the total for the two items of amortization and return that I arrive at in Table 3 is thus somewhat more than the corresponding total I arrive at in Table 1.

The accrual is set up at a more rapid rate in the first instance than in the second instance, this is due to the fact that net investment declines more slowly under the compound interest method than under the straight line method; therefore you have a higher average net investment for the period.

No, when I get through with the calculation I have not allowed an earning of just 8 per cent on the amount I started out with less the annual accruals. I have allowed the earning all the way through, but I merely combined it differently. I don't take anything away from the figures. They are all there. I just simply split them up in two different fashions here. I allow an amount in each instance which is the sum total of $1,000,000 plus 8 per cent on that $1,000,000, less the accruals to reserves from year to year during the period. I allow in the aggregate an amount sufficient to amortize the entire million dollars and to pay 8 per cent on the unamortized portion every year. That is the same amount that is obtained by the other process.

Cross-Examination by Mr. Slaff.

In that connection I believe I referred to the return shown on Table 1, $440,000 over the ten-year period, as my conception of the true return. The comparable figure of return corresponding to that figure, as shown on page 3, Table 3, where I use the same rate for the rate of return and for interest accrual to the sinking fund is $490,290. That is what I call the true return in the case of Table 3. The latter figure over the whole period in dollars comes to some 10 or 11 per cent more in the sinking fund method. The $490,290 exceeds the $140,000 by 10 or 11 or 12 per cent, roughly.

Cross-Examination by Mr. Morgan Resumed.

You ask if under the procedure in rate making proceedings where the straight line method of computation has been used, the rate base is reduced as between one regulatory proceeding and the succeeding one by the actual depreciation without regard to the book accruals. (Objection by Counsel for Illinois Commerce Commission overruled.) I am not prepared to answer the question. I can't even say as to whether the Illinois Commerce Commission does that. You ask me if I know whether or not this procedure I have outlined here in either one of the three tables I use in Exhibit 182 conforms to the ordinary procedure. (Objection by Commission Counsel overruled.) I have not actually made any thorough-going study of precisely the processes gone through. I have only my conceptions as to the principles. You ask if I am not offering this as something new to be applied in the field of rate making. It is something new to me. I have never seen it before.

Redirect Examination by Mr. Booth.

You ask whether the California Commission has consistently followed the same principles which are contained in my Exhibit 182. I don't know.

1725 You asked whether I have made an approximate calculation of the population indirectly served by the Natural Gas Pipeline Company of America. I have gathered some figures in connection with that. According to the 1930 census the city of Chicago had a population of about three and one-third million. The latest estimate I have seen is one that purports to show the population of Chicago as of January, 1939, and that estimate was three and two-thirds millions.

With respect to the area served with gas by the Public Service Company of Northern Illinois, I added up the 1930 census population figures for all the communities and arrived at 604,000. The company, however, states that they consider the area in which they serve gas to have a population of 690,000, a larger figure, which may be due either to using later estimates than the 1930 census or to including population on the fringe of a municipality that would not be included in my census figures.

In like fashion I arrived at the following information for the Western United Gas and Electric Company, in its northern division only. That company reported to me that they considered the area of the territory served to have a population of 347,000. By adding up the census figures of the community I arrive at only 288,000.

In addition, Peoples Power Company, who obtains gas from Natural Gas Pipeline Company of America, serves four towns with gas here in Illinois. There are a few communities through Iowa and Nebraska that appear to receive gas service upon the basis of some gas, at least, obtained from the Natural Gas Pipeline Company of America.

Taking the census figures of the population for the Peoples Power Company's four towns and these few towns in Nebraska and Iowa, I arrive at a total population for those particular towns of 306,000. Now the figures there—I have given different figures for the same thing, depending upon dates and sources.

The total will probably run from four and three-quarters to four million eight hundred thousand. I did not include a little town out in Kansas that I understand gets gas from the Pipeline. I couldn't find the population figure for it anyway.

You ask whether I was questioned by Mr. Morgan about studies of comparison of rates of various companies and their use in rate cases. I do not recall what I said about their use in rate cases. I said something about making comparisons from company to company. He questioned me about rate comparisons. I thought he was asking me as to what I had in mind or what I did when I said I made rate comparisons in giving my qualifications. I recall there was a proceeding before the Illinois Commerce Commission involving the application of the Peoples Gas Light and Coke Company for a rate increase.

You ask whether Dr. Paul J. Raver, who was at that time the head of the rate and research division of the Illinois Commerce Commission, prepared a table of comparison of rates, attempting to compare the rates of the
Peoples Gas Light and Coke Company and other large
1726 cities served a mixture of natural gas and artificial
gas. I remember that Dr. Raver compared something along those lines. My recollection is very hazy on it. I know it went to that general subject. You ask if I recall

whether an effort was made to submit it as testimony before the Illinois Commerce Commission and it was refused. I seem to have such a recollection that there was a refusal at one time to put in that exhibit. It seems to me the ruling was made by the Examiner, not by the Commission. I do not recall whether it was ever appealed to the Commission or not.

Cross-Examination by Mr. Slaff.

I have a prospectus of the Lone Star Gas Corporation on the $20,000,000 issue of 15-year 3½ per cent sinking fund debentures due in 1953, dated August 25, 1938. On page 17 of that prospectus the first paragraph is captioned "Gas Reserves". The first paragraph following that caption reads as follows:

"Ralph E. Davis, Inc., Engineers, have made a survey of the gas reserves of the Lone Star Gas Company, Lone Star Gasoline Company and Community Natural Gas Company, the three subsidiaries which produce and purchase all the natural gas for the System except such gas as is purchased for distribution in El Paso, Galveston, and Brenham, Texas, and Guthrie, Oklahoma, and Council Bluffs, Iowa. This survey covers reserves of gas available from System's production properties and reserves controlled by the System through gas purchase contracts. The letter addressed to the Corporation as the result of this survey is quoted below."

(Prior to the reading of the above quotation the Examiner, at the request of counsel for defendants, announced that the language read would be limited to the purpose of showing that the firm, Ralph E. Davis, Inc., Engineers, made an estimate in connection with the Lone Star Gas Corporation's financing.)

Immediately below the language I have read on pages 17, 18 and 19 there appears a copy or what purports to be a copy of a letter from Ralph E. Davis, Inc., Engineers, Pittsburgh, Pennsylvania, dated August 3, 1939, addressed to the board of directors of the Lone Star Gas Corporation, 100 West 10th Street, Wilmington, Delaware, signed by Ralph E. Davis, Inc., by Alden W. Foster, vice president, which deals with the reserves of the System.

I have here the prospectus dated August 17, 1939, of Oklahoma Natural Gas Company in connection with the $17,000,000 First Mortgage Bonds, Series B, 3¾ per cent, due August 1, 1955; and also the 58,000 shares of 5½'s Convertible Prior Preferred Stock. The fourth full paragraph on page 13 of that prospectus is captioned "The Gas Supply". Following the caption appears the following language:

"A copy of the report of Ralph E. Davis, Inc., on the natural gas supply, valuation of gas producing properties and oil and gas leases of the company, is filed as an exhibit to the registration statement, to which reference is hereby made. The letter summarizing certain portions of the report is quoted below."

1727 Below the language I have just read, on pages 13, 14, and 15 there is a letter from Ralph E. Davis, Inc., Engineers, addressed to Mr. Joseph Bowes, President, Oklahoma Natural Gas Company, Tulsa, Oklahoma, signed by Ralph E. Davis, Inc., Engineers, by Gail F. Moulton, vice president, which deals with gas reserves of Oklahoma Natural Gas Company. (Objection by Company Counsel overruled.) The first paragraph of that letter reads as follows:

"In accordance with your request, we have made a study of the natural gas supply available to Oklahoma Natural Gas Company for the purpose of estimating the natural gas reserves controlled through lease ownerships, through gas purchase contracts and available in fields presently connected to the pipeline system. We have also carefully considered the availability of gas in other fields in this territory served by the company and the prospects for the discovery of additional gas supply within a reasonable distance of the company's present lines."

You ask if from there on that letter deals with gas reserves available apparently to that company or to its system. They talk about a field investigation and adequacy of the reserves, and the company's requirements, and so on and so forth.

Recross Examination by Mr. Morgan.

On page 6 of the same prospectus of Lone Star Gas Corporation from which I read a few minutes ago there is an outline map or symbolic chart which bears the title "Major Territory Served by Lone Star Gas Corporation and Subsidiaries". (Objection by Counsel for Illinois Commerce Commission overruled.) There is a footnote to that explaining that some other territories are not shown. There is a tabulation on the page which carries the caption "Gas Fields". The tabulation then proceeds to list 39 of them or 39 things called gas fields. I don't know what the technical description is. From that caption I think it is intended to be a gas field. On the map there are various green spots. According to the legend those are gas fields and each one of them is numbered. The list, which is numbered from 1 to 39, shows the names of each of those fields and identifies them by this numbering system.

Redirect Examination by Mr. Booth.

I don't know anything about the reserves in any one of those fields. I don't know whether the total reserves in the 39 fields listed there are less or more than the reserves of the Texoma Natural Gas Company in the Panhandle Field.

Exhibit 185 submitted by Mr. Knapp shows the revenues for Peoples Gas Light & Coke Company for 1938 to be in the amount of $37,976,207. The figure shown for 1938 in the annual report of the Peoples Gas Light & Coke Company to its stockholders at page 7 thereof is $40,462,775.12. That appears to be indicated as total revenues. The corresponding figure for 1937 is $39,318,161.61. Now whether those figures are on the same basis as appear in Exhibit 185 I would have to check to see. The figures disagree and that is why I would have to look. The corporate and the consolidated revenues ordinarily do not agree.

1728 FRED KLEINMAN, a witness for complainant, called for cross-examination, testified as follows:

(December 5, 1939.)

Redirect Examination by Mr. Booth.

You ask if I have anything additional to say with reference to the exhibits that I presented that I did not state at the time I testified on direct. Yes, I noticed on reading the transcript of the evidence that I neglected to comment on one item contained in Company's Exhibit No. 141 which is involved in the calculation I made. That is in my Exhibit No. 188. That item is shown on line 17 of page 2 of Exhibit 141 and deals with replacement contingencies of ten per cent. The amounts involved vary from $6,439 in 1939 up to $36,417 in 1945, and intermediate amounts for other years. The total involved is $267,346 over the entire life of this property as shown on Company's Exhibit No. 141.

Originally in setting up my exhibit I was faced with the logical assumption to be made on the basis of the information contained in that line. The replacement contingencies of ten per cent are mathematically ten per cent of the capital expenditures for replacement and the cost of retiring capital replaced less the salvage value of retirements. It seemed to me an illogical assumption to make that all the amounts would be exactly in the noted amounts for each year, and the total amount involved being comparatively small, and having no real effect on my exhibit except to reduce, if these replacement contingencies happen, the cash on hand at the end of this property's life by $267,000, which is small in view of the other figures. I therefore merely left that out.

Cross-Examination by Mr. Morgan.

I graduated from Cornell University in 1913 with a degree of Bachelor of Arts. I did not major in the field of accounting. I majored in philosophy and psychology. I did not take accounting work in connection with my university training. When I left the university I went immediately with the Brooklyn Union Gas Company in a clerical position. I learned accounting in connection with my practical work. My accounting training has been of a practical character rather than formal. My tenure with the Brooklyn Union Gas Company extended over a period of about four years. I don't know now exactly what my designation was. I was employed in the general office of the company. I was not an official.

My work was changed during the four years because I was engaged first in the branch office located at Newtown, one of the subsidiary companies of the Brooklyn Union System. At the end of two months I was transferred to the general office in the auditing department. I received no special titles or anything else. I naturally gained after only two months with the company in the capacity of a clerk

no knowledge of accounting. I think my duties were covered in my direct testimony. I did other work besides
1729 just the low grade clerk's work. I started very, very small. I began at $52 a month with the Brooklyn Union.

The National Aniline and Chemical Company at the time I was employed was a recent merger of several of the largest dye stuff and fancy chemical producers in the United States. They had engaged a Mr. George W. Yates, who had formerly been comptroller of the American Tobacco Company, to put in a new general accounting and cost accounting system. Naturally with several companies in the one new company you would have to install one uniform system of accounting. I was engaged directly by Mr. Yates to act as his assistant and worked on that job. I began the general ledger for the company, ran it myself for a while and instructed somebody else how to run it. I worked entirely under his jurisdiction on putting in a general and cost accounting system for that company. My work with that company was strictly of an accounting character.

I began with the Emergency Fleet Corporation as assistant local auditor and at the end of one year became local auditor. My position there was the head of the accounting department and I was one of the two people hired who were charged with the duty of signing the checks to the contractor, which was the Submarine Boat Corporation, for their expenditures under the terms of the contract. I signed the checks subject to a countersign. The other man signed subject to my countersign. It took two signatures to make the check valid. In my work with the Emergency Fleet Corporation I was dealing strictly with accounting matters.

When I went with the firm of Barrow, Wade, Guthrie & Company, public accountants, I was a staff member working on accounting. I said in my direct testimony that while employed by that firm I worked on a variety of accounting work, but from 1925 specialized in utility work and principally in the investigation of utilities prior to the purchase of the utility, either as property or as a company, by some banker or some holding company. By that I mean I worked on the accounting features of utilities. I went over their figures and their accounts and books and dealt with them from the accountant's standpoint.

You ask the names of the natural gas companies on whose records I worked during that period. I can't give you the names of the natural gas companies on whose record I worked. The work on natural gas companies which I did was primarily in connection with three pending mergers into a new company. One of them actually became a company known as the Duquesne Gas Company, located in Washington, Pennsylvania. The other two. One was going to be called the Western Pennsylvania Gas Company and the other the Pittsburgh Natural Gas Corporation, I think, never became a company since the bankers for whom I was making the investigation failed in their attempts to finance it.

The properties which I examined in that connection were very largely holdings of individuals and small corporations who had been drilling wells and attained gas and who sold their entire output to the natural gas companies op-
1730 erating in the Pittsburgh area. Some of these properties, instead of selling, were using the gas themselves. I am thinking now about H. C. Fry Glass Company that had developed a gas field for use in the manufacture of glass.

My connection with those natural gas companies and the individuals whose properties were involved were of an accounting nature. It was my duty to ascertain the net income for a period of three years prior to the date I was making my examination for ultimate certification by my firm to the bankers for use in the prospectus in bringing out the securities on the properties, if, as and when they mere merged. My duty was to make an audit, pending certification, as to what the earnings were and then to make up various types of pro forma balance sheets reflecting the various types of financing which the banker thought he might try to use in financing his deal. I didn't originate the type of issuance because that was the job of the bankers' own employees.

I stated that when I was with Leidesdorf & Company, public accountants, of Chicago, my principal activity was to advise and consult with the Illinois Commerce Commission, "principally again with regard to the electric rate case of the Public Service Company of Northern Illinois which was then pending". You ask what is the significance of the word "again". I had used "principal" and using it the second time I wanted to show the particular activity I had been working on for the Illinois Commerce Commission was this one electric rate case. I did not have any general duties at that time. I had had no connection with the Public Service Company of Northern Illinois prior to that time. I didn't mean "again" in the sense of the second time as to the Public Service Company, but the fact I had used "principally" and I wanted to narrow it down specifically to the work I was doing for the Commission.

1731 I can give you a number of the companies with which we were concerned when I was with Barrow, Wade, Guthrie and Company. The American Gas and Power group, the Standard Public Service and Associated Public Utilities group. The first one was primarily electric and gas; the second was primarily telephone and water. They were holding company systems. The operating companies were far too numerous to remember. Some of these companies had fifteen or twenty smaller companies in there. We are talking about something that is a quite a number of years ago. I could, if you are interested, find a complete list. However, to be indicative of the type of company, I think the largest individual and complex utility I worked on was the Tidewater Power Company and the Pinellas County Power Company. Tidewater had electric, gas, heat, street railway, bus, toll bridge, amusement park, and hotel, and I think several other activities.

You will notice I am looking at Mr. Woodford. We were both associated together at that time and he remembers perhaps more vividly than I do the activities of these companies.

The largest water company I worked on was Consolidated water Company of Utica, New York. The largest individual Telephone company I worked on was Ashland Telephone Company in Kentucky.

The names of some of the other holding company groups were National Public Service, American Commonwealths Power Corporation.

I am an accountant, Mr. Morgan, and all of my work has been the work of an accountant. I did not have anything to do with the issuance, the purchase, or the sale of utility securities or the securities of other types of industry except in the matter of doing accounting studies and accounting reports. My title now is Chief of Accounts and Finance of the Illinois Commerce Commission. I said in describing my duties as chief accountant I have charge of all the accounts, general supervision of the accounting department, of the Illinois Commerce Commission. You ask what my duties are as chief of the Finance Department. I sit as hearing examiner in the more important finance cases presented to the Illinois Commerce Commission. Before a utility can issue securities which are to be outstanding for more than one year, they must receive the authorization of the Illinois Commerce Commission. The utility therefore comes before the Commission with a petition asking for authorization to do what they want to do. It is my duty to sit as hearing examiner. In the smaller cases I often delegate that duty to my principal assistant, Mr. Tholin. In the larger cases I sit myself, making my own investigation and advising the Commission on the merits of the company's proposal.

That work goes somewhat further than dealing with the figures involved in the financing. The Commission expects me to point out to them any proposal of a company which would lead to an unbalanced capital structure; any proposal of a company to pay excessive interest rates or excessive fees to underwriters; or to have unusual terms in their mortgages or their indentures; and all the other facts which would be pertinent for the Commission to know to make up their minds as to whether authorization should be granted to the utility to do as they seek. The information from which to test the issue is based on general knowledge and experience of what other companies in the field have been able to do and are doing and on the testimony presented by the company as to the particular circumstances in the particular case, as to why it is reasonable or proper to do as they wish to do.

I stated I testified in several rate cases. I testified on
rate of return in only one of those, that of Peoples
1732 Gas Light and Coke Company. In the Public Service
case and the Commonwealth Edison case I was testifying on income available for return. You ask if that was an auditing or accounting feature of the case. It is an accountant's duty to ascertain the recorded income available for return. Of course, that requires a knowledge of rate making principles and general knowledge of how utilities operate their business in order to advise the Commission as to what were unjust or unreasonable charges, or what might be unjust or unreasonable charges if I am not able to determine of my own accord what is unjust and unreasonable.

You ask if in those two cases my testimony then wasn't really of an auditing character to determine the propriety of charges in arriving at the earnings available for return. I think that both attorneys would object if I said "Yes," because after all, what I am determining is the facts relating to the income and expense of the company, those facts being presented to the Commission; then the Commission determines what is reasonable and what is not reasonable. I then testified what I found the facts to be concerning the charges, with such comments on the propriety of those charges, or on the status of those charges, that occurred to me. I made an independent investigation of my own to determine the reasonableness of the company's charges to the operating expenses and the amount which the company included as their revenues, and where I considered any item unreasonable or questioned its reasonableness, I set it forth for the Commission to look at and make their decision.

In the case of Peoples Gas Light and Coke Company I testified as to rate of return. I don't remember the date when I testified. It was in 1937, I think. That case is over but is still pending in the courts. So far as the Commission is concerned, it is a closed case. The Commission handed down its decision, and it is now up to the Attorney General of the State of Illinois to defend that decision in the courts.

I had nothing to do with either of the two volumes constituting the study of the staff of the Federal Communications Commission on rate of return, to which reference has been made in this record. I did some work on that subject, as I have stated. I rendered a report to my immediate supervisor which set forth my opinion of the status of the problem on which I was engaged. I did not complete my work. I left rather hurriedly. The funds for the investigation were running out, and the work was discontinued completely about four months after I left.

The annual reports filed by the Illinois utilities are forwarded to my department for review. They include the number of customers by various classifications, the quantity sold, the total dollars realized on that quantity. They include special inserted pages for breaking down those figures by rate schedules. They show the reported gross and net earnings of the companies.

You ask what I have to do with them personally after they are filed with the Illinois Commerce Commission. I give a few of the more important companies a look to see if there is anything novel or startling; but I handle the annual reports as a routine matter which one of my assistants takes over. He has an audit manual prepared, which I have approved, for work by my department, setting forth every operation to be done on these utility reports; which my men proceed to do. When a question arises as to whether things are correct or incorrect, they report to him in the first instance. He corresponds with the companies.

After he receives the answer from the company, if 1733 the answer appears to be satisfactory, that ends the matter. If, however, it does not appear satisfactory to him, then they are referred to me. I only personally get into those matters where my assistant believes something should be called to my attention and possibly to the attention of the Commission. You ask if my department then undertakes to analyze these reports from time to time. Not analyze. That primarily falls on Dr. Dittmer, the superviser of rate investigation, and Mr. Ostrander, the supervisor of the rates and research section. I check them for accuracy, and completeness, as far as we can, see that they are properly prepared and that they are annual reports that the Commission can use for their further purposes.

In connection with my duties I have promulgated a revised system of accounts, or sponsored a revised system of accounts for electric and gas companies. Yes, I am a member of the Committee of Statisticians and Accountants for Utilities of the National Association of Railroad and Utility Commissioners and have been since 1935. That is somewhat poorly worded. The correct name is the Committee on Utility Statistics and Accounts. The committee is a committee of the National Association of Railroad and Utility Commissions. I was not a member of the Special Committee on Depreciation which made a report in 1939. Dr. Dittmer was the representative of our Commission on that committee.

Referring to my statement on page 8030 of the record that for the period 1925 to 1933 I was almost continuously in touch with the financing of corporations, you ask if that had to do with accounting activities in connection with the financing of corporations. No, it went deeper than that. The bankers would make up a proposed capitalization of the company they were going to form or recapitalize. I would then be charged with the duty of reflecting those facts in a pro forma balance sheet, which was largely used in those days, to present to all interested parties what the company would look like after the proposed financing had gone through.

As those proposals were charged, and as the negotiations went further and further to conclusion, various of the terms of the financing would be changed; it would be my duty to prepare a new pro forma balance sheet; so that I actually became thoroughly familiar with what was happening during those negotiations in order to reflect the latest proposed facts in a statement which ultimately the firm by which I was employed was called upon to sign.

The assumptions and the estimates upon which those pro forma estimates were based were the assumptions and estimates of others. I had to understand what the various proposals were and what the then state of the negotiations was. I used that knowledge in preparing an accounting statement. The executives would come in and the banker's man would come in to see what it would look like if I did so and so. Then I would have to get all the information which I knew I needed in order to prepare the balance sheet. It was not necessary for me to know why the banker was insisting on a price of eighty-five instead of ninety, or why the promoter for whom I was working was willing to raise the interest from 5½ to 6 per cent.

I knew what the financing was all about. In fact, while it was not my duty to give them any advice, naturally, in the financing, I knew what the financing was going to be.
1734 Then we used that good old formula of dividing earnings by 15 or multiplying by 6, and that would give us the amount of bonds that could be put out, and things like that. It was not as if I had worked on only one or two of them. I worked with the bankers right along. They knew me and I knew them, and we worked together on the negotiations. They did not consult me concerning the negotiations. When I stated that my experience was sufficiently continuous and detailed to permit critical judgment of a situation, I meant I was in a position to pass judgment on the figures when I got them. I was not consulted by these bankers as a financial adviser, but I was intimate with these people and discussed the proposals which were put out at all times. I knew what the financing was. I knew what other companies were doing. Of course, they relied

to some extent upon my advice, but I had no responsibility for such advice. I was working for a firm of public accountants, and public accountants merely make up the statements. They take no fees for financial advice. That is not a part of a public accountant's duties.

You ask if it is not a fact that the security issues which have been referred to me as an examiner or to my department and assigned by me to Mr. Tholin have had to do largely with bond issues. (Objection by Counsel for the Illinois Commerce Commission overruled.) I don't know that that has any bearing on the particular discussion. What you want to know is whether the security issues referred to the Illinois Commerce Commission were mostly bonds. Both in numbers and in dollars they were mostly bonds. There were, however, very substantial amounts of stock. The single largest item of stocks were, of course, the Commonwealth Edison stock, that being one of the largest corporations in the city; and the volume of stock ultimately to be outstanding as proposed, and for which they received authority to issue, is, I believe, somewhere in the neighborhood of 165 or 170 million dollars. As to smaller companies we have before us now a proposal (which the Commission is inclined to deny, and which the company is inclined to change) to issue $450,000 worth of common stock and $450,000 worth of preferred stock.

We have another proposal which is dependent on whether the company will be able to purchase the properties which they are trying to purchase, which will required somewhere in the neighborhood of $400,000 worth of stock. We also have had during the past two years bus companies in more or less large amounts; everything from $1,000 up.

You ask whether the issues I have mentioned had to do with public issues of stock or with consolidations and reissues of stock. The Edison is a public issue. The others, most of them, were privately taken, not issued through underwriters or offered to the public generally by any means. Utilities in the State of Illinois can only issue securities for the acquisition of property or for refunding of securities previously issued for the acquisition of property. That is statutory. You ask whether some of these involved stock transactions where the properties were acquired directly through the issuance of stock as opposed to raising money for the buying of property. We had both types of transactions. Some of them, of course, were properties proposed to be constructed. Particularly in the last few years, I think, we have had three requests for capitalization of pipelines from the new Illinois oil fields to various places. There the property is not in existence at the time. They receive authority of the Commission to issue securities for money to be used for the construction of property.

As a whole, I would say that the great bulk of the financing which has come under the jurisdiction of the Illinois Commerce Commission has had to do with bond issues. There have been some stock transactions covering the entire period. There was not much of it in the first part, ex-
cept in the transportation field, bus companies. Later
1735 there have been more substantial issues for other
types of companies. When I say the entire period, I mean the period of my tenure with the Illinois Commerce Commission.

One large electric company which has financed through the issuance of common stock within the past four years, under the jurisdiction of our Commission, is the Commonwealth Edison Company. We have two small gas companies who have financed through the issuance of common stock. This was not for the raising of additional cash capital. The gas companies have had no real use for additional capital throughout this period of depression. Most of them were using the moneys accumulated through depreciation funds. There have been no gas company issues for the purpose of raising additional cash capital that I recall right now. The sale of the Commonwealth stock was in part to the public for cash. It was a sale to certain specified numbers of the public for cash. They received authority to sell to not more than twenty purchasers and not less than 25,000 shares to any one.

You ask whether, in my statement on page 8033 in which I referred to my accounting and business experience, I meant by business experience my official acts. I have never been engaged in business. I have had to give consideration to the factors which constitute risk in business. You ask what constitutes a risk in business. A risk in business means the venturing of money due to a decision that somebody is making. Sometimes the decision may be negative and money is ventured just the same.

For example, a man might own a thousand shares of U. S. Steel stock. He is, of course, at all times faced with the problem: shall he hold on; shall he sell? His decision may be to hold on. He is, nevertheless, venturing in that stock the amount of money which he has invested in that stock, or which he can get out today if he decides to sell today.

Primarily the decision is the thing that creates the risk or constitutes the risk. Primarily a risk means a decision you are making, to venture some money one way or the other, with the understanding, of course, that it sometimes has a negative aspect of holding on to what you have, or not venturing money but keeping it in idle funds. You ask whether it is the decision or the thing that confronts the man who makes the decision that constitutes the risk. Well, that is, I think, getting into a metaphysical distinction, as to whether it is the decision or the act of the man. He has either an investment which may be disposed of today or idle funds which he may invest today. He may be faced in business with all kinds of problems which the management must decide upon, the problem of: what will we do with our employees who are asking for increasing wages? Will we buy cotton today for our manufacturing or will we sell short today and get the cotton goods manufactured and buy the cotton as we sell the goods? Will we keep our plant open or will we shut it up? Will we run full force and manufacture for inventory, or will we run half force and merely take care of orders we have today? Will we raise our prices? Will we lower our prices? Each one of those decisions is a complex of all kinds of business factors, and being that complex the management must face the entire complex and make a decision, "What are we going to do?". In making that decision they take a risk regardless of which way they decide. There is no way of not taking a risk when you make a decision in business.

Questions by the Examiner.

You ask what I call the adverse factors that the risker
has to face. The risk is present whether the factors
1736 are adverse, or the contrary. The business man can-
not escape risk.

Let us take a man in a steel business. He knows that in manufacturing steel he needs iron ore and he needs scrap. The price of scrap is rising. Shall he contract for three months' supply, or shall he not?

Now what ultimately is going to be the result of that decision is, if he contracts for a three months' supply at today's price and the price goes up, he has made more money. If he does not contract and the price goes up, he has made less money than any competitor who may have contracted today.

Those are risks in business men must take. Once having sent out that purchase order, "We will buy for delivery day by day three carloads of scrap," the man is taking a risk. He cannot escape that risk. He is in the steel business. He must make up his mind one way or the other.

Now, he may get scrap first and decide, "I will pay you as I use it, whatever the then market price is." That is also a risk. If his competitor buys at today's market and he buys at the future market and the price of scrap goes up in the meantime, he is behind his competitor. If it goes down he is ahead of his competitor. That is the risk he and his competitor must take to stay in business, and there is no way of escaping it.

You ask what I call the element that produces the risk, that characterizes the thing as a venture. The fact that he either does or does not do a certain act necessary to be decided immediately, make a decision necessary to be made today; it cannot wait, which will ultimately result in either a better profit or a worse profit, depending on which side of the question his decision ultimately rests.

That is the real risk in business. That is the reason why General Motors may make a large amount of money and Henry Ford a small sum of money. That is the only risk that there is in business. Risk in business does not mean contingencies; it does not mean that we may get a wave of Communism that will blow up the plant. Those are not risks in business.

The risk in business is that in order to stay in business today I must make certain decisions. I must sell at today's price or hold back; I must close my plant or keep it open. Those are the risks; the way you decide all of those risks, which are constantly occurring, is the way your profit and loss account is going to look at the end of the period or whenever you look at it, and it means substantial sums of money. As all accountants know, when you get to the end of the year and you find out that this company in November is getting ready to manufacture for next spring's sales and contracted for so and so many bales of cotton at such and such a price. It is now January 1st. I go over the balance sheet and I find out that the contract that they let,—sound according to their opinion,—is for four cents a bale more than today's price; that is, four cents a bale on all the bales loss which we take into consideration right then and there and write off as loss for that year, and must write off as loss. That is risking money. When they sign that purchase order, that is risking money. There is no way to get away from it.

1737 *Cross-Examination by Mr. Morgan Resumed.*

You ask whether I think that is the kind of risk which the "decisions" talk about when they say that compensation in a regulatory proceeding involving rate of return should be in proportion to the risks involved. I think that since the utilities are competing for all the capital in all the world with all the other businesses in the world, that naturally capital is going to take into consideration that there are those types of risks, and I think those are the only real risks that there are in business that are important enough to be reflected; that those are the factors of risks that must be taken into consideration.

You surely cannot use that company "A", which is practically in the business of gambling its money in the cotton market—for example, a cotton converter whose principal gamble is: What is the cotton market going to do—you cannot take the return in his business and ignore that kind of risk and then say that this utility is going to pay the same for capital that he is going to pay or is entitled to make the same amount of profit that he is going to make if he is guessing right.

You ask me to assume that a man decides to buy cotton at 10 cents a pound; that he makes the decision which, I have said, may result in his losing money if it should go to 9 cents a pound. You ask whether the risk is made up of of the decision or the danger that it might go down to 9 cents a pound. The risk is made up of the situation that being in that business he must either buy his cotton to manufacture with, or manufacture and buy his cotton as of the day he sells. He must make that choice. That choice is a risk. You ask if it is the choice that constitutes the risk. Aren't you getting a little fine spun in that? It is that whole complex. He is in business. He must do one or the other. That is the risk that he has to take in his business every day of the year.

You ask whether or not in the sentence from the case of

Willcox *vs.* Consolidated Gas Company, 212 U. S., page 19, reading: "What may be a fair return for one may be inadequate for another, depending upon circumstances, locality, and risk", they are talking about internal decisions that the management may make. If they are talking about rate of return, they must feel that if you are going to compare utilities with non-utilities, that all of the risks of non-utilities must be taken into consideration and all of the risks of utilities must be taken into consideration, and a balance struck and a judgment made.

The risks of all utilities are not the same. To some extent it depends on the decisions of the management as to whether they are or not. Probably while decisions that are made by utility managements do not involve the risks of money to the same extent that they do in ordinary business, nevertheless, when the utilities in the State of Illinois decided to buy their coal from the Peabody Coal Company instead of on the open market, they took certain risks. They decided that they would pay a cost plus price which may today be lower than the market price and tomorrow higher.

No, the Illinois Commerce Commission, which has under its jurisdiction the gas company that employs coal and oil as raw products from which to manufacture gas, would not concern itself with whether they had or had not
1738 bought their coal in large or small volumes. You ask
if they would concern themselves with whether they had bought their oil over long-term or short-term deliveries in arriving at a proper rate of return for the risk involved. First, in arriving at the allowable operating expenses, and, secondly, since that is a risk which the management must face, the Commission must give due consideration to that risk in appraising where, in the scale of returns that all kinds of capital earned, the company's return shall be fixed.

You start from the most riskless security known and you go up to the most speculative investment known. Where in that long range shall a utility's return be fixed? It shall be so fixed, as I understand it—and I am willing to concede it is primarily a legal matter—but it means an evaluation of all the risks of all kinds of business, all kinds of capital; then to what rate does this company's risks entitle it? They must appraise all of the risk. You ask if I mean by that that they must appraise all of the company's decisions. They must appraise the net result of all their decisions, not each and every one, but how does this company operate? What risks do they necessarily have?

We must face, for example, that here in the City of Chicago management with sound business foresight built certain types of properties throughout this city. Certain areas around the loop have now become known as depressed areas. Now, that is the risk that the management had to take. At the time they built they could not foresee—I do not think it is possible for them to foresee. That is the risk the management has to take in Chicago.

When you are operating in a small town, for example, in territory like C. I. P. S., you are asked to build a line out to a coal mine, the risk that you take or protect yourself against is a risk of putting an investment in property to serve that coal mine. If the utilities do not want to take the risk, they demand a down payment or contribution for extensions from the consumer, which will relieve them from taking the risk.

You ask me to state in connection with the depressed area illustration that I gave what the risk was that confronted the owners of that property when they bought it. The risk was that they changed money into property by a decision to build, let us say, underground construction or 6-inch gas mains. Now, once that decision was made that money was venteured. That is the risk of that amount of money. The risk was that they might build property which subsequently they might have to tear up as being useless. It is the danger that confronts the man who has made the decision or who is considering making the decision that constitutes the risk. The danger is the thing which causes the loss, not the risk. Risking money is not to lose it. Risking money is to gain. You risk money in order to gain, not to lose.

Now, certain contingencies cause the risk to turn unfavorable and cause a loss. Change in the complexion of the city in this depressed area caused that to become a loss. Four blocks away the same risk was taken. No loss was incurred, possibly, because the consumers clustering around the neighborhood brought a very substantial profit about;
but the risk was when they took the decision to build
1739 the property. You ask if they both did not take the
same risk when they made the decision to buy the
property. If the amount was the same, they took the same risk. One of them lost money and the other made money,

that is right. You ask which it was that was confronted with a risk when he made the decision, the man who lost or the man who profited. Both. The decision was the thing that constituted the risk, and you are compensating utilities for the kind of risk they undertake. That is one of the kinds of risks that a utility operating in large cities does undertake. You compensate them for the kind of decisions they must make, not whether they are good or bad, but the kind of risk they must take, that they cannot escape.

If you wanted to ship a quantity of gold from New York to San Francisco by Chicago, you could get Lloyds, or some comparable insurance company, to insure the safe transportation of this commodity across country. The risk that confronted Lloyds, if it happened to be the insurer, would be the possibility of having to pay you for any loss that was occasioned during shipment. You pay Lloyds a premium, and they take your risk. If you are in the kind of business where you naturally want money in one place moved to another, that is a risk that you take, just as often as that condition arises, that you cannot escape from. You can pay a premium and shift it to Lloyds. But I have in mind one particular kind of business, the diamond business, uncut stones, where the margin of profit will not permit present insurance rates, on the authority of a friend of mine in that business. The premium is so high that if he were to pay it, he could not possibly make any money. He therefore has to take the risk, including the risk of being held up and shot.

You ask if the decision to transfer gold from New York to San Francisco had been made last July, would it have cost the same premium as if made today. I do not know whether rates on shipment of gold between those places have gone up in the meantime. I don't know whether it would or would not cost more now. I think American rates of trans-shipment might very readily have remained the same, in spite of a war in Europe. I don't know whether that is true or not. I have not followed those kinds of insurance risks. I am talking about both shipment by water and by rail. You wouldn't ship gold by water. That is too expensive a proposition. You would probably ship it by rail, by the fastest express you can take, because quite a number of the fastest trains on American railroads are commodity trains and not passenger trains.

The risk that you take if you take ordinary life insurance is that you might pay for a good many years and ultimately recover a smaller sum. Insurance people are not insuring you against dying. They charge a certain premium because they take the risk, and they pay a certain sum when you die or to your heirs when you die. They protect themselves against your going into professional aviation by providing for an increased premium or a cancellation of the policy. In other words, under those circumstances they evaluate the risk as different from that of an ordinary man.

Now you ask why I say that the risk is constituted by the decision. The answer is because business is a continuous series of acts of various kinds of various employees of the business concerned. In connection with those acts the management must make decisions. This decision is the kind of a risk they take. The risk is there before they make the decision. It is something they must do. Their only alternative is to take this sort of an out on the risk, or another sort of an out. The risk is there. They must risk that money because they are in business.

You ask if the risk involved in buying gas leases down in the Panhandle and building a pipeline from those leases to Chicago, drilling wells on those leases, and providing
compression equipment for moving that gas from
1740 those leases to Chicago did not exist before the own-
ers ever decided to go into the business. Some risk confronted them, if they had the capital to go into a project, as to what they are going to do with the capital, leave it idle, put it in government bonds, or do something else with it. At the time any one of these particular people began to engage in the natural gas business he undertook certain types of risk in a certain amount. You ask if I don't think that the risks that ought to be considered by the Federal Power Commission in arriving at a power rate of return were already there long before these men ever made up their minds to acquire leases of that kind and build a pipeline to Chicago and put gas through it. I can't see any risk that was there. I was alive at the time. I had no risk in connection with that project; merely the man who was going to venture his money into it, as of the day that he first ventured his time or invested his money in it. Then with respect to the amount of money he put in, he undertook certain risks. You ask, were not the risks which he found himself confronted with after he made his decision already there facing him before he made the decision?

When you say "Were not the risks that faced him after he made the decision," do you mean by that the risks that are now facing the defendant? When he made a decision to invest a certain amount of money in this project, he then risked that amount of money in the project.

Now whether that risk of money was profitable or unprofitable would depend on the gradual development of subsequent circumstances. The risk was taken. Now, from then on the risk that faces him is: Shall I hold on to this investment I have made, or shall I sell out?

You ask if I think that when a man or a group of men contemplate an enterprise that involves an original expenditure of $60,000,000 or more, that they are going to give some thought to the risks that are confronting them at the time they are thinking about it before they make up their minds to put their $60,000,000 in. I think now you are using risks in two different senses. The risks that they tried to evaluate at that time were, I presume, the possibility of getting their money back and making a certain return on their money while they had it out on this project. That is the risk which they evaluated as far as they could at that time.

Questions by the Examiner.

Yes, they do that by the process of considering and weighing factors which militate against their chances of getting their money back and weighing that against factors which enable them to get their money back and possibly a good return. You ask if those factors which they weigh, though they are of a negative kind, are not used to militate against the possibility of success in the matter of risks. You cannot take, in any business proposition, only four or five negative, as you call them, factors. You must take all of the factors. A business risk might have fifty negative and one good strong positive factor which outweighed the fifty negative, and a business might have fifty positive and one good strong negative factor which outweighed the fifty positive. What anybody must do in the appraisal of risk is to determine what is the relative balance of favorable and unfavorable symptons.

You ask if, in considering these factors which appear in some other industry, related, you do it by comparing characteristic factors in the two industries. If we were to make, as I was called upon to do, the appraisement of the

risks of this business and the return that it is therefore
1741 entitled to, I would take as large a group as I thought was desirable for study and then appraise what are the characteristics, favorable and unfavorable, of risking money in this business, what are the characteristics, favorable and unfavorable, of risking money in another business. I would probably give a little more weight to those that were closer in characteristics. The rate of return at which I arrived would be about 6 per cent. That was arrived at by weighing the returns derived from risking money in various kinds of industries. I mean by that risking as an investor in those industries. In doing that I employed all of the favtors. You ask if I mean, eliminating common factors or grouping common factors and giving it weight and then giving the distinguishing element of my characteristic factors weight. My answer is "no." I gave consideration to all of the risks: How difficult it is to wind up at the end of the year with a reasonable profit in a certain line of business, and what kinds of profits and losses naturally do these businesses make.

If I were to take and compare the Natural Gas Pipeline Company with other natural gas companies, I would evaluate all of their risks, all of the risks of this company as against all of the risks facing the other natural gas companies. Then go from there to utilities and, ultimately, if I wanted to make a comparison between the Natural Gas Pipeline Company of America and industry generally, manufacturing and processing and merchandising industry generally, I must look at the risks that face manufacturing industries, merchandising industries, and compare those risks with the risks that faced the Natural Gas Company of America, and try to strike some kind of a balance between those risks, in order to effect a judgment as to how much more or less than those industries earn is the Natural Gas Pipeline Company of America entitled to earn.

But I cannot say that the risk that faced Chrysler, for example, with this strike, which has just cost them a large amount of money, that that is a risk which I must ignore. Of course, that is the very kind of a risk, when I look at automobile earnings, that I must take into consideration, that the automobile people are now faced with a labor problem, that the labor problem can cause them a strike that will cost them a great deal of money. Naturally, if they are going to take that risk, it must be compensated for, or they will all go broke.

You ask whether the labor problem is a risk. Of course the labor problem is a risk of industry. It is one of the basic risks facing all industry today, where the cost of labor is a very substantial amount of the cost of your final selling price.

Cross-Examination by Mr. Morgan Resumed.

You ask what decision on the part of the management does the labor problem risk depend on. A great many. Ultimately it might depend on a decision of whether to fight a strike or give in. You ask whether it is the decision that arises when the strike is immediately impending that constitutes a risk. That is a pretty late date to face that risk. They are facing that risk all the time. How shall we treat our employees? How shall we do it? The Chrysler strike was supposed to be caused by the speeding up of the belt line. It was that original decision—in order to make money and sell our cars for a certain amount we want the belts run to move so and so fast, otherwise we cannot make a profit or the profit that we ought to make on this car—having made that decision, to price their product at that particular set-up of prices, they then had to work their belts so fast that the men kicked and ultimately struck, and Chrysler lost a lot of money, variously estimated.

1742 You remind me that I stated in connection with my direct testimony that I had given effect to the particular risks that I mentioned here, which I said prevailed in other industries and did not prevail in these companies, involving questions of decision, such as the accumulation of inventory; and you ask if that is the character of risk that I appraised in arriving at 6 per cent as an adequate return. Yes, because where that factor is present to a great extent in a business, as for example in merchandising, they are entitled to a larger return because of undertaking that risk than they are if that is not present.

You ask what distinction I draw between risk, as that term is used in a rate of return study, and hazard of loss. I thought I explained that a while ago. Risk means what you undertake to do which may result profitably or unprofitably; but when you make a decision, from that time on factors beyond your control determine whether it is going to be profitable or unprofitable. That is the risk that business in general is faced with, all business.

You refer to my statement at page 8038 of the record: "In a discussion of risks in business it is necessary, in my opinion, to distinguish between the continuous actions of conditions surrounding an industry and the continuous risking of money by the companies in industry," and to my further statement: "The first set of factors in general determines whether the industry will be profitable as a whole. The second set of factors determines the relative prosperity of the companies within an industry. The risks arising out of the continued commitment of money in a business are much more important than the risks arising out of the conditions surrounding an industry." You ask if I meant in those observations that the risks arising out of continuous commitment of money are much more important in a rate of return study. Of course I was leading up to rate of return, but I also mean much more important as an underlying factor of business. I was talking about industry in general. The one principal risk which the management or the entrepreneur in your property took in the first place was this: It cost $60,000,000 to build a pipeline. Is that justified by the amount ~~of~~ gas we have in the ground, taking into consideration the possibility of selling that gas in Chicago? They had a lot of other risks besides that one, but that was the one big risk, that was the paramount risk that they had, because if the gas was not there, if there was only enough gas for four years, you could not get $60,000,000 out to pay for your pipeline.

You ask if I meant by what I have said that having put their money in and built the pipeline, that the risks that are involved in the decisions which the management makes from time to time are the important thing, rather than the over-all risk running over the period of time that their money will be in the pipeline. I made that statement about business in general. Now, when we get down to the Natural Gas Pipeline Company, there are certain risks that the management is undertaking from day to day and from time to time. Every time they add a new interruptible customer on the line; every time they are faced with the question of shall we sell our gas to the industrial customer or shall we hold it for the residential and commercial consumer; every time they decide whether it is going to pay them to put in a new piece of equipment or whether they shall let the old one run for a while with such necessary repairs as can be made; whether the wastage of gas is enough to warrant an investigation or whether it is small enough to let it run,—those are all problems of management, as to whether they shall put so much money into labor or material or undertake to supply gas to this person or that person.

1743 In your particular line of business the day to day risks are comparatively small, I mean compared to business in general. I think most any business man will bear me out that you have a much easier business to run than an automobile business, for example, or Marshall Field's, and companies of that nature.

Now, the risk surrounding your property as a whole, which was a factor in the first place, by today has had certain years of development. The money having once been risked, some of the bondholders have their money back or have part of their money back. The stockholder has already received his three hundred or four hundred per cent dividends on his stock. It does not owe him very much. It was a profitable venture, even if he never got another nickel on his common stock.

You ask if the fact that it has been a profitable undertaking down to date ought to be used as a means of discounting the risk that still confronts defendants. I think that should get some consideration. I am not saying that because you made four hundred per cent dividends that you are not entitled to any dividends from now on. That is a legal problem as to whether you are entitled to these dividends or not, but as to the man who originally said, "Let's put our money into this proposition," and put his money into the common stock, nobody can say to him at the present time that he made a bad investment. He has got his money back four times over and still has a piece of paper that is worth a lot of money.

Yes, defendants together have certain risks surrounding them. You ask if I took those risks into account when I made the comparison between the business and operation of these companies and other companies which I mentioned in my direct testimony. I took them into account. I gave them, I think, complete valuation. But I say that that type of risk is a smaller one and much less important one than the type of risk that faces somebody that is in the steel business or in the automobile business, and if I am going to look at the rate of return made by people in the steel business or in the automobile business I must give full consideration to the fact that the Natural Gas Pipeline Company does not face anything like the risks that they face, in the matter of winding up with a profit at the end of a year, due to the activity of the management.

You ask if in determining risk it is necessary to examine into the matter from the basis of what will probably happen or the thing which might happen to a business of this kind. The thing that will probably happen gets most of the weight. I think every eventual contingency should get proper consideration, every contingency facing this as well as every other business. When we are talking about compensation for risk in connection with an investor, we can in part talk about probabilities, things that we can see down the line that are going to happen in all probability.

You ask if I think anybody would invest his money in a venture if he thought there was a probability that that investment was going to fail by reason of some contingency. Yes. You say his investment might fail, but people are buying stocks on the stock exchange right today at fairly sizeable prices that have not made a profit in a great many years, in the hope that maybe it will turn around and make a profit for them some day.

1744 Now the probability is that if you pick any one stock, you might in all probability make a loss, but the hope that these investors have, is that "if we pick five stocks and one of them comes through with a profit, we will have enough to compensate us for the money we risked in all five out of the one venture that turns profitable," and that is the reason you will find stocks on the stock exchange that have had losses for a great many years still selling for dollars per share.

When an investor is thinking of buying or not buying a certain stock, the risk that he appraises is: What are my chances to get my money back and a return either in the interim or an appreciation at the end of the period of time?

You remind me of my testimony on direct that "the risks arising out of a continuing commitment of money in a business are much more important than the risks arising out of the conditions surrounding an industry. The latter are slower and can be met over a period of years." You ask that we apply that principle to the railroad industry. You ask what major risk confronted the man who put his money in railroad securities, particularly common stock securities, twenty years ago. If you are going back twenty years, one of the major risks of investors was the honesty of management. Now, as far as the railroad industry itself is concerned, one of the risks that they faced at that time was the ability to overcome the change in the transportation habits of the American people to the automobile and away from railroad travel. You ask whether they have overcome that risk over the years or whether it is still with them. It is still with them. You ask if that risk has reacted upon their returns and upon the yields of their securities. To some extent. I think that the railroads that do a great deal of crying about the things that affect them are to some extent to blame themselves for not recognizing the factor of obsolescence and depreciation in their accounts, and continuing to pay dividends instead of plowing it back into the modernizing of their property. It was only at the very depth of the depression, the very worst time they could pick to gamble their money in the railroad business, that they started with streamline trains and new equipment. Up to that time the cars were run and used just as long as they could use them; the oldest equipment was still kept alive.

I think today the railroad industry might be in for a new lease on life if they would wake up to the fact that they are running an industry. They have to face industry and its problems the same as any other business man. They have to keep their equipment up to snuff if they are going to compete with airplanes, and buses and trucks. I think if they keep alive to that problem they can still come out; but if they are going to sit back and say, we want an increase in freight rates, or we want an increase in passenger rates, I think they are headed for the ash can.

You ask what investors think of railroad securities at the present time. Well, right at this time there has been a spurt in railroad securities. Prices have gone up. They hope even second class railroad bonds will earn their interest this year, and maybe that the railroad industry will come out. I think that by and large today's prices are a pretty good reflection of the status of the railroad industry and its chances for paying out on today's basis. As to whether they will ever be able to pay out on a 100 per cent of their capitalization, I think it will take a pretty strong optimist to express a favorable opinion on that subject.

1745 You ask if the great hazard or risk involved in railroad investment today is not the bus, the truck, the private automobile, and the airplane. That and the way management conducts its business. How many trains are they going to run? We get, in the Illinois Commerce Commission, railroads coming in and saying, "We want to take off this train, we want to take off that train." We have railroads going down to Washington before the Interstate Commerce Commission saying: "We want to make an increase in our freight rates. It is true we will lose a certain amount of business, but we think we will be better off over-all." I think as long as railroads stick to that kind of thinking there is not much hope for them, because I don't know of any industry that can make money by charging more and selling less of their product. I only know of industries who can make money by charging less and selling more of their product.

If the railroads try to give the best service that they are capable of, at the lowest price, and move America's commodities, I think they will be in the money again; not at capitalization, but what I think they are really worth. It is not that they could or could not have done it but just that they have not overcome the hazard which confronted them twenty years ago from competition. I think they are very slow in realizing the effects of that competition. We know that for years the railroads uniformly refused to have anything to do with bus and truck transportation. They would not go into the bus business. They would not go into the truck business. Today most of them own bus lines and truck lines.

You ask if I think that the trouble which has resulted as a consequence of this decision that I have been criticizing here on the part of railroad management is the kind of risk that ought to be taken into account in fixing the proper rate of return for an industry, or whether the compensation should be on the basis of the risk involved in the competition from buses, trucks, private cars, and airplanes and other competing transportation facilities. Well, how is anybody going to appraise that risk without giving full consideration to what the management has done with those risks that the companies face? You ask if I am going to have the regulatory body substitute its own judgment for that of the management. No, no, but it has to see what the management has done, and what the result of that has been. This management has done certain things, faced certain risks, and there was a certain return, they were making 12 per cent on their money. Here is a management which may be making 45 per cent on their money. I know that if there is any business in which men can engage and make 45 per cent on their money, there would be such a rush into that business there would not be any money to make in a short while. There is no such business, because capital would compete.

Now, what I say is, what the Commission is to give consideration to is: "What return does an industry make which faces a certain kind of risk"; then plot all of those on the scale; and if on this scale of risks this business falls here or there on the scale, then the returns of the business fall there. You weigh all the risks of business. You can't pick out three of these, say, three substantial risks of the natural gas pipeline business. Let us say we have an earthquake in the St. Louis area. I don't know how near that got to your pipeline; but certainly, if there was any indication that there was, generally speaking, an earthquake area around there that might destroy your pipeline, that is, break your pipeline once every year, you should be compensated for that risk one way or the other, whether that is effected by way of compensation or in the operating expenses.

1746 You ask if I mean to say that I don't know what risks confront defendants. I thought I made a pretty good evaluation of it. I merely said I did not know about this recent earthquake. I did not investigate how close this recent earthquake got to your property. No I did not say that earthquakes are the only things that break up pipelines. You ask if I think there are any other factors that might result in the parting of that pipeline between here and the Panhandle area of Texas that ought to be compensated for in the rate of return. Either in the rate of return or more normally in the utility industry, if they are normally recurring in more or less large intervals, in the operating expenses. Utility companies have to face that problem. For instance, the telephone industry in certain areas of this country is faced with sleet storm damage which periodically will knock down a large part of their lines. Well, usually the Commission says, "We will fix your rate today, and the sleet storm damages may be amortized over a period of years"; which seems reasonable when and if they occur at more or less regular intervals.

When your company had a break in the line almost two years ago now, the cost of rebuilding that line was paid for by the company; and some part of it got into the operating expense. If there is some of it allowed in the operating expense, then you are not entitled to it over again in the rate of return. If there is any such factor which deserves compensation, of course, the Commission will give it whatever consideration it deserves. Commissions have to face that problem over and over again, and they do what is adequate and reasonable and right to do under the circumstances in the case

You call attention to my testimony at page 8039 of the record reading: "One of the continuing risks that faces industries other than the utility industry is the conversion of cash into inventory." You ask if that is the kind of risk which I think regulatory bodies must take into account in arriving at a proper rate of return. If they are looking at the return earned by companies which face that risk to an important extent, of course they must discount the fact that this company does not face such a risk. You then call my attention to my testimony in the same connection that: "The size of inventories varies with the industry and with the company but in general constitutes a major portion of the invested capital of an industrial company." You ask if I am talking about dry goods stores and clothing stores when I make that statement. I mean steel companies, copper companies, the automobile industry. I didn't say inventories constitute their main fixed investment. I said a major portion. It may run anywhere from 25 to 75 per cent, or maybe 90 per cent, of their entire capital. I mean all of the inventories: raw materials, supplies in process, finished products. By inventories as I use that term here I mean merchandise, goods of all kinds, goods which have to be sold, those which the particular industry is selling or using.

I am assuming here that there is not to the same extent such a hazard confronting these pipelines when I say they are not confronted with that risk. They are not confronted with it to anything like the same extent. You ask to what extent I would say that they are confronted with that risk. Well, they have some problems in their materials and supplies that they are required to purchase. These particular companies are also in the gasoline business; they have been storing gasoline over a period of years to a certain

greater or lesser extent. As the size of that inventory
1747 goes up you take on more of that kind of risk; as it
goes down you take less. On the whole, however, the amount that you have in inventory is a very small proportion of their entire investment; whereas industry in general, particularly those industries which are making substantially larger returns than six per cent, are industries which have large amounts invested in inventories.

You ask what the ordinary merchant or manufacturer does with his inventory when he finds himself with more goods on his hands than he can sell for the moment. He must have an inventory to stay in business. A man can't stay in business without inventory. Now, the inventory of the average concern, even a manufacturing concern, consists of raw material, supplies, merchandise in process of manufacture, finished material, and finally, let us say, packaged goods.

Now, he has to accumulate that inventory in varying proportions in order to meet the day by day demand. That is a risk. If the price of his raw material falls, he can't sell at the cost of production to him; or certainly not the cost of production that he counted on. If it rises he can make a good sized profit.

When you look at the returns made by the manufacturing industry, you must take into consideration that part of those profits were made because they took this risk. I read here recently of a company in the jute business that made more profit from their inventory on account of the rise in price due to the war scare than they made in six years. Now, that was a risk to the man who bought that jute inventory from them, who wanted to stay in the business and was afraid he would not get a substantial supply.

The scrap industry, which is a major part of the steel and iron business, faced the same situation. The prices of scrap rose very rapidly. They have started to slump off now. The man in the steel business had to make up his mind: Will I buy scrap at today's quotations for my future supply; or will I gamble that I will be able to buy it cheaper a few months from now? The man who bought at the top of the peak will have smaller profits than the man who did not buy at the top of the peak. You must take that into consideration when you look at the returns of a particular steel company. What risks did they take?

You ask what defendants have to sell. They sell natural gas. They get it from the ground, and they have wells that they have drilled in order to give them a supply sufficient to meet the demand at the Chicago end, or at the Joliet end, of the pipeline. You ask when they got it. Some leaseholds were bought rather recently. Most of them were purchased or acquired in 1931 pursuant to an earlier contract. Some have been bought subsequently in order to round out their holdings and get them in the shape they wanted them. You ask if I don't think that natural gas which they bought there in a reservoir and have owned for the last eight or nine years is a considerable inventory of what defendants have to sell. No, not when you are not faced with a fluctuating market. If the price of that gas were determined by factors beyond your control, then it would be a risk, but if the price of the gas is subject only to the operations of a regulatory body, then you are going to make a fair return on the fair value of your investment and there is no risk.

1748 You ask about the thousands of owners who have an interest in that same reservoir who are working on the same aggregate inventory down there. There would be a risk if a man owned a leasehold and had to pay a rental on it and had no way of getting his gas out of there and selling it. You ask about the situation of the man who is taking as much gas as he can, but he can only take a small part of that which he has. After all, if he is taking out all he can, that is all he owns in the reservoir. He bought what was down there on the possibility that he could take it out. You ask if he didn't buy a certain quantity of gas down there when he bought the leases under which that gas is located, and if he isn't confronted with a risk as to whether or not he is going to be able to produce that gas and sell it, or whether somebody is going to do it before he can get around to it. I think in the natural gas industry, where the field is such that gas can be readily tapped away from one lease to another, that if an operator is in position where he is unable to get all that he might get, that all he owns is what he can get; the other belongs to the other man who can get it. Now, my experience in the natural gas field, I have known places—oil, rather, which is similar to natural gas—I have known men to drill wells very close together in order to get it out as rapidly as possible, because they own all that they can get out of the field, and not one gallon more. You don't own one cubic foot of gas more in that reservoir than what you can get out. You own what you can get out.

You ask whether that is my conception of what the law is down in Texas. That is my conception of the economics of that business. The law is something that I can't tell you anything about. I am not a lawyer. How much you can get out depends on how many more are down there getting it out and at what rate they are getting it out. You ask if, when you go down and spend $15,000,000 for gas reserves, you are not taking a long chance as to how much of the gas you are going to be able to take out of the field. I presume you are weighing the chances that you take; that what you do say is that you can get enough gas out of that field not only for your $15,000,000, but for everything else you have to spend in order to get that gas out; and the amount that you have to get for that $15,000,000 is the amount you are going to get out. It is more or less an industry which probably cannot be evaluated to the cubic foot or to the dollar; but you know within certain limits how much gas you are going to get out. If you don't know, I don't think you have a right to risk $60,000,000 in getting that gas out.

You ask if anyone in 1926 could at that time have predicted with any reasonable certainty as to the rate at which gas would be taken out between that year and 1936. They could not. Nobody knew at that time how many pipelines would be built, how many gas wells would be drilled, how many carbon black plants would be erected, how many gasoline stripping plants would be erected, how many oil wells would be drilled, how much gas would be used in the production of oil. You ask if that same uncertainty isn't confronting the owners of gas reserves down in the Panhandle today. I am not saying that there is no uncertainty. I am not saying that there is no risk. I am merely trying to get that leveled off to some kind of a measure, on some kind of a measuring stick. The question is: How much uncertainty, how much risk is there? Now I presume that in the figures I have dealt with here that the company says: "Here is an amount of gas, and we have a reasonable and safe expectancy of getting it out of the ground."

I presume they said that. You ask if that is what
1749 they said in their testimony or through their witnesses. I did read some place that you said there was a minimum and a maximum. I don't know whether you said minimum as much as you said maximum; but I would say that from the way I look at this picture and from what I know about this business, I think that there is a

reasonably safe figure to use; that that is what you are going to get out of this proposition.

I appraised that risk in arriving at my 6 per cent return and considered it carefully. You ask what elements of that particular risk I took into account and analyzed. Well, the risk that originally you put in this amount of money, which I looked up at that time; and what has happened to that investment in leaseholds since then; what returns you have made since then; what your future outlook is as set forth in Company Exhibit 141 and other exhibits; and from the fact that these figures that have been presented, there is a reasonable expectancy of what the company can do; and that on that basis how much risk does the company take?

Now, of course, you are probably taking the risk that somebody might get down there and do "wild catting," and drill this field wide open, and be able to get around the regulations of the Texas Commission that regulates the natural gas industry, and strip it down very rapidly; but I think that is a comparatively small risk. You ask why I think that. Because the conservation efforts of the Texas Commission have been such that they have begun to hold down this particular project; and primarily the fact that your witness admitted that there would be natural gas which you would get out until 1954. I think your witnesses testified to that effect. You ask if they did not say that there was a certain quantity of gas down there, and if certain contingencies, which they enumerated, which might operate to reduce the quantity of gas which could be recovered did not take place, that as a maximum length of time it might last until the year 1954. I think that your witnesses should have gone one step further and said that the minimum should be so much. I think the maximum was pretty close to the minimum, as I remember the testimony. I did not read it word for word. I think he was willing to state that you could get this much revenue out until 1954 on this proposition. I forget which witness testified to that. I read quite a number of them right together. I forget his name.

You ask if I am sure that any witness said that. That is the impression that I got out of his testimony. You ask if I appraise that risk as to the quantity you will get out of the field in the light of that impression. I appraise the risk this way: That if the Commission ultimately decides that 1954 is a reasonable expectancy of life of this proposition, and if they have given you a reasonable value on the gas you are going to get out between now and 1954; in the light of those two judgments there is not very great risk left.

I know that oil wells are being spotted all over that field down there, particularly in the east end. I know that every oil well drilled wastes a lot of gas and uses a lot of gas. I have also been told that there is a pretty good working arrangement in that field between the companies exploiting that field. There must be an increased number of oil wells being drilled. Every time an oil well is drilled, that gas reservoir is tapped and more gas is produced. No one can determine at this time exactly how many oil wells will be drilled down there next year or in future years; but geologists have estimated the life of fields. In my experi-
1750 ence, if they are real good competent geologists, they
are usually low. I presume that is a matter for you to substantiate before the Commission. And after all the testimony is in and the Commission has decided that there is so much gas that you are going to get out of the ground, and what the value of that gas is in the ground, which you are going to get out after so many years, and what is the reasonable length of time for you to take to amortize it over the life of the property; then if they appraise that, there is not a very large risk for you to be compensated for. You ask if that doesn't depend on whether or not the rate of withdrawal actually proves to be as they determine after doing the very best they can about it in the light of a possible or probable different history of that field in the future. I would say this: That if the Commission were inclined to view all of your evidence and the evidence of Mr. Brown and decide that the life of this field is going to be 35 years, instead of 16 years that you claim, then there is a bigger risk attached to your business than if they found it was going to be 16 years. You ask if I mean to say that there would be a bigger risk in following Mr. Claude Brown's testimony than that of Mr. Peterson and the other geologists who have testified. Not risk in following the testimony; but every year you put it further away, the bigger the risk; just the same as if you bought a 35-year bond there is a bigger risk than if you bought a 30-year bond—five years longer risk; the limit of the risk goes further. When you appraise that risk you have to take into consideration the length of time. You say that 1954 is going to end it; you are done.

You ask was it necessary to testify that it won't last that long in order to have a risk injected as to whether it will last that long. That question relies on the risk, not that this will have a longer life. You ask if the carbon black industry doubles its activities in that field and commences to take a billion and a half instead of seven or eight hundred million cubic feet a day, what effect that would have on the life of the field. That would shorten the life of the field as against the original estimate. If you want to ask me that question, my answer must be: What did your witnesses take into consideration? How did they evaluate all of these factors? Now, they certainly did not sit down and say we are going to stop at this certain particular point, and everything is through. I presume that what they have got is the point at which their evidence reduces the risk to a minimum, where there is at least a certain reasonable expectancy of getting this much out of the project. Otherwise, why didn't they come in and say 1950 or 1946? I presume the reason they came in is, that they said—we can substantiate this thing—that it will last such a length of time. I presume the reason they picked 1954 is that there is at least a safe and reasonable expectancy that this business should last that long;—and if a witness testifies it will not last that long, he will not stand up under cross-examination.

That works both ways. This property may last longer than 1954 or less long. I say on the basis of the evidence that is in here, as I have been able to interpret it, which I find in the record presented by your witnesses, that it will last until 1954 and produce a minimum amount of gas; that the testimony gives a reasonable standard that your property will last that long and will produce 164 millions of revenue in that time.

You ask how investors in dealing with the securities of these pipelines would view that matter, that is, if they would be willing to trust their money in bonds that would extend until the end of 1954 merely because any commission in the exercise of its best judgment thought the
1751 field would last that long. I think that they would be much more willing to follow the findings of the Federal Power Commission than they would of some company geologist who said it would last a certain length of time. I think one of the reasons why the natural gas and oil industry is in bad with the public as far as public financing is concerned is because of the extravagant valuation of the

leases, the extravagant estimates of reserves which are about to be exploited, the extravagant estimates of the amount of gas which can be recovered. If you give the people a sound, sane, reasonable judgment on all those factors, you are reducing their risk. I think that if the investor should find that the Federal Power Commission in deciding this case, if it found that this property is going to last 16 years, he would say, "Now, I think that is a pretty safe place for my money"; especially if you read some of the other prospectuses, that have 25 years of life ~~in them. There are bond issues of natural gas companies~~ that are in part exploiting this very field which have gone beyond 1954. I think if the estimate was 25 years and we have a bond issue for 15 years, he would be more willing to take the risk. Naturally, if the risk is longer, he is willing to put his money in for a shorter period. He will reason it is a safer risk. He will say: "All right, if you say that property will last 25 years, I will loan money up to 15 years. Ten years from now I might loan you money for another ten years."

You are not going to get a bond buyer to loan you at 3¼ per cent for a period up to 1954, but you can at 3¼ per cent on bonds that run that much shorter. You ask if he would take bonds over the whole period to 1954 at 4 per cent. You can get to a point where he would do it. You ask where I would get to that point. I will give you an answer on that tomorrow. Give me a chance to think that over. I must take into consideration quite a number of factors. Of course he is not going to advance his money on bonds running clear over the indicated life of the field at the same yield that he would if he is leaving himself a margin of ten years in there. I said he would find the yield so much. He would take it. Whether you call it bond, stock, or promissory note, the piece of paper isn't going to make any difference. For a certain amount of money you can get people to give you almost anything today. You ask if that is because I think the representations or predictions as to the life of the field that are promulgated in connection with these bond issues are often extravagant. I said that was one of the reasons why investors have disliked buying oil and gas securities. In this particular case I feel the Commission, having a thorough airing of all the factors applying to the life of this field and complete information on the life of the field, and also having complete information on the value of the property, are going to fix those two things. Now, as they fix those two things, if they fix them at a place where the life of the field is of reasonably sound expectancy, they have reduced your risk to that point.

I had to make a certain assumption. I had to make the assumption I was testifying on rate of return that was going to be on the basis that your property was being valued by the Commission, that its amortization was being fixed by the Commission, that its life was being fixed by the Commission, they would have everything else, and after they got all of those things settled in their mind, and, justly, because otherwise you are entitled to relief in the courts, on the fixing of the rate of return, at that time, I say, there isn't very much substantial risk.

1752 You ask if there is not the risk left there that, by reason of an increase in production from the field by parties competing for that production, it might not run as long as is now indicated to the Federal Power Commission from the evidence before it, even though it does the best it can to arrive at the probable life of the field. The answer to your question must be yes, because you are assuming that there must be some additional risk. Of course, there might be some slight additional risk, but I say after the Federal Power Commission has gone through all of the evidence in this case and has reached a sound decision, one which will be corroborated by the courts, as to the life of this field, that by that very process you have 16 years to go and you are going to get 164 million dollars. I presume they are not going to decide it will last for 16 years if there is not gas enough to last that long. You ask whether they can know that. Aren't you giving them all the evidence that bears upon those factors? Aren't they assigning their own experts to find out all the evidence?

You ask if there isn't always the danger and the hazard that, by reason of increased cost of production or formation conditions that will put wells out of commission after it is too late for them economically to drill other wells, and on account of increased production of gas by those who are competing, namely the oil producers, other pipelines, and the carbon black industry, you won't have enough gas to last out the length of time the Federal Power Commission, in its wisdom and exercise of the very best judgment it has, believes now the field might last. It may be some slight risk on that account. I think it is a slight risk. If it is not, let's have some information. I am assuming you have all the information in the record on which the Commission is to fix the life of the field. I am assuming they are going to fix the reasonably sound life of the field. They are not going to arbitrarily say 40 years or 25 years, when the evidence shows the reasonably sound life of the field is 16 years.

If the reasonably sound life of the field is 10 years, I presume the Federal Power Commission is going to fix 10 years and you are going to have amortization for ten years, and having fixed the reasonably sound life of the field the risk left is negligible. I have made whatever compensation I thought that risk was entitled to in the rate of return which I have expressed here in my judgment as the proper one. You ask how much compensation I allowed for that risk. I didn't evaluate just that way, by taking each factor of risk separately. I regarded that risk as of small though not negligible consequence. I didn't say the weight I gave it was negligible. I said the amount of risk, I think, is negligible. I wasn't holding you to a minimum of 6 per cent return. I think that is a very liberal return. I have plenty of leeway in my return. Yes, I think I am giving a liberal return when I say 6 per cent. I have given predominant weight to the fact that there is a war on and I didn't know what investors were going to get.

(December 6, 1939.)

You ask if in my direct testimony I did not undertake
to distinguish between the risk surrounding an industry
and the continuous risking of money by the companies in
the industries, which, for the purpose of the succeeding
questions, we will abbreviate as external and internal risks.
That is a satisfactory distinction to me, of course, if it is
understood by external risks we mean conditions surround-
ing an industry and by internal risks we mean risks
1753 arising out of the business process itself, a process
whereby a business makes or loses money. My statement was in brief that those within the business, arising out of the transactions of the company under consideration, are the important ones as compared with the risks surrounding an industry. I said later that those surrounding the industry are slower and can be met over a period of years. That is not true of all industries. It is a generalized statement.

You ask me to give you an illustration of what I mean.

Well, I mean by that statement the gradual replacement of a product by a substitute product. Let us take; for example, one that might be operating at the present time —I don't know how large it is—but the gradual replacement of silks by the new fabrics being developed by the chemists. That does not happen all of a sudden. That is a slow process. The management in the silk business sees it coming and can make to a certain extent provision for it.

Another type would be in the extractive industries; the gradual depletion of a certain ore; not the particular ore body of one company, but a whole field of operations, which ultimately means that business in that section is going to be removed.

I am thinking now of certain of the coal fields in the Pennsylvania neighborhood; for example, around Rich Hill, Pennsylvania; once a flourishing community in the coal field; with merchants doing business in that town, railroads operating to that town. Gradually, as all of the mines in that neighborhood became depleted, all the industry moved away, and today there is nothing but ramshackle buildings left to gradual destruction.

That did not happen all of a sudden. People operating that property saw it coming and made provision for it. Your own company will face that risk, and make provision for it by setting up adequate depletion; by, towards the end of the property, not maintaining your properties to the full extent as if they were going to run forever; and take other precautions.

Now, this kind of external risk, as you use the term, operates slower. They are not like fluctuations in the market price of raw materials, which affects the sales price of your commodity in the immediate future.

You suggest that we apply this principle and doctrine to the traction industry and ask whether the risk surrounding that industry was overcome over the years or whether it finally submerged the industry in a great many places. Well, it was seen coming over a period of years. Ultimately, of course, the industry goes out of business, whether it is the individual company or the entire industry. It takes a long period of time. During that period of time provision can be made. Certain street car lines were compelled gradually to change over to a bus operation.

The Evanston Street Railway, for example, operating under the jurisdiction of the Illinois Commerce Commission, because they had the foresight and prudence, were able to pay all of their bondholders one hundred cents on the dollar; and their stockholders still have for the money that was not returned through liquidating dividends a good going business, returning excellent dividends in my opinion.

1754 Now, the fact that some people in the traction industry have been pigheaded about trying to run a street railway in a small town where it is uneconomical, and where the bus operation is much more economical, and have allowed somebody else to take over that bus operation, does not change the fact that it is a slower risk than the ordinary risks of a man in the steel business or the automobile business, or any other regular business, non-utility; and that to a certain extent it can be overcome. Whether it is or not, of course, has nothing to do with my application of that principle. The fact that management may be pigheaded and refuse to recognize obsolescence and depreciation—

You ask what is the attitude of investors toward putting their money into a business like a traction company as that industry has been situated since the advent of the bus and automobile. Well, there is a security market where shares and bonds are being sold—at discounted prices, it is true; and if some investors feel that the present prices are too high, they sell. If others feel that the present prices are too low, they buy. You ask whether it has reacted to increase yields on the investments of those who are willing to put their money into that kind of business under the circumstances which confront that industry. I think there are speculative profits to be made in the industry. They are speculative, of course, and therefore, if the profit comes, it will be large. Most of the people will take losses. For that reason, those who put their money in require high yields. That is true of every industry which has facing it its ultimate extinction by competition or by the exhaustion of physical resources.

You ask if an industry is confronted with a short life which can not be definitely determined in advance, whether investors take account of that circumstance in the yield demanded for investing in the securities of that kind of business. They will take account of that in two ways: First, by seeing the amount of depreciation, depletion, and amortization which it sets aside; and then, if that is not sufficient, by yield. But if, in their opinion, the depreciation, depletion, and amortization is enough to restore to them their capital before the end of the project, then they will not require any additional yield.

A bondholder who is getting, let us say, a yield of 3½ per cent, would want more safety than a stockholder who is getting 6 per cent. You ask how long before the expiration of the uncertain terminable life would he want to get his capital back into his pocket. As soon as he can get it, naturally. But I think that where an investor would sit down and say, here is an uncertain life; the company is setting aside such and such amount for depreciation; he would then try to make up his opinion on what that life would be. If he thought that there was a good chance that it would run beyond what the depreciation and amortization called for, he might then be willing to take a comparatively small return on the gamble.

If there was a reasonable expectancy that the company was not setting aside enough, he would want a big return, or he would want to buy his securities at a liberal discount.

You ask if in the case of a natural gas company it isn't also possible that the life of the source of supply will be exhausted prior to the time indicated as of any particular time when we are still looking into the
1755 future. It is always possible that it will be shorter
than the estimate, unless that estimate is unreasonably short; or longer than the estimate, unless that estimate is unreasonably long.

In my experience in Kane, Pennsylvania, where they dug some wells which were drilled in the 90's, and allowed to run to air—gas wells allowed to run to air for a period of years, then turned into the lines serving Kane, Pennsylvania; they are still producing gas. They are pumped on a vacuum, but they are still producing gas. They have a very tight sand. Now, every geologist, as far as the records show to that time, that made any estimate of the life of that field, was low. It all depends on your estimate. If your estimate is extravagant, there is a big risk if you are going to follow that estimate.

Questions by the Examiner.

You ask whether, when I refer to Kane, Pennsylvania, that is a typical case in my estimation and whether I find estimates always low, so low that there is no possibility of the extinction of the field. No, the possibility of being high or low depends on two things: No. 1, the kind of estimate that is made; and, No. 2, the gradual change that is made in investigating your estimate. Just because an estimate is made today that this field will last so-and-so many years does not mean that there is a risk if it happens to run out in a year in advance. The very fact, as Mr. Morgan referred to yesterday, of additional people drawing from there, is known to the management when that happens, and you have a period of time to adjust for it. It does not necessarily mean that if the source of supply goes out in 15 years instead of 16 years, that the company is bound to make a loss. Of course, there is always a possibility that an estimate is too high or too low, if it is an honest estimate.

Cross-Examination by Mr. Morgan Resumed.

You ask whether any investor dealing with the securities of a natural gas company whose source of supply was the Panhandle field wouldn't be confronted with a risk that, for some reason which we cannot foresee now, it might run only 12 or 14 years instead of 16 years. I think an investor faced with a decision of the Federal Power Commission, founded on a complete study of the facts—company evidence and Commission evidence—would be more inclined to look upon the possibility that that field would last beyond that life than he would to look at the risk that the field would not last as long as the Federal Power Commission said it would.

You ask on what basis would he figure that it might last longer than now indicated. On the basis that the balance of the factors that are in play center around the period that the Federal Power Commission actually chose; that they probably were reasonably conservative in their opinion; that, therefore, there should be at least as many chances for the field to last longer as there are for the field to last shorter, and if the Federal Power Commission renders their decision, I think that that will be true.

Therefore, since most estimates to which a Commission would give weight are founded on what is known to be there, and there is always the possibility that there is more there than is known to be there, I think that most investors would be inclined to consider that there was at least an attractive speculation in the proposition that it would last longer than the Federal Power Commission has said.

1756 You suggest that we assume that the amount that is there can be definitely ascertained and that that is the amount that the Federal Power Commission finds to be there, and then ask if there isn't still a chance that it wouldn't last as long as it now looks like it might, in the light of what they had before them concerning those who were taking gas from the field. If you are merely stressing the point that there might be such a possibility, the answer is yes. That possibility is a risk. There is also a chance, but how much of a chance; how much of a possibility. What are the factors on the other side of that possibility? You ask how many pipelines have been built out of that field in the last 16 years. I think I have a recollection of five. I think that is all. There might be nine major pipelines and a lot of little ones that have been built from that field and a lot of smaller ones. I do not know how many carbon black plants have been built during the last 16 years. I do not know how many gas stripping plants have been built there during the last 16 years. I do not know how many oil wells have been drilled there in the last 16 years. I do not know how much gas has been produced in connection with the production of oil in the last 16 years.

You ask if I think the Federal Power Commission or any other human agency looking at that picture 16 years ago could have foreseen the total volume of gas that is now being taken out an that has been taken out during that 16-year period. I know that the Illinois Commerce Commission in 1933 had this very situation before it and reached a decision at that time on the life of the field, and on the basis of their decision the investor now finds that the life of the field is longer, in spite of all these things that have happened in the intervening period. If by your question you mean that they could have set down exactly the figures which happened and actually did happen, the answer of course is no, but if you mean by that

that a commission with all the then known facts before it could have given a decision which would have rendered substantial justice to the company, the answer is yes, and I think commissions will. Otherwise, you are substantially saying that regulation of natural gas companies is an impossibility.

I have no intention of denying that there is a possibility that the field will not last as long as the regulatory body thinks now it will last, after doing the best it can to get at the facts. I imagine that now there is a great deal more known about that field than there was in 1933 as to its extent and as to its productivity.

1757 A great many wells have been drilled around the field from which they have determined rather definitely the extent of the field. I am aware that wells have been drilled over the area to the extent that they have located unproducing areas within the outside limits of the field. You ask how many dry holes have been drilled within the outside limits of that field. I have a record of what defendants have produced and that is all. I know of one area within the field that is definitely known to be unproductive for some formational reason. That is in the eastern end of the field, and it is shaped horseshoe on the top and straight line across the bottom, substantially. I think that is over near the middle of Gray County. I have made no investigation as to the geology of this field, as to its resources, its life, or any of those things.

As I recollect it, Mr. Morgan was directing a question to me as to the possibility of a commission on the basis of facts now known reaching an estimate which would, or at least to the required legal extent, remove the risk from the investor, and I said that the Illinois Commerce Commission in 1933, when much less was known about this field than is known today, reached an answer, and that answer turned out to be low, showing that they did not step out and pick a period for the field so far in advance that the investor was put to an undue risk. I know that a great deal more is known about the extent of the field, the productivity of the different portions of the field, and the unproductive portions than was known in 1933. Therefore, there is more data from which to estimate the content of that field than was there in 1933. If you are directing your question to the exactitude with which a commission can determine the life of the field, then, of course, there is always a chance that they will be wrong, but I, as I think I stated yesterday, made the assumption that the Commission and the Examiner in weighing the evidence, which I have not weighed, will reach a life of the field which will put no new risk upon the investor. I think that is presupposed in this whole process. You ask what it is that is going to determine how long the field lasts if we know how much gas is there and know it definitely. To practically the largest extent, the maximum, the most important factor would be the rate of withdrawal; and the economic level to which it could be produced is another factor that would enter into it; and how much of that gas can be gotten out without causing trouble, without bringing in water.

The operators are not going to take it out any longer than they can do it profitably. They are going to try to make the greatest amount out of this natural resource that they can. I will accept as a fact on which to predicate my future answers the statement that the oil operations in that field are still in a process of development; that additional oil wells are being drilled down there from time to time. I do not know now, and no other human being can predict, how many oil wells are going to be drilled in that area in the next sixteen years before that gas is exhausted. Unless you know those things, even though you know how much gas is there, you cannot know whether it is going to last as long or as short as would be indicated by the present rate of withdrawal. Of course, I am perfectly willing to admit that any statement based on any set of factors might be one which would result in placing too long a life on this property or too short a life on this property. I insist that any investor, and I, in putting myself in the place of deciding how much an investor should earn, am working on the assumption that the balance of all of the factors which deal with the life of the field will be so weighed by the Com-
mission that there is at least just as much chance
1758 that the field will last longer as there is that it will
last shorter.

I think that a group of investors looking at the same proposition would reach different results. One would be inclined to say that the life of the field is longer than the one indicated and buy at a level. Another would say that the life of the field may not be that long and would refuse to put his money in at that price. But I do not think that we have a right to assume in discussing the rate of return that this company is to be entitled to earn, to assume that there is a large substantial risk from this factor. I have not assumed that there is any large substantial risk in arriving at the result I stated in my direct testimony. I have taken into consideration the fact that there is some risk in this business.

I know that some years ago two pipelines were built from the field down in Indiana to Chicago. I know very little about the situation. I know that there was a pipeline which the Peoples Gas Light and Coke Company guaranteed a bond issue for and ultimately had to pay on the guarantee. I am not acquainted with the exact nature. I have in the course of discussion with certain people been informed that the venture was not a loss, that it was substantially profitable, although it looked like a loss, due to the fact that at the end of the proposition the Peoples Gas Light and Coke Company was called upon to pay a very substantial amount of money to relieve themselves of the commitment they had undertaken when they had guaranteed the bonds. I don't know whether there was a profit in that transaction or not. I was given to understand the savings which Peoples Gas Light and Coke Company made during a certain period of their operation were sufficient to counter-balance any loss ultimately sustained. I have made no investigation of the subject. It is a matter of past history except in so far as Peoples Gas Light and Coke Company were called upon to pay off the guarantee. I was merely trying to give a general picture of what I knew about this proposition. I don't think there is any conclusion to be drawn from anything I have said. I do not know whether or not other large investments besides the pipeline investment were made in and around that Indiana field on the strength of the presence of that gas. I do not know that gas was being produced in large quantities. I don't know the length of time before the supply in that field was completely exhausted. I do know that it was far short of the contemplated life of the field as of the time the pipeline was built as indicated by the maturity of the bonds, but I have no knowledge as to whether the term of the bonds was a reasonable one or whether it was simply a "by-guess and by-gosh" venture in which some people were able or were going to make money by selling the bonds and ultimately palming them off on Peoples Gas Light and Coke Company through a guarantee. You can't prove from me that a lot of developments were made down there and the field was promptly exhausted.

You ask if I know anything about the Tioga field in New York. I know gas wells were brought in a few years ago, 1935, I believe, and for a while there was some rather rampant speculation in the field. All of this died down to a considerable extent. I do not know of a pipeline that the Cabot interests built to their plant up at Rochester, New York to convey gas for industrial purposes. I do not know that right now the field has been exhausted to the point where the withdrawal of gas must be restricted in the immediate future. I do know that gas fields are inevitably exhausted sooner or later, and that anyone who deals with natural gas pipeline securities must know that ultimately the gas which is being transported over that line, the source of that gas,
1759 will be exhausted. I do not know that that is a circumstance that the Commissions and courts in general regard as constituting a special risk from the standpoint of those who invest in properties that are dependent upon natural gas supply. I think on the contrary that is to be given effect to in setting the depreciation and amortization charge.

You ask if I have read the cases dealing with that subject. I am no lawyer. To a certain extent I keep abreast of what the courts have said about this risk, a sufficient extent for an accountant. I probably have not read the case of *Wichita Gas Company* v. *Public Service Commission of Kansas*, 2 Fed. Supp. 792; confirmed in 298 U. S. 561. You have read to me from the opinion of Judges McDermott and Phillips in that case as follows:

"The pipeline company is subject to the hazards attendant upon the production of gas, and its transportation to distant markets. The amount of gas it may take from its own wells, and the price it may charge for its product, is subject to regulation by public authority. It must find a market in a highly competitive field. It competes with coal and fuel oil in household heating and for industrial purposes; the competition of fuel oil is particularly formidable for household heating; improved oil burners are automatic, approved by the National Board of Fire Underwriters for safety, are as clean as gas, and dependable. Electricity has absorbed the household lighting and is making serious inroads on cooking. In short, it must search for and find its gas; transport it hundreds of miles without an hour's interruption; then find and satisfy its customers."

You ask if I agree that that is a correct appraisal of the risk involved in the natural gas pipeline business. I think it is a rather flowery description of the difficulties in natural gas pipeline business and I would certainly, giving it all the weight the court seems to have given it in there, still say that it is a very small risk compared to the risk in the ordinary competitive enterprise not subject to regulation, such as steel, automobiles, anything that you choose to take.

It is my opinion that a man who is confronted with the decision of whether he will buy his raw materials now or contract for them now at a fixed price and take his chance on the trend of the prices on the things which he makes out of the raw material, is confronted with greater risk than the man who puts his money into a pipeline extending 950 miles across the country, to engage in the production from a field in Texas of natural gas and transporting it through that pipeline to a market 950 miles away. If it turned out that the prices are lower than anticipated by the manufacturer he can give up a part of his return and protect himself against the risk. A great many manufacturers manufacture only on order and sell through jobbers who then take the risk and would have to get a part of the return. That is his option, to buy on a long-term contract basis or to buy on the market his raw materials; and he has the further option he can sell the basic raw material short on the market for repurchase as of the date of sale. You ask if that is the kind of option open to a pipeline company. The money in the pipeline is risked once and for all. These risks in the ordinary business keep on day after day. A man might be making a nice profit in January, February and March and then make a loss. It affects a larger portion of his capital. It works continually and rapidly. The risk of investing in the pipeline is substantially the same risk that a manufacturer undertakes in his investment in plant and machinery
1760 and his fixed assets. It is a different kind of risk.

You ask if I mean that the risk involved in the pipeline business is taken when the pipeline is built and that there isn't any risk after that. There is a risk for the capital over a long period of years with a part of the capital coming back each year. The fixed charges run right along through the years. You ask if there is anything he can do about it after he puts his money into the pipeline, such as the election of the manufacturer to buy his raw materials on the market from month to month or day to day, rather than take the chance of contracting for a long period of time. He can get certain underwriting agreements. I think he can relieve himself of part of the risk. No, he can't get out of the pipeline business after he gets into regulation. He can't shut his pipeline down like I have said these factories may be shut down at times, and for that particular reason he is entitled to a fair return on the fair value of his property. You ask if he is not entitled to make it if he can get it, under regulation. There are some possibilities of not being able to get a fair return on the fair value of the property, but I think for the present we ought to assume the indutsry that is being regulated can earn a fair rturn on the fair value of its property. You ask where defendants would be if their revenues be reduced by $3,000,000 and we have another year like 1938 coming up in 1940. My answer is I don't know. You ask if defendants revenues were not $1,000,000 less in 1938 than in 1937. They were less. I don't remember the exact figures. I could look it up if it is important. Yes, I said that the experience of the Natural Gas Pipeline Company has shown the pressure of this type of risk, that is the risk of varying demand, but it takes a microscopic examination to find its effect in the profit and loss account. I then went on to say "Its sales to industry during 1938 fell off substantially from the peak in 1937 but the effect on profits was hardly noticeable and could be determined only with a very detailed study." Yes, I was talking about the varying demand for natural gas in that statement. You ask what the figures were as between 1937 and 1938 according to those records. I don't think I want to answer that question because what I had in mind was the correct profit and loss.

I have had some men abstracting the records of Natural Gas Pipeline Company of America in order to obtain information. I find it—I made several attempts to segregate the profit and loss of this company, to segregate between profit on the sale of Chicago District Pipeline Company for residential and commercial consumers and the profits from industrial sales—and I find it a very difficult undertaking, and I wasn't going to spend too much time because I didn't think there was much point in it, but in my opinion the margin of profit on these industrial sales is comparatively small, the effect is comparatively small. There are a great many adjustments that would be required in the earnings statements submitted both by members of my staff and by the company. My investigation leads me to make that statement. I still feel if we segregate the effect of the sales to industrial consumers and the profit on those sales and then compare them we still find the net return is changed very slightly.

I don't know whether you are selling gas for all the purposes you can get anybody to buy it for or not. I presume you are selling gas in order to realize the maximum amount of profit that you can realize. It is true you are not confining it to industrial purposes. It is true that there was a considerable variance between the demand for gas from your customers in 1937 and 1938 for all purposes.
1761 The greatest part of that difference was the falling
off in the taking of industrial gas as between those years. Your exhibit shows that the net earnings from operations in 1937 were $10,763,000 as against $9,884,000 in 1938, but when you are talking about actual earnings you have to make a much more detailed examination than this one. There has been no attempt made by you people or by my people to actually segregate these profits and losses, as to how they arose. You haven't made any attempt to set forth those expenses which relate to the year's business and those expenses like drilling wells, the purchase of oil, for example, for lubricating purposes, which comes sporadically. You have nothing but one year's income account in this one year. I know that these figures have been reconciled with the figures of our Mr. Woodford, who himself introduced figures pertaining to those earnings in a broad general figure presenting the general picture. You cannot use these figures to draw any conclusion as to what the exact effect was of change in demand. No, the Illinois Commerce Commission is not going to put in evidence of the character I am now referring to. If you go down below net earnings how are you going to allocate depreciation, depletion, and retirement, one of the largest

expenses you have? Certainly one of the logical bases is to allocate those expenses on the basis of cubic feet of gas being taken out of the ground and make that adjustment and see what the profit and loss account is going to look like.

In my direct testimony I said the gross shows a very substantial change, but I think the net takes a microscopic examination to find. If you want me to, I will make just that one simple computation of depreciation and depletion and put that on a cubic foot basis. You ask if they didn't have the depreciation and depletion set up on the same basis in 1937 as in 1938. Is that the basis you are going to use when we discuss profits from industrial sales and changes in demands? Certainly a much more logical basis for the determination of the effect of change in demand is to set up your depreciation and depletion on the basis of cubic feet withdrawals and not on the basis of time. That is true even though you are competing for production from your different properties with 100 or 1,000 other producers. You are going to take out so many cubic feet of gas to recoup such and such an investment. It is a perfectly logical basis. It is my view, with respect to the revenues, that it would be microscopic and would take a close analysis to determine whether any loss occurred as between the years 1938 and 1937. On page 1 of Exhibit 136, the way that page of the exhibit is developed, the net earnings before other charges are set out in line 5. The indicated difference between the years 1937 and 1938 is approximately $900,000. That difference is not attributable to varying demands as between those two years. It is attributable to quite a number of varying factors. Let us take a simple thing like purchase gas expense. Now, purchase gas expense did not vary in accordance with the sales of cubic feet of gas. Neither did your production expense. Neither did anything else. You have certain expenses in here that are regular and normal expenses, which I presume in any proceeding, in any managerial judgment, will be chargeable against your basic load customer; in this case, the residential and commercial customer. Now, then, the mere fact that you make such a large differential in the price between the sales of gas for industrial purposes and the sales of gas for residential and commercial purposes, show that you are not charging a full pro rata share of your expense against that industrial customer.

Defendants do not have any residential and commercial customers, but they sell gas for those purposes at certain rates, at wholesale. The first line shows that there is 1762 a difference of $1,100,000 in the gross income, and when the operating, maintenance, and general expenses are all paid, the difference is reduced to about $900,000. You ask to what I could attribute that falling off in net earnings from operations, except the fall in gross as a result of variance in demand. Turn to page 2, and look at your gasoline sales, that have dropped off by $225,000, as part of your gross. You ask if the quantity of gas that you had a demand for had something to do with that. Your sales of gasoline in gallons in 1938 was $27,474,000 gallons, in 1937, 24,864,000, so that you actually sold more gallons of gasoline. You ask if that ought not to have reduced the difference between the revenues for the two years on that basis. You are taking much too simple a view of cost accounting analysis. We can't say that this ought to be this and this ought to be that. It requires considerable analysis to find out. You ask if I have studied the volume of gas that we sold in 1937 as compared with what we sold in 1938, I have the statistics and have made certain studies. In 1937, as shown on page 6, it is 74,476,000 M.C.F. In 1938 it is 68,759,000; a difference of nearly six billion cubic feet, or about 8 per cent. You ask if that drop isn't attributable to this element which I have said is a risk in some businesses but not in defendants', namely, the variance in demand. I did not say that variance in demand was not a risk in defendants' business. You ask if the falling off of the gas sold of almost six billion cubic feet is not an important matter from my standpoint. It is an important matter, but the six billion cubic feet gives you no indication as to the change in profit. It would depend on how much of that six billion was your lowest priced gas and how much was your highest priced gas. I can conceive that if your highest priced gas increased and the lowest priced gas decreased, you might have a reduction in M.C.F. sales and an increase in dollars. You had a reduction in all but two types of sales; line 11, Standard Oil contract, was greater for 1938 than for 1937; and line 13, all other gas sales, was also greater for 1938 than for 1937, as shown on page 6 of Exhibit 136.

You ask me to read from line 1, page 1 of Exhibit 136, where the difference is turned to dollars. I will read it.

but I am not going to draw any conclusions on those figures. My statement was based on an examination of this situation--and I say that you cannot merely take a few figures and reach a conclusion from them; that it would take a long, detailed examination. As far as my examination shows, that variation and change in demand is not one which produces a very large change in the profit and loss account, in comparison to what the change in demand produces in an industry. I would not say that this difference of $1,100,000 in gross revenues and $900,000 in net revenues from operations was of importance until I analyzed the operating cost. I would also want the depletion, depreciation and retirements. You ask whether investors would look at the gross revenues and the gross volume as between the two years. Do you realize that you are talking about a change of nine or ten per cent at the most in variation of demand, where industries are faced with changes of forty to fifty per cent; that actually change from a nice fat profit in one year back to a fat loss in the next. The next year they may go to a fat profit again.

The ordinary industry sometimes takes advantage of a rise in the market. Sometimes it does not. If it had the opportunity to do so it would do so, but they don't always do it. I don't think that in the ordinary situation they are in position to do it. A great many merchants do not take advantage of the change in the market. There are many extensive advertising statements to that effect. A great many merchants have a base price which they point to with pride; and advertise extensively that though the
1763 price of leather has increased so and so much, we
haven't raised the price of our shoes; although the price of cotton has gone up so much, we are still selling our shirts at one dollar, and so forth. They take advantage of the increase in price when they feel it to their best advantage to do it. I cannot say that ordinarily they feel it is to their best interest to do so. Most merchants are trying to sell at a fixed price, a base price, and adhere to that price. Your shoe industry, your hat industry, and to a great extent your shirts, like Arrow shirts and Manhattan shirts, make a price. That is the price of their merchandise. They want a man to know when he comes in and asks for an Arrow shirt or a Manhattan shirt that he will pay $2 or $3. The same way with Regal shoes, Thom McAn shoes, Walkover shoes; they all want one price. Florsheim, they have a fixed price. You ask if Thom

McAn didn't raise their price the other day. I am not saying that they always adhere to that price, but they don't take advantage of these minor fluctuations. I will admit, for the sake of going on with this proceeding, that in general business does look to take advantage if they can of price changes. You ask if there is always a chance that by reason of an increase in price or the value of the thing which they are selling that they will make profits just as much out of proportion as the losses which I referred to just a moment ago. That is at least their expectancy. They hope over a period of years to make money. That is the reason they are in business. The hope of making large profits is the reason they are in business.

You ask if defendants, so far as the top price is concerned, have been limited to the prices that were fixed by their contracts. They have a contract price on what they have to sell. I don't know that it is just the fixing of a top price. The top limit of their revenues is determined in part by the prices fixed by their contracts. The quantity is another term. When there is a varying in the demand, as took place between 1937 and 1938, that cannot be made up and offset except to the extent that the restoration of the volume at the same price would tend to offset. You ask if it isn't true that if 1937 represented a maximum of their capacity, approximately, and it fell off in 1938, with the result that they lost $1,100,000 in gross revenues, they cannot hope in 1939 or some other year to get $1,100,000 over and above the revenues of 1937, because they are held down by their prices. On the assumptions you have made your conclusion is correct. You ask if they have the hazard of varying demand without the opportunity of offset by increased market price for the thing they sell. If you want to call that a hazard, yes. You ask if I think it is a hazard. I think that it should receive consideration in determining what the reasonable expected earnings of this company is going to be. Yes, I said in my direct testimony that it is a terrific hazard from the standpoint of unregulated business. Ordinary business finds a loss at the end of fluctuations and demand, not just a reduced profit. They find a change of not one million dollars or one million one; but I am quite sure I can find some large corporations where the change was 100 million dollars. You cannot make it in dollars, because it is the per cent in the change in demand, and 10 per cent is a comparatively small change in demand as compared to what is faced by ordinary industry.

You state the question is, what will the reduction 1764 be next year if the varying demand reduces it by $1,100,000 and the Federal Power Commission reduces it by $3,000,000, making a total of $4,100,000 next year. You ask when defendants can recoup that $1,100,000. In subsequent years, I assume. I did not say that defendants did not have the hazard of varying demand. I said it is small compared with the hazard of ordinary business.

Now, I would really need some more information as to what caused the reduction of $1,100,000; what the cubic feet of gas were; whether you are going to have that tacked on, at least to some extent, in the year 1954. But I presume and assume that when the Commission determines what the reasonable expected earnings are they will have before them all the information that is necessary to reach such a determination, and that if there is any great hazard of the sales falling off, they will determine that in connection with the indicated earnings. I think you are trying to confuse the weight that should be given to the dollars sales which may drop off or increase and the weight which should be given to the hazard in rate of return. Now, I am assuming that the reduction when made will be on the basis of reasonably expected earnings for the future, not any peak year the following year is going to show a much lower figure which then can never be exceeded. I have stated that industry has a severe hazard as a result of varying demand. I have conceded on cross-examination that any falling off may be more than made up by an increase in the demand and an increase in the market at a later time, and that business is looking forward to those recoupments, which may or may not come. You ask me to assume, for the purposes of this question, an industry that is regulated and whose rate of return is fixed at the rate I have fixed here of six per cent, and then next year we have another 1938 and its revenues fall off by $1,100,000, as a result of varying demand and ask if it will make six percent under those conditions. You asked me to assume that the Commission is going to take as the earnings some figure that is not indicative of the reasonably expected earnings to accrue next year and the year after that and the year after that.

I have said myself that varying demand is one of the things that confronts industry. When there is a varying demand upon the industries that you serve with fuel there is going to be a varying demand upon you.

You ask how defendants are going to recoup the losses or have the losses offset which they will sustain as a result of these variances, should they occur. I am assuming that the Commission in finding the income available for return for the future will give full consideration to all of the factors which affect the sales up and down and strike a balance of those factors at some reasonable figure; that when they reduce the income through a rate reduction that it will not be reduced to that point where any drop in demand will cause the company a loss which can never be recouped. They will fix a figure that if the demand goes up they will make a little more than six per cent; if the demand goes down, they will make a little less than six per cent. I am quite sure that if they use the figures presented in Exhibit No. 141, the company will make more than six per cent if they are allowed a six per cent return on the basis of Exhibit No. 141. Yes, if defendants fail to make six per cent during any one year they will get less than six per cent. You ask if there is not a constant possibility from year to year that they will have a repetition of conditions that will operate to reduce their revenues. Yes, there is always a possibility of all possible things. Of course if the revenue is reduced by a million dollars next year, as an illustration, as a result in the falling off of demand, there is a way to recoup that and make the 1765 average six per cent. The fact that your rates are reduced is certainly not going to hinder your chances of selling the gas. It is going to limit your top price. Your earnings will be the result of a great many factors. One important factor will be, having nothing to do with absolute demand, whether you can sell all of your gas at the top rate block instead of at one of the cheaper rates, that you will have to abandon selling some of the interruptible supply gas, because you can dispose of that gas somewhere else without any increase in cubic feet sales. You can have a very substantial increase in dollars of sales and dollars of profits. You have been talking about things that have very faint chances of happening. I am talking about things that in my mind are a strong probability.

You ask if I do not know as a matter of fact and as a matter of law that if it turns out as a result of varying demand upon defendants for natural gas by their customers that you lose a million dollars some year, and there is thereafter a new rate case, that loss cannot be taken into account and restored to defendants at another rate proceeding. I certainly made no such assumption. I am acquainted with the fact that the Illinois Commerce Commission, for example, has been treading on the toes of the utilities of this state right up to the summer of 1937 in an aggressive program of rate reduction, right when the recession started. Now, the minute the recession stopped we are not going to jump back on those companies and say, "We think you are going to make six per cent and it is an allowable rate of return." That is not the way rate regulation runs. You are not going to be deprived of every nickel above six per cent. We are going to fix reasonable rates of return, and on the basis of expected earnings give full consideration to the testimony adduced by the company and full consideration of all of the testimony this Commission will set down, and decide whether this company is making too much money, and if so, how much too much. That will be taken, under normal circumstances, into consideration. It has been my experience under regulation that the utilities by and large will make more money than is expected of them, because our experience has always been that after a rate reduction, back comes the gross and back comes the net, and in about another year, a year and a half or two years, you have got another rate reduction coming. That has been the history of rate reduction. You do make more than six per cent sometimes. Fixing a rate of return at six per cent does not freeze you down that what is lost is lost forever and there is no possibility of ever making any more than six per cent. I am quite sure you will make more than six per cent in quite a number of years, even if this Commission fixes rates at six per cent.

You ask if the difference between defendants and a utility isn't that defendants have a pipeline through which they can transport 210 million cubic feet of gas daily whereas the utility has the facilities with which to supply the demand of their customers and there is not any top limit on the amount that such customers may take if the conditions are favorable. All utilities are restricted by their capacity; generating capacity of electric utilities is an example. You ask if that is the same restriction that there is upon a pipeline 950 miles long. I do not know what leeway you have in pressures. I am perfectly willing to state that it may be that your pipeline acts somewhat more restrictively than let us say the electric industry. I do not know that it acts any more restrictively than the loop does to the transportation industry. I mean the loop in Chicago. Bottlenecks always work for restrictions. The Chicago loop is the downtown business district in the city of Chicago.

1766 If the prices at which defendants sell gas are fixed so that they will be allowed a return of six per cent based on the normal quantity of gas they handled through their pipeline, and there comes a situation such as they had in 1938 where as a result of a business recession the volume demand was so reduced that their revenues were reduced a million dollars, defendants will have a reduction in net of an undetermined amount. Under the law it cannot formally be restored; but I have not any worry that utilities will find themselves earning an absolute level return which they cannot exceed. My experience has been that utilities uniformly are making more than a fair rate of return. That is the reason we have rate cases. You ask if I have not a perfect conviction that my last statement was true and that the rates of all utilities ought to be reduced. No, but it has been my experience that utilities do make more than a fair rate of return, and therefore we have formal rate cases that drag on a year or a year and a half before we get a reduction, during which time the utilities, as has been decided by the Commission and by the courts, have been making an excessive rate of return. I am quite sure that investors generally regard the regulated industries as those from which they ask the lowest return. You ask if I don't think that any investor contemplating putting his money into the securities of these companies under the circumstance of having the price so fixed as to limit the return to a definite amount, would take into account the possibility of a recurrence of another recession such as occurred in 1938, which would reduce the earnings to a level below the rate of return fixed by the regulatory body. I can't give a categorical "No" to a question like that, that no investor would give any thought to that. Whatever fear they may have, and I doubt whether many investors would have such fears, are more than counterbalanced by the regularity of the business in the field of utilities generally and in the natural gas field as shown by your specific company. Certainly investors are not going to give very much weight to a factor like that. They are not afraid of regulated industries, that because the Commission fixes a rate of return that they will never exceed that rate of return; that a loss once made is gone forever and cannot be recouped, because that is not the way the investor generally weighs the factors and decides. Generally the investors regard the regulated industries as the best. You ask how I found that out. The yields necessary to keep stocks and bonds of utilities at par are lower than that required to keep an industrial at par or any other type. As a basis for that statement, I have in mind the stocks of electric companies, gas companies, water companies. I didn't have any one particular company in mind whose stocks are dealt with on the basis that I have just described. If your question goes to the accuracy of my statement as to whether utilities can finance at lower rates of return than other companies, I will prepare a study for that. I thought that was almost prima facie. Look at the rates utility bonds are being sold at. I didn't say that investors are demanding small yields. I said smaller than he does generally demand. That is a fact.

You ask for some illustrations where that is true of equity securities. I will prepare a statement. I do not have that kind of a statement with me. I base my statement merely on general knowledge. You ask if I can name any other than the Commonwealth Edison common stock issue that has been offered to the public in substantial quantities in the last four years. Stocks selling on stock exchanges gives a fairly good indication as to how the public generally regards utility issues. There is a comparatively small volume of sales and purchases of common
stocks at this time and in the past several years.
1767 The financing through the issuance of common stock
has been smaller than usual; but I think that it can be done if, as and when there is need for equity capital by a soundly financed corporation. Based upon that statement, my general knowledge, and quite a number of other things, I think that an investor would take a smaller yield on securities of a regulated company, and that he would give no particular weight to any possibility of reduced

earnings through varying demand in the case of a natural gas company. I have given the element of risk in varying demand as applied to defendants the weight which I thought it deserved. I have given these companies substantial weight for risk. The riskless securities that I heard you talk about were 1.35 per cent. Now, I said six per cent. That is an awful leeway for some risk, isn't it? You ask if I have given substantial weight to the risk of varying demand. I have given it the weight I thought it deserved. Substantial is a very vague word. Would you call 1/16 of one per cent substantial? I am talking about 1/16 of one per cent of return on a rate basis of $60,000,000. I never said a while ago that I didn't think that was a risk of any substantial importance. I said it is not a risk of substantial importance when compared to that kind of a risk in unregulated business. I started out in my direct testimony to lay a background of the risks that are facing unregulated business in order to arrive at the reasons that a utility under regulation should not be allowed the type of returns that are made by unregulated industries, when they happen to be profitable. I never ignored the risks that are facing defendants or gave them insubstantial weight, otherwise how could I get six per cent. I would have wound up with two per cent if I thought they were insubstantial risks.

You ask if as to this one particular risk I have said that as applied to these companies which are now under regulation, it is not a substantial risk. Compared to unregulated industries that is my statement, and in my judgment as to a proper rate of return I have so rated it.

In my direct testimony shown on page 8041 I stated that the next element of risk which defendants had in a negligible degree by comparison, is that of the labor situation. You ask what I refer to by the expression the risk arising out of the labor situation. Well, the type of risk in the labor situation is demonstrated by the quite general situation that a manufacturer undertakes his contracts in advance of production, and then is called upon to fulfill those contracts, generally at a stipulated price. During the course of that fulfillment he is dependent upon labor to produce the required goods. If there is any dissatisfaction in labor the manufacturer either fails in fulfilling his contract or he finds his estimated profits substantially reduced. Investors regularly and generally take notice of that risk or hazard. It is naturally reflected in the yield which the investor would demand on the investment. Yes, I say that whenever a manufacturer contracts to deliver his products at some future day at today's prices he must face that risk.

You ask if I do not agree that defendants are in that situation so far as the fact that they are under contract to deliver at fixed prices on into the future is concerned. You have to the extent that labor is a factor, a variable factor, of course, in your instance. In so far as you are selling your commodity under a fixed contract you have some labor risks. In so far as you sell it under rates promulgated by the Federal Power Commission, you will have no labor risks, because that will be an operating expense; and if you have increase in operating expense which justifies an increase in rates, you will get an increase in rates. I have no opposition to the company making money. I am an accountant. I am not charged with the duty of seeing that the company's rates are reduced. I am to investigate and report on the facts as I see them. When a company gets under regulation
1768 its labor hazard is over to a very, very great extent.

I know of no case where wages paid to employees who are working in the business can be excluded as an operating expense. I make no criticism of that, even though I have reason to believe that they may be excessive because of certain circumstances. As an example of that, during the depression a great many of utilities found it desirable to discharge younger men in their employ, and keep the older men on the payroll. The older men, by reason of seniority, were quite generally getting a higher wage. In rate cases where I made investigations in 1935 and 1936, when that condition was prevalent, I pointed it out to the Commission, but there is no indication, either in my statement or the Commission's attitude, that wages honestly paid for men working in the business can be disallowed. I can't conceive of any Commission disallowing any such expense.

The demand of labor for higher wages is not the only labor trouble that industry may get into. It is slowing down of production. I don't want to get into all of the types. I have heard recently that in the building industry the A. F. of L. labor had refused to install materials produced in CIO factories. I don't think I want to pose as an expert on the labor situation. As an accountant I do know, however, that that is a prevalent risk; and certainly at the present time with the Chrysler strike we have a glaring example of the effect of that risk on industry, and its effects on a year's profits or a year's losses. Yes, there is the risk of strikes and other labor disturbances. I don't think that risk confronts these companies to any appreciable extent because their employees are scattered over a distance of some one thousand miles. In other words, I think that where you have one factory that employs, let us say, 3,000 men, you have a much larger labor risk than if you have those 3,000 men scattered in groups of ten over an area of 900 miles, or even over an area of 200 square miles. No, I do not think that the labor of these two companies is scattered in groups of ten, but it is more scattered than you usually find in an industry. You will find groups of men at each of the compressor stations. The risk arises out of the congregation of these men under certain circumstances. Now, if you have your men broken up into ten groups, you have probably one-third of the risk that you would have if you had them all in one group. You ask if the fact that some of them are rather remotely situated with reference to management adds to or detracts from this element of risk. I imagine that a man who has duties removed from management, and to some extent beyond the control of the management, would require a higher rate of pay, but I would not consider that that was a risk. I think there would be less likelihood of getting into labor disturbances under those conditions than if you had them all in closer contact with the management. One man alone is not liable to cause a labor disturbance, but a group of men working together may.

If you had 600 men all working in one plant, you would not have to get all or a majority of them agitated to start a strike. I think we have all been informed on at least reported facts that a few men can tie up the whole plant; not only that plant but all of the suppliers' plants that are around it. As a matter of fact, take the Chrysler suppliers, it was not their people that caused that labor disturbance, it was the Chrysler people. In the same way Chrysler might be confronted with that risk by one of its suppliers having a labor disturbance, by reason of the fact that he can't get steel or glass.

I made a distinction a moment ago between having 600 men together, or 3,000 men, and in having them scattered out in smaller groups over a thousand miles. That is

one of the distinctions. You ask what would happen
1769 if the group of men who operate the Joliet station
down here would take possession of the premises and sit down. You would have a very serious labor disturbance. You probably could not operate your pipeline until you had them under control. That is perfectly true of any station down the line. If the production crew scattered over the gas fields in the Panhandle of Texas were to go out on strike that might stop the operations of the pipeline. So you can have a strike in one of a number of groups in the case of defendants and put the pipelines entirely out of commission. I don't know how many strikes they have had in that field down in Texas. I haven't investigated that. Defendants have never been put out of commission by a strike. There is some risk there. If you had only one employee you have risk of labor trouble. We are talking here comparatively. After all, I am not trying to testify as to whether this risk exists or does not exist; but all of these risks must be taken together in order to arrive at a rate of return.

I say that this risk in the case of defendants is small as compared with industry generally; notwithstanding that at a dozen places, namely the ten compressor stations, the Joliet delivery station and the field, strikes would absolutely tie up the operation of the whole pipeline. You ask if that risk is confronting these pipelines just the same as the risk of a labor strike is confronting an industry which has its men all together in one place. If you mean by just the same, the factual risk, yes. If you mean by the "same" the same risk to profit and loss or damage to its property, no; because it is the total difference in the thing that I am interested in. I am not interested in whether they could tie it up for a few days or whether they could not tie it up for a few days; but what is going on in the mind of investors is what we have to evaluate; how prevalent that is in your industry; and how likely it is that the public authorities would step in here with this public utility and stop it. You ask what public authorities would step in in this instance. If it was Joliet the State of Illinois authorities would step in, I think, rather rapidly.

Yes, I have heard of labor strikes leading to the use of dynamite. You ask if I have heard of it in the newspapers. We had it more closely than that in the State of Illinois. I did not know that down in the State of Oklahoma, through which this pipeline runs, there have been repeated dynamiting of pipelines as a result of labor disturbances in the last three or four months. That is a possibility. That kind of an explosion separating this pipeline could amount to several hundred thousands of dollars to defendants. Yes, if it happened at a compressor station it might probably run larger than that. There would be some interruption in service and there might be some loss of profits. You ask how long it would take to rebuild a compressor station. I haven't made any investigation of that, of your setup for emergencies of that kind. I presume that the company has taken normal precautions against such catastrophies. Yes, it is quite a job to patrol a thousand miles of pipeline and it is also quite a job to patrol a thousand miles of electric transmission line or a thousand miles of railroad.

I think that there is an element of risk as to the possibility of labor disturbances confronting these pipelines to a degree sufficiently substantial to get some weight; but compared to ordinary industry any investor I am quite sure would agree with my statement that these companies have a much smaller risk arising out of the labor situation than ordinary industry. That is my judgment, on the basis of which I have given my testimony.

1770 You refer to my testimony of another type of risk shown at page 8042 of the record in which I use the language, "arises out of the overhead expense connected with the business, that is, the expense of operations other than productive wages and consumed materials. To a certain extent these expenses go on even if a factory is shut down completely; to a greater extent these expenses accumulate if the business is operating but at an unprofitable capacity. In the first place, the cubic foot sales of the pipeline company do not measure its revenue." I was talking there about the capacity charge in the contracts of defendants. I think your hazard in overhead expense is substantially taken care of with the capacity charge, due to the fact that seven and one-half million dollars collected for capacity charges would enable you to run along indefinitely and pay your expenses that required cash payment. I don't know exactly what you mean by the observation you have just made that that would be true if you are permitted to run along indefinitely under that contract. You ask if I am not here today as a party attacking the very contract that I say is defendants' security against overhead risk. I am not attacking anyone. I am testifying at the present time with relation to the rate of return which this company should be allowed to earn, and which in my opinion will be a fair rate of return. The Commission, of which I am the chief finance and auditing officer, is here attacking the price at which you are selling gas in the State of Illinois, and that price is made up in part of a capacity charge and in part of a commodity charge. You ask, if a reduction is made in your revenues the security which you have in your capacity charge against overhead risk may be reduced. If the price which you receive under that contract, which calls for payment partly on a capacity and partly on a commodity basis, is reduced it will not necessarily have been demonstrated that defendants have been confronted with a risk on the question of overhead expense. I don't see where any legitimate reduction in rates gives you a greater risk in earning that return. It gives you a risk that you are not going to any higher return, possibly, but not on that return.

I said a moment ago that defendants had an assured $7,500,000 a year under their capacity charge and for that reason they did not have this overhead risk. Now, if the three millions is taken out of the seven and a half million, then you will only have a four and a half million dollar guarantee, but if it is taken half out of commodity charge and half out of the capacity charge, you will have a six million dollar guarantee. If it is all taken out of the commodity charge you will still have a seven and a half million dollar guarantee. You ask what the commodity charge amounts to per M.C.F. In large parts, I think six and a half cents. Six. I haven't tried to remember those figures. I have them in my working papers. You ask if as long as I have been dealing with this subject I can't tell you what the commodity price under the contract here under attack is. First of all, I am not attacking it. Secondly, I am not interested in your present rate structure or your past rate struture or your future rate structure. My investigation was entirely to the line of what we are talking about now—the rate of return. The other investigations I made were relative to the company's incoming expenses for past periods, the cost of building its property, and the meaning of some company evidence.

It is true that the thing that has been the object of my attention has been the number of dollars that defendants have made and not the price of gas to the people of Chicago who are purchasing it here. I wouldn't say that I

haven't taken the trouble to see even what defendants are charging for it. I looked at the rate schedule and I
1771 did compare the prices under the various contracts,
but that was a long time ago. I saw no point to it at that time, and I have not bothered to remember. Besides which, I work on several cases at one time, and if I tried to remember things like that I would be overburdening myself. I simply can't. I believe in reporting things. If I want to find out what the price was, I would look it up for that particular purpose and not rely on memory.

You ask what is the capacity charge that is the subject of complaint in this proceeding. It amounts, as far as the Chicago District Pipeline Company is concerned, to substantially seven and a half million dollars. You ask what it is per thousand cubic feet. Five dollars and a quarter per thousand cubic feet of gas on the maximum demand registered by using the so-called firm sales. I mean five dollars and a quarter per month per thousand cubic feet. That is not based on the whole 210 million capacity of the pipeline. It is the maximum demand that was registered under certain conditions. There are several complicated clauses governing that, but to my recollection it substantially means the largest take, for what is usually shown as firm sales up to date. The figure happens to be 120 or 122 million cubic feet. I don't remember whether it is 120 million or 122 million per day. The reason for that capacity charge is that under their commitment to their purchasers defendants are required to hold 120 million cubic feet of capacity at the command of the purchaser. No, that is not the volume and the capacity price that was set forth in the contract as it was originally made. There have been some adjustments in favor of the customer. I don't remember the figures. It runs in my mind from five fifty to five and a quarter, and I don't remember what the other amounts to. The revision took place in 1935, I think. That was before the line was fully loaded, on what you have called fully loaded. I think we are in the same problem that we are into as to capacity. Is a capacity all that you can possibly produce or is it the reasonable maximum normal production, or is it a possible peak which you know can be produced and which is your objective to keep on producing? Now we often hear that capacity for steel is 85 per cent of normal production. They can go up to 105 or 108 per cent of the rated productive capacity. In 1935, at the time the investigation of the capacity charge was made, the pipeline was not transporting and selling as much gas as it has produced during the three or four years since that time; yet it was revised, I think to some extent it was the result of the case before the Illinois Commerce Commission, and to some extent it was possibly the initiative of the Chicago District Pipeline Company, and behind it the Chicago area utilities. Yes, the capacity charge as it was originally written as to both the price and the volume was revised, whether it was to meet the necessities of the Chicago District Pipeline Company or whether it was under pressure brought by the Illinois Commerce Commission. I think there is a possibility that that might happen again either on one of those considerations, or maybe some other considerations might enter into it.

(The witness continued his testimony as follows: "the company might become ashamed of its profits and decide of its own accord not to make so much." Upon being accused of joking by Company Counsel the Trial Examiner ordered the answer stricken whereupon the witness continued: "I am not joking. Why do you think utilities make rate reductions of their own accord? Because they know they are getting too vulnerable and they are ashamed of their profits, and when I made investigations of those systems I found statements of that system that 'beyond this point, we do not dare to go.'" Upon motion by Company Counsel the Examiner ordered stricken the statement of the witness over objections of counsel for the two commissions.)

You ask if, in the light of the history of this capacity charge and of the circumstance that that capacity charge is right now the subject of this inquiry, I don't think that I have rather lightly dismissed it in my direct testimony when I say that this one factor removes the pipeline from the plane of ordinary industry into that of a guaranteed industry. No, I still expect the Federal Power Commission will allow you a capacity charge which will be what capacity charges usually are; the reimbursement for those necessary expenses which are so basic to your operations 1772 that they cannot be properly loaded on the quantity of your commodity which you are selling. Now, that is the purpose of the capacity charge. I think if the Federal Power Commission were to find that the capacity charge was an adjusted charge for that purpose, that you would then be allowed the capacity charge, and any change in rate must come from the commodity charge. You ask if I didn't treat it in my testimony as a fixed sum of money, and if on cross-examination I did not state it in terms of seven and one half million dollars and said that these companies having that much money did not have any risk as to overhead expense. Certainly; that statement is true of the seven and a half million dollars, but I also felt I had a right to assume that there is going to be a demand charge or a capacity charge in any rate that the Federal Power Commission promulgates, and that that demand or capacity charge will be a proper one, one which will reimburse the company for just those expenses, which are the subject of the type of risk I am discussing. That is the idea of the capacity and demand charge. No, I have not in my direct testimony treated this particular risk which I say is applicable to other businesses as if you had a capacity charge fixed permanently which would take care of all of your overhead expense. I have said that you did not have that risk because I contemplated that you would always have a capacity charge and that that capacity charge would be the proper charge, not necessarily seven and a half million dollars. Offhand I do not know whether that is too high or not high enough. But whatever the Federal Power Commission through their rate department finally determine is the proper capacity charge is going to remove this type of risk to a very substantial extent from your business. That is certainly what I had in mind. I think that is what I said. Let's read it and find out.

On page 8043 my words are, "Even if the pipeline company sold not one cubic foot of gas, it would collect a demand charge from its principal customer, the Chicago District Pipeline Company, sufficient to pay all of its expenses including its present interest. Any business that has its complete overhead paid for regardless of business conditions need not worry about risk." Yes, I did assume a capacity charge that would take care of overhead expenses, including interest. I made that assumption in appraising that risk when I was considering the facts which led to my judgment expressed by me as to appropriate rate of return.

I remember making the statement "Another risk from which the Natural Gas Pipeline Company escapes is the credit risk." I can't recall the exact words, but I feel that utilities in general have a very small amount of credit risk, and that this company in particular has a still smaller

amount of credit risk than utilities in general have. In that sense I am talking about bad accounts, yes. In the sense that a merchant charging goods to Tom, Dick and Harry may have trouble collecting some of his bills. Any industry must collect its bills, and in the process of billing has a credit risk. I make the point that "Natural Gas Pipeline Company has very few customers and its one large customer that takes 90 per cent of its sales has not only its own credit standing to rely on, but its payments are guaranteed by three Chicago area utilities, which guaranty would satisfy any credit man." The ultimate purchasers of this gas are the Peoples Gas Light and Coke Company, Public Service Company of Northern Illinois, and Western United Gas and Electricity Company. Because these utilities have respectively guaranteed the price charged to the Chicago District Pipeline Company for that part of the gas that they respectively use, I think that guaranty would satisfy any credit man. I do not think that there is any present prospect of either of those three companies
1773 getting into financial difficulty. There may be a lawsuit pending now in which the issue is whether or not they are making an adequate return on their investment, but there is a lot of difference between making an adequate return on investment and being able to pay their bills. It has not always been their situation that they contended they were not making an adequate return on their investment. You ask if there have been changes in their situation. There was a change, according to their contention, from the boom days of 1929. Peoples Gas Light and Coke Company had a pretty tough time of it in 1920, 1921 and 1922.

You ask if I know the comparative figures of the net earnings of Peoples Gas Light & Coke Company for the last seven or eight years. There is a substantial discrepancy between the reported earnings and my opinion of what they have really earned. You state that you want the figures which they have reported to me officially. I don't carry them in my head. I have them. I think there are annual reports showing their net earnings from year to year for the past five years available in my Chicago office, which is all I can reach by tomorrow morning, the years 1934, 1935, 1936. Older periods I think are back in the Springfield office only.

You ask if there is more security in just having a few customers than there is in having a great many. Not always. It depends on who the customers are, how many the great many are. If you have a million customers, each one of whom is going to owe you $2 a month, you have certain factors which cause bad debt losses, general economic depressions, or particular specified economic depressions in a particular time, but over a period of years you will probably lose less than if you are selling the same total dollars to one thousand customers. But looking at this particular company with this particular situation, I think that there is an advantage to having a few large companies here as against having the same sales from, let us say, ten times that many customers more widely scattered and each one of them smaller. I think all of your customers are large enough so that if it impairs their ability to enter into a contract, there will be a receivership, and about all you will lose is what you have allowed them to run up as unpaid bills, which will probably be the current month's bills, and no more.

You ask if that was the case with reference to this electric line running up the north shore in its dealings with the Commonwealth Edison Company. I know something about that credit loss. I think you are getting on very touchy ground. I think at the time that credit loss was allowed to pile up, Commonwealth had one look at what their investment was in that proposition. They lost a very large sum of money in that one account. I don't remember that it ran into millions of dollars. There was a substantial sum of money, there is no doubt about that, but that was not due only to the inability of one customer to meet its obligations. That was due to the fact that the management of the Edison Company permitted that customer to fall behind in their bills over a long period of time, and the only reason that I can see that they did it was because of a community of interests as an investor with that company. I would think that was more in the line of an investment loss than a credit loss.

If one of these customers taking a very large per cent of defendants' total pipeline capacity were to get in a position where it could not carry out its contract to purchase, you would have a credit risk. You ask if
1774 you would not have that credit risk until it occurs.
I say my present appraisal of that risk is that it is very, very small; that over the life of your particular contract here to 1954 I think those three Chicago area utilities will be solvent enough to pay their bill for wholesale price

of natural gas, even if they do not pay their bond interest. A great many business men sell goods on credit knowing that the customer is very, very shaky. In those circumstances they try to get special compensation for the extra risk. In the case of defendants, if they exercised their judgment and stopped the delivery of gas before the amount accumulated, as I have said was done in the instance of the Commonwealth Edison Company, defendants would still have a tremendous difficulty facing them in that they would lose that volume of business. If the Peoples Gas Light & Coke Company goes broke you will have a much worse business than you have today. But they will have to go broke before 1954. I say that defendants have added security in that they have only a small number of customers of the type I have previously described.

If you had a hundred customers that were of the same quality in proportion to the quantity of gas they were buying from you as these dozen or fifteen that you have, you would have a better position from the standpoint of risk. I most emphatically do not think that a pipeline which serves three hundred cities or one hundred cities is in a more secure financial position than defendants who serve the City of Chicago and only a few towns down the line in Iowa, Nebraska and Kansas. I don't think there is a better market in the United States or even in the world than the Chicago market, for growth, prosperity, or any way you look at a market. I do not think that selling the same quantity of gas to three hundred towns would make your company any better or any stronger than selling it to the area to which you do sell it to.

Yes, I saw your gross income fall $1,100,000 in one year. I may be a little prejudiced in favor of Chicago, but I think that if Chicago and this Chicago area slumps down substantially, that slump will hit the whole nation at least as much. My discounting of the risk that defendants are serving only a few customers is based in part on the fact that I don't think the city of Chicago and the utilities serving that area are going to go broke, and that the balance of your customers also seem to be people who are a respectable credit; it is different than trying to serve people in sparsely settled areas. I gave no weight at all to the fact that the three Chicago area utility companies might go broke. I assumed that during the life of this pipeline that they would be solvent enough to pay for the gas they are getting from you. As far as the other customers are concerned, I believe that they are all of the type that with reasonable credit restrictions, not allowing the bill to run too high, there will be no substantial credit risk. Not the type of risk that faces ordinary business. I don't think I meant to say at any time on any of those risks that you had not any part of them at all. They are all present, but not anything like in the proportion you find in ordinary business. I cannot conceive of the Chicago area failing or going broke.

Yes, I said on page 8043 that "another risk from which the Natural Gas Pipeline Company escapes is the credit risk." Do I have to add that I did not state positively? I said that in my direct testimony, yes. You ask what I was referring to in my testimony on that page when I said "another risk." I was referring to all the others.

You ask if in my direct testimony I have treated all of the risks that I have mentioned, namely, the risks involved in the accumulation of inventories, the risks arising out of the labor situation, the risk of overhead expense, 1775 as being escaped by defendants. (Objection by Commission Counsel to the question as distortion of the witness' previous testimony overruled.) I did not so testify, and it was not my intention to so testify. I was comparing the risks facing this company with the risks facing ordinary industrial concerns, to act as a background for a conclusion that this company is not entitled to the kind of profits that may be earned by ordinary industrial and mercantile concerns. For that purpose and for that purpose only. When I came to evaluate the risks of this company, I gave all of the risks as I saw them, with liberal leeway, in my opinion, a substantial recognition, because I heard discussing at one point 1.35 per cent as a return on substantially riskless securities and I reached a conclusion of six per cent. Now, the difference between those two is for risks. When I said "another risk from which defendants escapes is the credit risk" I meant another one of the risks which defendants do not have as the same important factor in their profit and loss situation that ordinary industry does is the credit risk. When I say a little later that the two companies have substantially no risk, I am talking about defendants. You ask if I meant by the statement "another risk from which Natural Gas Pipeline Company escapes is the credit risk" to put all of these risks in the same classification as being insubstantial. No, as being merely another risk, which as the result of my appraisement of risks defendants are not entitled to the kind of return that is made by ordinary industry. When I used the expression "another risk" followed by the expression "escapes", I meant that in ordinary industry quite generally the credit risk is an important factor in determining the profits they are going to make, whether the credit risk is decided in favor of restricting credit and limiting sales or expanding credit and increasing sales, and that defendants, as compared to ordinary industry, have no substantial concern upon that score. That is another one of the elements of risk, and I did not testify on all of the elements of risk I could think of, but that is another element of risk that caused me to reach the conclusion that defendants are not entitled to the same kind of earnings that an ordinary industrial or mercantile concern may make.

I said there that the Natural Gas Pipeline Company escapes the credit risk and I said lower down that the two companies have substantially no credit risk, and I use that language in the first sentence in connection with the expression "another risk". I told you what the other risks were that I was referring to, namely, that I was referring to all of the risks I had been discussing down to that time. I did not regard all of those risks as being of the same type, merely as another indication. All I am doing or all that I am trying to do is to evaluate the Natural Gas Pipeline Company as against an ordinary industry. We can look at the indices of earnings made by ordinary industry and know that the Natural Gas Pipeline Company must be lower than those, if my factors are correct. Now, I tried to get all of the factors. I say in no substantial degree I can find no substantial reason for not coming to the conclusion that the Natural Gas Pipeline Company cannot be expected to earn as a fair return the same kind of profits that are earned by ordinary industry. That was the sum and substance of my thinking, and that was the sum and substance of what I was trying to present. I did not in any of these cases intend to indicate that they had no such risk or that that risk was so insubstantial that it was not to be given consideration, because, as I indicated before, Mr. Morgan, I did get over 1.35 per cent.

I used the expression to which you refer, "Another risk from which Natural Gas Pipeline Company escapes is the credit risk," because I had no conception that those words

would be interpreted as meaning that the Natural Gas Pipeline Company has absolutely no credit risk or
1776 that my testimony would be interpreted as meaning that they have no risk from any of these sources. I am merely saying that they escape the usual risk from these sources that are present in ordinary business. I am comparing the Natural Gas Pipeline Company with ordinary business. At no time have I tried to compare it with the Commonwealth Edison Company or the Peoples Gas Light and Coke Company or with investments in bonds or government bonds or foreign securities. I am talking about industrial concerns on the one hand and Natural Gas Pipeline Company on the other hand, in order to come to a conclusion on rate of return. That is all.

You ask if in my direct testimony I did not take the position that such competition as these companies have has to do with industrial gas; that there is practically no competition except as to industrial gas. I don't want to get into a repetition of the same statement. Now, I meant the competition that existed, except for industrial gas, is not important as risks go in industry; that the competition for natural gas is somewhat more important than the other, and it is closer; but still not up to the risks in general industry from competition by competitive products.

It is a difference in degree; and I think the competition in the field of industrial fuel, while of more consequence than the competition in the commercial and domestic gas fields, is not the character of competition in the ordinary industry.

I don't take the position that there is no competition with natural gas in the kitchen or in househeating. I am very well aware of the competition by electric ranges and other types of competition; but they don't have the importance that is ordinarily associated with the element of competition in ordinary industry. Theoretically, natural gas competes with any form of substitute fuel—electricity, manufactured gas, oil, coal, any specialized fuels or services that might be used for the same purposes that natural gas is used. Oh, yes, I know that there is severe competition between coal and natural gas for industrial purposes. To a gradual degree for the cooking load; yes; and in house heating there is more competition between coal and natural gas than there is for cooking. The competition is not necessarily confined to price; it is the degree of heat. Sometimes it is one or the other. I have known people in the glass industry, and the pottery industry and brick making, to say to have a good plant for those types of manufacture you need natural gas. We find them located where there is natural gas, where there is a good cheap supply of natural gas. There are other types of situations where coal might have or might obtain a fuel advantage. I am not a fuel economist, but I don't think that that is the kind of competition that obtains among the three automobile companies that I have named, the Plymouth, the Ford, and the Chevrolet. In fact the reason for that is that I don't think it has the effect on your profit and loss account that the other type of competition has.

You ask if I have known of any natural gas company that has grown from the proportions of the Ford Motor Company when it started out to its present proportion, on its own weight. That introduces a new factor. No, there is no natural gas company which is as large as the Ford Motor Car Company is; but natural gas has had a very substantial growth in certain areas. It is true that a particular company usually puts in a very substantial capital investment at the time it starts out. That is true of the exploitation of natural resources today. That was not true in the early days of the use of natural gas. I have examined the records of
some distribution systems in the east that had very
1777 modest beginnings. At that time they only sold it
for certain uses and for comparatively short distances. They did not pipe it for a thousand miles in those days. Defendants pipelines, as far as size is concerned, were about as large and about as long in 1933 and 1934 as they are now. I take it that the pipeline was designed with due regard to the most efficient exploitation of the gas market. No, I do not know of any effort on the part of the Ford people to prevent the sale of Plymouth and Chevrolet cars by legislation, or by imposing a tax on the other one that would make it impossible for them to sell. I don't think that is the type of tactics that the Ford Motor Company or any individual company would employ towards their competitors. That is not a part of their competitive methods. You ask if I know of any effort on the part of those interested in the coal market to do just that. They could not advocate that tax just simply on the basis of taxing the natural gas company so it would have to stay out. They would have to bring some broader reason; and before they get it I presume they will have to show some substantial reason for it. However, if such tax is imposed, I

am quite sure that it will be passed right down in the rate to your customer companies, and from them right down to the Chicago area consumers. You ask if it will be done just like the sales tax was passed on down by the Peoples Company. They did not get an increase in rate to pass on that tax because the Commission determined that it was making money to absorb it; but in all my statements on income available for return I have given 100 per cent allowance for that tax as an allowable operating expense under the law; and every Commission must allow it in fixing rates. You ask if the effort of the Peoples Gas Light & Coke Company to pass that tax on through an increase in rates was not what started the rate litigation between it and the Illinois Commerce Commission. That was one of the initial proceedings. I don't know whether that was what started it. That might have been merely the motivating cause. They might have been thinking for a year or so that they should have an increase in rates. I don't know what was in their minds. That was the first proceeding that came before the Illinois Commerce Commission that I remember. I don't know whether there were any negotiations. A company can't merely come in and say we want to talk on this, that, and the other item. They must file a schedule of rates. The Commission takes that schedule of rates and decides on the valuation of their property the proper amount of money they are allowed to make, and whether they are making a fair return, or a sufficient return. You can't change rates for one factor. If you are going to change rates, the Commission must take everything under advisement.

To repeat, I said that if any tax is levied on your company that tax will be an item of operating expense, and in determining the reasonableness of the rates the Commission must give it full allowance as an operating expense; and that therefore, if any additional tax is imposed it will ultimately go down in the price to the customer companies, and from the customer companies ultimately go down to the consumer. You ask if I am not referring to a tax at a rate that will not permit the sale of gas in competition with coal. I think that a suggestion that it would not be is rather a too far fetched assumption for me to accept. I do not think a tax which would make it prohibitive for these companies around Chicago to buy gas can be levied. You ask if I don't know that that kind of a tax has been suggested by bills actually brought in the Illinois legislature every session since the pipeline has been in operation. I can't stop bills that are presented in the legislature. Almost any kind of a crazy bill can under certain conditions find a sponsor. I have no information as to how many of these bills have passed either of the houses of the 1778 Illinois legislature. I don't know that the Senate actually passed a bill levying a five cent tax on each one thousand cubic feet of gas sold in the State of Illinois, but if it had that is still far from levying a tax that was prohibitive for the sale of gas. A bill which will pass one of the houses is always a possibility, if you are talking again about these possibilities. You ask if that isn't what a risk is, a possibility. No, a risk is an ever present force of influences that shape your profits and your losses. A risk is not necessarily a loss. A risk might be met and become a profit, but you have taken the risk just the same. If I go out and buy securities today, I take a risk. I may make a profit or I may make a loss; but I have risked that money, and for the risking of that money I want a return.

I have taken all the risks into account. A risk to me is anything that is ultimately going to be reflected in the profit and loss account, in the earnings that you get at the end of the year, or five years, or the whole life of the property. Those are the risks; if there is a risk it is ultimately going to increase your profits or decrease your profits, or leave them the same; but the effect of the risk shows up in the profit and loss account.

1779 If some tax were passed and defendants felt that it ought to be passed on to the public, it would be done as soon as they could prove to the satisfaction of the Commission or Commissions having jurisdiction that they are entitled to pass it on; and in my opinion under regulation they would be able to pass it on more rapidly than they could under certain forms of contracts.

The sales tax that is involved in the Peoples controversy was passed and found unconstitutional and the companies received a rebate. I think it was finally determined that the companies had to pay it in 1935. The fight is still going on. They have impounded the money. If they have a right to recover it, they will get it. If they have not the right to recover it, the consumer will get the money paid the company. They have no risk from that standpoint. If they are entitled to it, they will get it.

You ask if they will get it after a fight which has already gone on since 1935. After the fight has nothing to do with it. It is merely to determine whether they are entitled to it. They haven't a clear cut case.

You ask if an investor would assume that they were going to get it if he were dealing with their securities now or would their credit standing be impaired. I think investors would probably try to guess which way the case is ultimately going to come out. If it ultimately comes out that they will get this impounded money, that stock is a pretty good buy at the prices of the present time. If it turns out that they are not entitled to it, I think the stock is about properly priced at the present time.

I will say this, just to get one step removed from the Peoples Gas Light and Coke Company, I don't think that investors generally have anything like the widespread fear of regulation reducing their earnings below a proper return that is indicated by newspaper comment. People are still very anxious to buy public utility securities.

You ask whether it makes any difference how the tax is imposed if it be sufficient to prevent industry from buying your gas. That is right. If such a tax is levied, it will not make any difference to you how it is levied, if it results in depriving you of your customers.

You ask who is agitating for that kind of a tax in Illinois. I presume it is the coal miners, as a labor group; and the royalty owners and coal mine operators as a group of business men engaged in a competitive business. You are right; the railroads are. I was going to add that. It slipped my mind for the moment; all the railroads. I have heard many complaints of your company from a certain railroad which has very close relations with coal mines at the present time. I know that there is agitation among those three groups of people, the railroads, the coal operators, and the coal miners, demanding that the state take natural gas out of competition with coal. When you say "very strong," I don't think it is as strong as the agitation against chain stores. I don't know what you mean by the term "very strong." Give me the basis of it. There is a strong sentiment among all these people that there ought to be levied a tax on natural gas which will take it out of competition with coal.

You ask if there exists a substantial risk that these companies may find themselves confronted with that kind
1780 of a situation. If you mean by substantial risk that
there is some possibility, the answer is yes. If you mean that it is something which really deserves special

consideration to the extent of, well, you name your figure and we might come to an agreement—but that is too vague and general a question. There is some element of risk there, yes.

I have no intimate acquaintance with the report of the Natural Resources Committee to the President of the United States, and by the latter transferred to Congress. I know there was such a report. I heard something about the recommendation in that report for the setting up of a public resources commission which would have absolute control over the production and the use of power, coal, natural gas, and oil in this country.

You ask if the objective was to regulate natural gas for certain purposes, and that oil be used for certain purposes, electricity for certain purposes, and that coal be used for certain other purposes, each to the exclusion of the other. There was some such arrangement proposed. I don't know whether, following the receipt of that report by Congress, a bill was introduced with the objective of putting that recommendation into a legislative act.

I think Mr. Frederick A. Delano was head of the Natural Resources Committee which I suppose made that report.

You ask if I remember that the President in forwarding it to Congress recommended that it be given serious consideration. I think it probably deserves serious consideration.

You ask if I thought that that raises a risk confronting natural gas pipelines which derive a major portion of their revenue from the sale of gas in competition with coal for industrial uses. I am firmly convinced, regardless of what happens, that your property will not be confiscated, and that you will be allowed a fair return on the fair value of your property.

You ask if I think there is any risk involved there of such substance that it is entitled to any consideration in arriving at a proper rate of return for defendants. Again, I am evaluating all the risks; not finding an absolute factor as to the effect of each one. I am not trying to determine each individual risk, how much it existed, or how much shall I allow for it. I have compared the risks of this company from various sources, compared with the risks of various industrial business; and I have reached the conclusion that it is a low risk from that standpoint, and therefore it should be allowed a lower return, and I think I have allowed a return fairly compensatory for all the risks involved without undertaking to find how much is involved in each individual risk.

We are not trying to evaluate these risks separately. That is not my testimony. My testimony is that the natural gas industry has less risks than industry in general. That is my statement, and from that I draw my conclusions. I considered a great many risks which I did not discuss.

You ask if I considered the competition with coal, or the imposition of a tax, or direct intervention by the government which says that defendants can't use gas for fixing boilers. The answer to that is that in my judgment no such risks exist, because your companies' property will not be confiscated, and you will be allowed to earn a fair
return on the fair value of the property, or receive
1781 compensation for your property, regardless of what
laws are passed. I did not consider that any such risk would exist in determining what I concluded to be a fair rate of return. I did not give those two factors, which we have been discussing, consideration alone. I gave no consideration to the fact that a law might be passed which would put you out of business without your getting something for it. I certainly think a rate of return that did not make any allowance for that risk could still be a fair rate of return.

You are right, in my direct testimony, I have been talking, down to this point, about risks that were not mentioned by the company witnesses who testified on rate of return. I had in mind the industrial statistics that were put in one of the exhibits sponsored by defendants. The whole tenor of my discussion of risk is that the Natural Gas Pipeline Company is so situated from a risk basis that it does not deserve the similar kind of returns that are made by unregulated industries in general.

You ask whether in my testimony I was relating it to the industrial statistics the company had offered. Yes, after all, when we are discussing a rate of return we are faced with this problem; that most regulated industries are earning returns that are fixed by Commissions, with the exception that very often they get a little bit ahead of the Commission and are making an excessive return. Now, it is, therefore, difficult to find what rate of return is allowable for a utility, because those returns are regulated by Commissions. For that reason a great many people are introducing statistics on returns earned by industrial companies. I merely wanted to say, if I use returns earned by industrial companies; I must be appreciative of the fact that the Natural Gas Pipeline Company cannot earn that amount of return, because it does not undertake that much risk, and that I have a perfect right to send the return of the Natural Gas Pipeline Company below that made by industry generally. That is the whole purpose of my discussion of risk.

I have read the testimony of the rate of return witnesses who testified on behalf of the companies. You ask if any of them mentioned as elements or factors entering into the judgment that they reached on the proper rate of return any risks as to inventory or overhead or labor disturbances. They did not so mention. And in my opinion that is the weakness of their testimony, that when you are appraising risk you cannot pick out these three risks or six risks or ten risks as present in the natural gas industry without discussing them relative to other industries that you are going to use as your standard for arriving at a conclusion of rate of return, and without taking into consideration all the risks of all kinds of business.

You ask if I know whether or not they took them into consideration. In my judgment they didn't if they reached eight per cent. There is nothing in the record to indicate that they took into account the situations of these companies on those particular elements, which I have discussed, or that they did give consideration to these elements of risk. As I stated, there is no indication in the record to show whether they did or did not. I concluded that all things considered that they did not, and that they certainly did not draw the attention of the Examiner or of the Federal Power Commission to the risks existent in normal business, which are not present to anything like that degree in this business. Yes, they were talking about the risks confronting the natural gas business. I have not enumerated all of the risks that I considered in arriving at my judgment.

1782 You ask if there was any less duty on my part to state all of the elements and all of the factors that I considered than there was on the part of those men who testified for the companies. I at least pointed out the risks on both sides, those where the one is greater than the other, those where the other is greater than the one. I am trying to give an evaluation of risks to present some additional information to the Examiner and to the Commission on that point. I did not think it was necessary to elaborate any further in the light of the fact that Mr. Booth's question originally was: Will you mention a few of them? And I could have talked for two more days on risk very easily.

You ask me to show you some place where I pointed out in my direct testimony any risks which I said that defendants are confronted with to a greater extent than similar risks confronting other businesses. I made no specific mention of the risks, but I gave them consideration. I thought certainly, to my mind, that if the risks that the company experts had talked about had been fully covered to all the degree that they should be covered, the Federal Power Commission could evaluate how important those risks were. I merely wanted to point out the other side of the problem, and with respect to one particular kind of risk that they elaborated on, to differ with the opinion of your experts. In the ones in which I differed with them, I stated my views.

Redirect Examination Interposed by Mr. Booth.

You ask if I mean to say that I agree with the other points they covered in their testimony. I am not disposed to argue that there is no risk there. There are some risks in these companies. It is more along some lines; it is less along others. By and large the average balance that I strike is that they have considerably less risk than an industry.

Cross-Examination by Mr. Morgan Resumed.

No, I did not feel it necessary to point out the risks that confront the natural gas companies and which do not confront other industries to the same degree.

You ask if I think that the defendants' witnesses should be criticized because they did not enumerate all of the risks that I have enumerated here. They should certainly have given the Examiner and the Commission enough indication to show that they considered this question of risk proper and one on which they could have reached a judicial decision.

You ask why I didn't do that. The answer is because I am the second set of witnesses. Their evidence is in. It is before the Commission. They know all about that. Why should I go over them and try to whittle down because I think they put it a little strongly? But I am saying now that the Examiner knows that. I merely want to point out the other side of this picture for the purpose of arriving at the conclusion that I arrived at, taking into consideration the risks that they pointed out, those that I pointed out and those that are still unmentioned in the record, that this utility does not deserve as high a rate of return as an industry does.

You ask what I mean by industrial institution when I make that statement that defendants are not entitled
1783 to as high a rate of return as an industrial institution. I am speaking of the steel industry, the motor industry, general manufacturing industry, shipping, copper mining; industries where the prices and profits depend upon competitive conditions and the ability of the management to meet those competitive conditions. Among others, I am talking about General Electric, General Motors, Radio Corporation, Marshall Field, the moving picture industry, the companies that are making the losses and the companies that are making the profits, the companies that are in profitable lines of business and the companies that are in unprofitable lines of business, all of them. I am talking about the oil companies also. I do not think defendants should earn as much as the oil companies.

You ask if I know how much less they ought to earn than the oil companies, General Motors, Radio Corporation, General Electric. I am trying to take all of those industries, the good years that they have and the bad years that they have, and determine from that about where in the scale of return, from 1.35, let us say as the bottom point, up, what fair return for this company should be fixed. I think that is our problem in this thing.

You ask to what extent have I studied the returns of these companies, which I say ought to be greater or higher than the returns of defendants. I am generally familiar with the results of business. I have looked at some of the results. I took the trouble to take down certain statistics on some industries. For 1937 I have some of the automobile companies down in detail and general figures on agricultural machinery, implements. Let me see. There are 18 sets of average figures that I took a good look at, to see where they are, what they are making.

This particular compilation comes from some studies compiled by a PWA project, I think it is, from S. E. C. filings. I took off data on sales, net profits, depreciation depletion, because that is a factor in here. After all, when you are looking at return, you look at how good is depreciation depletion, how good is this company, how many of them make profits, how many of them make losses, what is the relationship to sales, what is the relationship to net investment. I have the balance sheet statistics. I took a general look as to what they are. I did not get this information from Mr. Gilman's exhibit. Yes, I saw his exhibit, but this is not the same information. You can check it, if you want to.

You ask why I prepared this list of risks, which I say exist in industrial enterprises to a greater degree than in business of defendants, in the preparation of my direct testimony. I prepared it to present some additional information to the Commission on the subject of the comparative risks faced by this company as compared with industry generally, for the purpose of arriving at a fair rate of return.

You ask if I prepared it on the theory that testimony had been offered by defendants that because some industry or group of industries earned a certain percent, that defendants ought to be permitted to earn the same percent, and if that was my understanding of the testimony at the time I prepared the data from which I testified on direct concerning these risks we are talking about here today. It was necessary for anybody reaching a conclusion on the question of rate of return. In the first place, that is the duty of witnesses. After that it becomes the duty of the Examiner and then of the Commission to make that
1784 decision, that there should be a more complete discussion of risks than was available, in the record, some further data. I then went on after I thought I had amplified the record on the subject of risks and testified to my conclusion on rate of return.

The figures I have handed you are not Mr. Gilman's exhibit. My working papers were always available to counsel for the company. The sheet I have just handed you is really a sketch sheet, not working papers, to get some data down, to get my mind down on something, so I merely presented it to you to show that it was not Mr. Gilman's exhibit. I just wanted to show it was something I prepared myself, and that it was not Mr. Gilman's exhibit. I have had all of the free ones in my office for quite a while, that I used from time to time to get oriented. I did not take all of them. I know what the reported earnings of General Motors were last year. I don't remember.

You ask whether the earnings of industrial companies like that enter into my judgment of a proper rate of return for defendants. I took generally the rate of return earned by industry, that it was earning its return purely on the basis of competitive conditions and the ability of the management to meet those competitive conditions, because that is our base. I think the whole problem of regulation is to substitute for competitive conditions regulation, and that what a utility should be allowed to earn is giving full account to all of the risks for a return that is equivalent to what it would earn if instead of regulation we had competition, such that there would be no more risks.

Now, that is a rather difficult thing to get to, but, basically we have what are returns earned by investors of capital generally, in all kinds of fields, starting from the highest form of security, which has the lowest guarantee, going right up to the most speculative venture—what do they all get—and then going up to this condition here, with its sheltered position, its lack of risk, as to what is fair for them to earn. That is our problem in deciding on a fair rate of return.

You ask me what I mean by the sheltered position of defendants. I mean as compared to ordinary business they have a very substantial lack of risk, that capital usually recognizes that investment in utilities is a safer investment than it is in business generally.

You ask if I mean natural gas companies or all utilities. I mean all utilities, even those that have gone bad. Electric utilities are the highest, telephone, water companies are better than some telephones, but that whole field is superior.

You ask if, as a matter of fact, it isn't my judgment that these pipelines ought to be allowed a rate of return such as is commonly allowed electric utilities, and if that isn't the real basis of my judgment in this case. I go further than that, they should be allowed even less than most electric utilities. Yes, even less than most electric utilities, because I think they have substantially less risk than most electric utilities. Let me give you an example. Let us take the Commonwealth Edison again, if you please.

1785 In 1939 the Commonwealth Edison issued $415,000,000 worth of bonds to run for 40 years. Now, that is risk, 40 years. Since then World War II has started. We hope it will end. But World War III might start. Throughout that long period of 40 years all of the economic forces of this world will concentrate on the value of that bond issue. It is not even a saleable bond issue. A few insurance companies took it. It is listed on no exchange. Before they can let those bonds go out they will have to inform the public that the insurance companies are selling and want the public to buy one hundred and fourteen and one-half million dollars worth of bonds for 40 years. And for what? 3.16 percent interest. Now, that is what money is worth, 3.16 percent interest. That is set by the shrewdest buyers of securities in the United States.

You ask if that is a cost to the company or yield to the investor. I forget now which. Both of them are very close together. 3.16 percent sticks in my mind.

I hope Mr. Morgan understands what I mean now in general. In other words, they have got 40 years to go. They have a risk until they go broke, because that is the end of all corporations, except yours, Mr. Morgan, because you are going to get your money back in 1954. Most corporations will ultimately wind up in bankruptcy. It happens to most of them. They cannot liquidate. Just as the end of most people is death, the end of most corporations is bankruptcy. But not yours. You will have your money back by 1954, maybe twice over. That is the reason I say that your company has less risk than the Commonwealth Edison.

You are finished in 1954, with your money back.

You ask what is the rate of return allowed Commonwealth Edison Company at the present time. I made no such investigation. In the last rate case the Commission found that it was not unreasonable to permit the company to earn 6.3 percent.

Redirect Examination Interposed by Mr. Booth.

You ask if I am not thinking about the Public Service Company of Northern Illinois rate case. That might be. I give my testimony. After a case is finished I have nothing to do with it. I don't care whether there is a rate reduction or not. I am an accountant. I want to get the facts in the record.

Cross-Examination by Mr. Morgan Resumed.

You ask if in the Peoples case, reviewed by the Circuit Court of Illinois, over which Judge Klarkowski presided, the observation was not made by the court that the risks in the gas distribution business were greater than those in the electric utility business, and on that basis did he not fix the rate of return at 6½ percent to the Peoples. He might have done so. I still think I am more nearly right than he was on the subject.

You ask what study I have made as to the comparative risks of defendants and of electric utilities, of gas distributing utilities, and of natural gas integrated companies. I made no formal study, but I gave considerable thought to: Should this company get a better return than other companies; should the natural gas industry deserve
1786 a greater return or a lesser return than your large
distributing utilities, like Commonwealth Edison, of your scattered distributing utilities like Central Illinois Public Service, whether it deserves a better return than a manufacturing company does, or a lower return. I made no formal studies in the sense of getting research together, as to how many companies die and how many live, and how many are prosperous and how many are not prosperous, but I gave considerable thought primarily, though, to your two companies.

You ask if that was in relation to manufacturing companies. Yes, to manufacturing companies, and then I finally got down to—I started all the way from government bonds up to highly speculative industries and tried to get wherein between does this company fall, how would I compare it with this and with that and with the other.

You ask where I got the 6 per cent. I got it primarily on the basis of what I thought this company could finance at, what I thought this company could sell its stock and bonds for. I made a few rough calculations and decided it would be a good company to finance with serial bonds, and what would they require, and then common stocks for the balance, what would that take, and, as I remember it, I originally got about 4¾ per cent, and I upped it.

You ask if I upped it from 4¾ to 6. No, I did not, not from 4¾ to 6. From 4¾ to about 5½, for other factors, leeway, and to bring it some place, and finally I said there is a war on and I don't know whether they can do it for seven years, because when I was making this study the war was on and there had not been any security issues, prices were going haywire, nobody knew the future, and from the point of view of being absolutely sure that I was giving a liberal return, one that I could substantiate from any point of view, I finally decided on six per cent, with a rough guess, and that certainly under the worst condition now prevailing this company's securities would sell at par, if their bonds are paying four per cent and their stock is paying eight, and I don't think that anybody can deny that.

The fact that many electric utilities and some gas distribution companies have been allowed six per cent return and that these pipelines are among the public utilities had something to do with the judgment at which I arrived. The rate of return fixed for utilities by our Commission particularly, the general tendency that nowhere Commissions are fixing returns today, did have something to do with it. It was not primary, but that resolved part of the background of my thinking. Primarily I started with the calculation as to what would this company get to, where should it get to; where did this company get to from the point of view of financing, what would it bring out. You are right, I made no distinction between the character of these two pipelines, from the standpoint of the risks involved, and of electric utilities and of the distribution utilities, except that I reached the conclusion that they have less risks or fewer risks than do those distributing utilities. I did make a distinction. The distinction was that they are entitled to a lower rate of return than an electric utility or a gas utility.

(At this point the Commission Counsel called upon the company to produce a report of Ralph E. Davis, Inc., Engineers, dealing with the natural gas supply and values of gas producing properties of Texoma Natural Gas Company, as of January 1, 1938. Company Counsel objected to making the report available on the ground that it did not show the reserves in the Texas Panhandle Field in any respect. At this point Counsel for the Commission produced a three page document described as being a photostatic copy of request for voucher on Natural Gas Pipeline Company of America, in favor of Ralph E. 1787 Davis, Inc., Engineers; office copy of the check to Ralph E. Davis, Inc., Engineer; check of Natural Gas

Pipeline Company of America, and bill rendered by Ralph E. Davis, Inc., to Natural Gas Pipeline Company of America, dated June 14, 1938, with the request that it be marked as an exhibit. At the direction of the Examiner, the document was marked Exhibit 201 for identification. EXHIBIT 201 was offered and received without objection.)

1788 W. C. GILMAN, a witness for defendants recalled for redirect examination, testified:

(December 12, 1939.)

Redirect Examination by Mr. Hedrick.

In response to questions I testified in the record at about page 6297, that I believe the most appropriate capital structure for an enterprise of this kind is either not more, and preferably less than, 50 per cent in the form of senior bond securities and 50 per cent or more in the form of common stock. I added that, preferably I would say between 40 and 50 per cent in bonds would be best.

You ask for my reasons for that statement. I did not make any provision for preferred stock because I do not believe that it is economically feasible or desirable to finance a company such as the Natural Gas Pipeline Company of America or the Texoma through the use of preferred stock.

A traditional method of financing public utility distribution companies in the past has been to assume 50 per cent bonds, 25 per cent preferred, and 25 per cent in common. I think that there is some question as to the soundness of that traditional method, even with old established distribution companies. And I would say that in my opinion that it is not economically sound or desirable or feasible to finance a natural gas pipeline company with the use of preferred stock.

I think that is pretty clearly indicated by what has taken place in the industry. Mr. Smith's exhibit, No. 186, examining some thirty odd natural gas companies, or companies that he selected which had certain attributes, namely, transmissions and production, or transmission, but also including distribution companies, showed in all those cases companies with securities outstanding of over a billion dollars, with only some $60,000,000 preferred stock; and of that $60,000,000 only about $34,000,000 was stock that was held by the public, as opposed to the other $26,000,000 shown as being held by affiliates.

Now, even of that $34,000,000, all but about $2,000,000 was preferred stock issued by companies with great distribution facilities; namely, Southern California Gas Company, which had more than $20,000,000 of the preferred; and Oklahoma Natural Gas Company, which had distribution facilities throughout the State of Oklahoma, which had some number of millions of preferred.

Of all the preferred stock shown in Mr. Smith's exhibit, only something less than a couple of million dollars was the preferred stock of a natural gas pipeline company, namely, the El Paso Company.

This industry historically has not used preferred stock as a financial vehicle. It is understandable because the pipeline companies who finance through the use of debt, are required by investors to have debt with a modest term, and debt with heavy sinking funds that usually pay the debt over a relatively modest term of years.

Any industry that puts out a debt of that kind, with heavy sinking fund, is taking a chance if at the same
time it issues a preferred stock with cumulative pro-
1789 visions. There have been very few issues of pre-
ferred stock in the past by pipeline companies. The largest issue that I can think of by a pipeline company was that of the Southern Natural Gas Company, while it was being promoted, and which eventually got into receivership, and the people who bought the preferred stock lost their position and received common stock in the reorganization, a class of common stock in the reorganization. When they reorganized it they reorganized it with bonds and common stock; in the first instance two classes of common, and later in proceedings during 1939 changed into one class of common stock.

Questions Interposed by the Examiner.

You ask whether the features are approximately the same when I group those companies in Exhibit 186 according to those which are financed mainly through affiliates and those which are financed mainly through public offerings.

That is right. Schedule 5, page 6. You will note that in these some thirty odd companies, which had total securities outstanding of a billion and thirty-eight million, that the total amount of the preferred stock in that aggregate was about $60,000,000, or about six per cent.

Now, of that six per cent, about 3.3 or .4 per cent was held by the public, and the remainder by affiliates, as classified by Mr. Smith. Preferred stock that is held by affiliates is essentially the same as the common stock, in that it does not represent a preferred stock in the hands of the public.

Redirect Examination by Mr. Hedrick Resumed.

At page 6430 of the record, I testified that I had never said that because they had low taxes there was any special risk. I said that the possibility of increased taxes was a very definite risk; and the fact that the taxes were at a low level now made them particularly good prospects for the taxing authorities who were short of money. I also testified at that point that it follows for that particular factor that the lower the taxes the higher the risk and the higher the taxes the lower the risk. I think my statement there and my testimony in the same direction needs an explanation.

The point in my opinion is that if taxes of any particular company in an industry, or of any particular group of companies in an industry, are lower than the taxes of other companies or lower than the taxes of other groups of companies, that that particular company or that particular group in this day and age, when taxing authorities are pressed for finding funds, is a good prospect for additional taxes.

And while it is true that under regulation theoretically taxes are included in operating expenses, it is nevertheless the fact that if the burden of taxation of any particular company or any particular group is increased substantially at any one time, there is always a lag in getting back from the rate payer what you have to pay out in the form of taxes.

That is not completely theoretical with me. For a number of years with the Equitable, where I investigated and made recommendations with reference to the purchase of utility and other securities, we were very careful about the purchase of utility securities in the State of Pennsylvania.

1790 In the State of Pennsylvania at that time public utility companies did not pay taxes based on the property in the communities which they served. They had some form of gross receipts taxes of some character; but they did not pay taxes anywhere near commensurate with the taxes being paid by utility companies in neighboring states.

We were always afraid to buy the securities of Pennsylvania companies, and consciously stayed away from them, because we were afraid that the taxing authorities would get onto that fact in Pennsylvania, and at any one time step up the taxation of these companies, at which time the times coverage on the securities would have been reduced and the securities would have had a tendency to go down in price. We would demand a higher return for the securities of the Pennsylvania companies for that very reason.

Recross Examination Interposed by Mr. Slaff.

You refer to my statement in substance that while it is true that taxes were always considered a part of the operating expenses, there was always a lag in getting back from the rate payers the additional amount of expense incurred through additional taxes. You ask if there is a relative lag on the part of the consumers where the company under regulation may be earning what is considered or what is more than a fair return, in getting the return down to a fair return.

I think that is right. If a company is earning more than a fair return, and that is decided perhaps in a rate case; the new return only applies, from the termination of the rate case. These things can't be retroactive, as I understand it.

You ask if there may have been a return which goes above a fair return with no immediate reduction to the fair return, whatever that might be. That is asking me to generalize, Mr. Slaff, I don't know. I think in some properties, in some jurisdictions, the regulation has been awfully close.

Redirect Examination by Mr. Hedrick Resumed.

Beginning with line 12, on page 6467, of the record, I testified, in substance, that for a number of years, the gas industry has been suffering in competition and has lost substantial amounts of its domestic business. That statement was intended to apply as the record says, generally speaking, but it also does apply to the local distributing companies.

You ask what I meant by the use of the words "gas industry", appearing in line 13, page 6467. By "gas industry" I meant the total gas industry. I think in that connection we have to pay also attention to the statistics of the manufactured and mixed gas industry to get any degree of comparability. As to the development which has taken place in the natural gas industry alone during the past few years the statistics are not sufficient to tell us exactly what is going on because of the large amount of natural gas which has been brought in de novo to new communities. Therefore, the major basis of my statement "for a number of years, the gas industry has been suffering in competition" refers to the manufactured and mixed gas industry, the industry which includes the three Chicago utilities who buy the gas from the Natural Gase Pipeline Company of America.

1791 They sell a certain amount of natural gas direct to industrial consumers but primarily serve mixed gas, and they are included in the statistics in Exhibit No. 194. The foreword in Exhibit 194 states, "Companies selling mixed manufactured and natural gas are included in these data."

In Exhibit 179 the contrary statement appears. The statement appearing in the foreword of Exhibit No. 179 says, "Companies selling mixed manufactured and natural gas are not included in these data." For that reason I used the statistics of the manufactured gas industry as applying to the customers in the Chicago area of defendants.

You ask that I proceed with my explanation of the figures in Exhibit 194. From page 14 of Exhibit 194, the revenue in 1929 was $408,737,000. That had declined in 1938 to $360,494,000; a decline of approximately 12 percent during that period. The gross corporate income which was $123,409,000 in 1929 had declined to $67,570,000 in 1938, or a decline in the amount available for fixed charges of approximately 45 percent. The net income available for dividends and surplus amounted to $82,204,000 in 1939 and had declined in 1938 to $23,030,000, a decline of 72 percent; these declines taking place in a period during which plant increased from $1,825,000,000 to $1,967,000,000 and as shown on page 6 total customers increased from 9,690,000 to 9,941,000.

As further shown on page 6, the domestic business of the companies in this industry has shown substantial declines; taking the gas sales to consumers in millions of cubic feet, in 1929, amounting to 254,769, which declined to 197,052 in 1938.

Similarly, revenues which in 1929 from domestic service amounted to $313,955,000 had by 1938 declined to $258,357,000.

The tables on page 7 show what has been happening to the domestic customer in this business. In 1929 the average domestic customer took 27,600 cubic feet of gas for which he paid in that year $34.06. By 1938 his consumption had declined to 21,300 cubic feet of gas for which he paid a reduced amount of $27.94.

I think it is apparent that this industry has been suffering in competition and has lost substantial amounts of its domestic business.

Questions by the Examiner.

You ask if the data on the page where it is designated Schedule 1, Exhibit No. 186, have to be considered in connection with the statistics I have just read; that is, whether it would be proper to go one step beyond the statistics I have just read and add in the data in Schedule 1, Exhibit No. 186.

Those are all natural gas statistics. I don't think they can be added. Those statistics have to be read, I think it is proper to consider them, but just how much weight you can give them in comparison with these statistics is a matter which each person has to decide for himself in this case.

The gas sold by the Natural Gas Pipeline Company is
1792 sold to companies whose figures appear in here. By
"here" I mean Exhibit No. 194. The figures contained in Exhibit No. 179 are the figures for companies that sell only natural gas; and we have had such an exten-

sion of natural gas to new communities during the last decade I don't know just how much reliance can be placed upon them in trying to get an over-all picture of what is happening to the gas industry, looking at it as a whole.

A little later I have certain statistics which I have prepared here for the three utility companies in the Chicago area. I think perhaps they might go some way towards answering your question.

Yes, those are the statistics which we have already referred to in connection with the reports I have obtained from the Illinois Commerce Commission.

Redirect Examination by Mr. Hedrick Resumed.

Commencing at line 11, page 6473 and continuing on the following page, I stated, in substance, that the gas industry had lost substantial amounts of its domestic business; and that I intended that this statement should apply to this case; that when I talked about the domestic business, probably it is apparent that I was speaking generally, but that the distributing companies, the Peoples and the Western United, the Public Service of Illinois have, over a period of years, been losing domestic business.

In response to further questions, I stated that those companies have more domestic customers, but revenue is what counts; that their total revenues are higher than they were 5 or 6 years ago, but lower than 10 years ago.

(At this point counsel for defendants handed to the reporter a document entitled "Data on Sales, Revenue and Customers, Peoples Gas Light and Coke Company, Western United Gas and Electric Company, Public Service Company of Northern Illinois, Witness, W. C. Gilman", with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit 202.)

The statistics contained in Exhibit No. 202 for identification are statistics of Peoples Gas Light and Coke Company, Western United Gas and Electric Company and Public Service Company of Northern Illinois, particularly with respect to gas sales, revenues, customers and per customer figures. The exhibit was prepared under my direction and the information which is the basis of the exhibit was obtained from the companies named.

Questions by the Examiner.

You ask if that is from their annual report to the Illinois Commerce Commission.

No, that was not possible—we examined the annual reports to the Illinois Commerce Commission, and in order to have the entire exhibit more along financial lines, where we can get comparable figures we have used the reports of the Illinois Commerce Commission, but unfortunately,
back in 1929, 1930, and 1931, the reports required by
1793 the Illinois Commerce Commission in the way of
breaking down the figures were not in anywhere near the detail that is required today. Generally, the revenues were reported simply by rate schedule. You couldn't find out whether the rate schedule included domestic or commercial or a combination of both. So we have had to obtain figures from the company, set up by the company, and we believe they are comparable, but, of course, the notes at the bottom of each page must be taken into consideration when interpreting the statistics.

I think that the statistics are available to investors. I don't know whether—yes, I can say that those statistics are available to the public, maybe not in exactly this form, not exactly set up this way, but the break-down and things like that are furnished by the companies to such services as Institutional Utility Service which is a financial service available to investors which gives a detailed breakdown of operating statistics and such matters for utility companies. Yes, I have that service. Most of the investors that are engaged in investing in this industry have the service in their files.

You ask what were my immediate sources in connection with this case. I requested information along this line from Mr. Hedrick when I first started working on the case. I think he passed on my request to the companies, I think possibly through Chicago District Pipeline Company. Anyhow, within a short time I was furnished with a portfolio of information along this line which I used in forming my opinion in this case. The material I received was typewritten. I have in my portfolio sheets which I can show you, this Institutional Utility Service, for example, which contains this same information. It is published by Institutional Utility Service.

I don't think I have checked every figure in Exhibit 202 with the data contained in that Service. I have compared certain figures. I have spot-checked it. In other words, I attempted to establish the validity of my figures in Exhibit 202 against this service and against other manuals. I am satisfied the information in here is correct information. As a matter of fact, the statistical department of the Peoples Gas Light and Coke Company puts out a printed sheet similar to this first sheet in this exhibit. I don't know just how wide the circulation of that sheet is. I have a copy of it here, I think. I don't think Moody's and Poor's publish this information in all the detail there is in that sheet; for example, in that one sheet for Peoples Gas Light and Coke Company. I mean a sheet put out by the statistical department of Peoples Gas Light and Coke Company. There are two more sheets right along with it. I would like to keep them together.

I should say that the information with reference to recent years is available in the reports to the Illinois Commerce Commission. You couldn't get the whole ten-year period in a comparable way from the reports to the Illinois Commerce Commission. That is what I feel should be done to indicate the trends.

Redirect Examination by Mr. Hedrick Resumed.

I will now go over Exhibit 202 by pages:

1794 Page 1 of this exhibit shows data on sales, revenue and customers for Peoples Gas Light and Coke Company.

The figures are broken down, both for revenue and gas sales, by customers, during the years 1928 to 1938, inclusive.

The average customers are shown during each year, and certain statistics, such as revenue per therm and average gas sales in therms, are set up on a per customer basis; in addition, annual revenue was set up on a per customer basis.

It will be noted that the 1938 figures are set up on two bases, the Notes A and B explaining the bases.

1938 A shows the figures including $2,667,371 arising from rate increase still in process of litigation, and 1938 B excluding the item of $2,667,371.

In view of what I have been told this morning, that the decision of the Illinois Supreme Court has come down with respect to the increase, I am not sure but what we should exclude the 1938 A figures.

Recross Examination Interposed by Mr. Slaff.

You ask if I think that decision is going to end the litigation right there. I haven't any basis for forming any judgment on that, Mr. Slaff. I just don't know. However, I think we should probably consider it on both bases. It is set up here in that way, and that is the way I intended to portray it.

Taking the revenues from sales to customers during this period, it will be noted that from 1928 to 1938 the total revenues show a slight increase if the rate increase is included and a slight decline over this period if the rate increase is not included.

Looked at from the standpoint of domestic revenue, it will be noted that there has been a decline on either basis, and that excluding the rate increase the decline has been from $23,074,000 in 1928 to $19,404,000 in 1938.

Redirect Examination by Mr. Hedrick Resumed.

That is the second column of figures under the heading of "Revenues From Sales to Consumers". It will be noted that space heating, for which there was a note, has increased substantially during the period 1928 to 1938, that commercial revenues have declined and that industrial and miscellaneous revenues have increased.

Similarly, in the second tabulation on the left-hand side of the page, it will be noted that the total gas sales in therms have in the period 1928 to 1938 more than doubled, that gas sales to domestic customers in therms have declined from some 121,000,000 in 1928 to 113,000,000 in 1938.

The third tabulation on the left-hand side of the page shows the customers, and it will be noted that during
1795 this period 1928 to 1938 total customers have increased, that domestic customers have increased, that space heating customers have increased substantially, that commercial customers have declined, and that industrial customers in number have declined some.

Going to the right-hand side of the page, where the figures shown cover the period 1928 to 1938, on the basis of revenue per therm, generally speaking there have been declines in all classes of sales,—total, domestic, space heating, commercial, industrial, and miscellaneous.

Of course, this period 1928 to 1938 covers the period of the change-over which took place in the latter part of 1931. I refer to the change-over from artificial gas to a mixed natural and artificial gas.

For the Peoples Gas Light and Coke Company the average annual sales per customer in the period have increased substantially, while the average annual sales to domestic customers have declined from 157.6 therms in 1928 to 143.9 therms in 1938.

During this same period there has been a great increase in the average annual sales in therms to industrial customers.

The average annual revenue per customer figures which are shown in the bottom tabulation at the right-hand side of the page for the period 1928 to 1938 show substantial fluctuations during the period.

I think one of the most significant figures or sets of figures in this whole exhibit is the revenue and sales and data concerning domestic customers, because it will be noted that this company derives, at the present time, 60 percent of its revenue from its domestic customers and they are probably properly considered as the backbone of the company's business.

In 1928 the average revenue received per domestic customer was $29.91. That has declined in 1938 to $24.68, excluding the rate increase, or $28.07, including the rate increase. I think the $24.68 figure at this moment is the most significant.

Turning now to the second page, headed "Western United Gas and Electric Company, Northern Division," similar data was prepared on sales, revenue and customers for the Northern Division of the Western United Gas and Electric Company.

The northern division is shown, because that is the division of this company which receives gas indirectly from the pipeline of the Natural Gas Pipeline Company of America. The Company has a southern division which furnishes artificial gas, I believe, to southern Illinois.

The figures here, again, follow somewhat similar trends. The revenue from sales to customers of this company has increased from $3,700,000 in 1928 to $4,200,000 in 1938, but the domestic revenue has declined from $3,290,000 in 1928 to $2,702,000 in 1938.

The number of customers of the company has increased from 82,136 in 1928 to 88,941 in 1938.

1796 The average annual revenue per therm has shown a rather wide variation.

This, again, covers the period of the change-over to mixed gas.

The average annual sales per customer shows a substantial increase largely accounted for by the substantial increase in industrial sales. Insofar as domestic sales per customer are concerned, they show a decline from 159.7 therms in 1928 to 147.2 therms in 1938.

The annual average revenue per customer shows an increase overall from $45.62 in 1928 to $47.32 in 1938 but from the domestic customers the annual average revenue has declined from $40.48 in 1928 to $32.37 in 1938.

Sheet No. 3 is prepared on a similar basis. It should be read along with the notes at the bottom of the page.

This page 3 shows the data on sales, revenue, and customers of the mixed gas territory of Public Service Company of Northern Illinois. It is necessary to separate the statistics, again, of this company, because certain of the territory served by the company is served with mixed gas. Certain other smaller portions of the territory are served with straight natural gas. So in order to have any comparability we have to keep the statistics separate, and I understand the company sets up its figures that way.

The total revenue shows an increase from $6,447,000 in 1928 to $6,735,000 in 1938.

During that period the domestic revenues have declined from $5,249,000 to $3,755,000.

I want to call particular attention to Note 2 on space heating, which shows the basis on which a division is made between these two types of customers.

Space heating in that column there, under revenues, includes the cooking and water heating as well as space heating used by those customers classified as space heating customers.

The company for a space heating customer has only one meter, so all that gas that that customer uses goes through that one meter and it is impossible to say just how much is used for the ordinary purposes of cooking as opposed to the amount used for space heating. That is one of the deficiencies in our statistics, and we have to use them the best way we can.

I think there is no doubt that some domestic is included in this space heating and the note so indicates.

There is a note on the Peoples' sheet under space heating, which says: "These figures include space heating only. Domestic consumption of these customers is included in domestic."

I am not sure but what some estimates have to be made in making that allocation in the case of the Peoples Company, but that is the way the allocation is made by them.

1797 So I think it is necessary in interpreting that decline in the domestic business of the Public Service Company shown on page 3 to take into consideration the fact there is certain domestic business among those space heating customers, but how much we do not know.

The customers of this company have increased substantially during this period. This company's territory is a growing territory.

I am not going to take the time to go over all the per therm and per customer statistics. The trends are apparent. But they should be read in the light of the notes which I have already indicated.

On the fourth page, we have data concerning the natural gas territory of the Public Service Company of Northern Illinois. That shows for that company data on sales, revenue and customers in the natural gas territory of this company, and the same note on the space heating business applies, that the third column there, under space heating, includes cooking and water heating, as well as the space heating for those customers which are classified as space heating customers.

Question by the Examiner.

Yes, prior to 1932, this territory was supplied by artificial gas. I don't know all the details, but they decided to change over there to straight natural, possibly because they did not have production facilities or the production facilities in that territory were old and it was deemed advisable to go to straight natural gas, whereas in the other portions of the territory it was decided to use a mixed gas.

Redirect Examination by Mr. Hedrick Resumed.

The second or middle table on the fourth page is on the basis of therms. You ask whether I have an opinion or judgment as to the effect that these general trends have upon investors in this particular type of utility.

Yes, the trends displayed by the domestic business, which furnishes a large portion of the revenue, and which is the high rate business, are in my opinion not healthy as compared with the electric industry; and in my opinion the prevalence of those trends has made investors skeptical of the future of the business.

You ask whether that would be reflected in any way in the securities of the Natural Gas Pipeline Company of America, in my judgment, if its securities were on the general market. Well, I don't know just exactly how I would translate that particular opinion to the Natural Gas Pipeline Company of America. The Natural Gas Pipeline Company of America is, in the last analysis, dependent on these companies. It is dependent on their sales. Its whole future is dependent on the sales of these utility companies in this area. If the trends are unhealthy, and if gas is not going to hold its own in competition with other fuels, and if the trends are going to decline, continue to decline, and the domestic consumption is going to continue to decline, I think it naturally will be reflected in the investor's valuation of the Pipeline Company which serves this territory. It is bound to be that way.

1798 (At this point counsel for defendants handed to the reporter a document headed "Residential Electric Service in U. S.", with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit 203.

Exhibit 202 was offered in evidence, and the Examiner took his ruling under advisement.)

Exhibit 203 was prepared under my direction. The exhibit shows statistics with reference to residential electric service in the United States. The source of the information was the Edison Electric Institute Statistical Bulletin No. 6 for the year 1938. The Edison Electric Institute, I suppose, would be classified as a trade association of the electric industry, and it has for many years compiled and released statistics on the industry. These figures are generally accepted by investors and other people as the best available information on the subject.

This exhibit shows for a ten-year period the number of customers taking electric service in the United States. It showns an increase from 19,569,606 in 1929 to 22,110,403 in 1938.

During that period the average annual use per customer in kilowatt hours increased from 499 kilowatt hours in 1929 to 845 kilowatt hours in 1938.

The average annual bill during this period increased from $31.44 in 1929 to $35.57 in 1938.

The last two columns on the right-hand side show the per customer information. I think possibly the heading should have "per customer" on there to make it perfectly clear. The figures certainly are on a per customer basis. From the average annual use in kilowatt hours and the average annual bill, it will be possible to compute the average annual rate.

Recross Examination Interposed by Mr. Slaff.

You ask why I did not do that. This exhibit was prepared to show in somewhat similar fashion to the way it was shown in former Exhibits, the consumption per customer in the domestic or residential field, and the amount of money received by the utility company for that use.

If I set up this exhibit on a comparable basis to show the average annual revenue per kilowatt hour, I would have to use six different headings. We have in Exhibit 202 six different sets of statistics with reference to domestic customers. I only used three in Exhibit 203. In order to make it completely comparable, I would have to use six. That could be done. It is all contained in that Statistical Bulletin No 6 of the Edison Electric Institute.

You suggest that the annual revenue per kilowatt hour of domestic consumption in 1929 is approximately 6.4 cents, and in 1938 approximately 4.2 cents. That sounds about right. There has been, I think, in the electric industry throughout the country an increase in consumption per year practically every year; a decline in the average rate in that classification, very nearly in every year since 1929; and the combination of those two has resulted in an increased annual bill per customer in practically every 1799 year during that period. There has been an increased consumption as shown in Exhibit 203. This has been accompanied by a declining rate and an increased bill. I think rate policies have something to do with consumption in the electric field. I think that is obvious. The average American residential customer has available to him today many, many different types of appliances for the use of electric energy; and in this period under consideration there have been many rate reductions, and the customers have continued to use more and more energy and they have paid a bigger bill.

Redirect Examination by Mr. Hedrick Resumed.

This is very largely due to the new type of equipment that the electric industry has furnished to its customers to use; the fact that we have a great development of appliances in the electric field. There are countless ways of using electric energy that appeal to customers. We haven't as many ways to use gas.

Recross Examination Interposed by Mr. Slaff.

Yes, in this respect what is shown on Exhibit 203 lends encouragement to investors in electric securities. That is very definitely so. I think that is one of the things investors look at and get a great deal of encouragement to go into the electric industry. I think that is what they are interested in, an industry which shows not only an increased use, but at the same time a few more dollars per customer.

You ask if a portion of these reductions in rates and increase in use in the electric industry is due to the pressure of regulation and rate reduction ordered by commissions against which companies have from time to time fought. I think certainly there are some of those factors in there. Of course, during this period there have been many voluntary rate reductions, and there have been rate reductions where rate litigation has been the result. I think it is true that even where there has not been rate litigation, the pressure of possible rate reduction by the commissions is also a factor which has brought it down. I think this is reflected in part by these reductions.

Questions by the Examiner.

The calculations made by Mr. Slaff were derived from the second and third column of statistics. They should result the same from the other figures. It is just a matter of dividing $31.44 by 499 to get the average rate in 1929, or dividing $35.57 by 845 to get the average rate in the latest year, 1938.

Redirect Examination by Mr. Hedrick Resumed.

(EXHIBIT 203 was offered in evidence. No objection was made by the Examiner to his ruling taking it under advisement because this exhibit is associated with Exhibit 202. Counsel for defendants handed the reporter a document headed "Commonwealth Edison Company", with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit 204.)

Exhibit 204 was prepared under my supervision and direction. This exhibit shows certain statistics on 1800 customers, consumption, revenue and rates for the Commonwealth Edison Company, the electric company which serves the general territory served by the three Chicago utilities that procure gas from the Natural Gas Pipeline Company of America.

The figures were obtained from Institutional Utility Service; and were the figures furnished by the company to that service agency in my opinion. It will be noted that the only complete comparable figures are from 1930 to 1938, during which time the number of customers have increased. Consumption has increased from 1930, from 537,000,000 to over 721,000,000 in the domestic field.

During that same time the revenues increased from $24,754,000 to $27,948,000.

Consumption in kilowatt hours per domestic customer increased from 468 to 863; revenue from $25.50 to $33.42, and the rate per kilowatt hour declined from 5.45 cents per kilowatt hour to 3.87 cents per kilowatt hour.

In my opinion this indicates a healthy trend, and is one of the reasons why Commonwealth Edison Company is today regarded by investors as one of the outstanding electric utility companies in the United States.

It is one of the reasons why it was able to sell 40 year bonds at approximately a 3.16 basis. It is the only utility company during that great period of refunding which has been able to sell 40-year bonds.

You ask if Commonwealth Edison is a riskier business than the gas industry or the business of defendants. I think the defendants are much riskier propositions from the investor's point of view than is the Commonwealth Edison Company; and I think by and large investors all over feel the same way. In my opinion the electric industry is a less risky industry than that of the natural gas pipeline transmission industry, in general.

Questions by the Examiner.

I am referring to the electric distribution companies. As a matter of fact, Mr. Examiner, in the electric industry most of the companies engaged in that industry have an integrated system. The great preponderance of the industry has integrated operations. There are not many power supply companies left.

In my answer to Mr. Hedrick's question, I was comparing an integrated electric industry against the natural gas pipeline idustry.

(Defendants offered Exhibit 204 in evidence. There was no objection but the Examiner withheld his ruling after the noon hour. On resuming the hearing after the noon hour, the Examiner announced that EXHIBITS 202, 203 and 204 were received in evidence.)

Redirect Examination by Mr. Hedrick Resumed.

1801 Commencing on page 6480 and continuing on through page 6493, I was cross-examined with reference to the relationship between defendants and Chicago District Pipeline Company, and the three Chicago utilities. I was asked if I investigated the assets of the Chicago District Pipeline Company in my investigation. I answered that I had not; that the latter company was unimportant to me. The real strength of the guarantee comes from the companies that are actually selling and distributing gas; namely, the three Chicago area utilities.

You ask what in determining the rate of return to which I testified I considered to be the relationship that existed between the companies mentioned and with reference to the guarantee of the contract of July 25, 1931, by the three Chicago distributing companies. Well, Chicago District Pipeline Company is the company which is wholly owned by the three companies that distribute the gas in this area. I think in my original concept of the problem, I looked through the corporate fiction and felt as though from a financial point of view, at least, of course the fact was as though the gas was purchased direct by the three Chicago utility companies, the Peoples Gas Light and Coke Company, the Public Service Company of Northern Illinois, and the Western United Gas and Electric Company.

From a financial point of view, looking at the contract and the guarantee which exists one could consider the Chicago District Pipeline Company somewhat the same as a buying agent, a separate corporate buying agent for those three companies, namely, the Peoples Gas Light and Coke Company, the Public Service Company of Northern Illinois, and the Western United.

On pages 6532 and 6533, I was cross-examined by Mr. Booth concerning the fact that defendants do not control their markets. In response to questions I testified in substance that defendants have some possibilities of control of the sales of boiler fuel and industrial gas, which is not a large proportion of the revenue, but in respect to the gas sold under firm contracts it has no such control. I added that I did not say that defendants are handicapped today, but that the result of my investigation showed that they might be. I continued that I was not positive that it was handicapped, but I said that it might be handicapped in the future.

You asked what I meant in my testimony in that connection by the terms "no such control" and "handicapped". Well, as I read that line 10 over, particularly in connection with that whole sentence extending from line 7 to line 10, I think that there is an implication in the use of the words "has no such control" that I should explain.

There is almost the implication there that I felt that it had control with reference to boiler fuel and industrial gas. That was not what I wished to convey.

What I really did wish to convey was that as I know the facts, the Peples Gas Light and Coke Company, for example, which markets a great deal of gas, in casting around for new sales of gas, to try to obtain new customers to use gas, might approach a single industry or might make a study of an industry or an individual plant, and try to convince that plant or that segment of industry that gas was a fuel that could be used economically at rates at which it could be sold.

It might then contact or get in touch with the Natural Gas Pipeline Company of America, and across the table with

that company discuss the possibility of selling a
1802 boiler fuel or interruptible gas to that particular
company or to that particular industry, and Natural
Gas Pipeline Company of America, under those circumstances, is in a position to say whether or not it has gas available, and whether or not the gas should be sold at that price. To that extent I might say that the veto power exists in Natural Gas Pipeline Company of America.

That, however, is not the same as having the power of initiation or going out to try to attract a particular type of business. That is wholly in the hands of the Peoples Gas Light and Coke Company, using that just as one of the companies which are the buying companies.

Natural Gas Pipeline Company of America does not have direct contact with the ultimate consumer, and therefore, in my opinion, is not in a position to control the marketing policies of the gas which is sold in this area. That is one of the hazards which I referred to originally in my direct testimony and discussed again on cross-examination, the absence of control of the market or the marketing policy.

I understand that people from the Natural Gas Pipeline Company of America have urged the sale of gas for particular purposes, but that power to urge the sale does not give to Natural Gas Pipeline Company the power to direct the sales or have control over marketing policies to be followed in the selling of gas in this area.

At page 6587 I testified in response to questions by Mr. Slaff that I did not consider it of great importance in coming to my conclusion as to the rate of return that the coal industry had approved generally the tentative recommendations of the experts of the Bituminous Coal Division of the Department of Interior. Then I stated that I would consider it of some importance.

You ask if I had not made a distinction between the use of the words "great importance" and "any importance" in connection with that testimony.

Well, I think there is some considerable difference between the two. I started to say "everything that—". I think if I were going to complete that statement I would say that everything that had any bearing whatever on the Chicago utilities or particularly on the Natural Gas Pipeline Company of America, with reference to this subject of the sale of gas, is of some importance, and probably is entitled to some weight, even though very minute. I felt with respect to the recommendations of the experts of the Bituminous Coal Division of the Department of the Interior that that was not of sufficient importance to me in forming this opinion as to the rate of return in this case to cause me to make any special investigation or study in Washington with reference to what their recommendations were.

I have a correction on page 6597 of the record. Lines 3 and 4, the first sentence, say "I do not think it is based upon the hazards." I am not sure whether I said it that way, but if I did I certainly did not mean it that way. The sentence should read "I do think it is based upon the hazards." I think it would be obvious from reading that line of testimony and the rest of that answer and the other answers there that that is what I did mean.

1803 At pages 7324 and 7325 of the record, the Examiner made the statement with particular reference to pages 3, 4 and 5, of my Exhibit 150, that there was some indication that the witness had selected only the higher yielding issues, and his reason was that the result would not be substantially different, but that the exhibit would be extended. Following that statement I added that in view of the questions which were raised I would like to revise it to include all issues. I have prepared a revision of pages 3, 4 and 5 of Exhibit No. 150 to show additional security issues.

(At this point counsel for defendants handed the reporter a document entitled "All Mortgage Bonds of Domestic Electric and Gas Utility Companies Traded on New York Curb September 15, 1939," with the request that it be marked for identification. At the direction of the Examiner the document was marked Exhibit 205.)

This revision is shown in Exhibit 205. The original pages 3 and 4 of Exhibit 150 showed only one issue of bonds for each company. These sheets in Exhibit 205 show all the bonds of each of the companies listed on pages 3 and 4 of Exhibit 150 which were traded on September 15, 1939.

For example, it will be noted with reference to the Alabama Power Company, the original sheet showed only one issue of 5s of 1968. The revised sheets, Exhibit 205, show four issues traded that day, an issue of 5s of 1946, 5s of 1951, 5s of 1968, and 4½s of 1967.

Similarly for certain other companies which were included in the original pages 3 and 4 of Exhibit 150, additional issues traded on September 15th are shown in the revised sheets. On the original page 4 an average, straight arithmetic average, of 5.12 percent was shown. On the revised basis, and in exactly the same way, the average is 5.15 percent.

(EXHIBIT 205 was offered in evidence.)

Questions by the Examiner.

That is the arithmetic average shown on page 2 of Exhibit 205. My original page 4 of Exhibit 150 showed only one issue of one company, largely for the purpose of showing an issue for each company that I had on that date, but not bothering to show all the issues for each company.

You ask what formula I adopted to choose one issue there and eliminate the othe rthree. I think I selected issues wit hthe highest coupon, which had the longest maturity. That, I think, was my general rule, in preparing this exhibit. I would like to check that with one or two more (examining papers). I think that is right. I selected the highest coupons and the longest maturity.

Recross Examination Interposed by Mr. Slaff.

In the case of Interstate Power Service, the highest coupon was a five of 1956. There I selected the one with the highest coupon. I think generally I should say it this way: I selected first of all the highest coupon, and then, when there were several bonds bearing that same coupon, of those bonds I selected the longest maturity.

1804 *Questions by the Examiner.*

No, I should not have weighted that coupon rate and maturity in order to put my average yield in a corresponding light. I do no consider the averaging of any importance. As a matter of fact, in view of all of the questions that were raised about averages, and weighted averages, weighted by amounts, if I were preparing this exhibit again I would certainly never strike any average. When I first prepared this exhibit I was interested in what it would show; and in my working papers in my office I took a line and divided by the number. We have had a lot of debate in this record as to whether the straight average, straight arithmetic average or the weighted average is the proper one to use. Nobody can decide that with any degree of finality. It is a matter of taste.

When I say the longest maturity, I mean the longest maturity from the present date. I don't mean the longest absolute maturity, but the longest maturity from the present time.

You ask how I came to use the heading on page 3 of Exhibit 150, "All Mortgage Bonds"; that is, whether I started out with the idea of using all mortgage bonds and then determined I would only use selections. Well, I definitely decided that I would confine it to the electric and gas fields. I don't think that I am answering your question directly, I think I probably had in mind when I started this thing to include all issues. Somewhere in the statistical process another man was working on this from the mechanical point of view, and we discussed it, and decided to only show one issue of each company. To that extent the heading is wrong.

As a matter of fact, my original notes which I discussed in connection with this exhibit two or three days before the testimony was given had a note, "only one issue of any company is included, that being the highest coupon and the longest maturity." Somewhere in the process that thing got left off, and caused me all kinds of trouble here on cross-examination. I was accused of bringing in misleading information.

Redirect Examination by Mr. Hedrick, Resumed.

(EXHIBIT 205 was received in evidence without objection. At this point counsel for defendants handed the reporter a document entitled "All Preferred Stocks for Domestic Electric and Gas Operating Utilities Paying Full Dividends Listed N. Y. Curb (September 15, 1939, Prices)," with the request that it be marked for identification. At the direction of the Examiner, the document was marked 206.)

In connection with the Examiner's suggestion, I have prepared a list showing issues in addition to those shown on page 5 of Exhibit 150. This list is set out in Exhibit 206, which was prepared under my direction.

Exhibit 206 could be considered as a revision of page 5 in the original Exhibit 150, to include all issues of preferred stocks of domestic electric and gas operating utilities paying full dividends. The original page 5 of Exhibit 150 showed only one issue of preferred stock of each company; that is, the preferred stock bearing the highest dividend rate.

For example, in the case of Alabama Power Company, the original page 5 of Exhibit 150 shows only one issue, the $7 preferred stock, yielding 7.2 percent. The revised sheets, Exhibit 206, show both the $7 dividend rate preferred stock and the $6 rate preferred stock of that company, selling at 86, or an approximate yield of 7.0.

1805 My original sheet, page 5, did not show the average yield on these preferred stocks, but I have read into the record the fact that I had made the computation, although it was not marked on the exhibit; and that showed that the average yield of those stocks listed there on page 5 of Exhibit 150 was 6.29 percent. I have not in Exhibit 206 showed the average yield of the preferred stocks, although I have made the calculation, and it is approximately 6.21 percent.

Questions by the Examiner.

The original figure on page 5, Exhibit 150, was 6.29. It was not marked on the exhibit, but it was read in the record at that figure.

You state that you have a notation of 6.4. I am not sure about that. I do remember at that hearing I read something in, and then we ran it up on an adding machine. I have marked here on my original copy that I have 6.29. Possibly 6.4 was read into the record, and that was an error. Actually, the original sheet of page 5 of Exhibit 150, if the straight arithmetic average is taken of those yields there listed, would show 6.29 percent.

You ask what theory justifies taking the highest dividend rate in the case of these stocks and the highest coupon rate in the case of the bonds. The procedure would be analogous. This whole exhibit was set up on the basis of showing opportunities to investors.

Now, if you and I were considering buying a preferred stock—let us go down here and take the Jersey Central Power; assuming we were interested in that company. The 6 percent stock shows a yield of 6.5. The 5½ percent preferred stock on the quotation shown here, shows a yield of 6.3. Which would you buy? I think the investor would buy the one today showing the highest yield; although here are markets, actual markets that exist, and people are buying and selling at these prices. Some people apparently are willing to buy the lower yield because the price appreciation factor is in there, since the spread between today's price and the call price is greater; so they are buying; and the best you can say is that they are buying, looking both ways at the same time. They are buying, looking at the yield and looking at the possibilities of price appreciation. An investor who is buying for yield alone, however, it is obvious that he would buy the one with the higher yield if it were selling below the call price.

I purposely selected them in that case, where they were selling well below the call price. No, I don't show the call prices for any of these bonds. In the original record, in the cross-examination, there was read into the record all cases where the securities were selling at or above their call prices, if I remember correctly. That was on page 1 in connection with the Natural Gas Company bonds, and in the cases of pages 3, 4 and 5 of Exhibit 150. Mr. Slaff asked me to indicate whether or not they were selling at or above their call prices. I note that my exhibit here shows the call prices in all cases, because during one of the recesses down there I went through the manual and determined the call prices in order to place myself in position to be able to answer any questions with respect to whether or not they were selling at or above call prices.

Redirect Examination by Mr. Hedrick Resumed.

1806 On pages 7309 and 7346 I testified as to the various companies shown on pages 3 and 4 of Exhibit 150, showing instances where the call prices were lower than the amount the bond was selling for, and in that connection, in response to questioning, I answered with respect to a number of those cases.

(EXHIBIT 206 was offered and received in evidence, without objection.)

Beginning with line 3, on page 7330, I testified in response to a question by the Examiner, in substance, that the New York Stock Exchange requirements are more difficult from the standpoint of information to be furnished than are the requirements of the New York Curb Exchange; and added that it is more expensive for companies to list securities on the New York Stock Exchange than it is with the Curb Exchange. I then added that a great many smaller utility companies never list their securities on the Curb Exchange.

The Examiner asked me if I did not mean the Stock Exchange and I responded Curb Exchange, in connection with my last statement. I think I must have been shell-shocked, because I did not even answer correctly when the Examiner asked me about it. The line 12 should read, "* * * Companies never list securities on the Stock Exchange."

On pages 7376 and 7377, in connection with one of my answers, the record shows I used the expression "They were the ones that we used in the telephone study in exactly the same kind of chart." I think it is a typographical error there. The sentence should read, "They were the ones that were used in the telephone study in exactly the same kind of chart."

On page 6570, line 20 to line 22, in the sentence "Well, a substantial part of their revenue is from sales of an industrial character where the profit margin is probably less per thousand feet than it is for sales under the current contract," the last term "current contract" should read "firm contract."

On pages 7377 and 7378, I testified that in order to get my average earnings price ratio for these twelve companies, we were then considering, I added the twelve earnings price ratios and divided by twelve.

I was asked by Mr. Slaff if I had added the twelve price earnings ratios rather than the twelve earnings price ratios, divided the total by twelve, and taken the reciprocal of the average, would I not have obtained a different percentage. My answer was that the price earnings ratio of any particular company at any particular time is the reciprocal of the earnings price ratio, but that I didn't know about any mathematical acrobatics.

Several other questions were asked in the same connection and at the end of this line of questions I stated to Mr. Slaff that I would talk to him later so that I will clearly know what he had in mind. Mr. Slaff has never talked to me nor I to him about it. I have never made any such calculation because any such calculation is not

any check in any way as to the validity of my statistical method. That question is really, getting down to mathematics, asking the question: "Does the arithmetic mean of the series equal the harmonic mean of the series?"
1807 It never does except in an accidental way. There is not any possible check as to the statistical validity of my method. Taking the reciprocal of my earnings price ratios is a very simple matter. I have the earnings price ratios for twelve stocks, and I put them down and add them up and divide them by twelve; but that will not work out the same, except in an accidental way, with calculations made this other way—the price earnings ratios added together, divided by twelve, and then calculating the reciprocal of that. There is no possible check as to the statistical validity of my process by doing it the other way.

Recross Examination Interposed by Mr. Slaff.

I satisfied myself with respect to the mathematic acrobatics since that time. I think I was probably punch drunk at that time after six days of cross-examination. I should have been able to make a calculation by setting down a simple example that would show that it is only in the accidental case those things would ever check. I don't think Mr. Smith took the same average of price earnings as a check. I am pretty sure he didn't check the validity of his statistical method in that manner because he would not have gotten any check.

Redirect Examination by Mr. Hedrick Resumed.

While Mr. Ostrander was on the witness stand on December 4th certain excerpts from prospectuses of the following gas and utility companies were read into the record during cross-examination at the request of counsel for the Company; on page 9084 the Arkansas-Louisiana Gas Company; 9089, Panhandle Eastern Pipe Line; 9142, Public Service Company of Colorado; 9154, Central Illinois Public Service; 9158, Central Power and Light Company; 9162, Kansas Power Company; 9164, Idaho Power Company; 9166, Missouri Power and Light Company; 9168, Public Service Company of Oklahoma; and 9169, West Texas Utilities Company. I have read the record in that respect and the excerpts that were taken from the prospectuses mentioned.

Yes, I know generally why such provisions are placed in bond indentures of utility companies in recent years. I know generally and I also know specifically with respect to some companies, because I actually sat in while the mortgage was being drafted and insisted those provisions be put in. The reasons are that investors who are buying the bonds of a company which is issuing bonds under an open-end mortgage, and under which the company can put out additional bonds by satisfying the covenants of the mortgage with respect to either property or earnings, are very careful with respect to the kind of property which is made the basis for the issuance of additional bonds. Gas transmission property, compressor stations, distribution systems, power plants and sub-stations are something that are tangible and real. Gas production property, such as leases, leaseholds, owned acreage, or in some places gathering lines, are in the opinion of investors less tangible and real, because a gas field or a gas lease which is worth something today might not be worth anything tomorrow.

From that standpoint the investors, in the mortgages particularly which have been drafted in recent years, from 1935 on, have, generally speaking, required a clause which is generally put in in the place where bondable property is defined, excluding from bondable property production property, and by production property I mean gas leases, leaseholds, acreage owned, and in some places, gathering lines.

1808 In some cases it goes farther than that and does not allow the inclusion within the term "bondable property" of transmission lines except where the transmission lines join together or link together distribution systems.

In the Northern Natural Gas Company case, where I actively took part in drafting the mortgage, we required such a provision.

1809 I sat in as representative of one of the buyers in the actual drafting of all the language of the mortgage.

Schedule 6 of Exhibit 186, introduced through witness Smith, showed as to Northern Natural Gas Company First Mortgage 3¼ per cent A's 1954 offered in August, 1939, in amount $16,000,000, that the yield was 3.25 per cent. At your request, I have made a calculation as to the historical cost of that debt money to Northern Natural Gas Company. I obtained from the SEC photostat of certain portions of the declaration filed by that company in connection with that refunding.

Recross Examination by Mr. Slaff.

It was not a certified copy. I ordered, as I ordinarily do. We have a standing account with the SEC. I order the photostats and they send me a bill. I could rely on its being a true copy of what is contained in the declaration. I could not rely on the declaration wholly because I had to get in touch with the company to get the actual figures because there were certain estimates in the declaration.

Redirect Examination by Mr. Hedrick Resumed.

Then, after obtaining certain information, I made a calculation and attempted to find out what the historical cost of this debt money was. It must be remembered this $16,000,000 issue which came out in 1939 replaced an issue of 4¾ and 4¼ bonds and 4½ per cent debentures on which there were substantial call premiums when they were called and replaced. Said call premiums amounted to a total of $682,955, the duplicate interest was $58,149, the unamortized debt discount and expense on the old issue was $159,646, the other expenses of refinancing amounted to $190,437, or total expenses and premiums and discounts in connection with the refunding of $1,091,187, which spread over a $16,000,000 issue amounts to 6.82 per cent of the principal amount. The average weighted term of the new bonds which had an actual maturity in 1954 is 12.05 years.

Questions by the Examiner.

The weighted average term of the new bonds which have a maturity in 1954 is 12.05 years or say 12 years. That was because of the sinking fund provisions. The yield on a bond which was sold at 93.18, which is 100 less the 6.82 previously mentioned, for a 12-year term is 3.97 per cent. That is obtained from the yield tables. It is just a mechanical job determining it from those tables, and that is what the historical cost of that debt money is in contradistinction to the coupon rate which the present security bears. That is the historical cost net to the company. The historical cost to the company includes all premiums on the old bonds and the discount, the expenses in connection with the issue, the duplicate interest, and things like that. This is a little different from the computation counsel asked Mr. Smith to make from data contained in Moody's. This kind of computation could only be made by finding out just exactly what were the premiums, expenses, and discount which the company suffered, and that is the only way you can get the difference between the yield to investors and the yield to the company.

Redirect Examination by Mr. Hedrick Resumed.

(At this point, counsel for defendants produced a document entitled "Gross Operating Revenue and Net Available for Fixed Charges After Depreciation of the Gas Departments of the Three Utilities Distributing Gas in the Chicago Area, Witness W. C. Gilman," with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit 207 for identification.)

Exhibit 207 was prepared under my direction. This is the financial information which I told the Examiner previously that we had taken from the annual reports by the companies to the Illinois Commerce Commission. It
1810 shows for Peoples Gas Light and Coke Company,
Public Service Company of Northern Illinois, and Western United Gas and Electric Company certain figures as to gross operating revenue and net available for fixed charges for the period 1929 to 1938. The notes should be read in connection with any examination of the figures.

These figures are set up for Peoples Gas Light and Coke Company and Public Service Company of Northern Illinois on the basis of assuming the average gross operating revenue and net available for fixed charges over the period 1929 to 1931, inclusive, as 100 per cent, and showing during the period covered the variations from that.

It will be noted then for Peoples Company starting with 100 per cent as the average for 1929, 1930 and 1931, in gross, that the gross for 1938, excluding the rate increase, is at 98.6 per cent. The net, assuming 1929, 1930 and 1931, as 100 per cent, has declined in 1938, excluding the rate increase, to 40.8 per cent of that amount.

Similarly for Public Service Company of Northern Illinois, the 1938 gross has increased to 116.5 per cent of the average of the gross in 1929, 1930 and 1931. The net, however, has in 1938 declined to 65.5 per cent of the average of 1929, 1930 and 1931.

For Western United Gas and Electric Company, from the Illinois Commerce Commission's reports, it was impossible to obtain comparable figures for the years 1930, 1931, and 1929, as stated in Note 3. Therefore, I used the figures from 1932 to 1938 and assumed the gross operating revenue and net available for fixed charges in 1932 as 100 per cent and show how the gross and the net available for fixed charges have been moved in the period 1932 to 1938. The gross has been increased from 100 to 110.3. The net available for fixed charges has declined from 100 to 71.6.

It should be noted that in the case of Public Service Company of Northern Illinois and Western United Gas and Electric Company, the figures are for the gas departments of those companies. I say that because the companies, in addition to their gas business, also have electric business.

(Defendants offered EXHIBIT 207 in evidence.)

Recross Examination by Mr. Booth.

The source of this data is the annual reports made by the companies to the Illinois Commerce Commission. Those reports were eventually made available to me or to employees of defendants. You ask if I can tell you what the total cost to Peoples Gas Light and Coke Company of producing and purchasing gas for the year 1930 was. I think I could if I had the report for that year before me; but I haven't it before me now, and I do not remember it.

(EXHIBIT 207 was admitted in evidence without objection.)

Counsel for defendants then produced a document entitled "Gas, Electric and Telephone Utility Companies Serving the City of Chicago" and requested that it be marked for identification. At the direction of Examiner, the document was marked Exhibit No. 208.)

1811 *Redirect Examination by Mr. Hedrick Resumed.*

I prepared Exhibit 208 in connection with Schedule 24 of Exhibit 185 for the purpose of showing additional information to that shown on Schedule 24. Schedule 24 in Exhibit

185 shows with respect to the gas, electric and telephone utility companies serving the City of Chicago gross operating revenue for the period 1929 to 1938, and taking the average of 1929, 1930 and 1931 as 100 shows the per cent relation for each of the companies of the gross in each of the succeeding years. Exhibit 208 is set up on a similar basis. It shows the net available for fixed charges after depreciation.

Schedule No. 24 showed that taking the average revenue of 1929, 1930 and 1931, as 100 per cent, that the gross of the People's Gas Light and Coke Company in 1938 was 106.8. That includes the rate increase. This Exhibit 208 shows that the net, taking the average of 1929, 1930 and 1931 as 100 per cent, has declined in 1938 to 51.1 per cent of the 1929, 1930 and 1931 average, excluding the rate increase.

Similarly, the figures are shown as to the movement of the net available for fixed charges of Commonwealth Edison Company and Illinois Bell Telephone Company.

The essential difference between Schedule 24 and Exhibit 208 is that Schedule 24 shows the gross and Exhibit 208 shows the net available for fixed charges.

The source of the data is shown at the bottom of the exhibit and is Moody's Public Utilities Manual, 1934, 1937 and 1939 editions. In that connection, it should be noted that since the source is Moody's Public Utilities Manual, the figures shown in here are as reported by Moody's. In the case of Commonwealth Edison Company, as was originally brought out by Mr. Booth, it shows in 1938 the inclusion for the first time of the consolidation with Super Power Company of Illinois. The company last named is a generating plant down here in Pekin, Illinois, which is a large power supplier for this area. It was originally owned by a number of utility companies in this area. The various interests were purchased by the Commonwealth Edison Company until, as I understand it, they acquired all of the stock and as of December 31, 1938 it was merged with the Commonwealth Edison Company. It was an electric generating company and in addition to that I think it owned some transmission facilities between Chicago and Pekin or Peoria, Illinois.

(EXHIBIT 208 was offered in evidence.)

Recross Examination by Mr. Booth.

I believe that the order reducing the rates of the Illinois Bell Telephone Company was handed down in the year 1938. I am not familiar with the decision handed down by the Supreme Court of the United States. During 1938, as I remember it, there was a rate reduction ordered by the Illinois Commerce Commission and during that year also certain refunds were made to customers. Perhaps I am wrong about that and I will accept your statement on that point. I was under the impression that there were some refunds made in 1938. I do not recall the circumstances that in 1938 the Illinois Commerce Commission entered an order reducing the rates of the Illinois Bell Telephone Company and that that company accepted the reduction.

There was not anything in Schedule 24 of Exhibit 1812 185 under the heading "Illinois Bell Telephone Company" with reference to the matter you have been discussing in these questions. These figures are the figures reported to Moody's Manual. I will accept them as correct. They are the net available for fixed charges. I am pretty confident that Illinois Bell Telephone would not report net available for fixed charges unless it really was net. I attempted to verify whether or not the 1938 figures which showed a sharp decline were in part affected by the reduction ordered by the commission during that year. I noted that reduction myself. It was substantial, some $2,300,000 with the gross remaining about the same. I looked at the break-down of expense in an attempt to locate just exactly what took place; and I found some substantial increases in commercial expense and one or two other items, but I could not put my finger on anything which satisfied me as to why this had taken place, and I did not have time to pursue any further. It is entirely possible that they made some rate increases too in that year.

(EXHIBIT 208 was received in evidence without objection.)

Counsel for defendants then handed the reporter a document entitled "Bonds, Debentures and Notes, Preferred and Common Stocks of Natural Gas Companies, Holdings by Public," with the request that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit 209.)

Redirect Examination by Mr. Hedrick Resumed.

Exhibit 209 was prepared under my supervision and direction. It is set up fundamentally on the same basis as Schedule No. 5-A of Exhibit 186. It shows the same companies and it shows in adidtion some information which I considered pertinent in an appraisal of the information which is implied by Schedule No. 5-A.

Exhibit 209, for example, shows the latest earnings available and the latest times bond interest and fixed charges earned instead of fixed charge coverage only in 1938. We find the yield to the maturities of these bonds as of September 20, 1939 prices. It is proper under those circumstances, to use the latest published earnings. I used the latest published earnings in Exhibit 209, and those earnings were taken from regular published service sources, Ithink, in all cases, either from Moody's Public Utilities Manual or the Public Utility Supplement. In addition to that there is a break-down which can be best illustrated by an example.

For Houston Gulf Gas Company, there is shown on Schedule No. 5-A, Exhibit 186, two issues,—mortgage bonds and debentures. It shows the times fixed charges earned in 1938 for not only the first and collateral sixes of 1943, the debentures of 6½s of 1943, but also a substantial issue of income notes. The total fixed charge coverage in 1938 is reported to be 1.30 in Schedule 5-A.

Exhibit 209 shows that the times mortgage bond interest earned during the latest available earnings period was 3.03 times, shown as the top figure in the "times earned" column. That the times interest earned on the first and collateral sixes of 1943 and the convertible debentures of 1943, lumped together is 2.06. Similarly, there is shown in Exhibit 209 the ratio of mortgage debt to fixed capital, whereas in Schedule No. 5-A of Exhibit 186 there is only shown the relation of total debt to fixed capital as of December 31, 1938.

For example, for the Houston Gulf Gas Company,
1813 Exhibit 209 shows that the ratio of mortgage debt to
fixed capital is 33.38 per cent, whereas Schedule 5-A shows the ratio of funded debt to fixed capital at 43.80. Somewhat similarly for the other companies additional calculations have been shown here which enable one to tell from Exhibit 209 the times mortgage bond interest was earned in distinction to times fixed charges earned and the ratio

of mortgage debt to the total fixed capital instead of the ratio of the total funded debt to the fixed capital.

In addition there have been some sub-totals drawn off and separate figures shown which are finally included in the grand total for companies which are primarily gas distributing companies, such as Southern California Gas Company and Southern Counties Gas Company, which companies are companies with very large distribution facilities, but which happen to have a gas transmission line extending from the distribution areas which they serve into the gas field and through which gas is transported to their properties.

The over-all figures are not greatly different insofar as approximate yield to maturity on the bonds is concerned. There is shown on Exhibit 209 for the companies which we classify as having pipeline operations or as pipeline companies, a yield of 4.06. The yield for the companies which are primarily distribution companies is 3.99. The grand total yield weighted by total amounts outstanding is 4.00 per cent compared to 4.02 per cent as shown in Schedule 5-A of Exhibit 186.

The page entitled, "Preferred stocks of natural gas companies," is basically similar to Schedule No. 5-D of Exhibit 186. I have divided that into a sub-total with the Southern California Gas Company set out by itself. That company, which is primarily a distribution company, has a large amount of preferred stock outstanding, and that preferred stock which sells on a relatively low yield basis, tends to bring down the yield to the 5.35 figure shown in Schedule No. 5-D of Exhibit 186. The preferred stock of Southern California Gas Company alone is nearly 70% of the total preferred stock shown on Schedule 5-D. Eliminating the Southern California Gas Company, we find an approximate yield of 6.08 in Exhibit 209 as against 5.35 in Schedule 5-D of Exhibit 186.

I think there is more information contained here in certain cases than there is in Schedule 5-D, but I think it is self-explanatory and must be read in connection with the notes at the bottom of the schedule.

The page, entitled, "Common Stocks of Natural Gas Companies," is set up on basically the same form as Schedule No. 5-F, Exhibit No. 186. In all cases we have taken the latest earnings available. I believe it improper in calculating an earnings price ratio of any common stock to take anything except the latest published earnings.

After all, an earnings price ratio is the earnings per share of the stock divided by the price of the stock.

If we take the September 30, 1939 quotations as the price for our stock, we certainly should take the latest earnings that were reported to the public prior to that time. Stocks were selling in September, 1939, not so much on the basis of their earnings back in 1938, but what they were earning in 1939, and perhaps what they are going to earn later. Therefore, I think that it is statistically unsound to show or calculate earnings price ratios using prices as of September 30, 1939, and earnings in all cases back in 1938, as shown in Schedule No. 5-F. If the latest reported earnings which were available to anybody 1814 who could read Moody's Manual before September 30th are used, the 7.33 per cent figure would be changed.

Exhibit 209 sets the companies up in two schedules, excluding in the first sub-total Indian Territory Illuminating Oil Company and South Penn Oil Company, which are primarily oil companies, and, as testified to by Mr. Smith, are probably not indicative in any way of natural gas pipeline companies.

Excluding those two companies, and weighting the earnings price ratios at latest earnings, and weighting by market values, instead of using the amounts carried on the balance sheet—it would show an earnings price ratio of 10.45 per cent. I want it clearly understood that this weighting is upon the basis of market value. I think again it is unsound and improper to weight earnings price ratios by the way the amounts are carried on the balance sheet, inasmuch as it is a ratio which is derived from the market price of the stock. If they are to be weighted at all they should be weighted by market values.

(Defendants offered EXHIBIT 209 in evidence.)

Recross Examination by Mr. Slaff.

You ask where I get the pro forma figure with respect to the Oklahoma Natural Gas Company. I think it was taken from Moody's manual. Those bonds were issued in August, 1939, the bonds and the stock. There was a prospectus issued in connection with those securities; and the calculation which is shown on the first sheet here is set up on the basis of the new amounts of bonds outstand ing. There again, I think that Schedule 5-A was improper because it shows the fixed charge coverage, Oklahoma Natural Gas Company, 1.91 times, which was on a capitalization which had completely disappeared. This company refunded all of its debt in 1939. It had new securities outstanding. I think there is no relation whatever between the yield of those new bonds and the times fixed charges earned on a capitalization which has disappeared.

I am not sure that the pro forma earnings with respect to the preferred and common stock of Oklahoma Natural Gas Company also come from the same source. I will have to look at the note. (Examining papers.) This is note 7; for the 12 months ended August 31, 1939; so I would judge that would not be in the prospectus. It must be in Moody's current supplement. You ask where I got the pro forma earnings on the common. Those pro forma earnings are apparently the same as used on the second sheet for the twelve months ended August 31, 1939, and I should judge must have been taken from Moody's current supplement. The prospectus which came out in August would have earnings ending several months prior to the date of the prospectus. That would also apply to the pro forma earnings statement which was used in connection with the bonds referred to on page 1.

(EXHIBIT 209 was received in evidence without objection.)

Redirect Examination by Mr. Hedrick Resumed.

On page 8800 during the cross examination of Mr. Smith, he testified in substance that defendants' bonds would be 3.75 for 40 per cent total capitalization; the preferred stock 20 per cent, yield to the public of 5.75, which he stated was undoubtedly high but a fair figure, and the price earnings ratio of 8 per cent plus a 10 per cent cost of financing on the common stock. You ask if I have an opinion as to the amount in terms of percentage of
1815 common stock that would be required in setting up a securities structure for a natural gas pipeline transmission company, and a further opinion as to the percentage of price earnings ratio on such stock. Yes, I originally testified that I felt that the most appropriate capital structure for a company of this type was from 40 to 50 per cent in bonds and the balance in common stock. I testified that I did not think that preferred stock was

appropriate for a company of this kind. I believe that if it were financed through bonds, 40 to 50 per cent of the amount necessary, that it could raise that money on approximately a four per cent basis, the cost of money to the company; and the balance I believe should be common stock; and I believe that could be raised on the basis of cost of money to the company at not less than 12 per cent. That is about eight times earnings.

If 50 per cent is bonds at 4 per cent, and 50 per cent is in common stock at 12 per cent, that will result in an overall cost of money of 8 per cent. That I believe is proper, and is one of the factors that I took into consideration in arriving at my rate of return. As a matter of fact, I had a number of calculations during cross-examination in Washington, the working papers of which were turned over to counsel, which assumed different yields on bonds and different earning rates on stocks.

Obviously, I have an opinion as to whether or not the securities of a natural gas pipeline transmission company, such as defendants, could be sold on the basis as testified to by Mr. Smith on page 8800. If I thought they could be sold on the basis as he has set them up, I certainly wouldn't have testified that I consider 8 per cent a proper rate of return.

Recross Examination by Mr. Booth.

In both Exhibits 202 and 207 the first money column in each of them relates to the gross operating revenues of the Peoples Gas Light and Coke Company. In the second money column of Exhibit 207 is shown the net available for fixed charges for Peoples Gas Light & Coke Company for each of the years 1929 to 1938, inclusive. This second figure represents, of course, the net available for fixed charges after payment of all operating expenses and after depreciation. It is after production, maintenance, commercial, new business, and all other expenses in the cost of producing gas or the cost of purchasing gas. These figures were taken from the annual reports made by the company to the Illinois Commerce Commission. It is true that the principal item of expense of Peoples Gas Light & Coke Company would be either the cost of producing manufactured gas prior to the time of the introduction of natural gas and the cost of purchasing natural gas after its introduction, plus the cost of producing such artificial gas as the company also produced.

You call my attention to the document you describe as the annual report of the Peoples Gas Light and Coke Company for the year ended December 31, 1930. That is the document from which the figures shown in Exhibit 207 for the year 1930 were obtained. Page G-5 of that exhibit contains the caption "Operating Expenses" and a sub-caption "Production Expenses." The production expenses include coal gas, water gas, and purchased gas. The total amount shown for 1930 for each item was: coal gas $1,977,567.54, water gas $3,004,244.27, purchased gas $5,494,168.16, a total of $10,475,979.97. I think 1930 was the last year in which the Peoples Gas Light & Coke Company supplied manufactured gas. In October, 1931 it began the supply of mixed manufactured and natural gas. The natural gas of course is purchased from defendants through the Chicago District Pipeline Company.

1816 You call my attention to another document described as the annual report of the Peoples Gas Light & Coke Company for the year ended December 31, 1938, to the Illinois Commerce Commission. That also is a document from which information used in compiling the figures in Exhibit 207 was obtained. On page 619 of that document appears the caption "Gas Operating Expenses" and a sub-caption "Total Production Expenses for the Peoples Gas Light & Coke Company." That includes cost of gas purchased, the total amount shown there for gas purchased in 1938 was $12,465,074.64, the total production expenses, which included that item, as shown in that report are listed in line 20 at $14,297,598.65. This report does not give the relative volume of artificial and natural gas at that particular point. It shows the amount elsewhere.

Mr. Hedrick: I have a matter I want to take up.

At page 5610 of the record Mr. Morgan offered the contracts on file with the Federal Power Commission of all the pipeline companies taking gas from the Panhandle field, namely, Colorado Interstate, Cities Service, Panhandle Eastern, Northern Natural, Lone Star and the Consolidated, and the Examiner advised Mr. Morgan these may be offered later. We at this time offer the schedules and contracts referred to in Paragraph Numbered A of Order 53 of the Federal Power Commission dated July 5, 1938, and the information requested in Paragraph D of that same order so far as the following companies are concerned, Colorado Interstate, Cities Service Gas Company, Panhandle Eastern Pipeline Company, Northern Natural Gas Company, Lone Star Gas Company and the Consolidated Gas Utilities Corporation.

The Trial Examiner: To be incorporated by reference?

Mr. Hedrick: To be incorporated by reference.

The Trial Examiner: Any objection?

Mr. Slaff: I have no way at this time of knowing whether what is offered is material or relevant or competent to this proceeding.

Mr. Booth: I want to object.

Mr. Slaff: I don't have them before me here. They are in the Commission's files. They are asked to be incorporated by reference. Certainly I can't at this time assume they are proper or improper for that matter.

Mr. Booth: I want to object to the introduction of these exhibits, these contracts. We are not trying the rates of these other companies in this case, as I understand it. It seems to me that opens up an entirely new field which places an unfair burden. There is no showing as to any relevancy, that these contracts are material at all to any of the issues in this proceeding, and we want to object very strenuously and before they are admitted we think counsel for the company ought to tell us what is in those contracts so that we can have an opportunity to object to them.

Mr. Slaff: We ought to have a statement now, I should think, at least as to the purpose for which they are being offered so we can examine the documents.

Mr. Hedrick: I will ask Mr. Culton to make that statement.

Mr. Culton: They are offered for any assistance they may give the Commission. The evidence shows that gas is being taken from the same field by each and every of these companies. The comparison is relative. The Examiner and the Commission can give those rates, those schedules such weight as it may seem proper. But there are plenty of authorities holding that they are proper for consideration in a matter of this character.

The Trial Examiner: Do you have a memorandum on that, Mr. Culton?

Mr. Culton: Yes, sir. I can give you plenty of cases tomorrow.

The Trial Examiner: I would like to have a short memorandum if it doesn't require any additional preparation on your part.

Mr. Culton: I can give you the cases tomorrow. They are based on all the rate cases. They are not conclusive, manifestly they could not be conclusive, but just for such weight as they may think that to have. One of the witnesses the other day said specifically it would be interesting to make those comparisons.

The Trial Examiner: Do you have copies of those schedules and contracts yourself?

Mr. Culton: We have portions of them, Mr. Examiner, and that is what I referred to a while ago. We may be able to have an analysis ready before we finish so as to put that analysis of those different contracts in evidence. We do not have copies of all of them. We have copies of some of them. We will be glad to submit them to the Examiner so they can see what they are. What they do is show the rate applicable, that is, the contract rate. Most of them give by such and such a number the volume of gas sold and the price. We do not have the contracts, but we have answers to the questionnaires.

The Trial Examiner: I think the Examiner ought to be a little further advised before he makes a ruling on this point.

Mr. Culton: We will be glad to submit to the Examiner the authorities on which we rely.

The Trial Examiner: And the general nature of the matter.

Mr. Culton: We will be glad to supply some of those that we do have. We have some photostats.

The Trial Examiner: If you have a copy of Order 53 I would like to see that.

Mr. Culton: Yes, sir.

Mr. Hedrick: May I loan it to you instead of giving it to you? It is my file copy. I can probably get more.

Mr. Culton: I will state, Mr. Examiner, the authorities which I shall submit consist of opinions by Justices Roberts and Brandeis, principally, on the value of comparison of rates. It is true you can never find them exactly the same. There are differences in distances in transportation. All those factors can be taken into consideration in determining the weight to be given. I recall a very recent case where they held where the freight rate in question on oil was from Mid-Continent Field to Montana, I believe it was, it was proper to show the rate on oil from the Mid-Continent Field to Idaho and the rate from Idaho to Montana was also proper.

I will be very glad to give you the authorities.

The Examiner has on his calendar an undecided motion by Mr. Hedrick, which appears at page 9736 of the transcript, for the incorporation by reference of schedules and contracts filed pursuant to the requirements of Paragraph A and Paragraph D of Order 53 of the Federal Power Commission, dated July 5, 1938, with respect to six companies, whose names appear on pages 9763 and 9768.

The Examiner was supplied by counsel for the companies with photostatic copies of material, indicating what was embraced under the offer; and also references to certain cases which counsel stated supported on the ground of relevancy the admissibility of the evidence offered.

The Examiner has considered the material and the cases referred to, and is of the opinion that the offer should be denied on the grounds that if the evidence were accepted an extended analysis of the wholesale rates of other gas pipeline companies would be required; which would mean extending the present rate case into a rate case involving as well the other six companies referred to in the offer.

The Examiner is aware of the fact that in the cases that counsel has referred to the Interstate Commerce Commission has used rate comparisons with regard to the fixing of rail rates for certain commodities. For instance, in the case cited in the 288 U. S., the commodity involved was petroleum shipped from the midcontinent fields. In the case cited in the 277 U. S., the commodity involved was rosin, referred to as a naval store. In those cases the court held in general that comparative rates could be used as one test, although not a controlling one, upon the question of reasonableness.

The Examiner feels that a fundamentally different legal problem is involved in this proceeding from that involved in the U. S. Supreme Court cases referred to.

Further, while the offer indicates that a comparison is to be made between the six companies, or any one of them, and the instant companies involved in this proceeding, on the basis of shipments of gas from the Panhandle; the Examiner is unable to determine from the offer that a comparison of the wholesale rates charged by the other six companies at their points of delivery with respect to gas transported from the Panhandle can be adopted as a practical test of the reasonableness of the wholesale rates of the instant companies. In the absence of any such showing of relevancy in fact, that is, of comparability of bases of comparison, the Examiner rules that the offer be and is denied.

Mr. Culton: Will you note our exception to the ruling, Mr. Reporter?

Redirect Examination by Mr. Hedrick Resumed.

I just discovered an error in Exhibit 209 which I would like to correct. I have the recalculation made roughly here and it is in the last line of the last column on page 3 of that exhibit. The 10.14 per cent should read 8.20 per cent. The figure 10.45 further up the column is correct.

(December 13, 1939.)

Recross Examination by Mr. Slaff:

In my testimony yesterday shown at page 9670 of the record speaking of the Commonwealth Edison Company 40-year bonds, I said in substance that it is one of the reasons why it was able to sell 40-year bonds at approximately 3.16 basis. It is the only utility company during that great period of refunding which has been able to sell 40-year bonds. What I meant was that the company was the only utility during that refunding period which had sold 40-year bonds. I think too when I spoke generally like that, I meant in large amounts. There might be some isolated case of a small issue of bonds of some company which might be classed as a utility company or water company or telephone company that had sold a bond with a 40-year maturity; but I was speaking of a company which had been able during that period to sell a substantial amount of bonds with a 40-year maturity.

You ask if I am prepared to say that the other large substantial companies which have done substantial refunding in the past year were not able to sell 40-year bonds. They had not, but I think I could say this: that investors during this period of low coupon money have, to the extent that they are able, been putting pressure on to keep the maturities down. There have been a lot of 20-year maturities and 25-year maturities. Investors do not like to tie up their money for very long periods of time at low interest rates, because another cycle may come along here and in five or ten years we may have high-grade mortgage bonds selling on a four and a half or five per cent basis. I do not know of a single case of a natural gas pipeline bond that has had a maturity longer than 20 years. There have been quite a number of 15-year maturities.

You ask if I have any judgment as to whether other large companies which have done refunding in the last five years or so would have been able to do so on a 40-year basis at substantially the same rates. Yes, I have a judgment. I don't think they could. You ask if they could not have financed on a 40-year basis at the rate at which they actually financed. I don't think so. I think if they had refunded with a typical company on a 3½ per cent basis with 30-year bonds, they would have had to pay more for their money if they had had a 40-year bond. Yes, I think
the Commonwealth Edison, had those bonds we were
1817 discussing been 30-year bonds, would have been able
to secure them cheaper than at a 3.16 coupon rate.

Recross Examination by Mr. Booth.

You ask if I participated in the negotiations for refunding of the securities of all the large public utility corporations in the last few years. No, I have helped some companies in certain ways in connection with refunding programs. I mean my present firm has. No, I did not participate in the negotiations concerning the American Telephone and Telegraph Company and its subsidiary companies for the refunding of securities. I do not know what determined the policy of the management of those corporations and the banks or underwriters with respect to the term for which the bonds of those subsidiaries were issued. What I know about that is what I know about how investors think. The question as to what tie-up there is in the maturity and coupon rate is a matter that not only is decided upon by the management, but investors. What investors will take has a substantial influence on the policy of the management with reference to what they shall issue. I keep as closely as possible in touch with buyers of securities. The representatives of the large life insurance companies who buy utility securities are personal friends of mine and I see them in my business at least once a month, the buyers of all of the large life insurance companies. I have no contact with the management of the American Telephone and Telegraph or its subsidiaries and do not directly know from them anything affecting the policy which they have followed in issuing securities.

Recross Examination by Mr. Slaff.

On page 9687, dealing with weighted averages and simple averages, I concluded by saying "Nobody can decide that with any degree of finality. It is a matter of taste." if it be assumed that there were 100 available issues and 99 of them were selling to yield 5 per cent and one of them was selling to yield 3 per cent, the arithmetical average would be substantially around 5 per cent as you say. If the outstanding amount of those 99 5 per cent issues amounted to only a few hundred million dollars and the 3 per cent issue amounted to a billion dollars or several billion dollars, the weighted average yield would be substantially 3 per cent or close to 3 per cent.

Yes, if there were large institutional investors with many millions of dollars to invest, looking at the securities available for investment, they would have to take into account that although there were many, in number, of 5 per cent issues on the market, the amount in dollars of such issues available to them was limited. In determining the opportunities open for investment, we must consider not only the rates, the yield on individual issue, but also the amount of each issue, it is true; but, of course, when we are talking about these companies, and when we are calculating these earnings price ratios, we were talking about companies which had earnings price ratios varying from four to ten, eleven, or twelve per cent. They were all large companies and each one of them had millions of dollars of securities outstanding in the hands of the public.

Yes, Exhibit 205 shows an average approximate yield of 5.15 per cent. Large institutional investors are buying today large quantities of this type of security yielding them only three to four per cent.

1818 Those institutions are faced with the problem of taking securities that are available in such quantities as are necessary for their purposes. Yes, they are constantly faced with the problem of what the available opportunities for investment are and in considering that problem they must consider not only the yield on the issues involved but the amount of each issue.

You ask me to assume that I bought one share at $100 and another share at $200, both of which stocks were earning 8 dollars per share; the earnings price ratio on the two stocks would be 8 per cent and 4 per cent respectively. The average earnings price ratio would be 6 per cent. The investment in those two stocks is $300. The earnings on those two stocks would be $16. On that basis dividing $16 by $300, the total purchase price, the earnings price ratio would show 5⅓ per cent. You ask if that is the type of harmonic mean that I waived aside for purposes of this case. No, where I introduced the words "harmonic mean" I had reference to your question as to whether or not I could check the statistical validity of my earnings price ratio by finding the average of the price earnings ratios and taking the reciprocal of that. That is where I used the words "harmonic mean."

Yes, in preparing the chart in my Exhibit 150, I used the straight arithmetic average. In determining the earnings price ratio on common stock as shown in my Exhibit 209, I did not make any investigation to determine what provisions were made for depreciation, amortization, and depletion by each of the companies involved. The companies included in that exhibit are just exactly the same as the companies which were included in Mr. Smith's exhibit 186.

You ask if it is not possible that such earnings as are shown represent a return of capital as well as a return on capital. It is possible, Mr. Slaff, that the depreciation charges are too low, in which case the actual earnings reported might represent a return of capital to the extent that it is paid out. And conversely, of course, the depreciation in some cases may be too high, in which the earnings may be understated. I haven't made any investigation of these particular companies.

You ask why in my Exhibit 209 I weighted the earnings price ratios by market value, instead of using the balance sheet method. I believe I followed the same general technique that was followed in the preparation of Exhibit 186. I have included certain additional information, to include in the exhibit certain other information that I thought was pertinent. Mr. Smith had weighted his results on the basis of book value. I felt from a statistical point of view, it was unsound to weight them by book value; so I weighted them by market value. You ask if I felt it was sounder to weight them than to take the simple average. I don't think I had that conscious decision to make. If I had been setting up a number of companies to determine an earnings price ratio to guide me in forming an opinion as to a return which would be demanded by common stock investors, I think I might have weighted the earnings price ratio. You ask if I would not have gotten 9½ per cent instead of 10.45 if I had weighted them in this particular case. I haven't made the calculation.

Recross Examination by Mr. Booth.

I recall stating in the record in this case that it was
1819 my theory that the risk to the company was greater
because its taxes were lower. I made this statement with an explanation. The simple words, the lower the taxes, the higher the risk, without having taken into consideration the additional statements that I made are misleading, I think. When I stated at page 9638 "We were always afraid to buy the securities of Pennsylvania companies" I was referring to my tenure with the Equitable Company. Yes, I did say that the Pennsylvania Electric Company is one of the principal utilities operating in Pennsylvania, and renders electric service to the City of Philadelphia and surrounding territory. I have not a copy of the list of the securities owned and held by the Equitable Life Assurance Company. I have not a schedule of the securities owned by the Equitable Life Assurance Company as of December 31, 1938.

You have handed me a copy of such schedule. The Philadelphia Electric Company is listed among the companies whose securities are held by the Equitable Company. The total amount of its bonds owned by the Equitable is $11,716,000 of first and refunding 3½'s due 1967. The Duquesne Light Company in Pennsylvania is a large operating company in that state. Equitable owns $685,000 of first 3½'s due 1965 of that company. Equitable owns $4,810,000 first 4½'s, due 1968 and $1,000,000 first 4's due 1965 of Metropolitan Edison Company, a part of the Associated Gas & Electric System. No, I don't think the Associated Gas & Electric System has as high a standing in the minds of the investors as the Consolidated Edison group, the Niagara Hudson group or the North American Holding Company system.

The Metropolitan operates in Pennsylvania. Its headquarters are at Reading, Pennsylvania. That is the principal town it serves. It serves surrounding territory in central Pennsylvania.

Recross Examination by Mr. Slaff.

There are other large institutional investors which buy securities of Pennsylvania operating companies. I think I should mention here that the period I was speaking of was during my experience with the Equitable. When we were in some doubt as to the securities of the Pennsylvania utility companies, when their taxes were low and when we would want a higher return, was a number of years ago. Since then anybody who takes the trouble to check it can see that the taxes of these Pennsylvania companies have gone up.

Questions by the Examiner.

On page 9638, line 14, where I said "In the state of Pennsylvania at that time public utility companies did not pay taxes based on the property in the communities which they served," by "that time" I meant when I was with the Equitable which was prior to 1935.

Recross Examination by Mr. Booth.

No, I do not know what the taxes of Philadelphia Electric Company were for 1938 other than income taxes as related to its gross revenue. I cannot state the figures. I cannot state the percentage figures as to any of the utilities operating in the State of Pennsylvania. In my file here there is a tabulation that is released by the Securities and Exchange Commission which I examine from time to time which shows the taxes of some 177 operating utility companies. I have referred to it many times in the course of preparing for this testimony and particularly for the cross-examination by you in Washington. This may be the first time I have mentioned it in the record, but it is not the first time I have looked at it.

1820 *Questions by the Examiner.*

That study came out in the spring of 1939. It covers a series of financial statistics on utility companies which are subsidiaries of registered holding companies for the year 1938.

Recross Examination by Mr. Slaff.

I can't state now the differential in return that I would demand on any Pennsylvania utility securities compared with another utility's securities.

Redirect Examination by Mr. Hedrick Resumed.

In connection with my cross-examination yesterday, on page 9732 Mr. Booth asked me to read into the record some figures from reports of the Peoples Gas Light and Coke Company covering 1930 and 1938 concerning the price paid by that company for gas in those years. From the annual reports of the Peoples Gas Light and Coke Company to the Illinois Commerce Commission for the years 1930 and 1938, I have drawn off the following figures.

In 1930, the total cost of gas produced and purchased was $10,475,979.97. The total amount of gas produced and purchased was 44,828,905 MCF, which, converted to therms on the basis of 535 Btu gas, would give a total of 239,834,642 therms; or an average cost of gas per therm of 4.37 cents.

In 1938 the total cost of gas purchased and produced was $14,297,598.65. The amount of gas produced and purchased was 522,210,715 therms, or an average cost per therm of 2.74 cents.

Question by the Examiner.

I have had a statistician check that 8.20 per cent correction on Exhibit 209 concerning which I testified at page 9742 and he tells me that the figure is correct. I previously stated at page 9690 of the transcript that the 6.29 per cent is correct and that it should not be 6.40 as it appears previously in the record.

1821 (At this point the Trial Examiner made the following statement into the record:

In regard to the two exhibits 189 and 190, which are the indentures between Natural Gas Pipeline Company of America and the Chase National Bank of the City of New York, trustee, in the first case, and the Texoma Natural Gas Company and the Chase National Bank of the City of New York, trustee, it seems to the Examiner that the following material can be stricken under the ruling admitting these exhibits with a proviso that certain property description would be omitted.

Omitting all after "Main Line" on page 13, in regard to Exhibit No. 189, to the bottom of page 18; pages 19 to the bottom of page 82, everything beginning after the title on page 19, "Beaver County, Oklahoma," retaining all the county names on pages 19 to 82.

Again omitting all particular descriptions of pieces and parcels of lands on pages 82 to 85, on the latter page down to the title, "Miscellaneous Lands In Fee."

Again omitting all particular descriptions of pieces and parcels of land after, "County of Cloud, State of Kansas", which is on page 85 to the third line at the top of page 91, again retaining all county names.

And finally omitting the general description of the Telephone System after the colon on page 91 down to line 28 on page 93.

In regard to Exhibit No. 190, omitting description of land after "Carson County, Texas," page 10 down to the line beginning "Except" on page 31, but retaining all names of counties and state.

Omitting the general description of pipeline beginning after the second colon in paragraph marked: "Second," page 31, down to the paragraph marked "Third" page 32.

Again omitting the description after the second colon of the paragraph marked "Third," page 32 to line 5, page 33.

Again omitting descriptions of real estate beginning after "Gray County, Texas," page 33 to paragraph marked "Fifth," page 43, retaining names of counties and state.

And finally omitting each whole paragraph following the second colon of each of the paragraphs marked "Fifth," "Sixth, Seventh, and Eighth," and with respect to paragraph marked "Ninth," page 45 of the five paragraphs after the second colon down to the paragraph marked "Tenth" on page 46.

The Examiner will instruct the reporter to make extra copies of these omissions in such form that those for Exhibit No. 189 may be attached by separate sheet to Exhibit No. 189 and those for Exhibit 190 may be attached by extra sheet to Exhibit No. 190. With those omissions, the admission of Exhibits 189 and 190 is complete, subject, however, to any corrections counsel may bring to the attention of the Examiner.

(At this point, counsel for defendants offered in evidence certain extracts from the minutes of the hearing before the Committee on Interstate and Foreign Commerce House of Representatives, Seventy-Fifth Congress, on H. R. 4008, March 24 and 25, 1937, being the hearing with
respect to what is now known as the Natural Gas Act.
1822 The offer covered specifically Section 4(a) and Sec-
5(a) as shown on pages 2 and 3 for the purpose of showing that the wording of those sections at that time was the same as has been carried forward into the Act as finally adopted.

Defendants then offered the language on page 45 of the same report, commencing as follows: "Mr. Booth. Let me suggest this other amendment," and ending with the quotation on that page, which is the amendment which Mr. Booth offered.

Counsel for defendants then offered some testimony of Mr. Maltbie beginning on page 114 with the words, "Now, there is no provision in here regarding temporary rates," and concluding on page 115 with the statement by Mr. Maltbie "Unquestionably it does. The opinion of the Court of Appeals pointed that out."

The Examiner instructed the reporter to copy the marked sections from the document referred to on the pages referred to, that is pages 2, 3, 45, 114, and 115, at this point in the record as if read. Pursuant to such instructions, the reporter incorporated the extracts from the report referred to as follows:

"Sec. 4(a) All rates and charges made, demanded, or received by any natural-gas company for or in connection with the transportation or sale of natural gas, subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rate or charges, shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful.

"Sec. 5(a) Whenever the Commission, after a hearing had upon its own motion or upon complaint of any state, municipality, or State Commission, shall find that any rate, charge, or classification demanded, observed, charged, or collected by any natural-gas company in connection with any transportation or sale of natural gas, subject to the jurisdiction of the Commission, or that any rule, regulation, practice, or contract affecting such rate, charge, or classification is unjust, unreasonable, unduly discriminatory, or preferential, the Commission shall determine the just and reasonable rate, charge, classification, rule, regulation, practice, or contract to be thereafter observed and in force, and shall fix the same by order.

(Extract of page 45 is as follows:)

"Mr. Booth: Let me suggest this other amendment and then I am through.

"The Chairman: Very well.

"Mr. Booth: First I want to offer for the record a provision which would have the effect of authorizing the Federal Power Commission, under any temporary rate situation to fix temporary rates.

"Mr. Bulwinkle: Fix temporary wholesale rates?

"Mr. Booth: Yes. The proposed temporary-rate provision would read as follows:

"The Commission may, in any proceeding involving the rates of any natural-gas company brought either on its own motion or upon complaint, upon notice and after 1823 hearing, if it be of opinion that the public interest so requires, immediately fix, determine, and prescribe temporary rates to be charged by said company pending the final determination of said rate proceeding. Said temporary rates so fixed, determined, and prescribed shall be sufficient to provide a return of not less than five per cent upon the original cost, less accrued depreciation, of the physical property of said company used and useful in the gas service, plus a reasonable amount for working capital, and if the duly verified reports of said company to the commission do not show the original cost, less accrued depreciation, of said property, the Commission may estimate said cost less depreciation and fix, determine, and prescribe rates as hereinbefore provided. In any such proceeding, whenever the annual depreciation expense is computed upon the sinking fund method, no depreciation shall be deducted from such original cost.

"Temporary rates so fixed, determined, and prescribed under this section shall be effective until the rates to be charged, received, and collected by said company shall finally have been fixed, determined, and prescribed. The Commission is hereby authorized in any proceeding in which temporary rates are fixed, determined, and prescribed under this section, to consider the effect of such rates in fixing, determining, and prescribing rates to be thereafter charged and collected by said company on final determination of the rate proceeding.

(Extracts on pages 114 and 115 are as follows:)

"Now, there is no provision in here regarding temporary rates. I think Mr. Booth, of the Illinois commission, made a suggestion yesterday suggesting that a section copied after the law in the State of New York regarding temporary rates should be added here, and we have found it very advantageous. We have found that section in the State of New York to be advantageous and it has been upheld by the court of appeals, so that it is the law in the State of New York at the present time.

"There is just one clause in his suggested language which does not meet with my approval, and that is the sentence relating to no deduction for depreciation in case the sinking method is used. I do not want to start on the question of depreciation, because I know that I would get a way beyond your time this afternoon. But, that sentence ought to be eliminated and if any of you are interested, I will be glad to sit down and explain the reasons. I will guarantee that I can show you.

"Mr. Boren: You do not believe then that line 9, page 7—in cases which may arise providing for refunds—you do not believe that refunds or the refund method should be adopted or would be as successful as a temporary rate?

"Mr. Maltbie: I do not. One of the criticisms against regulation everywhere is that it takes so long to get anything done. Complaint is made and then an investigation is had which involves the taking of testimony and with a large company it strings along and the best that you can do is for 3 or 4 years. The public says that nothing happens. Regulation is no good.

"Now, the New York law permits us to issue a temporary order immediately. If we get the rate too low, below a fair return as the investigation shows, then it is adjusted in the final rate. That has worked satisfactorily and as I say has been upheld by the court of appeals.

1824 "The Chairman: In brief, how do you fix your temporary rate?

"Mr. Maltbie: The temporary rate is fixed upon the basis, according to the law, of the original cost of the physical properties, less depreciation.

"Now, we make an investigation. In some cases the books of the company show the original cost of the property and we have an order out now which will require all of the utilities outside of the railroads in the State of New York to produce an inventory and show the original cost of their property before the end of this year.

"So, if the book shows we get the original cost from the books. If the books do not show, we are allowed to estimate the original cost.

"Also the depreciation, if the books show accrued depreciation, we take that from the books. If we do not think that they do, we can quickly make an estimate or fix the minimum amount that we will deduct and deduct that from the original cost, getting the original cost less depreciation, taking all of the physical property, material, supplies, as well as plant. Then, an analysis of the operating expenses show what the revenues should be and we can fix a rate of return on it and do fix it. So far there has not been a temporary rate fixed on that basis reversed in the State of New York; not one.

"The Chairman: In effect you give consideration to every fact that you do in fixing the final rate, but you act hurriedly and save yourselves as to the constitutional question in the final rate where you pay the company any deficiency that may be found due.

"Mr. Maltbie: No, Mr. Chairman; I have not included reproduction cost less depreciation.

"Now, according to the law of the land original cost and reproduction cost less depreciation must be taken off of each one and must be considered. There are a number of other things that might be considered before fixing a final rate, but in a temporary rate we do not need to give any consideration to reproduction cost less depreciation; none at all.

"The Chairman: Does not the fact that you subsequently award the utility the proper amount of compensation in case you under-compensate them in temporary rates save the constitutionality of your method?

"Mr. Maltbie: Unquestionably it does. The opinion of the Court of Appeals pointed that out."

(Counsel for the Defendants then offered extracts from the proceedings in H. R. 11662 before a Sub-Committee of the Committee on Interstate and Foreign Commerce of the House of Representatives, 74th Congress at the Second Session, April 2, 3, 7, 14, and 15, 1936. Counsel stated that the provisions of Section 4(a) and Section 5(a) shown on pages 2 and 3 were offered for the purpose of showing that the provisions of the Act then under consideration were the same provisions as in the Act which is now known as the Natural Gas Act.

He also offered certain statements from pages 28 to 29 and from page 10 and made by Mr. De Vane,
1825 solicitor, Federal Power Commission, with respect to the Act which was then under consideration; the statement offered from page 10 beginning at the top of the page and extending down to the words "I shall not, in my presentation this morning."

He then offered that portion of his statement commencing on page 28, commencing with the language "Section 4 of the bill in general relates to wholesale rates," and continuing through the statement by Mr. DeVane on page 29, ending with the language "If it finds the complaint is well founded, it has authority to prescribe a new rate. That is correct."

At the direction of the Examiner, the extracts offered in evidence from the above mentioned documents were copied into the record by the reporter as follows:

"Sec. 4(a) All rates and charges made, demanded, or received by any natural-gas company for or in connection with the transportation or sale of natural gas subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful.

"Sec. 5(a) Whenever the Commission, after a hearing had upon its own motion or upon complaint, shall find that any rate, charge, or classification demanded, observed, charged, or collected by any natural-gas company in connection with any service rendered or to be rendered in the transportation of natural gas in high-pressure mains in interstate commerce, subject to the jurisdiction of the Commission, or that any rule, regulation, practice or contract affecting such rate, charge, or classification is unjust, unreasonable, unduly discriminatory, or preferential, the Commission shall determine the just and reasonable rate, charge, classification, rule, regulation, practice, or contract to be thereafter observed and in force, and shall fix the same by order.

(Extract on page 10 is as follows:)

"Mr. De Vane: Mr. Chairman and members of the Committee, my name is Dozier A. DeVane. I am solicitor for the Federal Power Commission and have been in that position now for approximately 2½ years. I appear here this morning at the request of the Chairman of your full Committee and of your sub-committee, and that the record may be clear, may I also state that I do not appear in the capacity of a representative of the administration in connection with any legislation that it has submitted to the Congress.

"This Committee will recall that as a part of H. R. 5423 was title III, which had for its purpose the regulation of this industry. Title III of that bill was substantially the same in language as the part of title II that related to the regulation of the electric industry.

"Substantially the only difference was that gas was substituted for electricity in the language of the bill. After the hearings upon that bill, titles II and III—when I refer to title II, I mean that part of the bill providing for an amendment to the Federal Water Power Act bringing under Federal regulation electric utilities—both that title and title III, which provided for the regulation of the natural-gas industry was referred to the same sub-committee and considered by the same sub-committee.

"I suppose it is not out of place if I should say for
1826 the record here that title III, which related to the
regulation of the gas industry was not reported out with title I and title II.

"The bill that you have now, H. R. 11662, is in substantially all respects, insofar as it goes, similar to the provisions of the Federal Power Act, with reference to the electric industry. The bill itself does not go quite so far as nor does not confer quite as much jurisdiction upon the Commission as does the Federal Power Act.

(Extracts on pages 28 and 29 are as follows:)

"Section 4 of the bill in general relates to wholesale rates which are the rates that are subject to the Commission's regulation. Section 4(a) provides that the rates and charges shall be just and reasonable.

"Section 4(b) prohibits undue preference.

"Section 4(c) provides for the filing of rate schedules and contracts with the commission.

"Section 4(d) provides for the method of changing rates; and

"Section 4(e) gives the Commission authority to suspend rates pending an investigation when new rates are filed. There is a limit of time within which these rates may be suspended, and if the case is not disposed of within a period of 6 months in all from the date of their filing they go into effect. This section is substantially the same as the section on the same subject matter in the Federal Power Act.

“Mr. Lea: Mr. DeVane, under what conditions would rates be put into effect? That is, what would be the procedure?

“Mr. DeVane: In the beginning?

“Mr. Lea: Yes.

“Mr. DeVane: The companies will simply file their schedules.

“Mr. Lea: And those schedules would prevail unless the Commission saw fit to, after a hearing and notice, establish a rate?

“Mr. DeVane: Yes, sir; those rates would prevail. The rates that the company makes effective at the date of filing are the rates that will continue in effect until they are changed either by the company, as provided in Section 4, or by the Commission after hearing.

“Mr. Lea: There would be, I take it, no duty upon the Commission under this bill in the absence of complaint or just reason to call for interference to establish rates.

“Mr. De Vane: No, sir; the Commission can only establish rates after investigation and hearing. Now, that investigation can be undertaken under section 5 of the bill either on the Commission's own initiative or upon complaint.

“Mr. Cooper: Let me see if I understand you
1827 there. That is, the gas companies can establish
their rates?

“Mr. De Vane: Yes, sir.

“Mr. Cooper: They do not have to go to the Commission; they can establish them themselves?

“Mr. De Vane: You are talking about in the beginning now?

“Mr. Cooper: Yes.

“Mr. De Vane: They file their schedule of rates.

“Mr. Cooper: And they put them into effect.

“Mr. De Vane: Yes, sir.

“Mr. Cooper: And anyone who wants to file a complaint goes to the Commission; is that right?

“Mr. De Vane: That is correct; and they can change their rates, Mr. Cooper, by filing new schedules under section 4(d). After they have filed them with the Commission and announced those new rates, the Commission has the power to suspend and investigate, and the suspending power extends for a period of 5 months.

"Mr. Cooper: Well, does the Commission have the power to suspend as soon as the protest has been filed?

"Mr. De Vane: Not in the case of protests, Mr. Cooper; no, sir. The power of suspension only applies to a new rate.

"Mr. Cooper: What I mean is this, if the gas company establishes a rate and someone files a complaint against that rate with the Commission, does the Commission automatically suspend the rate?

"Mr. De Vane: It has no authority to suspend that rate.

"Mr. Cooper: I see. They first have to consider the case.

"Mr. De Vane: That is correct.

"Mr. Cooper: Does it have authority, if it finds that the complaint is well founded?

"Mr. De Vane: If it finds the complaint is well founded, it has authority to prescribe a new rate. That is correct."

(At this point the Examiner directed the reporter to copy into the record a stipulation among counsel for the commission, for complainant and for the defendants dated December 5, 1939 as follows:

STIPULATION

"It is hereby stipulated and agreed that Exhibits 197 and 198, introduced by the witness, Charles W. Knapp, Jr., on redirect examination and his testimony with respect thereto, page 8580, line 13, through page 8583, line 23, will not be used or referred to on the argument before the Federal Power Commission in the hearing on the motion for 1828 an order for an immediate reduction in rates, and should not be considered as part of this case on such hearing.

George Slaff,
Attorney for Federal Power Commission.
John E. Cassidy, by
Harry R. Booth,
Attorney for Illinois Commerce Commission.
J. J. Hedrick,
Attorney for Natural Gas Pipeline Company of America and Texoma Natural Gas Company.

Dated December 5, 1939.")

1829 H. B. DORAU, a witness for defendants called for redirect examination, testified as follow:

(December 13, 1939.)

Redirect Examination by Mr. Culton.

In my original examination, I made the statement begining on page 5633 that "the imposition of a style of regulation which was developed for and adapted to relatively mature and maturing industries, upon a young and growing industry still in the stages comparable to the early states of these industries now so much more readily regulated, would be a distinct threat to their growth and development," and on line 23 I made the statement that by "style" I merely meant to adapt a somewhat commoner term to express the idea that includes the particular format, layout, procedure, manner, standards, bases, actions, and judgment and that it had no implication in it of the question of regulation at all.

Then, beginning with line 16 at page 5635 of the record and continuing over on to the following page, I testified as follows:

"In my opinion, if there is going to be regulation of an industry in which it is apparent that there is a large function for enterprise to perform, which is an industry still in the stage of development and in which those social results may be looked forward to from the function of enterprise, then all I would want to say is that the responsibility for properly rewarding and encouraging that enterprise definitely falls on a regulatory authority and it will have to assume the responsibility for keeping enterprise properly fed and clothed and alive if,—and this is again assuming,—it desires to keep enterprise alive in an industry of this sort. I believe that if the nature and rigid formula of regulation is imposed on an industry in its teen age, that it will discourage its growth and development, and that the way in which that can be avoided is by a proper and appropriate recognition of the award for the disposition to be enterprising."

In giving that testimony, I certainly did not intend to pass judgment on the question of regulation as such. My discussion, I thought, was perfectly clear. I was merely commenting on certain aspects of the regulatory policy as adaptable to this kind of an indsutry. I did not intend to imply any comparison between regulation and non-regulation at all in that testimony. So far as I know, I neither did, nor meant to, imply any such comparison. I was discussing an aspect of the regulatory policy. I did not intend in any of my answers to questions propounded to me on cross-examination with respect to regulation to convey the idea that I was opposed to all regulation. That would be contrary to my frequently expressed opinion to the contrary. I have never, to the best of my recollection, in all my life expressed an opinion to the effect that I was opposed to all regulation of utilities or comparable concerns.

I would like just to make the record perfectly clear as to the idea I was intending to convey in my discussion of the question of regulation. Because the questions came and were answered in a rather disjointed fashion, I would appreciate it if I would be allowed to make a summary statement.

I responded to questions raising rate of return issues only, or questions which I considered as having a bearing on the rate of return issue only. I testified that in my opinion regulation to be most effective and to meet the test of social economy must be adapted to the characteristics of the industry to be regulated, and that, therefore, industries not having the essential and primary characteristics of public utilities are not to the best advantage regulated under the formula which has been developed for public utilities.

I expressed the opinion that industries in which the investment faced a large measure or risk and uncertainty were not suited to a system of regulation which relies on the determination of a maximum or ceiling rate of return since the very nature of risk and uncertainty calls for the chance of gain being held open and the opportunity for profit to appear to exist.

I expressed no opinion as to the desirability or undesirability of regulation as such. I did not express an opinion adverse to the regulation of public utilities and would like to clearly state that my position has always been and continues to be in favor of intelligent, effective regulation of utility industries to the best long-term interest of society as a whole.

With respect to the manner of public utility regulation, I expressed one reservation, namely, that the increasing rigidity, sometimes mistaken for true effectiveness, of the regulatory process was discouraging to enterprise and to risk and uncertainty assumption and that under a more exacting administration of the traditional public utility formula which eliminates those classes of gain due to lags, imperfections, and infrequency of rate adjustments, it becomes the responsibility of regulatory authorities to specifically recognize the necessity for enterprise encouragement and reward if it is desired to allow such an industry to develop to its economic optimum.

No comparison as between the states would be justified as to the effect of regulation on the attractiveness of the investment opportunity, because one state might be larger than another and of much greater population, and one might have grown faster than the other. Moreover, it is entirely possible that other factors make one state more attractive than another. It would and could prove nothing unless the situations were otherwise comparable. Thus, as a practical matter, the only comparison which could properly be thought of is that between the conditions which exist in a given state under a given administration and what might be the conditions if there was regulatory recognition of encouragement of enterprise.

You ask whether the fact that an industry continues to grow proves that certain aspects of the regulatory policy and procedure did not have a discouraging or retarding effect. No, I do not think that proves anything of the sort. We know that good money often follows after bad money and it is often the economical thing to do to invest more in order to get a somewhat larger return than would otherwise be available for the original investment. Neither does it prove anything that an industry was able to borrow additional capital or that it invested revenue set aside for depreciation in some additional property. In the case of public utilities, there is usually an obligation to meet the service requirements of the market which the utility has held itself out to serve or for which it holds a franchise. If this requires more capital, that capital must be found. The railroad industry has added to its capital investment despite a long period of unsatisfactory return. It may become
1831 necessary to pay more for additional capital than capital as a whole is earning in order to meet a public responsibility or even to retain control of an enterprise.

You ask if individuals necessarily leave an industry because they become discouraged as to its outlook, that is, because they do not see the possibility of reward in proportion to the enterprise which they have displayed. Obviously not as a general rule, and particularly not those who have been in an industry long enough to have come into positions of managerial responsibility. The tendency is to stay since changes at such stages in life are difficult. The effect of a discouraging outlook in this respect is twofold, primarily on the disposition of existing management to exercise itself as it might if it could look forward to compensatory rewards, and on the attractiveness of such an industry to those who are choosing what industry to enter for the first time.

At page 7123 of the record it appears that in answer to the question "The fact that with respect to this utility there have been frequent rate revisions and frequent rate reductions has not discouraged investment in that utility, has it, to your knowledge" I answered "Not to my knowledge." I then added that I do not believe so. In making that statement, I had in mind in connection with the Potomac Electric Company that not all of the results of good management in the previous period were eliminated by rate reductions. I attempted to make clear that there was a great difference in holding out some sharing in profits as under the Washington Plan and the operation of frequent rate reductions when no such chance of sharing appeared to exist. In this respect everything that can be said in favor of the Washington Plan is in support of my position that regulation would be in the larger public interest if it held out the possibility of an extra gain for extra effort or hazard.

I was asked to enumerate causes of trouble in utilities other than lack of sufficient reserves, and stated that they were undoubtedly financial causes, and then the question of bad capitalization came up. You ask what I meant by the expression "bad capitalization". If I remember correctly, the discussion had to do with natural gas companies and the capitalization of natural gas enterprises. I had in mind the quality of the capital structure rather than the quantity as reported by the total of the par or stated value of all outstanding securities. I was then, and am now, of the opinion that the mere quantity of capitalization was not important for the financial experience of investors in the natural gas industry. I know of no instance where there had been financial failure because of the amount or stated value of common stock outstanding. I was, on the other hand, aware from my studies in investment experience in this natural gas industry that a disproportionate amount of debt and preferred stock capitalization appeared to be a cause of such financial difficulty. I had found that natural gas companies which were in receivership during the period 1931 to 1938, inclusive, had had 79 per cent of their capitalization in the form of bonds and preferred stock, whereas all natural gas companies had only 55 per cent in debt and preferred stock capitalization.

I had found that natural gas operating companies, including those in receivership, had 50 per cent of their capitalization in common stock, whereas those operating companies which went into receivership had only 20 per cent of their capitalization in common stock; that is, 80 per cent in debt and preferred stock.

I found that the operating companies in receiver-
1832 ship had an average bonded debt ratio of 66 per cent,
whereas those not in receivership had a debt ratio of
only 35 per cent.

I, therefore, meant by my reference to bad capitalization the presence of a larger proportion of debt capital than was suitable to an industry of this character and the use of preferred stock, which in my opinion, was not generally well adapted to this industry.

On page 7732 of the record, counsel asked if I meant to state of my own knowledge that rates in New Jersey would be lower today if Mr. McCarter had had a free hand to set rates all by himself without the pressure such as it is of the New Jersey Board of Public Utility Commissioners. I was asked by Mr. Slaff in that connection to concede that rates in New Jersey were lower today because of the presence of a regulatory commission than if there had been no regulatory commission, to which I stated that there were other alternatives that I had in mind which counsel might probably not have. The question was then asked me whether in my judgment the rates would be lower in New Jersey today, other factors being equal, if there had been no public service commission in New Jersey since 1911, to which I answered that I was not in a position to say that that would be the fact. I was told at that time that I could later tell the other things that I had in mind. Had I had an opportunity to explain at that time, I would have pointed out that no one could tell what rates would be under those alternative conditions. Certainly no one could tell now whether rates under local regulation compared with commission regulation would be lower or what conditions under a system of local franchise control might be. Some rates might be higher and some lower. Local regulation would probably make these large uniform rate areas such as now exist in that and other states impossible. Rates in large communities, therefore, might be lower, but, on the other hand, rates in the smaller communities might be higher. I just found it impossible to put myself in the position of answering a question of that sort."

I certainly intended to leave no such impression as that I have appeared here oposing any character of regulation; and if there is anything in the record that validly leaves that impression, I would want to be the first to change it.

Recross Examination Interposed by Mr. Slaff.

I do not believe I am backtracking with respect to what I said in our discussion of investment in Kentucky Utilities as compared with investments in New York, at the time you were cross-examining me. I hope I made it clear at that time—I tried to—that I did not consider Kentucky in other respects comparable to New York, and I am also sure, from the record, as I recall it, I tried to point out that there were many other factors besides regulation which one would consider in making an investment. If that is clearly understood, I think the record is probably satisfactory.

Redirect Examination by Mr. Culton Resumed.

Mr. Booth read from the testimony in the Peoples case a portion of my testimony with respect to pure interest. Since that time I have examined the record in that case and have extracted other portions of my testimony on that subject. I think these portions of that discussion ought to be added, since he made reference to at least a summary of some
portions of the testimony. I would like to have in-
1833 cluded, if I might, the questions and answers given on
page 9269 of that record, beginning with Mr. Booths
question, as follows:

"Mr. Dorau, your conception of the rate of return as you have testified to in this case, consists of the three factors, interest and the risk—

"A. Risk and uncertainty and the wages of management.

"Q. —and the wages of management."

"A. (Continuing.) "You testified before the Commission that the fair rate of return would be about seven per cent?

"A. Yes.

"Q. And of the seven per cent, how much of it is attributable to each of the three items?

"A. The same question— I don't think it is possible for anyone to segregate that in an arithmetic way, such a rate of seven per cent, into the different elements that we have. We think of a figure of three per cent historically as rather representative of interest as such, very often, in a rough sort of way, and build on top of that, the risk premium and the wages of management. There might be a great deal of latitude in the division, but four per cent would cover the risks and uncertainties and such compensation as would be fair and reasonable over that which a passive investment would take, and that seems to me to be the most reasonable figure one could decide on.

"Q. The seven per cent did not include compensation of management?

"A. Yes.

"Q. You said three per cent.

"A. Interest, risk, uncertainty and the wages of management.

"Q. But you said three per cent of the interest—

"A. There is four left to divide among those.

"Q. Oh, I see, is that substantially what you had in mind when you testified before the Commission?

"A. You mean, as a division?

"Q. Yes.

"A. No, I did not— I do not think I attempted— that I attempted to make a division. I know, that back in my mind, the old three per cent is a rather traditional percentage of interest; it may be far from true from time to time.

"Q. Is three per cent far from the truth at the present time?

"A. I think the pure interest element, to calculate in the fair value of a substantial amount of capital, would be higher than the present circumstances indicate. It is fair to calculate it on that basis, but no one, and I, certainly, would not be influenced by the one and one-half per
1834 cent on government financing, any more than I would be, by a yield or price of four and five per cent on what we would consider as risk investments. I do not think it has generally been so regarded. We have neither taken the

extremes, up or down, and from a theoretical standpoint it is very doubtful whether pure interest actually fluctuates as much as we are sometimes led to believe by the market.

"Q. Then three per cent strikes you as being or constituting that part of the seven which would represent interest—

"A. I think it is probably a fair per cent to use for pure interest.

"Q. Now, what part of the four per cent did you allocate to risk or would you allocate to risk and uncertainty, and what part would you allocate to compensation for management or wages of management?

"Mr. Daily: I object to that.

"The Witness: It is a matter of opinion.

"Mr. Daily: It has been answered.

"The Witness: A. It is a matter of opinion.

"Mr. Booth: Well, now, Mr. Daily is not answering these questions.

"Mr. Daily: I am objecting to you asking the question; it has been already answered.

"The Master: He may answer it again if Mr. Booth does not recall the answer.

"Mr. Booth: I have asked him a different question.

"The Master: He may answer.

"The Witness: A. That is entirely a matter of abstract opinion.

"Mr. Booth: Well, what is your judgment?

"A. That is my judgment; that is what I am going to give you. You can appreciate from my previous answers that it cannot be reduced to mathematical amounts, yet you want an answer in those terms.

"Mr. Booth: No, I don't want an answer down to four decimal points. You accountants are accustomed to mathematical precision down to five or six points, but I would like to have your substantial judgment on the matter.

"A. I would be inclined to believe that the return available to capital in an industry of this sort, as a whole, and the type of company performs the work, and so on, that the risk and uncertainty, at any time, over and above pure interest, as pure interest, certainly would reach well to the three per cent level.

"Q. And the remaining one per cent would represent what?

"A. As a residue which we can say is a necessary and

additional inducement as compensation for aggres-
1835 sive capital that has to be managed over passive and inactive capital which does not need management."

Mr. Slaff referred to a portion of my testimony in the Peoples case with respect to price levels and as appears on page 7133 of the record he asked me if I were now a better profit as to price levels than at the time that case was tried, in I believe 1937. I have extracted what I said about price levels at that time from the record in the case in which I was testifying and would like to have incorporated here what I said at that time on this point. The questions and answers I wish incorporated here begin at page 9295 and are as follows:

"Q. You were referring to the positive possibility and you made this statement: 'Possibly only a courageous reversal of Government policies which in recent years have added to the usual abundance of funds in the trough of the depression and during the earlier period of recovery, will prevent such a rise in the price level;' did you so testify?

"A. Yes.

"Q. Has the Government taken any steps towards preventing speculative rises in prices. Has there been any recent steps taken?

"A. It is very difficult to interpret the policies of our present administration. I think the fairest answer to that is that they appear to have done both things, trying to work on both sides. Thus, we have seen the President acting to curb the rise in prices of certain raw materials. The President's energetic pronouncement has some element of threat in it with respect to the rise in the price of copper and such things. On the other side we note an effort to increase the reserve requirements of May 1st, I believe.

"Q. Wasn't that intended for the purpose of eliminating the speculation which—

"A. Well, I would interpret it as indicating a possible state of apprehension or anticipation of a run-away credit inflation.

"Q. Tell me, Professor Dorau, do you believe that it is possible to determine with a fair degree of accuracy, what the general commodity price level will be, well, on January 1, 1940?

"Mr. Daily: That is not cross examination.

"The Master: Is that cross examination, Mr. Booth?

"Mr. Booth: That is proper cross examination in view of the fact that this witness has testified as to what the level of commodity prices are going to be.

"The Master: Just a moment, tell Mr. Daily where it is and he may withdraw his objection. He says it is not cross examination.

"Mr. Booth: This witness testified in response to a question addressed to him by Mr. Daily.

"Mr. Daily: I will withdraw the objection.

"The Master: You may answer, Professor Dorau.

1836 "A. I would not be competent to do it, to make such a statement. Of course, that doesn't mean to say that there are not devices available to us on the basis of which we could make—something better than merely a guess.

"Mr. Booth: Do you know of anybody in this country that can determine with a high degree of accuracy the general commodity price level which will exist on January 1, 1940, and thereafter?

"A. I would like to say something off of the record.

"Mr. Booth: I want this in.

"The Master: Off the record.

"Mr. Booth: Will you read the question?

(Question read.)

"The Witness: A. I think there is just one person in this country who would be in position to do that with a high degree of accuracy.

"Q. And what is his name?

"A. Franklin Roosevelt.

"Q. Would you say that the future of commodity prices is dependent upon a great many factors?

"A. Certainly.

"Q. Would you say that one very important factor would be the policies of the present Federal Government?

"A. Very definitely so."

Recross Examination Interposed by Mr. Slaff.

I did not mean at all that that is all that I testified about with respect to rising price levels in that case. I wanted this to clarify merely the portions that were raised here in this case.

Redirect Examination by Mr. Culton Resumed.

In that testimony at that time, I made no prediction as to what the price level would be as of January 1, 1940, and thereafter. I said on the basis of the evidence then available it seemed the reasonable expectation that we would face a rising commodity price level. I made no detailed study of the price levels to determine what the levels are at this time as compared with what they were back at that time, when I was testifying, but I was interested in the Temporary National Economic Committee's release on December 10, which pointed out that as of December 2, 1939, all commodity prices were 105.3 as compared with August 26, 1939. Raw materials were standing at 108.8 on December 2, 1939 as compared with August 26, 1939. Semi-manufactures were standing at 109.7, as compared with August 26, 1939. Finished goods were standing at 103.5 on the same basis, as of December 2, 1939.

Recross Examination by Mr. Slaff.

No, I did not mean to say that I have read into
1837 the record everything from my original testimony
which we discussed here at page 7133 of this record. I made no statement indicating that. I would not presume to read all of that into the record. I have not read into the record the transcript of those portions of my direct testimony under examination by my own counsel before Master Swissler to the effect that we were in for definitely rising price levels from June 1937 on. I think that is already in the record.

Yes, at page 7133, you questioned me from an abstract of the record in the Peoples case. I did not think it necessary to read into the record at this time what I actually said in the Peoples case in June, 1937, because it is already in the record. I think that part in the transcript was in quotations.

You ask if there is any doubt in my own mind now that in June, 1937 in my testimony before Master Swissler in the Peoples case I testified that we were in for a definitely rising price level. If I may add one more statement as to my recollection of the effect of all that testimony; after making reservations and observations with respect to the difficulties of any forecasting, I said that in the light of the evidence then prevailing that the most reasonable expectation was that we were in for a period of rising prices. That is already in this record. I am not going back on that now. No, it was not my intention to backtrack on that when I read into the record certain portions of the transcript in that case just now. I merely wanted to clarify that rather limited excursion into it.

You ask if from 1937, when I testified, down to September, 1939 this country was in a period of decline in the general price level. I think, if I remember the indices, I don't try to remember them accurately, we had several months of rising prices following the last available figures at the time of my testimony in 1937, and that irregularly since then we have had a slightly declining general commodity price index.

You ask if it is not a fact that after my testimony in Chicago in June, 1937, the wholesale commodity price index went up in one month only, July 1937. I should like to make it clear, we didn't have the data available at that time; I think the lag was two months at least. There was a period of two or three months after I testified, as I remember, in which the prices were rising. That is what all the discussion in this present intervention is about. I think it declined irregularly, beginning with August, 1937, through August 1939. It ended up at a lower level. I don't recall all the statistics, but I think you are probably correct in stating that it did not increase in any one of those months of the two years following July, 1937, over the preceding month. My recollection is there were two or three months in which it continued to go up after that date. At that time there was a reasonable expectation of a rising price level.

You ask if that reasonable expectation did not turn out to be wrong. 1940 is not here yet. Yes, at that time I testified that in the light of circumstances then prevailing it was a reasonable expectation that we were facing a rising price level. That was my judgment at that time. I think it was a reasonable expectation. No, I am not admitting that I was wrong in expressing it as a reasonable expectation at that time. That was my opinion and I do not admit that my opinion as to what did occur was wrong. It has taken longer for certain factors to develop than I then anticipated. I say I am not wrong about the reasonable expectation: I will say that the index of wholesale statistics has not moved in the way it was expected to at that time, if that is what you mean to get at.

Questions by the Examiner.

I made no prediction in June, 1937. My testimony
1838 related simply to my opinion which was not primary
testimony on my part, either, that in the light of circumstances then existing, in the light of apparent development of trends, it was the reasonable expectation that we were headed for a higher price level. I think the questions were directed at the wholesale commodity prices. I believe that is right.

Recross Examination by Mr. Slaff Resumed.

When you suggest that I held out to the Master on which he might form an informed judgment with respect to how wholesale commodity prices were going in the next year or two or three years, I think you misinterpret the whole matter of forecasting, Mr. Slaff. It was not how it was going to go, but what was the reasonable expectation as of that time. No one can state at any given time what the price level is going to be in three months or six months. If that were the requisite, there would be no sense in making that sort of an estimate or forming that sort of a judgment. All we can do is to give our best judgment. Up to the middle of this year, or the fall of this year, that rising trend had not developed as anticipated. A decline of some seven points in the index is shown. It may be somewhat more than seven. The index speaks for itself.

You ask if it is not true that even with the rise which has taken place since approximately September, 1939, we still today are not at the price level of June, 1937. Not of the all-commodity price level, that is true. I would like to add if I may so there is no misunderstanding, I did not presume to put everything in the record that bore on that question. I merely wanted to get in certain aspects that would explain the circumstances and the limitations on which that observation of a reasonable expectation was made. I wanted to add these excerpts to provide a little more background for the interpretation of the brief thing that was taken out of the abstract on my former examination.

Question Interposed by the Examiner.

You ask if I am quite satisfied with the statement as it appears in the record, subject to whatever limitations I have just made, that I did testify in June 1937, that in my opinion we were facing a definitely rising price level in commodity prices. Yes, with the exception of the fact that all of the testimony I think is clearly indicative that I was expressing it as a reasonable expectation at that time.

1839 (December 14, 1939.)

Redirect Examination by Mr. Culton Resumed.

In my cross examination some questions were asked with respect to the amortization period of defendants. I have made no attempt to determine what should be a proper amortization period for defendants. I have made no estimate as to what that period shoud be. My testimony was not based on the assumption of any particular period. I assumed that would be determined as the most reasonable possibe estimate in the light of all of the evidence available. After the Commission shall have used its best efforts and determined as best it can what a proper amortization period would be there still remains the hazards connected with the amortization period.

Coming to an estimate, no matter how admirable it may seem at the time, does not remove the risk involved; because making an estimate does not establish the certainty; and the making of an estimate does not reduce the risks that inherently exist. Checking the elements of risk and uncertainty is just a step in measuring and appraising the value of the risk.

I do not believe the investor necessarily avoids risks, but what he is interested in is whether the return possibility is compensatory for the risks and uncertainties involved. I don't think it matters much as such who makes the estimates. It does matter whether the investor thinks the possible rewards are worth the chance that he sees in the situation.

I don't believe that either a public or a private opinion as to what is likely to happen necessarily predetermines or necessarily imposes any restraining conditions on what nature, for example, is going to do, or what the operations of the economic forces are going to do. The most reasonable provision for amortization is not necessarily accurate. It can't be assuredly accurate, because no one can foretell the behavior of natural forces, or for that part, of economic change. All that can be done as to expectations, as with the price level, is to make the best estimate in the light of the circumstances then prevailing. The conditions on which the estimate is made may change radically. They may even change quickly; and it is that possibility that the investor keeps in mind irrespective of the estimates made.

You ask what risks or hazards would be left to be considered by investors after the Commission has exercised its best judgment as to the proper amortization period. I would not assume to take the position of an engineer or geologist, and never have; but it seems to me that to investors there are remaining hazards as to what the possible withdrawals from a given field of this sort might be, as compared with past withdrawals; what the rights of carbon black utilizers might be or might come to be in a field of this sort; what natural accidents underground and other developments there might be. Any one, at least any one acquainted with gas in the least way, understands that such things can happen without any warning.

1840 The rate of withdrawal probably would appeal to the more informed investors as a possible factor influencing the availability, that is, the cost at which natural gas might be available. If he should be more widely read, he might even be concerned about the possible new uses for natural gas nearer the points of consumption, such as a basis for a new chemical industry.

He may even be concerned about public proposals for the proration, or assignment, rather, of the various fuels to various categories of use which might interfere. I don't mean to imply that he is necessarily in a position to accurately and technically appraise the possibilities of that; but he is influenced by any knowledge he may have as to these uncertainties, which no one would be in position to forecast accurately.

You ask if there is any way that the Federal Power

Commission could protect an investor against these remaining risks to which I have referred. Well, that is a broad question. I assume, theoretically there are some possible ways; but as far as I understand the present rules and practice in regulatory procedure, the Federal Power Commission can't assume to protect investors against that sort of thing.

I don't understand that any governmental agency offers to reimburse investors for any experience they may have which is worse than anticipated in any of that type of estimate. A regulatory commission can, of course, in the future increase its own estimates if it has found it has been too conservative; but I don't understand that there is any principle according to which the Commission can retroactively reimburse in case it finds it is wrong on the other side.

In my direct testimony I tried to explain what the investor believes is compensation for the risks involved as he sees them. I might add that he may be relatively ignorant, or relatively well informed, but the thing of practical importance is how he behaves towards this situation in the right of whatever information he may have.

In my cross examination there was some discussion about control of markets. I stated that one of the risks of defendants was that they do not have control of their markets. I used the term "control of market" in the sense in which it is used in public utility literature, when we say that a public utility has control of its market. That is, it is engaged in the distribution business; it has direct access to the customers; it is in position to determine the marketing and merchandising policies. It is in position to determine how much exploitation of incremental or marginal business it is appropriate to go into; in other words, simply the contrast between a company which occupies an industrial and business situation, where it can deal with its market, as distinguished from a situation where it is insulated from its market as a wholesaler is. I would like to say that there was no invidious implication in the word "control", such as might be derived from anti-trust literature or anything of that character.

In my opinion it has been rather generally accepted as a good principle of organization in utility industries to
strive to integrate the production of the service, the
1841 transmission of the service and the distribution of
the service. And the history of the utility industries,

of course, most strikingly the electric industry, is in harmony with that principle. The number of isolated stations is relatively rare. Isolated power plants and isolated transmission lines are not, so far as I know, looked upon with favor by the investor because he does not feel, whatever their arrangements might be, that they are as good or as stable or as reliable as integrated ownership, where the community of interest is completely established.

When I stated that the defendants had no effective control of their markets I meant they were not in the public utility distributing business. They might have a degree of veto of some aspects of marketing policy but they were in no position so far as I know positively to direct or determine what the marketing policy should be with respect to the general distribution of their product.

You ask what I meant in my testimony about the risk incident to the load factor employed by defendants. Well, my understanding is that the property of defendants is being utilized well up to capacity; that in fact it is operated at times over 100 per cent of the stated or rated capacity of the line. Under those circumstances the outlook for increased business or improved utilization, economies or gains from improved utilization would not be very good as compared with the situation where it was operating, say, at 60 to 70 per cent of capacity; and there was some outlook that defendants might take advantage of the unutilized capacity and do a larger or more compensatory business. The risk, therefore, is that in the development of the future with respect to an enterprize operating at nearly full capacity, it might find itself operating at lower capacity, but rather improbably operating at higher capacity.

In my discussion of the risk arising from the possibility of raiding lines I did not undertake to say where those raiding lines would come from. I was trying to reflect the investor's reaction to the possibility of some one offering to bring gas to the Chicago market at a lower price than is now being offered; because some one might be able to bring it under more advantageous conditions, or from more advantageous locations. The possibility of such a thing is what was in my mind, because if some one offered to bring gas at some lower price to the Chicago market it would create an embarrassing situation which I believe would ultimately tend to force the existing company to give regard to the price level at which such gas was offered.

As a practical matter, in the instances where lines have been built to markets or territories, I recall, by natural gas pipeline companies, it has caused some disturbance or concern to those local markets and they would tend to be forced to capitulate to the most economic price at which gas would be available.

I think I had in mind the possibility that if gas were offered at a lower price to the Chicago market that regulatory commission authorities might well bring pressure. It is not inconceivable that a local distributing public utility company might be asked to point out why they should continue to pay as high a price under an exist-
1842 ing contract when gas actually was offered at a lower price, if an arrangement could be made.

Presumably, if my understanding of the law is correct the Commission has control over the necessity of operating expenses, and the price paid for gas presumably might come within the powers of the Commission. Whether that would break such a contract I am not in position to say. If such a company had to bear the burden of paying the price and couldn't recoup for it the chances are it might some day find itself in financial embarrassment and might find some other legal relief from the burden of such contract.

I didn't presume to make any determination as to exactly what the probability was legally, but simply stated in my opinion in the light of those circumstances that was something the investor, if at all informed about the situation, might give consideration to.

I was asked on cross examination what other fields there are from which gas could be obtained to support a raiding line into the area of defendants' markets. I am not a geologist, as I have stated. I think an investor is rather impressed nowadays with the fact that gas is being found here, there and somewhere else. He may know that Nebraska brings some in or that Southern Illinois brings some in. He is rather getting the idea, in my opinion, that gas might be found most anywhere after a while. So far as my general knowledge goes I have the impression that gas is being found in an increasing number of states and over a wider area. I don't mean to say I know where this gas is going to be found. I don't know that.

If I did know I would probably do something about it. All that the investor is concerned with is that somebody might find gas closer to the market served by defendants.

In my cross examination I made a distinction between incremental business and marginal business of the natural gas company. By marginal business I mean, I think it is the general meaning, that business which is just sufficiently compensatory to be worth taking on. It is the last class of business or the last portion of a class of business which is just worth while for an enterprise to assume to take. It is the business for which cost and income are just in balance. The company would not go any further. It finds it probably worth while only just that far.

By incremental business I had in mind any business which could be taken on additional in the light of the capacity of the property, in the light of the circumstances of the market and in the light of the market already served, at an advantage over and above what the marginal business would yield; referring, therefore, to any additional business. There is no implication in incremental business that it is just compensatory or that it is a burden on any other business, simply a reference to additional amounts of business which could be taken on to advantage. Marginal business would be that business which is only just compensatory.

In my prior cross examination reference was made to the fact that some of the risks which faced defendants in 1931 have been to some extent overcome. You ask if
1843 I think that having in part overcome such risks the investor should be deprived of the fruits of having successfully overcome them. No, I don't believe you can with impunity deprive the investors in any industry of the necessary compensation for the assumption of the risks peculiar to the initiation or early periods of a business enterprise. It is one of the most important risks which he assumes and he expects sooner or later to be compensated for it. In a competitive non-utility enterprise he looks to the time when the business is established as a going concern, at which time he figures the risks in initiation and origination will be over and he will be making a return which will compensate him for his earlier risk assumption. I believe I did testify I did not consider that question ought to be allowed to enter into the rate of return calculation.

I have always felt it was more appropriately given consideration in the determination of going concern value, the value of a going business over and above the value of an enterprise just physically and legally established.

The record at page 7013 shows that during my cross examination I testified in substance that a consideration of the advantages of a given industry is a part of the mental processes of an investor in making up his mind as to the return required by him from a specific industry or a specific company. I added, however, that he could do that in two ways, one of which was by weighing the advantages of the particular industry or particular enterprise against the advantages or disadvantages of another industry or another enterprise.

I said that because I was of the opinion there is no absolute measure of risk and uncertainty; that the determination of risk and uncertainty is a relative matter. The process by which it is arrived at is comparison. I would like to have said at that point that comparisons may be made with respect to a given industry either by reference to a group of industries which by more or less common consent are considered to be more risky, or by reference to a group of industries which are considered by more or less common consent to be less risky. I prefer to begin my comparison with the utility industry which I consider to have involved in it generally less risk and hazard. I prefer to begin with the utility industry, because compared to other industry segments, I feel I know a good deal more about the risks of the utility industry. Also, it appealed to me as the natural and logical thing to do since there appeared to be some implication in this case that the utility status was being prepared for this particular enterprise.

I would say I think the expression probably speaks for itself. What I meant to say was from what I had read of the record in this case and the complaint, what I knew of some people's interpretation of the legislation, it appeared to me that the procedure was going to be that of trying to show that this industry was to be regulated as a public utility industry is regulated, and if that were the case, or if there is any good reason for that at all, it was a perfectly logical thing to start your comparison with the utility industries and think in terms of what additional risks there were in this enterprise as compared with the more commonly understood public utility; entirely practical without any implication as to the merits of the case from a legal standpoint.

1844 I stated on page 7018 of the record that I did not believe it would make any difference in determining the proper rate of return whether a company was capitalized on an all-common stock basis or on a basis of 50 per cent first mortgage bonds and 50 per cent common stock. I believed it was true because I never had the understanding that a public utility is under the legal obligation to go into debt in order to get a fair rate of return. It was my opinion that the fair rate of return should compensate for the necessary supply price of capital at the most advantageous capital bargains that could be made at the time.

As to what the advantageous bargains are that can be made at one time is often a question on which there is a great difference of opinion, some people believing that a long term obligation is advantageous issued at one time, and possibly others differing. When the management makes the decisions as to that, it assumes the risk that it may be wrong at some time in the future. I have always been convinced there is nothing appropriately in the regulatory process that makes it right and proper for public authority to impose on consumers any burdens arising out of the nature of the capital bargains which different classes of security holders may have made among each other and that, conversely, if the hazard that a given capital structure prove disadvantageous at some time in the future is assumed by the equity capital, for example, that should it turn out advantageous in the future, there is no one who more appropriately might have that little differential of reward than those who took the chance of its turning out disadvantageously, namely, the equity ownership.

At page 7038 Mr. Slaff asked me if I had the ratio of bonds to the total capitalization of the Northern Natural. To the best of my information there is about 39 per cent bond indebtedness without giving consideration to surplus. I think the company has something of a surplus, so the ratio is probably something around between 37 and 39 per cent for an average 42-year maturity. If the surplus was considered it would be down to 37, and without giving consideration to the surplus I think it is 39.

At page 7039 Mr. Slaff asked me whether or not I could give the bond interest coverage if defendants issued bonds for 40 per cent of the capitalization of the company, carrying coupons of 3.25 per cent. You ask if I can now give that information. I believe I indicated that I was unable to make that kind of a calculation because I did not know what the rate base of all of the property would be.

I had in mind, of course, the distinction between establishing a ratio on the basis of the capitalization that a given company happens to have and a ratio on the basis of the value of the property. There is no necessary assumption that capitalization reflects the value of the property. Consequently, some concern may have a modest amount of debt, only a modest amount of stock, and carry a very substantial amount of surplus. It might choose to state its common stock at a nominal figure on the balance sheet; thus there is no necessary parallelism between the capitalization and the value of the property.

1845 You ask if in computing times interest coverage it is ordinarily the custom of the investor to use capitalization based on the fair value. When they are trying to discover the coverage of a particular issue, the question does not arise because they take the bonds and the interest on the bonds and the income available for that particular issue, but it is only when they are trying to relate times interest coverage and debt ratio to rate of return that the effect of a possible difference between capitalization and value would have an influence on such calculations. A company, to make it very simple, might show a 40 per cent debt ratio to a formal capitalization but might have only a 20 per cent debt ratio to the value of the property.

I think I stated in my testimony that one normally makes calculations of that sort. I do from time to time. I carried some out further. If you wanted to assume, for example, that a concern had a 40 per cent debt to value ratio, that it was able to finance 40 per cent of the value by debt capital, and that the interest requirements on the bond issue would have to be covered five times, let us say, just for illustration, then it could pay as much as four per cent for its debt capital and maintain those ratios. That is, a 40 per cent debt ratio, and a five times interest coverage would allow four per cent interest cost on 40 per cent of your investment. And incidentally, if you had a 40 per cent ratio with interest requirements covered five times, the equity, the remaining 60 per cent, would at an eight per cent rate of return earn 10.67 per cent. Those are purely arithmetic relationships.

That example would be pertinent to any rate base that might be used. It is not necessary to know that it is sixty million or sixty-three million or seventy-five million. It can be calculated simply on unity or one hundred. Take one hundred and have 40 per cent of the one hundred as debt and earn the interest requirements on forty dollars out of the one hundred five times over; you could pay as much as 4 per cent and have five times coverage. The remainder would earn at an 8 per cent rate of return 10.67 per cent. That can be calculated for any possible or any conceivable relationship.

In my cross-examination there was considerable reference to the statute of New York with respect to legal investments for savings banks and trust funds. One paragraph of the New York statute, Section 13, was offered in evidence. Subsection A of Section 13 reads as follows:

"(a) Such corporation shall have all franchises necessary to operate in territory in which at least 75 per cent of its gross income is earned, which franchises shall either be indeterminate permits or agreements with, or subject to the jurisdiction of a public service commission, or other duly constituted regulatory body, or shall extend at least five years beyond the maturity of such bonds, and such corporation shall file with the superintendent of banks and make public in each year a statement and a report giving the income account covering previous fiscal year and balance sheet showing in reasonable detail the assets and liabilities at the end of the year."

1846 As I stated on page 7050 of the record it is my understanding that "supplying" as used in Section 13 in the statement "business of supplying electrical energy or artificial gas or natural gas purchased from another corporation" referred to distribution of public utility services at retail. That was my interpretation of the statute in response to questions by Mr. Slaff on cross examination. I had that meaning of the work "supplying" in mind when I answered those questions.

In my cross examination Mr. Slaff asked some questions with respect to the individual enterprisers and the corporate enterprisers. I meant to make no distinction between individual and corporate enterprisers.

At page 7071 I was asked if I had not made the statement, "The gas and electric industries are characterized by decreasing costs, increasing returns, and thus the possibility of lower prices to the consumers." In my judgment there is a difference in the cost behavior of the electric industry and a concern of the character of defendants. That distinction is, I believe, quite obvious if one understands the nature of decreasing costs and increasing returns.

The most generally accepted meaning of the phrase "decreasing costs and increasing returns" refers to that circumstance in any given enterprise which arises out of the fact that its full capacity for production might not at any one time be fully utilized; and therefore, any incremental business can be carried at lower unit costs, because the fixed overhead and common costs of such an undertaking have already been taken care of; and thus any increase in the volume of business up to the point of full utilization would, assuming a constant price for its product and an unchanged cost level, result in a lower unit cost for the service or product of that enterprise. It is quite possible that any enterprise which has unutilized capacity could experience decreasing costs and increasing returns if it got more business.

That behavior has been particularly evidenced in the electric industry because in the electric industry the capacity has to be capable of meeting the peak load demand; and consequently any additional business which you can get at off peak hours can be taken on to great advantage; but once the total capacity of a plant is reached that kind of decreasing costs and increasing returns is no longer available.

I don't think there is any probability that that cost behavior to which I have referred such as has been experienced by the electric industry would apply to defendants. If I am correctly informed, this enterprise has been operating nearly at full capacity, and consequently there is apperently no basis for a decreasing unit cost experience of that sort.

Moreover, it does not seem to qualify on the other two assumptions which are always necessary, namely, that the level of cost experience as such remains unchanged, and that the revenue rate remains unchanged.

Here you are dealing with natural resources, a situation which affords every reason to believe that increased costs per unit of raw material will develop in the future.
Consequently, you have no opportunity for the aforementioned type of decreasing costs; and there ap-
1847 pears to be reason to believe that there will actually
be increasing costs insofar as the circumstances under which the raw material is to be provided are as I assumed they were.

In my cross-examination some questions were asked me with respect to the earnings of defendants and their depreciation or amortization. Clearly, I have not endeavored to ascertain the value of the properties of those companies, their earnings or the proper amounts of depreciation or amortization. I was interested only in the question as to what the ratio of the return ought to be to the rate base. I am not in position to determine the value of the rate base, nor to appraise the validity of the operating expenses and thus determine the return in dollars.

On page 7170 of the record it appears that the Examiner asked whether I had the figures on the Northern Natural Gas Company with respect to its revenue and the sources from which it was obtained. I attempted to obtain those figures and so far as I know this is the best form in which they are available. As of the twelve months ending June, 1939, the revenue from domestic sales made directly or through subsidiaries of this company was $1,006,942; for commercial, $615,258; and for industrial, $2,909,681; making a total sold directly or through owned subsidiaries of $4,531,881. Town border sales are reported at $6,029,586 which should add up to an overall total of $10,561,467. I obtained these figures from Mr. Gilman who had received them from some insurance company. I asked him if he would give them to me from reports he had. My only interest in bringing in these figures is that the Examiner asked me about it. I haven't checked these figures with the companies and can't assume any responsibility for them; it is my understanding that those are the figures that the insurance company got.

Questions By the Examiner.

The MCF figures in that connection were: For domestic, 1,493,320; for commercial, 2,053,272; for industrial, 18,721,922; or a total of 22,268,514 sold directly. The total town border sales aggregated 24,876,729 MCF, making a grand total of 47,145,243 MCF for direct and town border sales. That is the best information I was able to get. I could not find it in Moody's.

Redirect Examination by Mr. Culton Resumed.

I recall reading the examination of Mr. Emery with respect to an exhibit which he offered in the Chicago District Pipeline case relating to comparative yields on bonds, preferred stock and common stock in the ratio or 1, 1.1 and 1.4. I tried to acquaint myself with it and I believe I understand the formula he employed. If that formula be properly used it is probably a satisfactory device for use in determining a proper rate of return, but if such ratios are going to be employed against, let us say; an average bond yield, all of the elements used ought to be brought up to date as of one time. Averaging the base of bond yields after bringing them up to date and then applying a multiplier as of some particular date, does not appeal to me as being a reliable and valid statistical procedure.

1848 The relationship between those different classes of securities or the spread of relationship between them might very well change in the companies which were used to determine such ratios. It might be different from one time to another.

If I can just use an illustration I can possibly explain it. It is possible that in tabulating a list of companies of that sort you may have a company which had only preferred stock, no debt, and common stock; and the preferred stock may be in a very good position and have a relatively low yield. The next company you might take might be one which had a very high ratio of debt or little or no preferred stock and the rest common stock, and so on down, with any possible type of combination. Consequently, it is mathematically possible that within the preferred stock there would only be the best preferred stock, that within the bonds there would be bonds of very high debt ratios and consequently you may come out with an overall summation of 1.1 for the preferred stock yield compared with the bond yield. In fact, it is arithmetically possible, using that device, to come out with less than 1 ratio for the preferred stock. Consequently, unless you determine all the relationships and their validity at a given time, and check on that, I would say that that method might be unsafe.

The change in the corporate structure of such companies as are considered during the period of years changes the relationship between the different classes of securities. That is so especially in this industry where securities are issued under very heavy retirement requirements; seven or eight years later might show a much smaller proportion of bonds outstanding than at some earlier period. I think it is a very dubious statistical procedure.

Mr. Slaff asked me how many bonds I had used in my exhibit which were not rated by Moody's and which were privately held. I tried to ascertain that for him and found twenty out of the list I had were privately held. I would like to say, however, that I am not privileged to assume that the rating services never rate privately held bonds, or what the reason is why they do not rate them. They refused to commit themselves with me on the matter, so I must go on the assumption that since they were privately held that the reason is they would not be given any rating. That is all I can do.

Recross Examination by Mr. Booth.

If I were running a company it doesn't necessarily follow that I would provide for capitalization in relation to its fair value. What I was speaking about, of course, was formal capitalization. I want to get that clear. You ask if as an economist it is my notion that economically it is sound and proper to set up a capital structure with no relation to its fair value. No, as a practical matter it rarely develops because we have the surplus item to which I referred; and there is no practical necessity for making continuous readjustments in formal capitalization. What I pointed out was that the dividing line between formal and informal capitalization is less easy to distinguish with the introduction of no par stock, and the liberality with reference to stating the value of no par stock, and the possibility that capital is largely reflected in surplus.

1849 I think there are times when a company's capitalization ought to be brought in line with the facts disclosed by appraisals or reproduction cost appraisals of engineers. There are times when they are justified in readjusting the capitalization upwards in accordance with the facts. No, I do not think that the capitalization ought to be increased merely because an engineer states that the reproduction cost is $25,000,000 higher than the investment in the property. I don't think that would be sufficient evidence; but when a management is firmly convinced and the facts have been established over an extended period of time that there is a wide disparity, I see no reason, given perfect information and making a perfectly clear statement as to what it is doing, why it might not be adjusted.

If under those circumstances there has been a sharp decline in prices and the engineers determine a year later that the reproduction cost is $25,000,000 less it would be no different than if the value of the property a year after its inception gets out of line with its capitalization.

Yes, I testified in the Peoples Gas Light and Coke Company case.

1850 S. E. CAMPBELL, a witness for defendants, called for recross examination, testified:

(December 14, 1939.)

Recross Examination by Mr. Booth.

I am Secretary of Natural Gas Pipeline Company of America. I am somewhat familiar with Exhibit No. 136 presented by Mr. Miller in this case which is the earnings statement of defendants. That exhibit was prepared by Mr. Miller under my general supervision.

Page 1 of this exhibit is a statement of combined profit and loss of defendants for the years 1932 to 1938, inclusive. Column 7 shows the combined profit and loss of the two companies for the year 1938. Included in that column under the caption "Other Charges" is an item for depreciation in the amount of $1,978,408.31. That depreciation figure is made up of various percentages applied to the different groups of the plant account.

You have shown me a sheet headed "Depreciation Expense Year 1938 for Natural Gas Pipeline Company of America" which you state was taken by your accountants off the books of that defendant. That sheet shows the depreciation rate as used by that company for 1938 was 4 per cent with respect to Account 1002, rights of way; Account 1005, main lines; Account 1006, compressor stations; Account 1008, telephone system; Account 1009, meters and regulators; Account 1010, other main line structures; Account 1011, branch lines to distributors. That is the rate which the company used in 1938 for those classes of property, in computing the depreciation for those properties.

That sheet shows that for Account 1013, tools, the depreciation rate was 20 per cent; for Account 1014, general laboratory equipment, the rate was 10 per cent; for Account 1015, automotive transportation, 25 per cent; and for Account 1016, furniture and fixtures, the rate was 7.5 per cent. Those percentages were related to the average book cost of the company contained in the various accounts for the year.

There is a difference between the rate of depreciation applied to the properties of Texoma Natural Gas Company and to Natural Gas Pipeline Company of America for the same classes of property. I don't know whether I can recall all of the rates applied in depreciating Texoma's properties. I do know that compressor stations, for instance, are 6 per cent. I believe main line is 2.5 per cent; gathering system, I believe, is 2.5 per cent; automotive equipment is 25 per cent; gasoline plant is 10 per cent; furniture and fixtures, 7½ per cent; laboratory, 10 per cent. I don't believe I can recall the others. Those are the major items, however. Those percentages are related to the average book cost for the year. There is no change in the percentages applied to Texoma's properties for the year 1939.

Yes, I am familiar with the fact that the Federal Power Commission has recently promulgated a classification of accounts for natural gas companies. I don't believe I
1851 can state that that classification of accounts provides
for the computing and the determination of annual depreciation expense in relationship to the book cost of the company's property. I don't know. I don't believe I can answer this question because I haven't studied it thoroughly yet. I have a copy that has been turned over to the men in the accounting department. I haven't made a thorough study of the classification as yet.

I was present at the hearing before the Federal Power Commission in connection with this proposed classification of accounts. I did not make a personal appearance. The defendants were represented by their attorney, W. A. Daugherty. I would say the company was given an opportunity to make objections to the proposed classification of accounts prior to the time it was promulgated. Our company officials did not discuss the position the company would take with respect to that classification of accounts. We left it up to the attorney, who was working through an A. G. A. committee. It was left to that committee to make the objection and we permitted our companies to be included in the group objecting. So far as I know the company never suggested that the determination of annual depreciation expense should be computed on the basis of value of the companies' property as distinguished from book cost in connection with this proposed classification of accounts for defendants. As far as I know defendants never suggested the annual depreciation expense be computed in the classification of accounts on the basis of reproduction cost. So far as I know defendants never suggested that the item of going value be allowed for or be amortized in the proposed classification of accounts.

Redirect Examination by Mr. Hedrick.

I stated that W. A. Daugherty represented our companies at that hearing in Washington. Mr. Daugherty is a member of the board of directors of the Natural Gas Pipeline Company of America. He is attorney for the Standard Oil Company and he represented the A. G. A. committee at that hearing.

Recross Examination by Mr. Slaff.

That was an industry committee presenting the views of the industry to the Federal Power Commission with respect to the proposed system of accounts.

Recross Examination by Mr. Booth Resumed.

You ask how the items of depletion and retirements for 1938 included under the caption "Other Charges" on page 1 of the exhibit we have been discussing were arrived at. The depletion is arrived at by taking the amount of gas under each acre at the beginning of the life of this project which was, as I recall, estimated at 12,000 cubic feet. I would like to be able to check that, though, in case that is wrong. Taking as a factor the book cost of the acreage we arrive at the depletion factor for each unit of gas taken out, whether the unit is M. C. F. or a cubic foot, as you might determine, and that factor is applied to the acreage on the books by months. That estimate of 12,000,000 cubic feet per acre was made, as I recall, as of 1931.

1852 The item of retirements is the difference between the book cost and the depreciated value of the items retired less any salvage value. In other words, if we have accrued less than the book cost of an item of property, when that is retired there is charged to retirement expense the difference between the accrual and the book cost of the property less salvage. Stated another way, it is the undepreciated portion less the salvage value.

Questions by The Examiner.

You ask how we arrive at the depletion factor. You have a total reserve; your production divided by your total reserve gives you the ratio or the factor. The factor changes from time to time as the acreage changes and it changes each month with the amount of the production each month. The factor changes every month and as the acreage increases or decreases the total reserve changes or decreases. That actually changes the figure every month. Yes, I meant there when I was talking about changes in our figures that the factor would change from month to month and consequently our monthly, and finally, our yearly figures for depletion would vary from year to year or from month to month. That is, the financial figure would vary.

You ask how these depreciation rates compare with past depreciation rates used by the company. On Texoma they are the same. On the Pipeline they are a little higher than we had in the earlier years. The change was made in 1938 when the depreciation rates were increased.

(At this point argument was had on motion for interim order before the full Commission in the hearing room, Hurley-Wright Building, 1800 Pennsylvania Avenue, Washington, D. C., at 10:00 O'clock A. M. on December 18, 1939.)

1853 **ROBERT H. DELAFIELD**, a witness for defendants, called for redirect examination, testified:

(January 8, 1940)

Redirect Examination by Mr. Morgan.

I testified in this case about Saturday, October 28, 1939. I have gone over the transcript of my testimony for the purpose of determining whether or not I have any corrections that I wish to make in the record. There are a few typographical corrections and those, I believe, have already been turned in to the reporter. There were the following errors:

On page 6710 to 6712 I testified about a high pressure line in New York State belonging to a subsidiary of the Standard Oil Company and running north and south across the Pennsylvania-New York line. I was in error and had that line confused with a high pressure line belonging to the same interests running from Pittsburgh to Charleston. The line in New York State is not a high pressure line.

In page 6778, lines 15 and 19, 20 and 21, either I was confused in testifying or the record is confused in words. There are none of them particularly important.

In line 15, the words "small section of" should be stricken. At that point I was testifying about the Seaboard line and said it was only a small section of pipeline. It is a large section.

The next answer reads on the record this way: "One is a distribution company, one is a transmission company, one is the Amere Gas Company. I am sorry, that is wrong. It only has two subsidiaries now, I think. One of those companies has been dissolved."

That is an error, and the answer should read: "Two are distribution companies, one is a transmission company and one is the Amere Gas Company." That "I am sorry, that is wrong" and the rest of that answer comes out. There are three subsidiaries, the Amere Gas Company is the third subsidiary.

On page 6780—this is a very minor—line 23, I say that Bracken County Gas Company is a land owning company. It is not; it is a distribution company with about a hundred customers, a very small company.

Now, beginning at page—I am sorry that I have not got that page, where Mr. Slaff's calculations begin on the rate of return—I think it is on page 6777 and from there on there are numerous calculations on rate of return, and I think it was agreed, or so I understood at that hearing, that I would accept Mr. Slaff's calculations for that purpose. In checking them over, I find no errors of real importance, most of them being in the second decimal place, but I thought I would give you the check.

In my cross-examination Mr. Slaff asked me a great many questions concerning a document which our company had filed with the Securities and Exchange Commission in which the earnings of a number of subsidiary companies of the Columbia Gas & Electric Corporation were
1854 brought out and discussed. I believe that the average earnings of those subsidiaries was some 3.52 per cent as stated by Mr. Slaff and to which I agreed in substance. That document and my testimony concerning it is dealt with in Mr. Slaff's first brief in this case and is referred to as an indication that notwithstanding these low earnings Columbia Gas & Electric Corporation expects to refinance some $90,000,000 or $100,000,000 of indebtedness at a rate more attractive than the present rate.

Columbia Gas & Electric Corporation has at present approximately $104,450,000 of 5 per cent debentures outstanding. The financing that we contemplate is to refund those with an issue of approximately $90,000,000 of debentures in a different form. The difference is to be made up from cash.

This 3.52 per cent average earnings of the subsidiary companies referred to in that document is based on the earnings for the year 1938. The latest earnings that I have available are for the 12 months ended November 30, 1939, and they are substantially higher than the earnings for the 12 months ended December 31, 1938. For the year 1938 the gross revenues consolidated of the Columbia System companies were $92,968,000. For the 12 months ended November 30, 1939, they were $99,264,000, an increase of approximately $6,000,000. The per cent increase was 6.2.

The gross corporate income for the year 1938 was approximately $21,500,000. For the 12 months ended November 30, 1939, it was $24,500,000, an increase of approximately $3,000,000, or 14 per cent. After the payment of all interest charges on a consolidated basis, the income available for the stocks of the Columbia Gas & Electric Corporation in the year 1938 was approximately $10,300,000, while for the 12 months ended November, 1939, it was approximately $13,065,000—an increase of $2,752,000, or not quite 27 per cent.

Making my calculations here on the stand, which are necessarily approximate, the figure that would correspond to the figure of 3.52 would be approximately 4.25 for the year ended November 30, 1939. The divisor is approximately $578,500,000 to be divided into $24,700,000 approximately.

Questions by The Examiner.

You point out that with respect to 1938 the gross corporate income there is $21,500,000 and I use for the November 30, 1939, rate return result $24,700,000 which corresponds to the $24,500,000 gross corporate income which I gave for the 12 months ended November 30, 1939. You ask why I use that figure which corresponds to the $24,500,000 rather than a figure which would correspond to the $19,655,000.

I think that those two figures do correspond. The difficulty is this. I am working here from an operating report. Mr. Slaff had worked from a report to the Securities and Exchange Commission on a little different form, and as you go down the statement, the figures change in the statement, but not the final result. There are figures within the statement which I have had to add and subtract, but they come to the same thing.

1855 Let me give a final measure of the increase by saying that the very lowest figure on the statement, which would be exactly the same in either Mr. Slaff's statement or this statement, shows earnings available for stocks of the Columbia Gas & Electric Corporation for the 12 months ended November 30—I beg your pardon—for the common stock of Columbia Gas & Electric Corporation, for the 12 months ended November 30 of $6,605,000-odd,—an increase of $2,752,000 over the preceding 12 months, that is, the 12 months ended November 30, 1938, because I have not available to me here the 12 months ended December 31, 1938. These figures will not correspond exactly, because I am making a comparison with a 12 month period ended November 30, 1938, and while the relationships will be the same, the exact dollars wont.

Yes, I know what that $19,655,000 is. It is the gross corporate income on a consolidated basis for the year ended December 31, 1938. The 1938 figures I have just given in the record are not the year end figures but the November 30 figures because that is the only way I could compare them. The relationships will be the same, but the exact dollars wont.

Redirect Examination by Mr. Morgan Resumed.

If we were refinancing the present value of the consolidated properties, which we will assume to be $578,500,000, between 1[illegible] and 16 per cent of the total valuation would be represented by this contemplated bond issue of $90,000,000. I think to make this statement perfectly clear I might read into the record a tabulation of the consolidated capitalization of the system and relate it back to earnings that way.

These figures are as of December 31, 1938, in order to correspond with the previous testimony. At that time the Columbia system had outstanding the following capitalization:

"Subsidiary Bonds	$79,167,000	16%
"Subsidiary Preferred stocks and minority	50,180,000	10%
"Columbia Debt	104,450,000	21%
"Columbia Preferred Stocks	110,101,000	22%
"Columbia Common stock, surplus, etc.	155,116,000	31%
"Total	499,014,000	100%"

That was the capitalization of the Columbia Gas & Electric Corporation and its subsidiaries at December 31, 1938. It had income for that year to support that capital structure of about $21,635,000, and the charges on the subsidiary company debt, preferred stock and the very small minority plus the interest charges on the Columbia Gas were $11,404,000 approximately. So that on a consolidated basis, the system earned all of its charges prior to its preferred dividends, about 1.9 times. That is looking at the picture in the worst way.

If you consider only the Columbia Gas & Electric Corporation itself, it had for the year ended December 31, 1938, gross corporate income of about $14,273,000, and its interest charges were—that is, interest charges on long term debt—were $5,228,000, so that it earned its interest charges almost three times.

1856 In qualifying and saying "interest charges on long term debt," I want to make clear that there was no short term debt, but there is interest on reserves and things like that.

In addition to those facts, Columbia Gas & Electric Corporation owns natural gas subsidiaries with gross fixed property and the figure that we were using in the cross examination was approximately $400,000,000. Those assets have against them only $10,500,000 for subsidiary debt. Adding that to the Columbia debt of $104,000,000-odd you get $114,950,000 of debt against the properties with a gross book value of $400,000,000. Those are only the gas properties.

Columbia, of course, owns in addition, 100 per cent of the Cincinnati Gas & Electric Company, a combination company; 100 per cent of the Dayton Power & Light Company, a combination company—and by "combination", I mean electric generating and distributing and gas distributing—and practically 100 per cent of the stock of, that is, over 95 per cent of the stock of the Union Light & Heat Company; and the electrical revenues, forgetting those companies' gas revenues but the electric revenues from those companies over a period of 3 years have in each year been approximately 95 per cent of the total carrying charges of Columbia Gas & Electric Corporation debt.

Otherwise stated, Columbia has in addition to any gas earnings, electric earnings available to it which fail by only 5 per cent to cover its total debt charges.

I have tried to point out in previous testimony that the risk on an electric company is materially less than the risk on a natural gas company, and the effect of those electric earnings improves the credit of the Columbia Gas & Electric Corporation which is also affected by the very low relation of debt to total property.

To make an exaggerated but perfect example, I testified on direct that the Ohio Fuel Gas Company, with assets in excess of $100,000,000 and earnings in the neighborhood of $4,000,000 had outstanding approximately $5,000,000 of notes. Let us assume that the Ohio Fuel Gas Company earned only 1 per cent on its $100,000,000 of assets. That would be $1,000,000. The $5,000,000 of 4 per cent notes would have interest of $200,000. So that earning only 1 per cent on its property and having a $5,000,000 debt, a company in that shape would have 20 times more property than debt, and would earn its interest charges 5 times. And I think that those obligations could be sold by a gas company.

In conclusion, the point of the rate of return is not to finance the underlying and best debt that a company has. You have to finance its entire capital structure including all of its common stock, which in the case of the Columbia Gas & Electric Corporation is approximately $500,000,000. But it is perfectly evident from the fact that Columbia's 6 per cent preferred stock is currently selling at a discount of 10 per cent, and that its common stock is selling for less than half of its book net worth, that on the returns which we arrived at in the cross examination, it would be impossible at the current market quotations to raise that amount of money.

1857 If we were refinancing the capital structure of the Columbia Gas & Electric Corporation at par the investing public would demand a very substantially higher earnings than our present rate of earnings to finance the equity securities. The $500,000,000 is the capital structure whereas the property value set up on our books and which was used in the calculation I made to arrive at the 3.52 per cent earnings was some $559,000,000. This figure as of November 30, 1939, has been increased to $578,500,000; but in figuring it with Mr. Slaff we took out certain intangibles just by estimate and that accounts for the difference between $559,000,000 and $578,000,000. I am afraid we are going to confuse this by a multitude of figures here. If we were refinancing the Columbia Gas & Electric Corporation the capital structure would be a most important factor. The amount of debt to the whole is conservative; it is low and therefore lower earnings will serve to carry that capital.

It is my thought that this $90,000,000 indebtedness to be represented by the new issue of bonds on which we are working in the Securities and Exchange Commission can be accomplished at less interest than the interest which is being paid on the outstanding indebtedness. We think we will be able to do this largely because we are going to change the form of the issue as I testified in answer to Mr. Slaff's question. The fact that this is a refunding operation is of importance in the matter of our ability to refinance at a saving of interest.

Questions By The Examiner.

We plan, Mr. Examiner, to sell a serial issue with maturities of from 1 to 10 years, and then 3 maturities, one 15, and one 20, and one 25—that is the present plan if we get to it—and of course, the interest rate on those very short maturities is extremely low; and that is what I mean by the form of the obligation making a great difference in its cost. The existing securities mature in three lots, some $54,000,000 in 1952, and $50,000,000 in 1961, and obviously a serial and 100 per cent sinking fund issue is a much better form of financing for a company that is heavily in the natural gas business.

In this refinancing issue there will be 10 serial maturities and then 3 maturities on a 100 per cent sinking fund basis. The rate of interest on our two existing maturities is 5 per cent. The rate of interest on the new serial issues in the refinancing will depend on the market when we are able to bring it out, but it will run from 1 per cent to 3½ per cent, 1 per cent on the first year, 1 and a fraction on the second, one and a bigger fraction on the third. You see, as we go away from the date of sale the risk increases to the investor and he demands a higher return. If we are able to sell in the existing market our interest savings should be approximately $1,500,000 per year. Our total interest today is about $5,400,000.

Redirect Examination By Mr. Morgan Resumed.

That would reduce it to about $3,900,000 a year. That interest would be on the $90,000,000 or on the amount necessary to take up the entire present debt. When
1858 I speak of a savings figure of $1,500,000 it is on $90,000,000 and not on $104,000,000. I think I would say there that of course the reduction in that debt makes a big difference in the sale of the securities. A reduction of $14,000,000 in your debt makes it easier to sell the balance. When we have accomplished that refinancing, if we do, Columbia Gas & Electric Corporation's part of the income of its electrical subsidiaries will be sufficient to take care of all of its fixed charges. It will be more than

Columbia Gas & Electric Corporation's total interest charges. I mean that Columbia's proportion of the net earnings of the electric companies which it owns, earnings available to it, will exceed the interest on the proposed new financing and that income, as well as the income from the gas properties, will be behind this bond issue.

We are talking about a consolidated picture. That is the income of the subsidiaries. In view of the fact that Columbia owns them wholly it could take that income, if it wanted to, and the sum of their income before being taken in dividends by Columbia will be substantially in excess of Columbia's interest charges, and I am sure that if they pay reasonable dividends that the dividends received by Columbia from electric operations would be more than its interest charges.

In the course of my cross examination Mr. Booth asked me some questions going to the point as to whether the natural gas industry is or is not a fully developed industry. I have given some further thought to that subject. The point that I had in mind was that in the past 10 years there has been an enormously rapid growth of the natural gas industry, and I named over or attempted to name over at that time, in response to a question by either Mr. Booth or Mr. Slaff, the number of states in which natural gas was served. Nor, those states, for example, Alabama, Arizona, Florida, Georgia, Iowa, Nebraska, Virginia and the District of Columbia have received natural gas or have been served with natural gas since 1928.

The following cities have been served with natural gas since 1928, that is, gas has been introduced in those cities for the first time or for the first time in many years. I believe one city did previously have natural gas. The cities served since 1928 are: Atlanta, Detroit, Ft. Wayne, Memphis, Minneapolis, Oakland (California), San Francisco, Chicago, Omaha, St. Louis, Syracuse, Washington. All of those cities are not served with straight natural gas—some are served with mixed gas as Washington is.

Due principally to this tremendous addition to the market, the number of gas customers which in 1928 was approximately 4,366,000, that is the number of natural gas customers, had increased by the end of 1937 to approximately 9,067,000. The source of the figures that I have just given is the United States Mineral Year Book for 1939 and Brown's Manual of Gas Companies. When I say

that all of these cities are not served with natural gas I mean that some of them, for example, the city of Washington, are served with mixed gas, natural and manufactured gas. Chicago has the same thing, of course. In qualifying that they received natural gas for the first time I am not perfectly certain that the city of Ft. Wayne, some
1859 20 years ago, did not receive for a short time, natural
gas. I am not positive but I am under the impression that it did; so that one city has at one time been on natural gas service.

The customers' figures I gave are the customers in the cities that began to use natural gas, roughly within the past decade, mixed or otherwise. The point is, where I differ from Mr. Booth, I think that any industry that has grown as rapidly as that in as short a period has, by the very rapidity of its growth, incurred risks. They are dealing in new markets. Ten years is not a long enough period to know what you are up against in marketing your product. In addition to which, the enormous increase in the use of natural gas, if anything, adds to the risk of depletion and exhaustion.

I think, Judge Morgan, if I may state so, we have a perfect example of exhaustion facing us now which is extremely serious. Could I use that as an example here?

In about 1931 the natural gas fields in southern New York and northern Pennsylvania were brought in. I think in March, 1931, the big well in the Tioga field came in, and as I remember, it came in at about 60,000,000 feet a day and around 3,000 pounds pressure. It blew the rig away, and they had to send to Texas for assistance to get it capped. That well was in the Oriskany sand. From that time until the present, there has been tremendous development of natural gas due to exploration in southern New York and northern Pennsylvania, largely in the Oriskany sand. Less than a year ago, the head of one of the big gas companies testified that in his opinion he had 13 years supply of gas. Last year in April I talked to the head of one of the big producing companies and his geologist and they told me that they had years' supply of gas for their market. In April again our head geologist testified before the Securities and Exchange Commission that he did not think that there was much more than a year's supply, and while his testimony, without being facetious was not characterized as airy, they felt very strongly that he overstated his case. That was April, nine months ago.

In February in 1937, Godfrey Cabot completed a line to Rochester, a distance of 90 miles, at a cost of approximately $1,700,000. A year ago he was delivering 30,000,000 feet a day through that line, principally to the Eastman Kodak Company. At present he is only able to deliver 3,000,000 feet and he has notified all customers that the service will cease in July of this year.

Over the last week end, in order to supply our properties in New York, it was necessary to take about 1,700,000 feet of gas from Pennsylvania through the western end of the system due to the small amount of gas supply, and a good many geologists think that the gas production in that area is very close to over. We have substantial reserves under contract, and as our geologist testified, can go on for a long time, but within the past week we have been considering looping our lines in order to supply gas from the west.

The point is that within a year some of the best informed men operating in that territory thought they had years of supply of gas, and there was at least one operator who felt so strongly enough three years ago to spend $1,700,000 and he has, unless he can discover new sources, lost just that much money. That is one of the risks in the gas business.

1860 I mentioned a while ago that we brought in 1,700,000 cubic feet per day from our western lines. If we had been relying solely on this southern New York-northern Pennsylvania field, the Tioga field, the domestic customers at the western end of the line would have suffered from shortage. As it was we had to let go all boiler load and dump load because we had no gas to serve that load.

Questions by the Examiner.

You ask why we did not use our reserves. In that territory, Mr. Examiner, we purchase our gas under contract and we own a minimum amount of acreage. The difficulty is that the geologists figured on a certain amount of gas and competitive drilling in that section has been extremely hard. Gas has been taken out from under the property of the owners and they consequently stand to lose their investment in transmission lines.

Redirect Examination by Mr. Morgan Resumed.

By my statement that we have reserves under contract sufficient for a number of years I mean our contracts in that territory are long term contracts. They have, of course, failure clauses in them if the contractor cannot supply the gas, but we have a large amount of acreage under contract, some of which has not been drilled but which I think we can reach to save the situation next summer if we have time to drill it, but it is new acreage and means exploration and all the risks involved there.

Not only a very, very large proportion of dry holes have been drilled in that area recently but those holes that are not dry went to salt water. I am not a geologist, but that sand, the Oriskany sand, has proved very difficult and there is evidently water there. That is only one of the difficulties that producers in that territory are finding and having.

I mentioned a while ago that Ft. Wayne probably had natural gas a good many years ago. That was before the depletion of the Indiana field. There were a great many cities and towns in Indiana that were served by local gas. That field, as you remember, was completely depleted and went out of business I should say around the first 15 years of this century. It was at one time a very large field and supplied those cities there in Indiana. I don't know if that field supplied through two 12-inch pipelines, or pipelines of about that dimension, natural gas to the city of Chicago for a number of years. I know that during the war we bought a lot of pipe from the southern part of Indiana which was no longer in use and we moved it to West Virginia. We bought it from other people; we did not dig up those lines, so I don't know.

This morning on redirect you asked me concerning the new issues of securities on which we have been working before the Securities and Exchange Commission and I stated what the earnings times interest on the present indebtedness is. I have made some calculations going to the earnings times interest that will result from that refinancing if it goes through as planned. Using the same estimated figure that I have used this morning for the interest charges on the proposed refunding issue

amounting to $3,900,000, in 1937 that interest would
1861 have been earned 2.7 times on the consolidated basis; in 1938, 2.36 times on a consolidated basis; and in the 12 months ended November, 1939, 2.7 times on a consolidated basis.

For the year 1937 it would have been earned 4.3 times on a corporate basis; in the year 1938, 3.65 times on a corporate basis. I have not available the corporate figures for the 12 months ended November 30, 1939. These calculations are made in haste and I would like to have the privilege of having them checked from an arithmetical standpoint. I am doubtful of my arithmetical summations.

If we were confronted with the refinancing of a natural gas transmission and production company you ask whether preferred stock would have any place in the new security set-up. Personally, I am of the opinion that preferred stock is not a proper type of security for a natural gas company that has a large proportion or a substantial proportion of production. Again expressing a personal opinion, I have even gone so far in the past as to say that bonds, except under very advantageous conditions for the industry, were not a proper form of security. That is exemplified by the fact that in the Columbia system we do not put either bonds or preferred stock against our producing gas properties. With bond issues when you have very heavy sinking funds and the bonds run a very short time, such as our serial issues, it may be possible, but I do not think it is good financing, and I certainly do not think preferred stocks for a natural gas producing company are good financing.

You ask what about a pipeline which is operated in connection with the production activities. Each company is a case in itself. As a generality, I would not like to put preferred stocks on a pipeline either.

I am familiar with what is known as an open end mortgage indenture. An open end mortgage provision permits the issuance of additional bonds upon bringing under the terms of the mortgage additional properties. Yes, I know of restrictions that we have found in this open end mortgage provision with reference to natural gas producing and transmission properties, but it goes further than that. In, I should say, carefully drawn natural gas bonds or bond issues, the indenture usually provides that additional producing properties shall not be bondable, that is, that you cannot buy additional producing properties, and usually the appurtenance of that property, gathering lines and so forth—and bond it for the new money.

In a good many mortgages, where the bankers or the drawers of the mortgage believe that there is a chance of that money going into the gas business, they will exclude producing properties, and in some instances transmission properties. Of course, with producing properties I include gathering lines. They either do it positively or negatively; in other words, they either describe the property that is bondable and omit that type of property from the description, or in some instances they have a specific clause saying that you cannot include gas producing property, gathering lines, and so forth.

1862 That character of restriction is placed in many of these mortgages because the drawers of the mortgage do not consider that natural gas producing property is properly bondable or falls within the security. It is too risky. And where they include in the restriction the transmission of property that reflects the same attitude. It reflects in reality the fear of complete depletion and the loss of value of the transmission property thereby.

Questions by the Examiner.

That applies to the case of the producing and transmission company as well as the so-called integrated company. In any company, Mr. Examiner, when you make a loan, that is, get out a bond issue on the property as it exists today, which is open ended, it is common to put a provision in that you can purchase new property and bond it to, say, 60 per cent or 66⅔ per cent. With natural gas companies it is lower, 50 per cent, but exclude from such bonded property producing properties. In other words, when a company goes and buys new acreage they must do it with their own money; they cannot borrow money for that purpose.

Recross Examination Interposed by Mr. Booth.

That means that they cannot borrow money under that issue for the purpose of buying the property included in the restrictive provision.

Recross Examination Interposed by Mr. Slaff.

It is true that sometimes they have already borrowed money under the bond issue on property which includes producing property. If you will look over the natural gas mortgages you will notice some,—I know some with which I have been connected in the past,—where the producing property is excluded entirely. There are two reasons for that. One is the lack of security and the other is the physical difficulty of including it.

The bonds of the Texoma Company are secured only by their producing properties, it is true; but they are held only by their own stockholders. It is not a public issue.

Questions by the Examiner.

My observation would apply to a mortgage bond issue of a producing company. Any careful drawer of a mortgage would, I think, put that provision in. There are those that have not had it and there are many natural gas bonds in default.

The point there, Mr. Examiner, trying to explain it,—supposing you have a company with property, including natural gas producing properties, of $1,000,000 and a provision in your indenture that you can bond future property at 50 per cent. Now, the company goes out and buys $500,000 worth of producing property and bonds it to 50 per cent. The issue is increased from $500,000 to $750,000, but the only added value is $500,000 of producing property, which may be quickly depleted, as for example the New York properties that I was discussing this morning.

1863 *Recross Examination Interposed by Mr. Booth.*

The fear of the lack of reliance of investors on values that have been placed on gas acreage may be a factor entering into these restrictions, Mr. Booth. The real factor is the unfortunate past history of these companies. A great many natural gas bond issues have been in trouble; and in the minds of investors that trouble arises chiefly from exhaustion of the fields. I think it is true that they do not have the utmost confidence in the value that is frequently placed by engineers and others upon gas acreage because nobody, no engineer, no body of men, can say exactly how much gas there is in a given place and everybody knows that.

Questions by the Examiner.

When I said the unfortunate past history of these companies I meant natural gas companies. I was not referring to defendants. I should have said that I meant the companies in the natural gas industry as a whole.

Redirect Examination by Mr. Morgan Resumed.

The restriction at page 9090 of the record contained in the Panhandle Eastern mortgage reads:

"The term 'fixed property additions' will not include among other things (1) the first $4,000,000 in cost to the company and/or one or more qualified subsidiaries, of fixed property additions purchased, constructed, or otherwise acquired by the company or a qualified subsidiary subsequent to March 1, 1937, or (2) any gas production property, viz gas acreage, gas wells, gas or gas oil leaseholds and other works and properties used in or useful for the production of natural gas."

The purpose of including that is to prevent the company in the future from buying with money borrowed under this indenture producing property, thus increasing the proportion of producing property to the whole, and in the opinion of the underwriters, I presume, and certainly in my opinion, reducing or hurting the security of the issue by including more producing property. (Objection by counsel for Illinois Commerce Commission overruled.)

Question by the Examiner.

You ask if we have such a provision in the mortgage indenture of the subsidiaries of Columbia Gas & Electric Corporation? We have no gas companies that are mortgaged. We do not mortgage our gas companies. I think there is one gas distributing company that has a small remaining issue but we did not put it on.

Redirect Examination by Mr. Morgan Resumed.

I have read Mr. Kleinman's statement on page 8038 of the record to the effect that a risk in business arises out of a decision which must be made by management and which, when made, will affect the subsequent profits realized by the business. I do not consider that a risk arises out of a decision of management. Risk is a possible future event which may be adverse to a business. It has nothing to do with a decision of the management. I think I have read all of Mr. Kleinman's testimony, and any answers, predicated on such testimony, which I may make are in light of my memory of his testimony.

1864 I have read Mr. Kleinman's further testimony as follows:

"In a discussion of risks in business, it is necessary, in my opinion, to distinguish between the continuous actions of conditions surrounding an industry and the continuous risking of money by the companies in the industry. The first set of factors in general determines whether the industry will be profitable as a whole. The second set of factors determines the relative prosperity of the companies within an industry. The risks arising out of the continuing commitment of money in a business are much more important than the risks arising out of the conditions surrounding an industry. The latter are slower and can be met over a period of years. The former are immediate and cannot be escaped. They can only be turned into a profit or loss. The risks surrounding an industry slowly affect the profitableness of the investment in the fixed assets, that is, the plant, the business itself; the other factors affect the profit and loss for a given period, and its cash and credit standing."

If I understand those observations by Mr. Kleinman I am not in accord with them. They are really difficult to understand. I will give an example by going to another industry. If you were in the airplane transportation business, what that testimony means to me is that the risk in your business is not that a plane will fall and kill some passengers and that you will be sued, but that you are investing your money for a long term. I could not agree with that. The risk in the airplane business is that a plane will fall and you will kill some passengers and be sued. That is the principal risk.

By the same token, go to the natural gas business. I think that among the immediate risks that we are running is, for instance, an explosion on the line, a failure of service, the exhaustion unexpectedly of the gas territory. Of course, time plays a part in that.

As I see it the type of risk which I have illustrated as applied to the natural gas industry is not a matter that is affected by the decisions of the management. From the standpoint of the investor he is most concerned with the risks that are of daily occurrence in the business and constant to the business, but I should qualify that answer, of course, by saying that the first thing that an investor would look at would be the management today to ascertain whether it is a good management. Bad management is the worst kind of a day-to-day risk. Having satisfied himself that the management is good the risk that an investor worries himself about is the risk that goes with the business, as in the gas business, exhaustion, explosion, landslides, failure of service.

At page 8041 Mr. Kleinman testified:

"Only public utilities and those few manufacturers whose raw materials and products are so specialized that there is no competitive market, escape this risk. The two companies we are considering have a very small percentage of capital in inventories, and the fluctuation in price is too small not to permit the recoupment of full cost through operations."

1865 I do not agree with Mr. Kleinman that defendants are without this risk of inventories. The time element and the rapidity of the turn are important, in the first place, from an inventory risk standpoint. That is exemplified by, for instance, a banker who purchases his inventory and turns it within hours, and he is satisfied with a very low mark-up, that is, the difference between the cost price and the selling price. As against that you take a furniture dealer. A furniture dealer, I think, ordinarily expects to turn his inventory about once a year, and if you have ever bought furniture, we all know that the general mark-up is about 100 per cent, in partial compensation to him for the long term risk of a year. A dealer in precious stones, a retail jeweler, is apt to carry his precious stone inventory a long time, and correspondingly marks up that inventory substantially; sometimes 150 or 200 per cent represents the difference between the cost price and the sales price. There are other departments in a jeweler's catalogue of goods that have the same type of large markup and long carry.

The natural gas company, this company or any other producing company, when it makes a contract with a purchaser, a city, it has to show that it has got an adequate supply of gas to fulfill that contract, and that is its inventory when it has a 5 or 10 or 15 year carry depending upon the contract.

Mr. Kleinman is right when he says that there may not be the rapid price fluctuation that there could be in diamonds or perhaps even in furniture, but on the other hand there is another risk, and that is that those inventories you can put somewhere and keep, whereas the gas inventory is in the ground and can get away from you. Somebody else can get it. Gas does not always stay; it migrates. So that while the inventory risk is different in industry and in the natural gas business, there is to my way of thinking a distinct inventory risk in the natural gas business.

You ask which is the greater risk in degree, to have 25 per cent of the total investment tied up in an inventory in the nature of an underground gas reserve in a field where there are hundreds if not thousands of others producing from the same formations and which must be provided with a view of supplying the requirements of a gas pipeline over a period of 15 or 20 years, or to have 25 per cent of the total assets tied up in an inventory of furniture or jewelry or automobiles manufactured and ready to be placed on the market.

It would seem to me, though it is hard to compare risks, but it would seem to me that the risk in the gas business would be greater, and not only because of the time element. There is one other very important element there. The furniture man or the man with the physical inventory can dispose of it and get rid of it at distress prices, but the gas man with his inventory underground could not even get it out of there fast enough if he should be distressed, admitting all the time that distress prices are not as apt to hit the gas man as they are the ordinary industry. But his inventory is locked in and he cannot get at it. He cannot save himself.

1866 If a man who had accumulated an inventory of manufactured commodities or goods, whether it be jewelry or dry goods or other type of merchandise, is subject to an era of high prices he can take advantage of the much higher price; but the man with the natural gas inventory is held down by regulation to the rate that is fixed. The rate is not regulated by contract as it was prior to regulation in the natural gas pipeline business.

At page 8041 Mr. Kleinman testified concerning another type of risk, as follows:

"* * * arises out of the labor situation. Whenever a manufacturer contracts to deliver his products at some future date at today's prices he must face the risk inherent in the labor situation. It must be kept in mind that in manufacturing industries the element of wages is a much more important part of sales value than it is in the utility industry and particularly in the case of the two companies." And "Further, their workmen are not collected in one locality, a condition which removes to a very great extent the risk of strikes and other labor disturbances. The principal substitute of gas, coal, is an example of the labor risk; natural gas has no substantial risk in this respect."

I am not wholly in accord with Mr. Kleinman's testimony. I think there are two very important things to consider there. It is true that generally speaking in the natural gas industry the men are trained to stay on the job, as is true in all public utility industries. The morale of the industry is to keep the service going and exists to a greater extent than in an industrial concern, I think.

I heartily disagree with the statement that because the men are isolated there is less labor risk. In our own experience we find where we have a compressor station with a hundred men in it, or 25 men, they are much easier to organize. The job is done much faster and you are under a much greater risk, because those 100 men can tie your whole system up. It is not like a big industrial plant where if a hundred men went out, the plant could still run. But I think defendants have perhaps 10 compressor stations. I don't know about all of them, but I can think of one, I believe, with 100 to 150 men in it that could stop the whole operation, and it is much easier to organize 150 men than it is 2,500 or 3,000. And I might say one further thing, that we have in our own experience found that sabotage in labor difficulties is far more dangerous in the natural gas business than it is in any industrial operation that I can think of at the moment. I suppose there are some.

Another risk which Mr. Kleinman discusses is the risk arising out of the overhead expense connected with the business, that is, the expense of operation other than productive wages and consumed materials. On this point he testified:

"To a certain extent these expenses go on even if a factory is shut down completely; to a greater extent these expenses accumulate, if the business is operating but at an unprofitable capacity. In the first place, the cubic foot sales of the Pipeline Company do not measure its revenues * * *

"Even if the Pipeline Company sold not one cubic foot of gas, it would collect a demand charge from its principal customer, The Chicago District Pipeline Company, sufficient to pay all of its expenses including its present interest. Any business that has its complete overhead paid for regardless of business conditions need not worry about risk. This one factor removes the Pipeline Companies from the plane of ordinary industry into that of a guaranteed industry." 1867

Without aggreeing or disagreeing with everything he says, there are certainly some things I do not agree with. I do agree with him in the general premise that the natural gas production and transmission business has a lesser risk of overhead. There is not as great a proportion of the continuing overhead; I agree with that.

I am familiar with that demand charge that the Chicago District Pipeline Company has obligated itself to pay for the privilege of calling on defendants for as much gas in any day as it has taken in any day. I do not consider that a guaranty. I think you move right there into probably the next subject of the credit risk; and while I believe that the credit risk of this company is different than the credit risk of an industrial concern, I think it still exists. In fact, I know it exists because it has suffered a credit loss.

I testified in the direct that, I think it was in 1934 or 1935, the Illinois Commission issued an order forbidding the ultimate consuming companies, that is the Peoples Gas Light & Coke Company, and so forth, from including in their operating charges more than a certain price for the gas that they purchased. Those companies then could not pay the Chicago District Pipeline Company for that gas in excess of that price, and the Chicago District Pipeline Company could not pay these companies the contract price, which is obviously to me a credit risk, and I think the figures are all in the record. My recollection is that this company suffered a loss of over 1¼ million dollars on that credit risk.

Now, there is the additional credit risk that these contracts are for a long term, and while the credit of the Peoples Gas Light and Coke Company and the other customers of the Chicago District Pipeline is excellent today, it is difficult to judge what it will be in 10 or 12 or 15 years hence, and I would prefer personally to have a more diversified risk. I mean a risk scattered among more people. I would rather have a million people owe me small bills than one person owing me as much as a million, no matter how good the one person.

Recross Examination Interposed by Mr. Booth.

I will be glad to accept your correction of the first part of my statement that in effect the Illinois Commerce Commission refused to approve the contract between Chicago District Pipeline Company and Peoples Gas Light and Coke Company which in turn was based upon payments by Chicago District Pipeline Company to the Natural Gas Pipeline Company. The net result is the same. The Chicago District Pipeline Company did not have the money to pay for the gas and that is what a credit risk is. This was testified to before and I am sure it is in the record and entirely corroborates my point. I did not want to exaggerate it. This arose through a Commission action and created a situation where the buyer was unable to pay.

1868 *Redirect Examination by Mr. Morgan (Resumed).*

I understand these companies wrote off a loss in excess of a million and a quarter dollars.

Mr. Kleinman also testified that "Another type of risk which the pipeline company does not face arises out of competition between rival concerns for the same market for the same product." Any natural gas company selling gas at wholesale or retail or any other way faces a very serious competitive risk from other fuels.

In industrial operations many industrial companies which are using gas for heating purposes even maintain oil connections and oil equipment, because many of these natural gas industrial contracts are on an interruptible basis. It is very easy for them when from a price standpoint it is advantageous to use oil, to switch right over, at a loss to the natural gas company.

From the standpoint of the use of gas in what we call the commercial contracts, small manufacturing, in recent years particularly, the use of gas for heat treating has been very largely replaced, or I would like to qualify that, has been replaced in many instances by electricity in small furnaces. An example is in your dentist's office. Your dentist 10 years ago used gas for heat treating. Today he uses electricity. That is not for his instruments for which he puts in a little gas flame, it is for his furnace in his laboratory.

Another example that you see all over now is in vulcanizing tires in the service stations. There is a little electric disc that you just put on the top, and it vulcanizes the patch on. Formerly that was sometimes done with a blow torch, or if gas was readily available, with gas.

The same is true of a great many of those small uses, which is competition and is a risk of the gas business.

Finally, there has been a great deal of talk in the industry about the loss of cooking load to electricity, and I have already testified as to the decline in the Columbia system of the domestic use of gas, and I think other witnesses in this case have testified to the same thing in connection with the Chicago companies. A good deal of that arises through the use apparently of electricity for cooking purely on a style basis, where there is no competition in cost, but the woman who has a gas stove sees her neighbor and friend, Mrs. Jones, with an electric stove, and she wants one to keep up with Mrs. Jones. So style losses are not confined to the millinery and the ladies ready-to-wear departments of business in general.

The next risk that Mr. Kleinman discusses, beginning on page 8045, is the risk arising out of the varying demands for a product, in which he says:

"This type of risk must not be confused with the demand for a particular manufacturer's product which I just discussed. In general, the risk of varying demand for a general product cannot be overcome by any manufacturer. For example, when the demand for steel falls off, a
1869 manufacturer may obtain increased sales at the expense of his competitors but he nevertheless has been facing the risk inherent in change in demand. The experience of the Natural Gas Company has shown the pressure of this type of risk, but it takes a microscopic examination to find its effect in the profit and loss account. Its sales to industry during 1938 fell off substantially from the

peak in 1937 but the effect on profits was hardly noticeable and could be determined only with a very detailed study."

I think I have already testified that we estimate for the Columbia system that the drop in domestic use between 1929 and 1938 per customer has cost us about $5,000,000 in net for the system as a whole. I don't want to be facetious but I don't need anything to see that. That was a drop from about 78,000 cubic feet per customer per annum to 58,000 cubic feet per customer per annum in the residential load.

In the industrial load, I think I testified on the direct, and there is testimony in this case to show, that fluctuations in the industrial load follow very closely the curve of industrial activity for the country as a whole, and all you have to consider is the wide fluctuation in the steel business. Steel mills shut down, and with a big steel mill, some of which use as much gas as a city, shut down that load is gone. You don't get any revenue from it.

Exhibit 136 shows that as between the years 1937 and 1938 the gross revenues declined from $15,552,607.50 in 1937 to $14,441,349.76 in 1938, or a difference of something more than $1,100,000 as between those two years; and the net earnings from operations as between those years declined from $10,763.067.30 in 1937 to $9,884,745.28 in 1938, or a difference of nearly $900,000.00. I would not regard a decline of substantially $900,000.00 out of a total of $10,763,000 in net earnings from operations as between one year and the following year as one requiring a microscopic examination to find its effect on the profit and loss.

We would consider that very important and it is particularly important because this is an industry with a very large amount of capital invested in relation to its earnings; therefore, when you get that much drop in earnings it is more important than it is in an industry where the amount of capital is not as great in proportion to the gross earnings or to the net earnings.

It appears that the gross sales in 1937 were 74,476,893 MCF and that in the following year they had declined to 68,759,039 MCF, which is about 9 per cent, and that is about the same percent reduction as the reduction in the net revenues from operations.

Those three sets of figures, the decline in the net from operations, the decline in the gross, and the decline in the sales on the volume basis, indicate that that fall in revenue was attributable directly to varying demand.

The varying demand for natural gas as between the years and as between portions of the same year is regarded by the natural gas industry and by those investing their money in that industry as a real and substantial risk. One of the great difficulties of the natural gas business is to maintain 1870 the supply during the winter months when you have tremendous demands on your system, and to be able to live during the summer months when your demands shrink very low. A month-to-month curve of the volume of business of the Columbia system shows the steepest hills and valleys in demand, and that is a risk in the business. There is a constant effort of the gas companies to increase the summer load and level out the winter load to a reasonable extent. So you have two types of shifts there,—inter-season shifts, and inter-year or inter-period shifts, and it does not take any explanation to know what the difference in the temperature do to a company. We, in our system, figure that 1 degree temperature changes the average domestic customer's use approximately 6 feet. Now, if you multiply that by a million that is 6,000 MCF which at 50 cents is $3,000; in other words, a degree's change in temperature for the system can change your daily earnings $3,000. I think my arithmetic is right on that.

Recross Examination Interposed by Mr. Booth.

Of course, it could increase it as well as decrease it.

Redirect Examination by Mr. Morgan (Resumed).

You have a limitation by the capacity of your lines and you have a certain temperature limitation. It only gets so cold. Many winters are warm but very few of them are colder than normal. It is perfectly proper to say that with weather as cold as this last week we were having great difficulty in supplying our demand with the extensive system we have. Two weeks before we did not know what to do with the gas. That is a risk of the business.

By my observation that the winters get warmer but not colder than normal I meant that there is a limit as to how cold a winter could be on the down side; but if you have a winter with average temperatures of 65 degrees at this latitude, which sometimes occur, you sell very little gas for house heating or for other heating purposes; and the average temperature is sometimes higher, but it is unheard of to have a winter that would average 5 or 10 degrees below zero for three or four months. We had just such a winter as I first spoke of in 1932. That was a very warm year.

Recross Examination Interposed by Mr. Booth.

I have the exact figures for the year 1936. (Examining papers.) The month of February, 1936, Mr. Booth, in the territory served by the Columbia System, was 10 degrees below normal winter temperatures—the coldest month that we have recorded back to 1927. The next coldest month was 7 degrees below normal, and there are only two of those. But there are many instances of months that were 6 and 7 and 8 and 9, 10, 11 and 12 degrees above normal.

Redirect Examination by Mr. Morgan (Resumed).

As a matter of fact appliances which utilize natural gas in the home or establishments requiring furnace fuel are limited in their intake capacity. If they turn them on full blast on an exceptionally cold day and that is not
1871 enough there is nothing to do but go to bed. They cannot increase the gas intake. That helps too to this extent. They will burn their ovens and leave them open and turn everything on that they have for heating; but even that won't make up for the comparatively long periods of warm weather, apparently. This varying demand becomes a very important factor with the industrial load as I think was brought out both on my direct and redirect examination.

Still another risk concerning which Mr. Kleinman testified as appears on page 8047 is the risk due to technological changes; about which he said:

"Risk due to technological changes which face the two companies. The type of risk which arises out of technological changes has several aspects. In most lines of industry there is a need for expending substantial sums of money in research on the products to be sold. In our case the product, natural gas, needs no such research expense and its sales cannot be affected by the research expense of any competitor which results in an improvement in the quality of its gas."

I do not think Mr. Kleinman's testimony covers the technological risk or hazard that confronts the natural gas business. I would agree with Mr. Kleinman that the natural gas business certainly does not spend as much money on research as, let us say, general business; there is no question about that. I am not saying at this moment whether that is a wise and far-sighted policy or not. The technological risk of the natural gas business is the risk already spoken of this afternoon, of the development of other heat processing, particularly. I spoke of the vulcanizing of tires and the dentist's furnace. It is true in all small shops where they use small heat treatments. Electricity has replaced gas with the technical improvement of the electric furnace. Just after I spoke of that a moment ago it occurred to me that there is a domestic coal stove being sold now called the Agfa stove, a self-contained stove with practically complete combustion. The initial cost of that stove is very high. The operating cost is extremely low, and the makers say there is no radiation from it. Everything is cooked within the stove. You can put your hands on it while it operates. I can see how that stove might give great competition to gas cooking.

The same thing is true of the newer electric stoves which have little radiation so that the person cooking on the stove does not suffer from the heat as much as over the older type of stoves. The gas industry has made some advance there, but not as much as the electric industry, or certainly as much as this new Agfa stove.

The point is that it is not the technological improvements in the gas industry alone that affects the overall demand for gas. Technological improvements on the outside affect that demand also, although I agree with Mr. Kleinman that the cost of technological improvements in the gas industry has not been as great as in other industries in general. The risk of losing customers or losing volume to the customers
that we have is not confined to the technological sit-
1872 uation in the gas industry alone, but it is affected by
technological improvements in the appliances of the
electric, coal burning and oil burning industries, and in all
heat treating industries.

I do not agree with Mr. Kleinman that the effect of change in utilization appliances of competing fuels would be small in amount and slow. That is what I am talking about.

1873 At page 9592 Mr. Kleinman testified in substance that the witnesses who testified for defendants on the subject of rate of return did not mention as elements or factors entering into the judgments that they reached on rate of return any risks as to inventories or overhead or labor disturbances. He then added in substance that in his opinion the weakness of their testimony was that when you are appraising risk you cannot pick out those three risks or six risks or ten risks as present in the natural gas industry without discussing them relative to other industries to be used as the standard for arriving at a conclusion of rate of return, and without taking into consideration all of the risks of all kinds of business.

In arriving at the conclusion to which I testified on direct examination, I did not use as my standard the risks and earnings of unregulated industries. I used it for purposes of orientation and to demonstrate to my own satisfaction the competitive demand for capital and the conditions under which capital was found. Had I followed that course that you suggest or that Mr. Kleinman suggests, I think I would have made direct comparisons with industrial or other companies. Now, I did not do that, and of course we had for example before us an excellent comparison, because if I embraced that theory, I would say that as completely a comparable risk as you could get to a natural gas pipeline would be, let us say, a gasoline pipeline. There is a gasoline pipeline that serves in the same general territory that these companies serve. It extends from the Panhandle of Texas or southwestern Kansas to Minneapolis, with a branch off to Chicago. That is the Great Lakes Pipeline Company. The rate of return on that company was testified to by Mr. Dow, Fayette B. Dow, before the Monopoly Committee just prior to the time that I appeared for the direct testimony here. I did not consider that it gave as fair a comparison or as broad a picture to make a direct comparison there.

(The following testimony was stricken by the Examiner on motion of Commission Counsel over objection of Counsel for the Company: "In that particular instance the Company transports gasoline and transports it as a carrier for a tariff, that is, it is not using a contract to market at the end of a line but its rate of return is calculated in my exhibit for the year 1938 as approximately 33%. For 1937 it was approximately 30%. Those figures are taken from the Temporary National Economic Committee's bulletin beginning September 26, 1939, and on that subject on page 539 there is a graph that shows the rate of return on the major gasoline pipelines, on the independent crude pipelines, on all companies reporting to the I. C. C., and on the major crude pipelines. The gasoline pipelines essentially started in business in 1929 and in that year and until the end of 1930 they lost money. Since then the rate on all of these companies has increased until at the end of 1938 it was 30% according to this graph. I intentionally did not make a direct comparison like that or other direct comparisons of risk to other companies even though this particular company is, of course, regulated.''

I did say that if an investor had as many dollars as there were companies listed on the Chicago Stock Exchange, as shown in my exhibit, and invested a dollar in each industry, or the same number of dollars all in defendants' undertaking, that there would be less risk in the first investment because of the diversity factor.

Columbia Gas and Electric Corporation owns subsidiaries having both electric and gas properties. It is a holding company but owns the securities of other companies which own distribution properties, as well as companies owning pipelines and production properties. In my direct testimony I made the point, as I remember it, in substance that these particular pipeline companies involved in this inquiry face an additional risk and are at an additional disadvantage through the circumstance that they do not own any distribution companies and do not control the sales policies in the distribution of their natural gas. Columbia has had to do with selling at wholesale and distributing its own gas. It has been the experience of our company that there is an advantage from the standpoint of building up the load in owning the distribution company which controls the distribution policy. There is such an advantage particularly where you are selling the gas to a former manufactured gas company. The policies involved in the sale of manufactured gas and natural gas are different, and it is difficult for the selling personnel of the manufactured gas company to embrace, understand, and solve the problems involved in the sale of natural gas.

1874 Practically speaking, the manufacturing company makes gas and pumps it to the holders, and from the holders it is pumped out to the customers. There is always a limit to the amount of gas that can be handled, and the average manufactured gas man is afraid of peaks, high peaks. For natural gas, on the other hand, the holder is an enormous pipeline. There is a great capacity there, and in many natural gas companies, most of our own, we are accustomed to operating at low load factors, and consequently we have not the same fear of peaks. I mentioned in the direct, the house heating business. The house heating business is a peak load business, and it has been our experience that it is hard to get the personnel, the sales personnel in the manufactured gas companies, to push house heating business with the enthusiasm and the results that the sales personnel in the natural gas business does. In fact, in some instances we offer particular covenants in the contracts to encourage the sale of house heating.

Approximately 8 per cent of the domestic customers of the Columbia system have house heating installations. Those figures apply throughout the system as an average. It varies widely in different places. For example, in Charleston, West Virginia, house heating saturation is practically 100 per cent. It will move downward in other places where there is very little house heating.

The last figure I saw for the Chicago distributing company was about 12,000 house heating customers out of 850,000. That was approximately 1½ per cent. I have some notes here. In Detroit, natural gas was introduced there in 1935, the estimated house heating saturation is 6 per cent. That is approximately 27,000 house heating customers out of 440,000. In the Columbia system, we estimate that our saturation is about 8 per cent, but last year of all the new homes built on the system, that were centrally house heated, approximately 33⅓ per cent were heated with gas. That is an estimate from the sales department. In Chicago, the last figures I saw were 12,700 house heating installations, a saturation of about 1.52 per cent.

I believe there is a difference in our system in the percentage of saturation, as I have used the term here, in those cities where we control the distribution sales policies and those in which we sell at wholesale. It is very difficult to get the figures. I could not prove it. We are convinced that that is the case. The best example we have is where we have purchased properties. As soon as we have put our own force to sell house heating on those properties, there is a big increase in that load.

At page 9605 Mr. Kleinman, referring to defendants, made the statement in substance that as compared to ordinary business, they have a very substantial lack of risk and that capital generally recognizes that investment in utilities is a safer investment than it is in business generally. He then added: "I mean all utilities, even those that have gone bad. Electric utilities are the highest. Telephone, water companies, are better than some telephones, and so forth, but that whole field is superior." I do not agree with that conclusion. That is not the attitude of the investing public.

The first thing my mind jumps to is the street railways. There was an enormous loss to investors in them. I
1875 cannot help thinking of the natural gas business as a whole and the losses that have resulted from that in the distant past. We spoke of the Indiana field this morning. This is a matter of history—the losses there. The losses resulting from financing in 1928 and 1929 through failure of the fields, through failure to obtain markets, and the investors who I see, and I see a great many professional investors and bankers, consider the naural gas business a very risky business, as I do.

I remember one company, a producing gas company, that in 1928 was financed for $3,600,000 first mortgage bonds, and I think $800,000 debentures behind them. That property was located in Kentucky. The gas was drawn out from under it, and the same property that they financed for over $4,000,000, sold at auction within the year for $156,000. The investors just cannot forget that kind of loss.

The experience that Mr. Cabot had over here in the Tioga field is a perfect example. Three years ago he was willing to spend $1,700,000 for a transmission line; and he has now had to advise the customers on that line not to expect any gas through it after July this year. Cabot has been doing pretty well in the gas business. He is, I am afraid, losing a good deal of money in the New York field just now.

The Cabot organization used to be in West Virginia. I think Mr. Cabot has gotten out of the carbon black business. I cannot speak for his other interests outside of the Appalachian field. He is the same Cabot who was connected with the Cabot Carbon Company, which operated down in the Panhandle, but I am not familiar with that operation.

1876 CHARLES W. KNAPP, JR., a witness for the Federal Power Commission, recalled for further cross-examination, testified:

(January 8, 1940.)

Cross-Examination by Mr. Morgan Resumed.

I have Exhibits 197 and 198. In connection with my direct testimony the Commission offered Exhibit 185. It was developed in cross-examination that I had not shown the comparable yields on transactions in common stock securities but had confined my figures largely to bond yields. That is partly true. Subsequently I prepared Exhibits 197 and 198 to meet that point. Exhibit 185 does contain data on yields from purchases of preferred stock of electric operating utility companies for the period from 1935 through 1939. It was only with reference to common stocks that you inquired as to why we have not supplied similar information.

In preparing the additional exhibits I did prepare some figures having to do with the yields on electric operating utility preferred stocks. You ask why I picked out electric operating utility preferred stocks rather than the stocks of other classes of utilities for the purpose of developing these figures. First of all I did so because it followed a consistent pattern with our studies that we have presented in great detail in connection with electric utility bond issues. My explanation of why I believed the electric utility yields and earnings were justified in this study is the same as that advanced by me when you asked why I selected electric utility bonds in getting up Exhibit 185.

Exhibit 197 contains 21 issues of preferred stocks. The number at the left is an identification number which is or will be found in the footnote in a study made by the Federal Communications Commission entitled "The Problem of the Rate of Return in Public Utility Regulation," and in the tables and schedules included therein, the items were designated by number; and it was thought it would facilitate the tracing through of these items if those numbers were retained. In their study they included additional companies. I don't know the exact number, as a matter of fact. I do not think it was more than two times this number. It may have been slightly more, but, as indicated also in the footnotes here, I selected only those issues for which dividend and prior requirements were earned in excess of 1½ times in 1938.

You ask if these are not the highest rated stocks that are included in that study by the source. These preferred stocks were not described as such; but as I gather the intent of your question, they would be those of the highest quality in the study. These preferred stocks are recognized as among the highest quality of preferred stocks that are being bought and sold by the public, and they were selected for that reason.

Of the 21 companies listed in Exhibit 197, some of them are electric and gas. I have not made any particular study to determine how many of them are in the natural gas business. It may well be that some of these companies handle distribution of natural gas, either in its original state or mixed with manufactured gas, but I would not be prepared to state which ones or how many of them. I did not think it was necessary to make a detailed study of each one of these companies for the purposes 1877 of this exhibit. I think that the companies here listed are shown as electric operating utilities. I do not think it would require any extensive study to verify that point. It was necessary to determine for my purposes, of course, whether they should be classified as electric operating utilities, and I did so determine before making this schedule, but I do not retain a recollection of all of the details involved, which are contained in the sources to which I referred.

I made no detailed study to determine the source of the electric current that each of those companies distributes as to whether it is manufactured or generated by the distributing company or purchased from other sources. I could perhaps go through here and indicate companies which largely generate their own power and others which purchase; but I did not make any detailed study and do not have a summary of any such details with me. You ask if I do not undertake to keep myself informed concerning details of that kind as far as concerns the electric companies whose statistics pass over my desk. I don't know as I can answer that categorically. As I said a moment ago, I made no specific study relating to these companies for the purpose of determining the exact quantity of power produced, but I would not care to make any generalization based on that. You ask if I tried to find out those who were generating their own electricity or were using steam power or utilizing hydroelectric facilities. I have a knowledge of some of these companies, and the names of some of them indicate the nature of the source of power.

The principal reason for selecting these companies was that they were electric operating utilities. I don't believe I was asked if I selected the companies whose securities were of the highest quality. I was asked if these companies were of that character, and I thing I answered in the affirmative.

Questions by the Examiner.

The fact that dividends and prior requirements were earned in excess of 1½ times in 1938 would indicate that these preferred stocks were of a high quality; but I did not mean to imply that I had selected these companies in any other way than by reference to times that preferred dividends and prior requirements were earned. The 1.5 times requirements earned is getting pretty close to a lower limit. In other words, if preferred dividends and prior requirements are earned less than one time, the preferred dividends would not be earned.

You ask why I selected 1.5. I felt that that was a reasonable starting point. Unity is what an investor would ordinarily demand for investment purposes. He might take something that was not earning its dividends for speculative reasons, but unit is the lowest point at which the investor would be willing to consider, I imagine, a preferred stock as an investment, and as you approach—as you rise above unity and approach two and three times earning power, the quality of the preferred stock increases.

Cross-Examination by Mr. Morgan Resumed.

You state that you understood me to say several minutes ago that I had picked these because they were of the highest quality of preferred stock. I picked these because the preferred dividends and prior requirements were earned in excess of 1½ times, and that in itself indicated that they were above the level so far as quality was
1878 concerned. The quality was better than those whose earnings were covered less than 1½ times. I don't re-

member that I said that I selected them because they were of the highest quality, but, as I explained, these would be of the highest quality. I just don't understand what the distinction in terms is that is involved. I am just trying to make a frank statement; I just don't want to do anything other than that.

You ask why I have a fewer number of companies in Exhibit 198 than I do in Exhibit 197. The reason for that is simply explained by the holding company dominant in the electric utility industry, and if a holding company owns in excess of 95 per cent of the common stock, as is true in the great majority of instances, it does not leave you a very large selection from which to determine any price rates, because you do not have the market price which you need in computing that ratio. In Exhibit 198 I listed all of the stocks listed in Schedule 26 of the Federal Communications Commission study from which I took them, provided that at least 5 per cent of the issue was in the hands of the public. I excluded the gas companies from that exhibit for the same reason that I did from Exhibits 185 and 197. I confined the common stocks to electric utilities for the same reasons I have stated in connection with my testimony concerning Exhibits 185 and 197.

The Pacific Gas & Electric Company possibly has some natural gas distribution. I don't know of any other that would have. You ask if I noticed anything out of the ordinary about the earnings price ratio of that particular company. It has a very high earnings price ratio. The earnings price ratio for the Pacific Gas & Electric, based on the market prices for the week ended November 17, 1939, is 8.53 per cent. That is based on earnings per share for the twelve months ended June 30, 1939. There is another issue, Southern California Edison Company, Limited, for which the earnings price ratio on a similar basis, except that earnings are for twelve months ended September 30, is 9.11.

You ask if I have any way of accounting for that high earnings price ratio in the case of Southern California Edison Company, Limited. I believe so. I believe that it is generally—if these earnings price ratios are related statistically to percentage of gross income available for the common stock as shown on the same exhibit, it will be found that as the percentage of gross income available for common stock increases, the earnings price ratio tends to decrease, and you will note in the case of the Pacific Gas & Electric Company that for the year ended June 30, the percentage of gross income available for the common stock was 40.95. In the case of the Southern California Edison Company, the corresponding percentage was 39.72. And those two issues reflect the highest earnings price ratios on this exhibit, and at the same time reflect the lowest percentage of gross income available for the common stock. I would not care to make a statement as to whether there is municipal competition or a threat of it in the city where Southern California Edison Company, Limited, owns its distribution facilities. I may have read something about it, but I would not be willing to offer my recollection as any testimony on it.

You ask if these companies listed in Exhibit 198 are not also companies whose securities are of the very highest quality in the electric field. I would not care to make a commitment on that question. That had nothing to do in this case with the selection. I included in this exhibit all issues which I could find in this study that 1879 was referred to by the Federal Communications Commission, which were issues of electric operating utilities and common stock issues of which at least 5 per cent of the issue was held by the public. I made no attempt to classify them as to quality except insofar as the column to the extreme right calling for the percentage of gross income available for common stock is an indication of quality.

Questions by the Examiner.

This is an exclusive list of companies. There are not very many electric operating utility common stocks on the market. I have listed those here which were held by the public to the extent of 5 per cent of the outstanding issues. Your question as to whether by and large that list represents the cream of the electric operating utility crop, so to speak, I do not think can be fairly answered because I have shown nothing here with respect to companies which may be equally as good or better than these companies but which are wholly owned by holding companies.

Cross-Examination by Mr. Morgan Resumed.

You ask if I can mention one that will qualify as being better than this group of companies here, even though its stock is owned by a holding company. It is difficult to make any generalization about such things as better or equal to or the same as, in these cases. There are always points of comparison. Or there may be a combination of them, but there are companies whose bonds carry high ratings which are among those companies which are wholly-owned by holding companies. I can give you the names of a few of those. Among public utilities whose bonds carry Aaa rating are the Brooklyn Edison, which is a subsidiary of the Consolidated Edison Company of New York. Yes, the Consolidated Edison Company of New York is in the list. The Duquesne Light Company, which I believe is a subsidiary of the Philadelphia Company, is also among those whose bonds carry Aaa ratings. In the same classification would be New York Edison, which I believe is a subsidiary of the Consolidated Edison of New York, and the Philadelphia Company, the affiliate of which I do not recall. I am referring to my Exhibit 185, Schedule 1, page 8. Moody's Manual does not rate common stocks. I could get Moody's ratings on their bonds, of course.

You ask if I am saying by my last answer that some of these companies whose names I read from Exhibit 185 are in my judgment, better companies than those listed in Exhibit 198. I said a moment ago that I did not think it was possible to generalize about what is better, equal to, or worse than. I could have included in Exhibit 198 from the same source a number of gas distributing utilities. I believe there were gas operating utilities included therein. I excluded them because I desired to confine my studies to electric operating utilities.

In Exhibit 185, Schedule 23, I had some figures concerning average weekly earnings indexes, and in Schedule 22 I had factory employment and payroll indexes. You ask if I made any further study of that subject to see whether or not information concerning wage scales is available. I have not made any such study as that. There has since come to my attention some data which is published in the State of Illinois on employment and payrolls, but I am sorry that I have not had the opportunity to examine that thoroughly.

1880 Yes, I have access to a publication known as the Survey of Current Business, issued by the United States Department of Commerce. It gives information on employment and payrolls, yes, sir. I am familiar with the publication in general. I have not prepared any figures from that publication showing the prevailing wage scales, particularly in the field of construction, over that period 1929 to 1939, inclusive, the same period covered by my Schedule 23, Exhibit 185. If they are in the source concerning which you have just asked me, I will be glad to know it, but I have not noticed them.

You have handed me the 1938 supplement of the publication "Survey of Current Business, United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington." You asked me to take that and state into the record from that source the figures for common and skilled labor under the caption "Construction Wages" beginning with the year 1929 through the succeeding years. These are the monthly averages of wages per hour. They are not the monthly wages but the monthly averages of hourly wages. The caption says "Dollars per Hour." The information appears to be divided into two categories, common labor and skilled labor. For the year 1929 the figures for common labor in dollars per hour are .547; 1930, .561; 1931, .50; 1932, .427; 1933, .456; 1934, .532; 1935, .528; 1936, .564; 1937, .645. Skilled labor—for the year 1929, $1.36; 1930, $1.38; 1931, $1.27; 1932, $1.02; 1933, $1.01; 1934, $1.10; 1935, $1.09; 1936, $1.15; 1937, $1.32.

I have read those figures but, without having an opportunity to examine into the basis of their preparation or to make any study at all, I would not care to ascribe any significance to them. You ask if I am willing to accept the figures coming from that source as authentic figures. I don't know, not having studied those figures, just what industries are involved, what kind of construction labor, and so forth. The weekly wage scales here on Schedule 23 of Exhibit 185 are for the United States, the wages of weekly earnings in ninety manufacturing industries. Those for the State of Illinois, according to my recollection, are a cross-section of Illinois industry representing somewhere in the neighborhood of 60 per cent for factory wage earners and factory payrolls.

You have asked me to turn to page 177 and see if that discloses the source of that information and the character of the construction that is included in the figures. I will read what appears there, if I may.

"Compiled by the Engineering News Record, and represents the hourly wages of both common and skilled labor in the construction industry as of the first of each month. Both the skilled and the common rates are the arithmetical average of wages actually paid in 20 cities, as follows,—New York, Boston, Philadelphia, Baltimore, Atlanta, Birmingham, Cleveland, Cincinnati, Detroit, Chicago, St. Louis, Kansas City, Dallas, Minneapolis, Denver, Seattle, San Francisco, Los Angeles, Pittsburgh, and New Orleans. These data are compiled from monthly reports that correspondents in 20 cities submit as to wage rates. Union wages actually paid are used except where non-union jobs predominate. In some instances, it has been necessary to average the rates for union and non-union where both exist.

"The skilled rates are the average of the three principal trades, carpenters, bricklayers, and structural iron workers in heavy construction."

It goes on to say where comparable data prior to these dates can be found.

1881 Now, you have asked me after reading that, to consider its importance, and I would say that I see no mention made with particular reference to the natural gas pipeline business, that it says "heavy construction, iron workers," but it combines bricklayers, carpenters, and iron workers. Whether I would have used that had I had it is another question. Pipeline companies in their various construction activities may have employed all of these classes of construction workers, but I am not familiar with pipeline construction. I am not an engineer.

You have handed me the February, 1939, supplement of the same work, and on page 69 of that publication I find the monthly figures continuing the figures which I just read into the record on down to October, 1939. These figures are as follows: For common labor during the year 1938, for the month of January, .680; February .675; March .675; April .677; May .673; June .677; July .677; August .677; September .677; October .682; November .682; December .682.

For skilled labor during the same period, January $1.39; February $1.39; March $1.40; April $1.40; May $1.40; June $1.42; and for the remainder of the year $1.43.

For 1939 for common labor: January .682; February and March .680; April .683; May .682; June and July .684; August, September, and October .685.

For skilled labor in 1939: January and February $1.43; and for the remainder of the period to and including October, $1.44.

The monthly average shown by the publication from which I have read is .500 for common labor for the year 1931. The monthly average for the year 1939 is about .685, an approximate 37 per cent increase since 1931. For skilled labor the monthly average for 1931 was $1.27 and for 1939 is approximately 17 cents higher, an increase of approximately 13 per cent.

1882 E. V. KESINGER, a witness for defendants, called for redirect examination, testified:

(January 9, 1940.)

Redirect Examination by Mr. Morgan.

As I stated heretofore, I am general superintendent of the two pipelines involved in this proceeding. I have occupied that position since January 1, 1932, when operations were commenced. Prior to that time I was chief engineer in charge of the engineering work connected with the construction of the pipeline properties from the beginning of construction to completion.

In the cross-examination of Mr. Delafield on October 28, 1939, he was asked concerning unusual developments in the gas industry in the last five years. At page 6712 of the record he stated in substance that there had been constructed within the last few years two high pressure lines, which he briefly described there in his testimony. In his redirect testimony here yesterday he corrected his former testimony at that point by stating that he was mistaken in thinking there were two high pressure lines, adding that there was only one.

I have made an investigation as to the capacity and operating pressures and stresses of the line to which he referred to in that testimony. The smaller diameter line to which he referred is operated by the Hope Natural Gas Company. It states at their Cromwell station near Charleston, West Virginia, and runs northeast for 95 miles. The south 65 miles of that line is made up of 12¾ inch outside diameter pipe, commonly known as O. D. pipe, of which the wall thickness is ⅜ of an inch. The north 30 miles of the line is made up of the same kind of pipe, with the exception that the wall thickness is 5/16 of an inch. There is only one of those high pressure lines. In speaking of the smaller of the two lines I was referring to his original testimony. He said he thought there was one line 18 inches in diameter and a smaller line also. Yesterday he said he was mistaken about the larger line.

The line concerning which I have obtained the information is the same line that was referred to in a magazine article which counsel for the Commission read into the record at pages 6192 and 6193 by T. R. Weymouth. That line was designed to operate at a pressure of 1300 pounds on the south end of the line at the Cromwell station, and a pressure of 1000 pounds at the point where the 5/16 inch wall pipe starts, 65 miles north. The 1300 pounds on the 12¾ inch O. D. seamless pipe with a wall of ⅜ inch would result in a fibre stress of 22,000 pounds per square inch. The 1,000 pounds on the 5/16 inch wall pipe would result in a fibre stress of 20,400 pounds per square inch.

When the line was completed it was tested to a pressure of 1287 pounds. This produced a fibre stress in the ⅜ wall pipe of 21,880 pounds. The line has been operated at pressures ranging from 700 to 850 pounds. The 850 pounds produces a fibre stress of 14,450 pounds on the ⅜ wall pipe.

Comparing these pressures and stresses with the operating pressures and stresses at which the lines of
1883 defendants are operated, we limit the maximum operating pressure on the 24-inch pipeline of defendants to 720 pounds. It must be remembered that the 24-inch pipe on the system of these two companies is of two different wall thicknesses. The seamless pipe is 5/16 inch wall, and the electric welded pipe is 11/32 inch wall. Consequently, the 720 pounds maximum operating pressure produces a fibre stress of 27,650 pounds in the 5/16 inch wall pipe, and 25,130 pounds per square inch in the 11/32 inch wall pipe. The 27,650 pounds on the seamless pipe compares with the operating stress of 14,450 pounds on the 12¾ inch line about which I first testified a few moments ago.

Another comparison that might be made is that if and when the Hope Natural 12¾ inch line is operated at a pressure of 1300 pounds, for which it was designed, the fibre stresses will compare as 22,000 pounds on the Hope system to 27,500 pounds on defendants' system. You ask me to explain how a line operating at a pressure of 1300 pounds would have a lower fibre stress than a line operating at 720 pounds. The pressure alone is not a measure of fibre stress resulting from that pressure. It is also necessary to know the diameter of the pipe and the wall thickness. The Hope Natural Gas line is 12¾ O. D., and the wall thickness is ⅜ of an inch. The pipe on defendants' system is 24 inches O. D. and 5/16 inch wall. The fibre stress varies directly with the pressure, other factors remaining constant. The fibre stress also varies directly with the diameter, the other factors being constant; and it varies inversely as the wall thickness increases or decreases, other factors remaining constant.

There is a formula by which we can take any given piece of pipe where we know its diameter and its wall thickness and determine the fibre stress on that piece of pipe at any assumed pressure. The commonly accepted formula for this calculation is known as Barlow's formula. It is expressed in this manner: Fibre stress in pounds per square inch is equal to the product of the pressure in pounds per square inch, multiplied by the diameter in inches, divided by two times the wall thickness in inches. That formula produces the figures showing the stresses to which I have testified. The constant is two times the wall thickness. The figure 2 is the constant. Expressed in symbols, the formula is F is equal to PD over 2-T, the F being fibre stress in pounds, per square inch, the P being the pressure in pounds per square inch, the D being the diameter in inches, and T being the wall thickness in inches.

The term "high pressure" has been used in this record to refer to the practice employed on the system of the Texoma and Natural Gas Pipeline Company of operating their pipeline system at pressures in the neighborhood of 700 pounds as compared to the prevailing practice in the natural gas industry prior to 1930 of operating gas pipeline systems at pressures in the neighborhood of 320 pounds.

The term "high stress" has been used to refer to the employment of fibre stresses in the neighborhood of 25,000 pounds on the system of Texoma and the Natural Gas

Pipeline Company as compared to the prevailing practice in the natural gas industry prior to 1930 of operating pipeline systems at fibre stresses ranging from 11,000 to 15,000 pounds per square inch.

The term "high pressure" may not be necessarily significant, when used by itself, since it is also necessary to know the diameter and the wall thickness of the pipe if it
is desired to know the fibre stress. The term "high
1884 fibre stress" is more significant particularly when
you are referring to the degree to which the steel is
being utilized in its normal operation.

Mr. Floyd C. Brown testified concerning an extensive research study to determine whether or not it was feasible to build a gas pipeline from the Panhandle of Texas to the Chicago area. He testified that their original investigations of this subject convinced them that the project was not feasible and that he recommended against proceeding at the close of the first series of studies. The use of the high pressure at which these lines are now operated is not the only factor which makes the operation of defendants' pipeline feasible. There were a number of factors involved, the high pressure being one of them. It should be remembered that from 1926 forward, when the engineers were working on this project trying to determine how to design it, and how to make it feasible, that they were confronted with the use of lapweld pipe. The maximum fibre stress that could be used in design work where this pipe was to be employed was 15,000 pounds per square inch. Also the steel in this pipe has a yielding point of 25,000 pounds per square inch, and an ultimate strength of 45,000 pounds per square inch.

The development of a higher grade of pipe of more uniform wall thickness and more uniform physical properties by two manufacturers brought about a change in some of the basic factors. The pipe that became available was manufactured from a steel that had a yield point of 35,000 pounds per square inch, and had an ultimate strength of 60,000 pounds per square inch. The uniformity of the physical dimensions and the physical properties were such as to lead us to conclude that it would be safe to utilize this steel at fibre stresses in excess of those that had been employed, consequently the design employed in this system utilized fibre stresses in the neighborhood of 25,000 pounds per square inch. This term is indicative of the degree of utilization of the factors employed in the pipe.

The higher pressure and the higher pipe stress were very important points or important factors, but those were not the only factors involved that resulted in the building of this project. The other factors, I believe however, have been fully and clearly covered in the record.

1885 W. C. GILMAN, a witness for defendants, called for redirect examination, testified:

(January 9, 1940)

Redirect Examination by Mr. Morgan.

I am the same W. C. Gilman who has testified in this case before. I am the same Gilman whose testimony is discussed in the brief of counsel for the Commission under the title "Heads We Win, Tails You Lose." In the opening paragraph of counsel's brief reference is made to the circumstance that I was formerly an employee of the government in the capacity of chief or director of the Public Utilities Division of the Securities and Exchange Commission. You ask how I happened to obtain that position. I was asked to come to Washington to help in the establishment of the Public Utilities Division of the S. E. C. soon after the passage of the Public Utility Holding Company Act of 1935. At the time I was asked to come down here I was employed by the Equitable Life Assurance Society. I had a job. I did not agree when I came down here that I would spend the rest of my life in that job.

The. S. E. C. has rules concerning the limitations that former employees of that department are under when they leave the employment of the government. I have observed those rules in every way.

Questions by the Examiner.

The rule is generally to the effect that any former employee of the S. E. C. who leaves the employment of the Commission shall not engage in any practice before the Commission for a client with respect to any matter which was pending before the S. E. C. while he was with that body.

Redirect Examination by Mr. Morgan Resumed.

In the course of my cross-examination I was asked concerning my testimony in a case before the New York Public Service Commission involving some proceeding between that Commission and the Brooklyn Union Gas Company. In the brief filed by counsel for the Commission there is a quotation from my testimony in the Brooklyn Union Gas case appearing at page 7243 and subsequent pages of the record, given by me in response to questions by Mr. Hertzoff, who is referred to in the brief as assistant to the Corporation Counsel of the City of New York. The questions and answers quoted are:

"Q. Would you say that an investment in a natural gas company is a better class than an artificial gas company like the Brooklyn Union or a manufactured gas company?

"A. I hate to generalize.

"Q. Oh, you have generalized all along.

"A. I would say that—yes, that in the past few years, experience in what has gone on has demonstrated that investors are more willing to buy the securities of natural gas companies than they are of the artificial gas companies."

1886 You ask what securities I was talking about in my answer to those questions. At page 7245 of this record, after that testimony was read by Mr. Slaff, I stated that "there have been in recent years many million dollars worth of natural gas pipeline bonds sold, particularly to institutional investors. While I was at the Equitable, we bought many million dollars of such bonds of short maturity with heavy sinking funds. At that same time, we were not buying the bonds of artificial gas companies. Natural gas pipeline bonds were special types of securities and fitted a special position in the fortfolio of the investing institution. And that is what I meant by investors being willing to buy the bonds of natural gas companies."

I thought that my explanation at that time in the record right after that testimony had completely explained my position in the matter. In the redirect, no consideration whatever was given to any further explanation of it.

I do not see how anybody, and I did not think that anybody could misunderstand my position, but Mr. Slaff's brief certainly does.

Questions by the Trial Examiner.

You ask in what respect I think the brief misinterprets my position. The brief implies that in the Brooklyn Union case I took the position that manufactured gas bonds or manufactured gas securities were riskier than natural gas securities and in this case the reverse. I do not think that in any reading of the testimony and my explanation any one could properly take that position.

Redirect Examination by Mr. Morgan Resumed.

I did not testify in the Brooklyn Union case at any time or in any place that the risks in the artificial gas business were greater than the risks in the natural gas business. In this record I testified that there was a greater volume of transactions in the bonds of the natural gas industry than those of the artificial gas companies. I have not at any time testified to the contrary of that. I have said in a number of places in this record that in recent years there have been many more bonds of natural gas companies sold than of artificial gas companies. They are bonds of peculiar character or special character, short maturities and heavy sinking funds, and from that point of view have been relatively attractive to institutional buyers who want to put their money to work and who want to get it back and see it coming back over a short period of years, at which time they hope to be able to reinvest it at higher interest rates than the present level.

My position is that by reason of the character of the natural gas bonds which have been offered and the character of the artificial gas bonds which have been available, the investing public has seen fit to put more of its money into the natural gas bonds of the character that were issued than they have in the type of artificial gas bonds which were available to them. This is true for the principal reason that the natural gas companies during the past five years or so have offered a particularly attractive type of security to investors at this particular time, relatively short maturities and heavy sinking funds. At the time I was discussing the risks of the natural gas business as compared with the risks of the artificial gas business in
1887 my direct testimony in this case, I made that distinction that there is a difference in the short term view-

point and the long term viewpoint in the risks of the two types of companies.

Also in the same brief of counsel for the Commission appears a quotation not from this record but from the brief of someone described by counsel as "the fair and temperate Mr. Mulligan." That brief was filed in the Brooklyn Transit case, which has been mentioned here. That was a tax case in the State of New York, involving taxes for the year 1916 of the Brooklyn Rapid Transit Company and other companies in that street railway and elevated railway system. In the computation of those taxes, called franchise taxes, the formula which had been established over a period of years required the establishment of rate of return. My testimony delivered in 1938 was with respect to a proper rate of return for the Brooklyn Rapid Transit Company and system companies in the year 1916. The testimony was delivered before a Special Master of the Supreme Court of the State of New York.

In connection with the study and investigation that I made, which was a rather difficult problem because the testimony was delivered in 1938 and was supposed to go to rate of return proper in 1916, was a study of historical cost of capital to the B. R. T. I considered it of some importance in forming my judgment as to what was a proper rate of return, and I followed the method suggested and outlined by the staff of the Federal Communications Commission in their study of rate of return, to which reference has been made a number of times in this case.

A substantial section of that study of the staff of the Federal Communications Commission is given over to a development of a method of computing the historical cost of capital. I followed that method exactly. Naturally, there were different figures to be inserted in the formula, and to the best of my ability and to the best of my judgment, I obtained the proper figures on the B. R. T. system and inserted them in that formula, which the staff of the F. C. C. had developed, and put that computation of the historical cost of capital in exhibit form, and it was inserted in the record in the case.

I had never read Mr. Mulligan's brief until it was called to my attention from Mr. Slaff's brief. However, as soon as I saw that he had prepared a brief and made some comment about my method, I obtained it and studied his criticism. I think that his remarks with respect to my methods followed are financially illiterate, and that is the best way

I can characterize Mr. Mulligan's comments with respect to the methods that I followed. I stand back of those methods, and I defy him to meet them.

Questions by the Trial Examiner.

The Brooklyn Rapid Transit case was mentioned in the cross-examination very briefly. I think I stated when I was being asked as to my qualifications that I had testified in the matter of the rate of return in connection with that case. I was not cross-examined on that case. There was no extract of anything from the record in the Brooklyn Rapid Transit case, if my memory as to what I was asked on cross-examination is correct.

1888 *Redirect Examination by Mr. Morgan Resumed.*

At the top of page 132 of the brief by counsel for the Commission appear the first few words of an answer of mine as follows: "I think it best to be honest." I have examined the page of the record at which those words appear. I made no reference to this statement in my redirect examination. I did not think it necessary to mention it. You ask just what I meant by those words and how the matter came up. Well, I think originally that I should have said, "I think it is best to be fair," but I was very disturbed on the witness stand, and I said, "I think it is best to be honest." I really meant that those words should be directed to Mr. Slaff, because I thought that he was implying and getting into the record the implication that I had no responsibility with reference to the investment of large sums of money, whereas I very definitely recollected that I testified to having spent a substantial number of years with the Equitable Life Assurance Society, and having made recommendations to the Finance Committee, through the Treasurer of the Society, with reference to the purchase of some hundreds of millions of dollars of securities. I thought it was clear in my direct testimony where I said, I am sure, a number of times, that I made investigations of utility companies and prepared recommendations for the Committee, and that the Committee acted on those recommendations.

I never tried, in my opinion, to imply that I was the head of the Equitable Life Assurance Society, and that I alone had the responsibility with reference to several hundreds of millions of dollars. Obviously that would be silly. This question that he was directing to me at page 7371 was: "You did not have any final responsibility for the investment of those large sums of money or any sums of money outside of your own personal moneys?" The use of the word "final" there I thought was unfair, an unfair word to put in there to characterize the work that I had done, and that was the reason why I said, "I think it is best to be honest." I am sorry now—at least I think I should have said, "I think it is best to be fair," and I was directing those words to Mr. Slaff.

I did not imply at any place in this record that I had the final responsibility for investing those moneys by the Equitable. I think it is very proper to have on the record the fact that I did not have any final responsibility. I did not want to leave that impression, but the point is that I at that time had the feeling that Mr. Slaff, consciously or unconsciously, was trying to leave the impression that I had misrepresented my position with reference to what I did at the Equitable, and therefore I directed those words to him, "I think it is best to be honest." As I have just said, I think I would more clearly have conveyed what I was trying to convey if I had said to him: "I think it is best to be fair in your questions, Mr. Slaff."

I think this cross-examination to which I have just been referring was sometime after my cross-examination about my position with the Central Hudson Company. As I remember it, the reference to my position with the latter company was very early in my cross-examination.

I was present and heard the testimony of the witness, Mr. Fred Kleinman, who testified for complainant in this case. I have read his testimony since I heard him testify. On page 8038 of the record Mr. Kleinman was asked certain questions to which he answered in substance that:
1889 "A risk in business arises out of a decision which must be made by a management and which, when made, will affect the subsequent profits realized by the business." He added that it is necessary to distinguish between continuous actions of conditions surrounding an industry and the continuous risking of money by the companies in the industry. Continuing, he said that the risks arising out of the continuing commitment of money in a business are much more important than the risks arising out of the conditions surrounding an industry.

I am not in accord with the conclusion that the so-called internal risks, as Mr. Kleinman classified them, are much more important. I think the risks surrounding any industry are of great importance from an investor's point of view. The risks due to changes in the habits of people, changes in the arts, outside developments, are completely beyond the power of any management to control and are of extreme importance, and are so considered by investors.

You ask into which of the two classifications would fall the risks involved in the uncertainty of the life of the source of supply. I don't know whether we can actually put that in one slot. Certainly one phase of the question of supply can be placed on the external side, and that is what other people will do who are taking gas from that field down there. That question is completely beyond the power of the management of defendants. No decision of theirs can affect it except as it is affected by their own operations. If there are great developments or great increases in the demands for carbon black, and if the carbon black manufacturers take a lot more gas for carbon black, or if chemical industries use natural gas, or if there are increased takes by other lines, and things of that kind, those are factors which will affect the operations of this company and affect its supply. Those things are beyond the power of the management to control.

Then there is the risk of salt water intrusion. That is certainly a risk that the management has no control of. I suppose salt water intrusion might result or be increased depending upon the takes of gas by other takers, but the presence of salt water in the field and what is going to happen as the result of it is not a matter that can be controlled by the management, except in the manner in which they drill and operate their own wells.

I did not use the earnings and the risks of industrial companies as a basis for my judgment as to a proper rate of return for this company. I think it is clear in my direct testimony that I made a comparison of risks between pipeline companies and electric companies and artificial gas
companies, and the basis of forming my judgment was
1890 by comparing the risks of electric and artificial gas
distribution companies, and so forth with the risks of
the pipeline industry.

I did introduce in an exhibit a PWA project study under the Securities and Exchange Commission which showed net earnings before income taxes of a substantial number of American industries. At the time I introduced it, there was substantial discussion and argument about the use of it, and I stated at that time that that study was among other studies in my exhibit, and was useful for orientation purposes and to indicate what capital invested in industrial establishments had been earning over a period of time, but I did not from those figures arrive at the rate of return to which I testified.

In other words, my approach was to try as best I could to relate the risks and the necessary rate of return for defendants to the regulated concerns which I sought to distinguish or compare in the course of my testimony. I approached it from that side and not from the unregulated side. When you speak of regulated concerns, I relied primarily on concerns in the electric and gas field.

I testified that one of the risks confronting these pipelines and the business in general is the risk of exhaustion of supply. Mr. Kleinman testified on a phase of that subject at page 9440 of the record and said in substance that he thought any investor faced with a decision of the Federal Power Commission, founded on a complete study of the facts, company evidence and Commission evidence, would be more inclined to look upon the possibility that that field would last beyond the life found by the Commission than he would to look at the risk that the field would not last as long as the Federal Power Commission said it would. I do not believe that the attitude of an investor would be as Mr. Kleinman says it would be. I do not believe that an investor, having before him the decision of the Federal Power Commission with reference to the life of the supply, is going to say to himself, "No, it will last longer." I just do not believe that.

If we assume that the Federal Power Commission has heard the evidence on both sides and has done its best in the exercise of its judgment to determine how long that field is going to last in the light of the facts that can be developed as of this time, and it determines that it will last 16 years from the first of this month; and if we assume that these companies desired to refinance their capital investment or the value of their property partly by bond issue, in my judgment it would not be possible for defendants to sell at the prevailing bond rates, such as have been offered in evidence here in the course of these proceedings, an issue of bonds that would extend to the end of that full 16-year period. Investors buying the bonds would require a margin of protection. They would not be willing to take the risk of buying bonds which matured at the completion of the life of the supply. That would not imply that there was anything wrong with the finding of the Commission; but it simply means that the prospective bondholders would want a margin of protection. There is no surety. Even though this life of the supply is determined after a careful investigation and after a consideration of all the evidence in the world that it is possible to get, there is still the risk that the supply won't last as long as that life is determined to be.)

Anything that is in the ground and cannot be seen is very
difficult to measure exactly. The history of our coun-
1891 try is full of the stories of the mistakes which people
have made where the basis of their judgment was
estimates with reference to mining enterprises. If we could assume for a moment that they could ascertain exactly what is there, still they could not determine how long it would last or how long it would be economically available. That is true because there is the factor which is still unknown and that is how fast it is going to be taken out of the field by this company and by the other companies who are presently taking gas from the field or who in the future may take gas from the field.

You ask if in addition to the uncertainty that it cannot be determined how much gas will be taken out by all of those taking it out, there is also the uncertainty that formation developments might put a large portion of the wells out of business, or economic conditions might cause the stopping of production at a time short of the time they would stop if conditions continued as they are now. The investment banker and ultimate investor would take all those things into consideration, every single possibility that might result in an unfavorable condition with respect to the company whose securities he would or would not purchase. The bondholder in order to get the margin of protection that he wants, would first of all require that the amount of bonds be modest or relatively modest in proportion to his evaluation of the assets; and secondly, he would demand that the maturity of the bonds be in advance of the shortest competent estimate as to the life of the supply, and probably a 25 per cent margin below that. If the estimated life be 16 years, based on what investors have required in the past, the investor would probably fix the maturity of the bonds at 12 years. Under those circumstances the risk that the field would not last on through the remaining four years after the maturity of the bonds would fall on the equity security holders. As a matter of fact, the bondholder would place as a condition upon the advance of the money on the bonds at the prevailing rates that that risk, as far as he could protect himself against it through that safety factor, would shift to the equity holders. The bondholder gets a small hire for his money, and he is not going to take the risks of the other security holders in the enterprise, who are entitled to and would demand a higher return on the money that they have put in for the riskiest part of the enterprise.

A person buying the equity security knows that he is taking the risk. If he buys the common stock of a company that has contracted to pay off a substantial part of the debt over a period of 10 or 12 years, he is the residual security holder, and his ultimate profit is dependent on the final results, the over-all results of the enterprise. In the meantime, the bondholder has assumedly received his interest and has been paid off.

Recross Examination Interposed by Mr. Slaff.

Yes, the equity holder gets all the benefit if the field lasts beyond the estimated life, and he gets all the grief if it lasts below.

Redirect Examination by Mr. Morgan Resumed.

What Mr. Kleinman has characterized as an attractive speculation does not remove the risk.

Recross Examination Interposed by Mr. Slaff.

You ask if what I have testified to today was not all substantially covered in my direct testimony and if I have added any new element. I have no new point of view, Mr. Slaff. I do not think in my direct testimony I testified in quite the A, B, C, language which I think I have used just now. I don't think there is anything new in what I
1892 have said. I think it is just a different manner of explanation. I am not changing any position I took in connection with my testimony on direct or cross-examination.

Redirect Examination by Mr. Morgan Resumed.

At page 9460 Mr. Kleinman was asked if he knew anything about the Tioga field in New York. He replied that he knew gas wells were brought in a few years ago, about 1935, and for a while there was some rather rampant speculation in the field. I have some knowledge of that field. I have recently made some study of the gas situation in the Tioga field. I have read the testimony in the case of the New York State Natural Gas Corporation, a company which operates out of that field and which is engaged in a proceeding with the New York Public Service Commission and the Federal Power Commission at the present time with respect to rates. I have been in the field and examined some of the wells. I have been there while drilling operations were going on, studied the report of geologists of the State of Pennsylvania and the State of New York, and have talked with the head officials of a number of companies who operate out of that field.

The gas supply in that field is failing rapidly, according to the testimony of the geologists. An officer of the New York State Natural Gas Corporation testified less than a year ago that they had a supply available to them through their own production and purchase at that time of around 55 billion feet. Some 9 month later or less, he testified that they would have to revise their estimates due to a large number of dry holes and salt water and that his best present estimate was 13 billion feet.

Questions by the Examiner.

In both cases the witness to whom I have just referred was testifying in a rate case before the Federal Power Commission. It is a well known fact that the gas supply, at least as presently known, in that field has depleted very rapidly, and it has reached a point where pipelines running out of the field have cut off their interruptible customers to the extent that they can be cut off immediately, and have given notice to other industrial customers where notice was required. News and knowledge of that kind travels very rapidly. It is known in the investment world.

Recross Examination Interposed by Mr. Slaff.

I cannot have any basis of measurement in determining how that has affected the securities of a particular company like the Northern Natural Gas Company. These securities, as you know, are held by institutions, and it is impossible to get any market appraisal. I think refunding securities of that company this past summer were sold to six very large institutions at very favorable prices. To try to give you as good an answer as I can, I don't know that the failure of the Tioga field would have any direct effect at this time on the price of the securities of companies such as the Northern Natural, but I do take the point of view that failures of this kind, failures of supply in the natural gas industry are bound eventually to have an influence in the minds of people who are putting their money at stake.

1893 Yes, I testified that as the years have gone by recently natural gas securities have become more attractive to investors. That is right as to natural gas bonds. I cannot say the same thing, and won't say the same thing, with reference to common stocks, because I do not think that is the case. Certainly natural gas bonds, with the terms which the natural gas companies have been willing to put in them, short maturities and heavy sinking funds, have been attractive to the institutional investor.

Recross Examination Interposed by Mr. Booth.

No, I would not say that an investment in the equity securities of the defendants would be an unattractive investment. I think that a study of the historical financial picture of the common stock of defendants reveals that it is a sound investment. From 1936 on they have received very substantial dividends.

Redirect Examination by Mr. Morgan Resumed.

In my opinion that does not relieve the risks that confront these particular investments at this time.

At page 9605 of the record it appears that in answer to questions on cross-examination Mr. Kleinman made an observation that these companies have a sheltered position. When asked what he meant by "sheltered position," he answered: "I mean as compared to ordinary business that they have a very substantial lack of risk. That capital generally recognizes that investment in utilities is a safer investment than it is in business in general." He was then asked whether he meant natural gas companies or all utilities. He replied, "I mean all utilities, even those that have gone bad." That is not the attitude of the investing public as I know it and understand it. I just do not understand what Mr. Kleinman had in mind when he said that investment in industry was more risky or less desirable than in utilities which have gone bad. I do not see how anything could be worse than an investment in some of the utility companies that have gone sour, investment in the street railway business, investments in the telegraph business, investments in the steam railroad business. Millions and millions of dollars have been lost in those industries. Those are examples of utilities which have certainly in many cases gone bad.

I know of no unregulated industrial businesses or classes of business who are seeking or petitioning the legislatures or the Congress to put them under regulation. You might imply that some of this coal price regulation might be moving along that line. I do not think that any industry is asking for complete regulation. I do not think that Mr. Kleinman's statement that there is sentiment among the investing public that regulation removes the risk is a correct statement. I don't think that regulation removes risk at all.

Recross Examination Interposed by Mr. Booth.

I can't point out in the record just where Mr. Kleinman used those words. I do not know definitely that he has made that statement in those words. I said that regulation does not remove all of the risk. I do not mean to imply that it does not remove some risks. Certainly an electric company serving a community and operating under a franchise which it obtains perhaps by virtue of regulation does have freedom from competition of other electric companies in the same territory. If a natural gas
pipeline company, which has built its line into a cer-
1894 tain territory, now finds that under the law no other
natural gas company can, except under certain re-
stricted circumstances, build a line into the same territory

without the consent of the regulatory body, it would find itself relieved of certain substantial risks. If no other line could come in, it would be in the position of having no competition from natural gas in that market. If no natural gas line can come in without getting a certificate of authority from a regulatory agency, that would help to improve the competitive situation and relieve to a certain extent the existing natural gas company of certain risks.

Redirect Examination by Mr. Morgan (Resumed).

You ask whether that situation would be met by the Natural Gas Act if the application for a certificate of convenience and necessity comes from one who, by reason of the discovery of a gas field closer at hand, can sell gas at a lower price than defendants can sell it. I have read the statute on that point. I don't know how anybody can be sure of his ground until the statute has been in operation for a number of years and there have been interpretations of it; but certainly the implication is in there that it is the purpose of this act to bring natural gas into communities at the cheapest possible price. From that there is the implication that if somebody discovers gas near a city which is presently being served by gas, that it is the purpose of that act to allow that natural gas to go in there at a cheaper rate. I am familiar with the language of Section 7, subdivision (c) of the Natural Gas Act, which you have just read to me, contains the language: "In passing on applications for certificates of convenience and necessity, the Commission shall give due consideration to the applicant's ability to render and maintain adequate service at rates lower than those prevailing in the territory to be served," it being the intention of Congress that natural gas shall be sold in interstate commerce for resale for ultimate public consumption, for domestic, commercial, industrial or other use, at the lowest possible reasonable rate consistent with the maintenance of adequate service in the public interest. As an investment counsellor I do not regard that as conferring any monopoly on defendants of the market they serve. I regard it as just the reverse.

I have just said that we do not know how that is going to be interpreted yet because the Act has not been in operation long, but certainly the implication in there is that monopoly will not be maintained, and that whenever gas can be brought into a community at a cheaper rate, it will be so done.

You ask, if a gas field should be discovered in the State of Illinois, if the Federal Power Commission would have any jurisdiction over it so far as bringing gas from that field to Chicago was concerned. There have been a lot of arguments about the jurisdiction of commissions under the use of the words "interstate commerce," but I should judge that if gas were discovered within the State of Illinois, and the lines hauling gas from that field were wholly within that State, such a company would not fall within the jurisdiction of the Federal Power Commission under the Natural Gas Act. I am assuming no connections with any interstate companies.

Recross Examination Interposed by Mr. Booth.

I am not wholly familiar with the Illinois statutes which prohibit the construction of such lines by any public utility without a certificate of convenience and necessity. The general requirement of those certificates of convenience and necessity is that before transmission facilities may be built, you go to the Commission, and after a hearing
1895 and a proper showing as to the public interest being served, you obtain your certificate of convenience and necessity. It may be denied.

Questions by the Examiner.

You ask if these risks of regulation were all considered in my testimony on rate of return. I do not think they are of any substantial importance from my point of view. I stated in my direct that regulation under a new law on which there is no history entails in the minds of the investors some uncertainty. That influenced to a very minor extent my figure on rate of return. I took it into consideration, Mr. Examiner. I do not even know whether it influenced me, but I took into consideration that this company was operating under a new law and under regulation on which we have not any history, and we don't know how it is going to be interpreted, and things like that.

Recross Examination by Mr. Booth.

I have not made any determination of how much it would cost to build a competing line from the southern part of Illinois to the Chicago area. I did not in my testimony or in calculating my rate of return assume that that was any particular risk of this company. It is probably one of the things that ran through my mind, but I did not consider it as of sufficient importance to have given any special allowance for it. That is my statement today and my statement before.

I know how much it costs, generally speaking, to build natural gas lines. To build a 20-inch line or something like that would cost around $25,000 a mile for the line. It would cost $125 a horsepower, or something like that, for compressor stations if any were necessary. That would be a very rough estimate of the cost of the line.

This morning I had said in response to your questions, Mr. Booth, that I was familiar to some extent with unit costs of building gas transmission lines. To build a 20- or 24-inch line would cost in the neighborhood of $20,000 or $25,000 a mile, depending upon the factors such as right of way, steel prices, and such things; and to build compressor stations would cost from $100 to $150 per horsepower. A 400-mile line of that size would cost perhaps somewhere in the neighborhood of $10,000,000 for the bare line. You would have to have a lot of other factors to be able to make an estimate of the compressor station capacity. You would have to know the pressure at which the line was to be operated, you would have to know how much gas was to be carried through the line, and such things.

Of course, the first thing I would have to do would be to acquire a supply of natural gas. There is nothing in my testimony this morning from which it may be reasonably inferred that I had come to the conclusion that there was an adequate supply of gas in the southern part of Illinois in large enough quantities to attract the investors to build a line from there to the City of Chicago. You ask if there is any natural gas down there at all in commercial quantities. It all depends on how you define "commercial quantities." I have read some reports about oil in southern Illinois and some reports about gas, small amounts of gas, in southern Illinois and southern Indiana, but I have made no specific investigation as to the amounts of such gas.

1896 I don't think that anybody would put up the money for a project of that kind unless they were reasonably sure that they were going to get that money back and get a return on the money. They would want a return of at least 8 per cent, I think. I haven't a feeling that there is any immediate prospect of anybody putting up any money to build a line from any natural gas reserves which I am able to state as adequate reserves to serve a market like the City of Chicago, even though they could get that market.

1897 **JOHN A. COOKE, a witness for defendants, called for redirect examination, testified:**

(January 9, 1940.)

(At this point the Trial Examiner announces that upon motion of Commission Counsel he orders stricken all of Mr. Delafield's answer which starts on page 10140 to through most of page 10141.)

Redirect Examination by Mr. Morgan.

I have testified before in this case that I am identified as a partner in the firm of Peat, Marwick, Mitchell and Company, a partnership. The general business or profession of that firm is professional accounting practice. I live in Evanston, but my office is in Chicago.

The principal offices of defendants are located in Chicago. I have sustained professional relations with these two pipeline companies during the past several years. We first took up professional work for them toward the end of 1933 and have continued annually since then. At the end of 1933 we made arrangements to examine the accounts from the inception of the companies up to the end of 1933. They had no previous outside auditors up to that time. We have served as an independent accounting firm. We have not worked under their direction in the performance of our duties but have simply used their records as the basis of making an examination and a report to them.

You ask me over what period my first engagement took me in their accounts. Our first work covered the accounts from the inception of the company up to the end of 1933. It extended even prior to that into the construction accounts. We made a review of the capital charges there or the accumulation of the construction costs right up to the time of the inception of the Natural Gas Pipeline Company of America, at which time all of the work done by the construction company was turned over to the Pipeline Company and to the Texoma Company.

An arbitrary date was selected to mark the termination of the construction period and the beginning of the operation period. That arbitrary date was December 31, 1931. The reason for an arbitrary date being taken was that as the construction neared completion, the company was able to pass gas through its lines in small quantities, and get some revenue, and so you had running contemporaneously there, the construction and revenue earning. For convenience, December 31, being the end of the company's fiscal year, was taken as the date as of which you should cease to consider any expenses, that is operating expenses, as a part of construction cost, and after which those expenses should be applied against revenue produced from gas sold.

Our audit disclosed that as of December 31, 1931, construction work was still going on. It was not all finished then.

You ask what we do in the performance of our duties as an outside or independent auditor when we go and audit the books of defendants. It is quite a large program, but it may be summarized as a verification of the assets and liabilities as of a certain date, and the review of the operations and transactions regarding operations in the period covered by the examination.

Our first work began after the first of Januarw, 1934,
and covered the period ending December 31, 1933.
1898 We found that up to the date last mentioned nothing
had been set up on the books with regard to depreciation, depletion, and retirement ~~of capital~~ invested in acreage. We so reported in our report on the accounts. We began in the latter part of 1933 working on the construction accounts, but the work then was left in abeyance until the 1933 accounts were closed, and we went in in 1934 and completed the work. Our first audit covered the

period ending December 31, 1933, instead of the end of 1932.

In our report to defendants early in 1934 and in our discussions with the management prior to our report we raised the questions concerning the state of the accounts as to depreciation, depletion, and retirement of capital invested in acreage. We would in any concern where it had not been taken care of; and in our report we mentioned that it had not been done. We were advised that it would be given consideration in 1934, and in that year it was ultimately. We sat in in a consulting capacity at that time, but the accounts for 1933 were closed without anything being set up in there for depreciation or depletion.

I have here a signed copy of our report of defendants in 1934 for the year 1933 and prior years. On page 10 of that report, which is dated March 23, 1934, on the Texoma Company we say:

"The original acquisition of leaseholds on acreage in gas producing territories, from the participating companies, was made on a basis of an over-all price of approximately $45.00 per acre without discrimination as to desirable or undesirable territory. It is the contention of the company that the total purchase price in all probability would have approximated the same figures had the acquisition of leaseholds been confined to such sections of the territories as were really desirable, consequently on relinquishing and reassigning leaseholds on acreage, as and when such was determined to be undesirable, in order to terminate the expense incident to the carrying of such acreage, no adjustment was made on the accounts with respect thereto. We have been informed that it is the intention of the company to fix a date as of which all such discriminatory reassignments shall be considered to have been accomplished and that thereafter all necessary abandonments or reassignments shall be accounted for by appropriate adjustment of the company's leasehold investment account. Should a date prior to December 31, 1933, be fixed for this purpose it would necessitate an adjustment of the accounts in respect of reassignments between that date and December 31, 1933, and accordingly, would affect the statements presented herewith.

"In accordance with the original policy of the company no provision has been made on the books, or in the accounts submitted herewith, for depreciation of the company's physical properties or for depletion of the leaseholds and gas reserves, as it was the intention to charge operations with the current amount of the sinking fund requirements for the retirement of the bonded indebtedness, beginning in 1934 and ending in 1946. Subsequent to December 31, 1933, the question of depreciation and depletion has been reconsidered by a special committee, as a consequence of which, we are informed, the accounts are to be adjusted to reflect charges to operations based upon appropriate rates and such charges are to be applied retroactively to the commencement of operations January 1, 1932."

1899 We discussed the omission of any provision for depreciation or depletion with the management of defendants prior to making the report from which I have just read. As was stated there, the company advised us they were going to look into the matter inasmuch as we had brought it up particularly, but that they could not do so in time to have anything set up in the 1933 accounts which we were then reporting on. They stated that if any changes were made thereafter on the matter of depreciation and depletion, they would be made retroactive. Subsequently in 1934, the matter was discussed, and the 1934 accounts showed that it had been given consideration, and the method adopted was applied retroactively.

The management discussed with me their reasons for not having made any entries of that character prior to the time I was discussing the situation with them. It was the feeling of the officers that the sinking fund requirements of the bonds would take care, as far as they were concerned, of this depletion, depreciation, or whatever they liked to call it. In their minds they were thinking in terms of the sinking fund requirements under the Indenture rather than the depreciation as such of the properties.

They stated to me, or I knew from the records, that the bonds were owned by the stockholders. I talked to Mr. Floyd C. Brown about these matters. My discussions were with him on every occasion. There may have been others in at different times, but mainly and at all times I was conferring with Mr. Brown. He was speaking as general manager of the company, and when I refer to the management, I am referring to Mr. Brown. If others were there, it would include them, but my talk was with Mr.

Brown, and anything that may have been submitted to me for discussion or for information was with his knowledge and approval and with his consent or direction, as is customary.

You ask what observation Mr. Brown and the others with whom I was talking there made concerning the ultimate ownership of the earnings of defendants after the payment of operating expenses. I don't know as I could answer that as such. The whole picture was a closely held corporation. The bonds, I knew from the records, were held by the participants. Any ultimate profit or loss would accrue to them through the equity securities, which consisted of common stock. It was their picture. They were not concerned with outsiders. There were no outside stockholders, no listing requirements. It was a matter in which they could do as they pleased, and we merely reported on what they had done, but made suggestions for the consideration of other things which eventually they did give thought to.

In discussing the subject of depreciation with them I was speaking of depreciation which applies to any industry, for that matter, that has an investment in fixed assets which are used up in the course of their business. Depreciation reserve is a charge made to operations over a given period of time, which is intended to recover the amount invested in the fixed asset which is used up or worn out in that time; in other words, to recover the capital investment within the useful life of the property.

1900 As depreciation is applied, it would be the physical life of the property equipment. In discussing with the management the fact that they had not set up any reserve for depreciation, I was addressing my suggestions particularly to the depreciation of the physical property.

I did not fix the rate at which they started to set up this depreciation of the pipeline and other physical properties of the Pipeline and Texoma Companies other than leaseholds. After I brought up the matter or suggested the matter for discussion, the company officials, through the committee that looked into that matter recommended that 2½ per cent be applied to the pipeline and other certain percentages to the other physical properties. These percentages varied according to the nature of the asset, but for the natural gas main line and branch lines, the depreciation rate recommended was 2½ per cent. In fixing the rate of depreciation of the lines and the fixed assets, the subject of the reserves in the Panhandle from which defendants were obtaining their gas did not enter into the discussion in any way. We discussed the matter of the depletion of the reserves about the same time. That subject came up only in connection with the discussion of depletion. We had the circumstances of the gas field and the conditions in the gas field as reported to us before us all the time we were talking about the depreciation of the physical properties. We made no examination into the gas fields at all, we merely based our opinion on the figures available from the companies' files and the figures submitted to us in the discussion of the situation.

When the committee made their recommendations, I was consulted in the matter of setting up the depreciation reserve. At that time I reviewed the rates to see if they were reasonable from an accounting standpoint. The rates with the exception of that for the pipelines were in general within the ranges which were reasonable. I had no knowledge of the pipelines and I took the liberty of consulting one of my partners as to what he thought was a reasonable rate for the pipeline. He disclosed to me that forty years was a reasonable life and I was satisfied that 2½ per cent was not out of proportion.

I was not particularly concerned with the field at the time I agreed to that 2½ per cent because I had no knowledge of the life of the field. So that there may be no misunderstanding, the gas reserve which the company had was not expected to last 40 years, but that of itself would not be a factor which would make me decide on any additional rate of depreciation if I were satisfied that the physical life of the pipes would be 40 years. I was not approving a reserve which in my judgment would return to the companies the investment in the pipeline and other physical properties within the life of the reserves of gas from which they were producing and transmitting gas at that time, because the gas reserves they had then available and acquired was but one factor. There is another factor which any business man would invoke if he had a pipeline that would last longer than his present reserves; he would endeavor to buy additional reserves if available to use in the remaining life of the pipe. So that the factor of the reserve might not determine the ultimate conclusion of the operations. The available reserve might be extended if they could acquire additional acreage. Under these circumstances, I was satisfied to have it set up on the basis of physical depreciation.

Mr. Brown at that time was quite concerned with some things that were going on down in the Panhandle field about stripping which was, as I understood it, wast-
1901 ing the available gas reserves. If allowed to go on
without any interruptions or without cessation, this stripping might be a very serious factor in the life of any company drawing from those fields, and one thing or another. In my consideration of the problem, I did not make any allowances for that factor of gas wastage for the reason that in determining the reserve which it was decided to use as a means of fixing the depletion rate an attempt was made to be conservative. It was below the figure of reserve which the various surveys had indicated to be there. The factor of safety was allowed in an attempt to be conservative in setting up the unit rate of depletion. The company fixed the rate at which depletion as originally set up on the books was figured. However, the rate was based on a method which I suggested, as follows:

In order to get a convenient accounting rate and a convenient method of taking care of this depletion, I tried to strip it of all frills and difficulties of recomputation. To do that, it was my thought, and I so suggested that they take some date as of which they should consider the acreage then held as available acreage for the purposes of this computation. They should then take the total cost of all of the acreage; because up to this time no change had been made on the books for the acreage surrendered. By that I meant that they should take all of the acreage as of some date as representing the total cost, which was subsequently fixed at January 1, 1933. However, the date is not as important as the fact that a date was taken. The number of acres then at that time was divided into the total cost of some $15,000,000 and it produced a figure of $65.548 per acre. That was the average cost of the acreage still retained at the date last mentioned, on the method I suggested.

Thereafter, any surrender of acreage was to be deducted from the total figure of cost at the same acreage value, $65.548.

At that time, it was contemplated that other acreage would be surrendered. It was not known how much would be surrendered. It was not my thought in recommending the setting up of the accounts on that basis that when this acreage was surrendered it was worth $65.548 per acre. That was obviously not considered at all. An average doesn't represent true value; and by any process of reasoning, that which you give away as valueless to you is obviously of less value than that which you keep, so that the very fact that it was surrendered was an indication that it was worth little or nothing, and certainly not anywhere near $65 an acres. The value would lie in what was left.

It was not intended by me that the system of accounting that we set up there would reflect the value of the retained acreage as of any given date subsequent to that time. The value at which it remained on the books would not be any indication of the value of that retained acreage.

Recross Examination Interposed by Mr. Slaff.

None of our accounts were designed to show the value as against cost. In this particular case, the original cost of $15,000,000 was set up. From then on, by the use of an average and a variation in the accounts for the surrendered acreage on that average, they ceased to have even the dollars representing the true cost of the balance of the acreage. The applying of this average as the acreage was surrendered was a convenient accounting method. We were not concerned with problems of value.

1902 *Redirect Examination by Mr. Morgan* (**Resumed**).

We were not concerned with the problems insofar as the accounting cost of the retained acreage was concerned. We were concerned only with the result of a method of accounting. It was my understanding at the time I recommended that method of accounting that in acquiring that acreage they considered that the acreage which turned out to be desirable would cost them the full amount that they paid for all of it. That was the understanding they put up to me in that discussion. If they had only had half of the acreage left after the weeding out process was completed, that was all that they were after originally in their acquisition—all that was useful to them. That which was not useful to them was surrendered as it was found to be useless to them.

Recross Examination Interposed by Mr. Slaff.

That information or understanding of mine was based simply on that conversation with Mr. Brown and perhaps other officers and members of the management of the company. I made no personal review of the situation because I am not competent to do that.

Redirect Examination by Mr. Morgan (*Resumed*).

In response to Mr. Slaff's question, I was referring to what they told me back in those days when I was setting up that system of accounting dealing with the subjects now under discussion. I was not referring to what they told me in the last month or the last week.

I did not finish the matter of the unit rate. I got to that point where I stated how the average acreage cost was determined for accounting purposes. The next stage was the matter of reserves as of the day the acreage was determined, the gas reserve figure being submitted from the company's record at that time. That was taken as the available reserves as against the available acreage, and a division was made which produced a figure averaging approximately 12,000,000 cubic feet per acre. I did not assume in arriving at that computed reserve that every acre they owned had 12,000,000 cubic feet of gas under it. That was an unknown factor. That was just an arithmetical result of dividing one figure by another, total reserve by acreage as conservatively stated. It is no indication of what each individual acre would contain, but the average was 12,000,000 cubic feet. Having fixed the 12,000,000 average, then that, divided into the total cost of the acreage, produced the rate of so much per thousand cubic feet. That rate on our recommendation was to be applied to all withdrawals of gas from the reserve by the company.

If that is carried to its conclusions, and there are no interruptions, no other factors to consider, then by the time the field is exhausted, if the reserves taken of 12,000,000 cubic feet per acre are proved to be a true and correct average, the total investment will be recovered. That was the thought that predominated in my suggesting this method. I was thinking about a convenient accounting method rather than an attempt to evaluate, if they could be evaluated, the various acreages and the various volumes of gas in the various acres, which, as I say, if they were determined, would have involved constantly changing each unit rate of depletion, and it might vary the earnings quite considerably between years if one year the production was from a very high value acreage, and another year from a low value acreage, so the idea was one of convenience rather than a reflection of anything in the nature of value.

1903. As a result of these two entries which I have described, the retirement and the depletion would arrive ultimately at a point where the gas produced by these companies will be used up as of the time the company ceases its operations down there. That would mean that the company itself would have produced a quantity of gas which would amount to 12,000,000 times the number of acres that it owned as of January 1, 1933. If it turns out that the subsequent developments disclose that Texoma is not taking out of these reserves all of the gas that is going out from under them but that large quantities of gas, totaling, as I remember the record, 60 per cent of the total that has gone out have been drained back to the wells and leases of other parties, this depletion reserve would not accumulate by the end of the field's life reserves sufficient to take care of the total reserves purchased by Texoma in that field in the beginning. It would be short to the extent by which these extraneous withdrawals had depleted their reserves below that conservative figure fixed for the determination of the unit rate. If as a matter of fact large quantities of gas have been drained off to other leases, that accounting entry there under the heading "depletion" does not truly reflect the amount of depletion of those leases as of this time or as of any particular time between the setting up of these reserves and the present time.

Recross Examination Interposed by Mr. Slaff.

If the reverse were true and if Texoma were draining gas away from its neighbors' acreage, the defendants would get more gas than that against which the reserves were set up.

Redirect Examination by Mr. Morgan Resumed.

The basis of setting up depletion has continued from that time down to the present date with the exception that where the company has acquired additional acreage, then insofar as the cost of that additional acreage varied from the $65,548 per acre, bringing it into their total picture varies the average per acre and the unit rate of reserve. The same principle of accounting, however, has been employed right down the line to the present date. There have never been any adjustments made to take care of the drainage to or from the reserves originally contained under the Texoma acreage as set up on the books in the beginning. In making that statement, I can only speak to the end of 1938. We have not the figures on 1939 yet.

The original schedule of depreciation set up in 1934 as above stated and adjusted back to the first of January, 1932, has not been continued from 1934 down to the present time. The pipeline rates were changed from 2½ per cent beginning January 1, 1938 to a composite rate of 4 per cent. They were adjusted at the end of 1938 back to the first of that year. There were some changes made in the depreciation rates on other properties, what they were and the amounts, I do not recall offhand. They are in the report here if it is of interest to you. I listed the changes there showing the rates to which they were changed and the previous rates. In connection with my examination of the companies' records, I was informed that the rate set up in 1938 was the result of a revision of their depreciation policy to conform with the settlement made with the Federal Income Tax authorities. The books were simply changed to meet the figures on which a compromise had been reached with the Federal Income Tax authorities. This compromise and settlement, however, affected only the Natural Gas Pipeline Company of America's depreciation rates, the Texoma's books were treated a little differently. I believe the rate of 2½ per cent 1904 continued on the Texoma (examining papers) yes, 2½ per cent was the rate applied on the Texoma books for pipelines. The other depreciable properties of Texoma were carried as they were fixed in the 1934 set up. The reason for this was that no similar compromise arrangement with the Income Tax Department has been made on behalf of Texoma, as I understand it. The company officials can answer better. That has not come up yet, inasmuch as those things only arise when they are showing taxable profit. As long as the company is showing losses, the day of settlement of depreciation and depletion and other rates of that kind is usually deferred. The Texoma of course under the terms of its Indenture is operated as a non-profit corporation. (Motion by counsel for the two commissions to strike all of the testimony of Mr. Cooke denied.)

Recross Examination by Mr. Booth.

We have been the regular auditors of defendants since the making of the audit for the three years and seven months ending December 31, 1933. We prepared the audit from which I have read here and we have prepared annual audits of the books of these companies since that time.

Yes, in our report dated March 22, 1934, from which I read here, I pointed out and discussed the fact that the companies' books reflected no provision for depreciation or depletion. The income account and the balance sheet in the audit report also notes this fact, I believe. Yes, it is noted here that the audit is "before depreciation and depletion." I made these notations in the report purely because and only because provision for depreciation and depletion had not been made; and we thought some provision should be made and we recommended that it be considered.

Yes, at the time I made the audit in 1933 and 1934, I would normally have expected to find some provision for depreciation and depletion in any company for any year in which it owned assets which are depreciable. Yes, my method of determining depletion expense was the so-called unit method, that is for each unit of gas withdrawn during the accounting period, so much is charged to depletion expense. The number of cubic feet multiplied by the unit rate. I would expect such charges to be reflected on the books year by year as the gas was withdrawn. If I were making a re-computation now, I would take the figures that are available based on an increased knowledge gained in the intervening period of five years or so. For instance, the amount of the acreage surrendered is now different than it was then, therefore, I would have a new factor, that is not a new but a different factor from that used in the 1933 base. I would require the sum total of acreage which has been surrendered and would suggest that that be deducted from the total original acreage. Then I would divide that present acreage into the total cost, that would give me a revised or up-to-date average value per acre, book value or cost. I don't like to use these terms because you put a different construction on them. It is the original cost of the whole field divided by the useful and available acreage. That is what I am trying to say. I would ascertain the average cost on that basis, then from the reserve point of view, the reserve would be adjusted, that is, the original reserves would be adjusted to what is considered by those who have a better knowledge of it than I have, the present total reserve ~~in that~~ acreage. On that basis then a unit charge could be determined that would be more accurate now than that which was determined five years back.

In other words, my objective would be to take as the base the reserves originally under the acreage now retained and deplete that original reserve down to what its present content actually is. I would have to rely on the figures given, but that would be the theory that would be 1905 applied. That which has been withdrawn would have to be considered in my total reserves to get the unit rate, and that which has been withdrawn from the reserves would be charged to operations at that unit rate and credited to the reserve for depletion.

You read from page 10 of our first audit report the following language: "it was the intention to charge operations with the current amount of the sinking fund requirements for the retirement of the bonded indebtedness beginning in 1934 and ending in 1946." You ask how this would be done. That was the companies' problem. I was not acceding to that, as you can tell from the fact that I take exception to that method and suggest depreciation and depletion; but it was Mr. Brown's thought that the charge to operations of the amount each year called for under the sinking fund would take the place of depreciation or depletion. In other words, if he could recover a figure each year which would enable him to pay off that sinking fund requirement, he would then have accomplished the purpose in his mind of a reserve for depreciation and depletion. I was not stating that as a fact, but merely the explanation, as I recall, Mr. Brown gave me at that time.

Yes, under his method, he would have accomplished what would ordinarily be accomplished by a depreciation and depletion charge, namely, the recovery and the return of the investment. That, generally speaking, is the purpose of it. You ask if that is what I understood his original purpose to be in charging operations with the current amount of the sinking fund requirements. I would prefer that Mr. Brown answer that, as he is the only person who can say what his intentions were. I did not approve of the method at all because it did not reflect depreciation and depletion as professional accountants require it to be set up, and I so stated, and as a result of that, the matter was given consideration. I think it should also be mentioned that under the agreement between the defendants which provides for payment to Texoma by the Natural Gas Pipeline Company, no provision was made for depreciation and depletion, but a sinking fund sum was allowed to be included as a charge. So I think that may have had something to do with Mr. Brown's thoughts on the matter. I would prefer that he should answer that himself.

You ask if it was intended to accomplish in a general way what depreciation and depletion would accomplish. No, I don't think that was it. The sinking fund provisions were not drawn up with any idea of being equal to depreciation and depletion, or of accomplishing the same purpose. They were drawn up with the idea of recovering over a certain period, by the amounts stated therein, a certain sum of money representing the amount of the original issue of bonds. You ask if the amount of the original issue of bonds represented the investment in the property and if the function of the sinking fund would be to return the original investment which, as I have indicated, is the object of depreciation and depletion. That is true if the sinking fund provisions were workable, but here is the point that should be considered, that the sinking fund was on a gradually increasing scale. It started very low annually and went to very high figures and though I cannot go into a discussion of the future of that company—it is not my province and was not at that time—I did bear in mind that these amounts in the later years were so high that the company might not be able to carry on this method of setting aside this amount to be considered as depreciation and depletion, because they probably would not be able to stand such high figures.

I do not know what you mean by your last question. If they are not making enough money to set aside the sinking fund in those later years, when it gets heavy, there obvi-

ously is nothing available for dividends, so I was not
1906 looking at the dividends. You are speaking of the recovery of that capital through the goal of a depreciation charge called a sinking fund figure. It may work out; but if the company's earnings do not reach those amounts, if they are not sufficiently high in amount to pay that sinking fund, they may find themselves in a hole there.

The object of the depreciation and depletion was to equalize the charges annually and arrive at the same results by accepted methods of annual charges which would be set up on the books, regardless of whether there was the cash there to set aside for it or to utilize for that purpose. As a matter of fact I think if you look at the years before 1934, you will find that before depreciation was set up they had quite a deficit in the sinking fund.

You ask if my recommendations would have been any different if I had found the same situation true as far as their failure to provide for depreciation and depletion was concerned for a gas company subject to the jurisdiction of the Illinois Commerce Commission in 1934. In any case where I found depreciation or depletion had not been provided, regardless of commission regulation as to accounting, I would draw attention to it. You know as well as I do that reports are coming out year after year on utilities which state that the retirement provision does not necessarily reflect the exhaustion or the wear and tear of the property. It is prescribed by the Commission and so it is set up, but that does not necessarily mean that we as accountants consider that, or for that matter anybody considers it the true accumulation of depreciation, so I do not want to answer your point by any yes or no, because I would have to look into each individual situation. It makes no difference whether the company was subject to regulation or not as to whether it is providing depreciation. It either is or it is not, regardless of whether a commission sets one thing up or says another thing shall not be set up.

My reaction would be identical whether or not it was an industrial, a utility, or any corporation that had assets that were consumed partially or wholly in its operations, it should set up a depreciation provision.

The retirement of the bonds would normally affect just the balance sheet because it is a depletion of the cash and a corresponding reduction in the bonded indebtedness.

The depreciation and depletion is obviously normally reflected by the charges into the income account.

Redirect Examination by Mr. Morgan Resumed.

The bond indenture and the terms of the bonds themselves provided for payment in 15 years from about the time of the beginning of operations. Those depreciation and depletion reserves do not accomplish that purpose. The depletion reserves will only do so if the reserves are drawn to the extent that the number of cubic feet multiplied by the unit rate equals that sum. When I am speaking of withdrawals, I am speaking purely of Texoma's withdrawals for its own purposes.

The fact that defendants did not set up depreciation at the beginning of operations has not affected the property value of that property or the condition of that property as at this particular time. (Objection by Counsel for Illinois Commerce Commission.) The fact that on the books a reserve for depreciation is set up by a charge to operations does not attempt to reflect the physical value of the property as of any date.

1907 Yes, it has been about 5 years since I first had this matter up and was discussing the matter and gave that report. You ask if as of the time they set up this depreciation rate of 2½ per cent on the pipeline property which was about three years after the pipeline operations had started, it was my thought that by the first of January, 1940, which is eight years after the pipeline operations had started that the condition of the pipeline would then be 80 per cent of its original condition. (Objection by Commission Counsel overruled.) My answer to that question is that the application of any annual average rate does not attempt to set up during the physical life of that property what its actual value may be. It is merly an average rate which starts with the investment in the early stage and leads if properly applied to the recoupment of the investment at the end. I am not in a position to state the rapidity with which physical depreciation may accrue. It is merely a recognition for accounting purposes of the necessity for a recording of that depreciation spread over the physical life.

Recross Examination by Mr. Slaff.

The annual amount is not supposed to represent the actual loss and serve as the value of the property because that it something that cannot be determined by arithmetic.

In using the expression "not actual annual loss and serves as value" I am trying to distinguish between physical and accounting depreciation of a machine which is running, which cost a sum of money and will last 10 years. That would necessitate the application of a depreciation rate for accounting purposes of 10 per cent per year. That machine may run very little one year, another year it may run quite a little, quite more than the average. I cannot say how the depreciation is affected by the varying usage, but I think there is general agreement that the machine does not physically depreciate purely in relation to the time that you have had it on your floor.

Yes, that depends upon what meaning I attach to the word "depreciate". I am speaking of accounting depreciation rather than physical depreciation; and the two do not necessarily strike the same curve or straight line or whatever it may be as the measurement. I am obviously not in a position to attempt to state the physical depreciation factor or the depreciation due to a variety of circumstances, such as obsolescence, inadequacy, and so forth.

1908 CHARLES W. SMITH, a witness for Federal Power Commission, recalled for further cross-examination testified as follows:

(January 10, 1940.)

Cross-Examination by Mr. Morgan:

I have been with the Federal Power Commission since July 1, 1936. Prior to that time I was with the Maryland Commission for a number of years in a position somewhat similar to that I occupy with the Federal Power Commission. In the Maryland Commission, my duties had to do largely with electric, gas, street railway, water, and telephone utilities. There was one company which distributed natural gas in the state of Maryland and that was the only company which involved the questions which are associated with the natural gas companies. Those questions had to do with a distribution company; but this company purchased natural gas from an affiliated company and we had to go back to the seller. That was in an informal rate case.

Several years ago, the Public Service Commission of

Maryland and the Public Service Commission of West Virginia had joint hearings involving two or more companies, including the company which distributed the gas in Maryland. It involved the companies which produced the gas, because both of the state commissions were interested in the cost of the production, and after these commissions each rendered separate opinions, it was necessary for me from time to time to go back and study the case in the light of current facts and advise the commission with regard to them. That took me back, of course, to the cost of production to a certain extent. The name of that company was the Cumberland and Allegheny Gas Company which distributed gas to Cumberland, Maryland. It was bringing gas from West Virginia. I do not know the exact distance over which it transported gas. I would say that 3000 miles is a rough approximation of the distance.

Upon coming with the Federal Power Commission in 1936 and up to the summer of 1938, I was dealing exclusively with electric regulation. Since 1938, the natural gas pipeline engaged in interstate commerce have been added to the enterprises or institutions made subject to the Commission's jurisdiction under the terms of the Act. This is the first rate case that has actually been on trial under that Act. There is a case in northern New York which was called ahead of this but did not reach this phase as quickly as this one. I do not know whether the case actually started before this one or not; but I look upon this case as having progressed much farther than the New York case at this stage. The case up there has passed the jurisdictional and other preliminary matters at this time. The initial proceedings were quite largely jurisdictional questions, but then they were followed up with questions, for instance, as to the source of gas and the gas reserves, and got down to depletion. They gradually got into all of the phases which we have discussed in this case. The commission has not put on its testimony as to engineering, accounting, and rate of return studies.

Cross-Examination Interposed by Mr. Booth.

As a matter of fact since the Natural Gas Act was passed we got into rate cases, and I have been deep into natural gas rate cases since that time up until the present. I would say that since the Natural Gas Act was passed, or at least shortly thereafter, up until the present date, 1909 the major part of my work has been devoted to natural gas companies, involving many other companies in addition to this one.

Cross-Examination by Mr. Morgan Resumed.

In my Exhibit No. 186, I listed 31 gas companies, I believe. In my Schedule 5-A are listed 7 companies. You have asked that I name those which are confined to production or transmission activities, to the exclusion of distribution. The Houston Gas Company is a gas company which purchases and produces and transmits and sells at wholesale. The Lone Star has retail and wholesale. You probably want that excluded because of the retail business. The Panhandle Eastern Pipeline and Southern Natural Gas Company are transmission and production companies. On Schedule 5-D, I think the El Paso Natural Gas Company and Houston Gulf Gas Company would fit that description. I believe that is all.

On Schedule 5-F of the same exhibit, the El Paso Natural Gas Company, the Houston Gulf Gas Company, the Interstate Natural Gas Company, Southern Natural Gas Company and the Memphis Natural Gas Company fit the description of being engaged in transmission and in production to the exclusion of distribution. The Mountain Fuel Company sells at retail.

On Schedule 5, I have in mind the Arkansas-Louisiana Gas Company which has large transmission lines and production fields and sells a good deal at wholesale, and yet it sells a great deal at retail. We will probably exclude the Arkansas-Louisiana. Canadian River Gas Company would be another of the companies, as would also Chicago District Pipeline Company, the Cities Service Gas Company, Colorado Interstate Gas Company, the El Paso Natural Gas Company, the Hope Natural Gas Company and the Houston Gulf Gas Company. I would also name the Interstate Natural Gas Company. I have a little difficulty with the Lone Star Company, which distributes gas at Fort Worth, otherwise, it would be in the category but because of its retail sales in Fort Worth, you would probably want it excluded. The Memphis Natural Gas Company and the Mississippi River Fuel Corporation are transmission companies and have no producing fields. The Natural Gas

Pipeline Company of America, the Southern Natural Gas Company, Texoma Natural Gas Company, Northern Natural Gas Company, Panhandle Eastern Pipeline Company, the United Fuel Gas Company, and the United Gas Pipeline Company are all producing and/or transmission companies, to the exclusion of distribution. The Northern Natural and the Panhandle Eastern may have a small amount distribution. I believe that completes the list.

You ask if I am familiar with the physical conditions encountered by each of those companies listed in Exhibit 186 under Schedule 5 and the subdivisions thereof which I have classified as producing and/or transmission companies. I was familiar with the source of supply but as to the topography, I have a general knowledge that any person who has read some geography would know about it in the United States. I have just the information that I would get from an Atlas, except I have been to some of those places. I have made no detailed study of course. For instance, I have been up along the Mississippi Valley. I know something about the pipeline company which serves St. Louis in a general way from having seen the territory in an automobile and from a train window; but I would not know anything about the details of the physical structure of the earth, of the rivers, the detail of them, the depth, the width and so on.

At the time I prepared this exhibit, I made a study as to the sources of supply generally as to the fields. I knew the fields which supplied the lines. I have some information as to which of them depend upon one trunk line largely for their handling of that gas to the market, as opposed to those which have a system or network of pipelines connected with a great many fields. I know of course
1910 that the Panhandle Eastern and Northern, for instance, take gas from the Panhandle Field and from the Hugoton Field. I am not sure that the Northern takes also from the Otis Field in Kansas. It was the Panhandle and Hugoton field that I was especially familiar with as the source of supply for the Northern line. Colorado Interstate takes its gas from the Panhandle field. Lone Star has a wider source of supply than the other companies you have mentioned. I would classify it as a network. You are going beyond my depth when you ask me whether it can switch gas from one part of its system to another to meet shortages and things of that kind. I don't know which of these companies are in position to do that.

You ask whether I know the location of the markets of the Panhandle Eastern. Detroit is the final market. It serves a great many places enroute. I think Springfield, Illinois is one place and Indiana, one or two places, and then it goes on up to Detroit. It serves some communities in Kansas, if that is important. I have that information in my office and can give it at great detail. It has a large market, yes, if you consider the ultimate market and the places which it serves. It does not have a pipeline to Detroit. The terminus of its line is at a point near Dana, Indiana, adjacent to the Illinois-Indiana state line. There it turns the gas over to a line belonging to the Michigan Gas Transmission Company.

The Panhandle Eastern line runs in a general direction to the northeast out of the Texas Panhandle Field across the States of Oklahoma, Kansas, Missouri, Illinois, and Indiana. It crosses the Mississippi River. I imagine it crosses the Missouri, I don't have a very good map in front of me. I would not be able to go any farther than that. I don't know whether it starts in Moore County, Texas north of the Canadian River or not. It starts in the Panhandle field and goes in a northeasterly direction.

The Colorado Interstate runs north out of the Panhandle, up through the northeast corner of New Mexico, and on into Colorado. I do not know of any large rivers that that line crosses. I don't know anything about any topography of the country there that would indicate that there were any extraordinary hazards confronting that company.

The Cities Service Company runs out of the Panhandle to Kansas City and also takes from other fields in Western Kansas and Oklahoma. I do not know whether it crosses either the Missouri or the Mississippi River. You are getting out of my field when you get down to the topography of the country through which these pipelines pass. I do not know whether it delivers the gas to the Kansas City Company on the east or the west side of the Missouri River.

The Northern Natural Gas Company comes out of the Panhandle field and also takes gas from the Hugoton field. It crosses the Missouri River, I imagine, but it is confined to territory west of the Mississippi in its delivery points.

The transmission lines of Lone Star Gas Company are generally in two groups, the main group from the southeastern extremity of the Texas Panhandle to Ft. Worth and

Dallas, and there connects to the network of the transmission and distribution lines which extend through the central part of Texas and southern Oklahoma. The secondary group extends in a southwesterly direction from a point from Brownwood, Texas, to San Angelo, Texas, to which gas is delivered from the Coleman County and
1911 Brown County fields, westerly from San Angelo, Texas, to the Big Lake field, and thence to Girvin, Texas. I do not know how far it is from Wheeler County, Texas to Ft. Worth or Dallas. I know the company owns over 4,000 miles of mains and field lines, according to this report to the Federal Power Commission. That is the whole system. That particular line running from the Panhandle field down to Ft. Worth and Dallas would probably not be more than a few hundred miles long.

1912 S. E. CAMPBELL, witness for defendants, called for further redirect examination, testified as follows:

(January 10, 1940.)

Redirect Examination by Mr. Morgan.

I was called to testify on Exhibits 141 and 142 introduced in this case. In those exhibits, I used as our allowance for amortization an amount which together with interest figured at the rate of 1.35 per cent per annum compounded annually, would yield the total amount shown in those exhibits as the amount to be amortized up to the end of 1954, beginning January 1, 1939. I have prepared a revision of part of that exhibit.

(At this point counsel for the defendants produced a sheet described as a "revision of page 1 of Exhibit 141" and requested that it be marked for identification. At the direction of the Examiner, the document was marked Exhibit 210. The Examiner also authorized the witness to add to the top of the document the words "Revision of page 1 of Exhibit 141".)

Exhibit 210 is a revision of page 1 of Exhibit 141. It changes the figures in line 33, both in columns 2 and 3, and it changes the figures in line 34, in column 2 and column 3, and the figure shown in line 35 of column 3.

In Mr. Delafield's testimony on rate of return, he stated that he would prefer and at this time would be more apt to choose 2 per cent as the proper interest rate for sinking funds; and on the basis of his testimony, we have simply revised page 1 of Exhibit 141 to include 2 per cent interest, compounded semi-annually, in place of 1.35 per cent which was the rate of interest, compounded annually, used in the original page 1 of Exhibit 141. So in computing the amortization allowance instead of using as an interest rate of 1.35 per cent compounded annually, I have in Exhibit 210 used a compound interest rate of 2 per cent compounded semi-annually. Compounding the interest semi-annually is a more conservative procedure and results in a lesser amortization allowance. I believe Mr. Delafield testified that that was the way he would do it at the time he testified concerning the 2 per cent.

I have a similar revision of a page of Exhibit 142.

(At this point, counsel for defendants produced a document described as a revision of page 1 of Exhibit 142 and requested the Examiner to permit the witness to add to the title thereof the words "Revision of Page 1 of Exhibit 142," and to cause the document as thus amended to be marked for identification. The Examiner authorized the addition to the caption and directed that the document be marked Exhibit 211.)

Exhibit 211 is the same as page 1 of Exhibit 142, with the exception of the revision of some of the figures. The first difference occurs in line 21 entitled "Value of gas reserves". On Exhibit 142, we use the value as submitted by Mr. Wallace of the gas reserves, which was later found to be in error and was corrected on Exhibit 146, and we have substituted in this revised sheet, the revised gas reserves value, shown in the last mentioned exhibit. The original figure was $13,288,552, and the revised figure is $13,334,775.

As a result of that one correction, that changes the figures by a like amount in line 25, columns 1 and 2, the 1913 figure in line 26, column 3, the figure in line 32, column 2. It is also a revision of the figures in line 33, columns 2 and 3, the figures in line 34, columns 2 and 3, and the figure in line 35. The changes in lines 21, 25, 26, and 32 are merely to conform to that correction by Mr. Wallace in the arithmetic of his exhibit from which the figure in line 21 of Exhibit 142 was taken.

In addition to the slight effect of the change in line 21, the figures in lines 33, 34, and 35 have been changed as the result of substituting a 2-percent interest, compounded semi-annually, in place of a 1.35 per cent interest, compounded annually, as used in computing the amortization allowance in Exhibit 142. I have computed the amortization allowance on the 2 per cent semi-annual basis for the same reasons that I gave for computing it on that basis in my discussion of Exhibit 210.

(Exhibits 210 and 211 were received in evidence, subject to the objections and exceptions of counsel for each of the two commissions to Exhibits 141 and 142 respectively.)

I am familiar with the document from which Mr. Ostrander read some time ago, described in the record as a report submitted to the National Association of Railroad and Utilities Commissioners at its 50th annual convention in New Orleans, Louisiana, November 15 to 18, 1938. That Association has had another annual meeting since 1938. You have handed me a document styled "National Association of Railroad and Utilities Commissioners, Report of Special Committee on Depreciation" which was submitted to the Association last named at its 51st annual convention in Seattle, Washington, August 22 to 24, 1939. That is the same Association referred to in the document from which Mr. Ostrander read. Aside from variations in the personnel, the document filed with the Association in 1939 is a report of the committee which filed with the Association the report in 1938 from which Mr. Ostrander read.

The names of the members of the committee submitting this report are found on page 66. They are as follows: Asel R. Colbert, Wisconsin, Chairman; Steuart Purcell, Maryland; W. A. Dittmer, Illinois; A. B. Greene, Florida; Herbert J. Flagg, New Jersey; John C. Damon, Securities and Exchange Commission; W. J. Norfleet, Federal Communications Commission; E. H. Merrill, Utah; Claude M. Smith, New Hampshire; C. W. Smith, Federal Power Commission; A. J. Greer, Washington; G. C. Boyer, Virginia; C. Radford Berry, Pennsylvania; Francis T. McNamara, Connecticut; R. A. Wehe, California; and W. C. Loss, Colorado. This list shows 16 men on this committee. The report is signed by 9 of these men. Some of the names on the two committees are identical. Among those I find on the committee in both the year 1938 and 1939 are: Asel R. Colbert, John C. Damon, W. A. Dittmer, Herbert J. Flagg, A. B. Greene, E. H. Merrill, and W. J. Norfleet.

Beginning near the middle of page 25 of the 1939 report of this same committee to the association above referred to under the caption "Straight line or sinking fund method may be used" and the succeeding two subdivisions, the second called "Sinking fund interest rate", and the third "Advantages of the straight line method", we read as follows:

(Counsel for the two commissions objected to the reading into the record the following excerpts by the witness who is not offered as a witness on depreciation and their objections were overruled.)

1914 "Straight line or Sinking-fund Method May Be Used:

"As a practical matter either the straight-line or the sinking-fund method, when properly used, accomplishes a spreading of the cost of depreciation. The former spreads the cost on a straight-line basis; the latter on a rising compound interest curve basis.

"If the sinking-fund method is viewed narrowly as the accumulation of a fund by means of annuities to cover replacement costs, it would appear incorrect to use it to record cost of present operations. To illustrate, the uniform consumption of a coal pile could not be accounted for equitably under a sinking-fund plan because when half of the coal was consumed its cost should have been charged to expense. Any method which failed to charge this cost to operation, on the theory that the deficiency would be made up by increased charges in the future, would be erroneous. If applied to utility plant, however, the sinking-fund method may be used if it is assumed, as stated hereinbefore, that the consumption of the investment in plant is progressing on a compound interest curve basis."

Under the sub-caption, "Recording of Sinking-fund Interest":

"Where the sinking-fund method is used the total annual depreciation provision required is the sum of the annuity and the interest. Both these amounts should be so recorded as to show operating income both before and after the inclusion of the interest component of the total provision for depreciation. This would make both corporate operating income and operating income which might be used by the regulatory authority in rate matters readily available from the income statement.

"The interest element of the sinking-fund method is sometimes charged as interest expense. This procedure is not desirable as it results in an overstatement of the earnings available for interest on bonds because gross income is determined before full provision for depreciation of the plant. Investment counselors often make adjustment in income statements to reflect the so-called interest increment of the sinking-fund method in depreciation expense, but small investors frequently do not have the benefit of such advice and are apt to accept income statements at face value. It appears particularly desirable that accounting regulations be such as to require a correct showing of earnings available for investors."

Under the sub-caption, "Sinking-fund Interest Rate":

"The use of an interest factor in the sinking-fund method raises the question as to the rate of interest to be used. The theory is sometimes advanced that it should be approximately the same as the interest rate for bonds, or from 3 to 4 per cent. This theory is probably based on the premise that the sinking-fund reserve represents the extent to which customers have contributed to the capital of the utility through depreciation charges included in service rates and that, therefore, they should be given credit for interest on about the same basis as bondholders.

"Others claim the sinking-fund interest rate should be the same as the rate of return. This view is probably based on the theory that the sinking-fund interest rate should be determined from the earnings on depreciation funds. Since these funds are, as a general rule, invested in utility
plant the interest rate indicated is the same as, or
1915 at least approximates, the rate of return.

"The interest rate to be used is particularly important in rate-making procedure, especially where the sinking-fund method is used with an undepreciated rate base. Here the problem is largely one of equity to both customers and investors and the picture must be considered as a whole, including the rate of return allowed by the regulatory authority. It is doubtful if a specific interest rate could be advanced which would be equitable in all cases. Probably the nearest approach to a general rule is that the sinking-fund interest rate might reasonably lie somewhere between the rate of bond interest on the low side and the rate of return on the high side.

"Insofar as accounting only is concerned, neither the arguments in favor of making the sinking-fund interest rate equivalent to the rate of bond interest or the rate of return is persuasive. The rate of consumption of service capacity is not dependent on the cost of money nor does it bear any necessary relationship to the earnings on the depreciation funds. The funds might be invested in plant and earn a high or low return, or even a loss; or in a separate fund with the same result. Again, in a given set of circumstances, they might be used to pay partial liquidating dividends on common stock to be employed by the stockholder as he saw fit. What happens to the depreciation funds, however, has nothing to do with the rate of depreciation of property. The cost of depreciation is not dependent on earnings but occurs regardless of whether any earnings result.

"Accounting for depreciation is concerned with the matter of spreading the cost of depreciation. Therefore, for accounting purposes, the interest rate to be used in connection with the sinking-fund method should be that which results in a compound interest curve estimated to approximate the rate of consumption of service capacity of the plant to the end that the cost of service capacity of plant be spread equitably."

That concludes the three sub-divisions which you asked me to read.

Recross Examination Interposed by Mr. Slaff.

On the first page of the report, which is on page 5 of the proceedings, the following language appears:

"This report should be considered as tentative as there are several matters which time has not permitted us to complete. Among other things, no discussion is presented covering the proper treatment to be accorded depreciation in rate proceedings or of court decisions relating to the subject. It is recommended therefor that this report be considered in the nature of a progress report for distribution to the members of the Association for their information, review, and criticism."

On the next page, the first paragraph reads:

"As pointed out, this report dealing as it does with a subject presenting so many controversial issues in regulatory matters, does not conform in all respects to the views of each individual member of the committee. However, it is believed that better understanding of the depreciation problem has been gained and that many parts of the report can be considered as acceptable to a majority of the committee.

1916 ***Redirect Examination by Mr. Morgan Resumed.***

I am the Secretary of both defendants and as such have the custody of and responsibility for the records and books of account of defendants. The accountants who keep the accounts are responsible to me directly and I am responsible for the keeping of the books of account. I have had those responsibilties with both companies since December, 1933. I was not Secretary at the time I first assumed these responsibilities. I was Assistant Secretary. I was made Secretary in November 1934. During the period from December, 1933 to November, 1934 my duties and responsibilities were the same as they are now. The Secretary had resigned prior to my taking up the duties of Assistant Secretary and there was no Secretary during that period when I was serving as Assistant Secretary.

At the time I became responsible for the keeping of the books of account under the title of Assistant Secretary, beginning about December, 1933, the company had not recorded on its books any depreciation, depletion or retirements. Those subjects received consideration immediately after I became responsible for the books of account. The matter was discussed with the Manager, Mr. Brown, and with outside auditors, Peat, Marwick, Mitchell & Co., who had been employed to audit the company's records from the beginning up to the end of 1933. The firm last mentioned is the firm in which John A. Cook is a partner. We talked to him personally about the matter. Yes, I know why the company up to that time had made no book provision for depreciation and depletion. The company started out with the idea of operating on a revenue or income basis, having certain responsibilities in mind which had to be met from their income after taking care of their operating and construction costs; these obligations being namely, bond interest and bond retirements under the sinking fund provisions of the indenture. Anything left after those, of course, was subject to disposal by the board of directors as they saw fit. This included the payment of dividends if they desired.

The company was a closed corporation. Its stockholders and bondholders were one and the same, so that any money produced in excess of the company's requirements for operation and construction would ultimately go to the same people, regardless of how the book records were kept. The life of the project was considered at that time to be about 15 to 20 years; and the management did not feel that depreciation and depletion reserves were necessary for use in the replacement of the property, and since they would not affect the amount of the income available for interest and bond retirements, they did not see any reason or any necessity for recording them on the books at that time.

Yes, it was possible to pay off their bond interest and the principal of the bonds as they matured without provision for depreciation and depletion. The provision for depreciation and depletion did not affect the cash produced by the company or the disposition of the cash prior to the time it was set up. Our change in policy during the year 1934 relating to depreciation and depletion was adopted to meet two criticisms that the company had received. One was through the Federal Trade Commission in their report on the investigation of natural gas pipeline companies, I believe under Senate Resolution 83, in which they criticized the company for not having recorded on their books, depreciation and depletion, and stated that under those conditions, the company could pay dividends out of capital. It had not paid any dividends at that time. They simply stated that it could. About the same time the outside auditors, Peat, Marwick, Mitchell & Co., were employed to audit the books of the two companies and they likewise criticized us on the same subject and along the same lines. The company did not feel that these
1917 criticisms were incorrect as far as the bookkeeping records were concerned, and agreed to adopt a policy that would meet their objections.

After a number of conferences with Mr. Cook and Mr. Brown in which a number of employes of the company sat, a committee of representatives of the owner companies was selected to consider the subject and arrive at a depreciation policy. Mr. Cook met with these representatives from the owner companies on one or two occasions, outlining his thoughts on the subject, and later this committee met in New York and arrived at the rates of depreciation that the company should adopt on its book records. These rates were arbitrary to begin with, as the various members had different ideas and they arrived at rather an arbitrary compromise based on the records that they had available on the past life of similar equipment in other properties. I mean the physical life. And they adopted rates that would correspond with those physical lives. I believe I have the schedule of rates set up for the different classes of depreciable property (examining papers). Yes, these rates, which are the same rates which were carried on our books up to the beginning of 1938, were:

Main lines 2½ per cent; compressor stations, 6 per cent; telephone system, 8 per cent; meters and regulators, 7½ per cent; other main line structures, 7½ per cent; branch lines, 2½ per cent; gathering lines, 2½ per cent; gasoline plant, 10 per cent; tools, 20 per cent; automotive equipment, 25 per cent; furniture and fixtures, 7½ per cent; laboratory equipment, 10 per cent.

We used those rates of depreciation relating them back to the beginning of operations on January 1, 1932 until the year 1938. In 1938, the rates as applicable to Natural Gas Pipeline Company of America, only, were changed, effective January 1, 1938. Not all of the rates were changed but several of the rates in addition to the pipeline rate were changed. The reason for this was that at the time we had concluded a settlement with the Internal Revenue Bureau on the depreciation rates they would allow for income tax purposes, and purely for a matter of bookkeeping convenience we adopted the rates that the Revenue Bureau had agreed to. That was a compromise agreement for the purpose of income tax settlement.

We did not make the same revisions on Texoma's books for the reason stated by Mr. Cook, that we have never made a settlement with the Internal Revenue Bureau as far as Texoma's depreciation allowances are concerned. We never had a taxable income on Texoma and therefore have not had a settlement with the Revenue Bureau as far as Texoma's books were concerned. We left the rates of depreciation just as they were originally agreed upon by the committee back in 1934.

All of the owner companies are represented on the respective boards of directors of the two defendants; that is, all owners of Pipeline Company are represented on its board of directors and all the owners of Texoma are represented on its Board of directors. That has been true all along.

Recross Examination Interposed by Mr. Slaff.

The rates applicable to the Pipeline Company's property in 1938 and 1939 were: mainlines, 4 per cent; compressor stations, 4 per cent, telephone system, 4 per cent; other mainline structures, 4 per cent; branch lines, 4 per cent; meters and regulators, 4 per cent; tools, 20 per cent; automotive equipment, 25 per cent; furniture and fixtures, 7½ per cent; laboratory equipment, 10 per cent.

1918 *Redirect Examination by Mr. Morgan Resumed.*

Those are the only rates that the settlement affected.

1919 At the time we set up those rates of depreciation in 1934, it was not the object of the management and the officials responsible for the records to set up reserves for the purpose of returning to the owners their capital within the physical life of the field from which Texoma produces its gas. Those rates have nothing whatever to do with the life of the field. The rates were based on the usual allowance for physical depreciation of the depreciable property affected by the rates, and contemplated a 40-year physical life for the pipeline itself. For the other equipment, the life was conceived to be 100 divided by the rate set up.

In the matter of making provisions for depletion, we were discussing that subject at the same time we were discussing depreciation with Mr. Cooke and Mr. Brown and the other representatives. Mr. Cooke made a recommendation on the procedure that he thought would be appropriate for the company to adopt as its depletion policy, and this suggestion of Mr. Cooke's was adopted. The representatives of the owner companies and the company officials agreed to that procedure.

The recommendation was that we should first establish a date when the operations actually started. That was one thing that was necessary, that we should determine a date, for bookkeeping purposes only, when the retirement of acreage released should start. And he outlined a procedure by which the book costs would be reduced for acreage retired, and the company furnished him an arbitrary figure on the average reserves per acre, to apply to his formula. This applied to acreaged owned as of January 1, 1933.

The total reserves based on the assumed content of 12,000,000 cubic feet per acre were divided into the book cost of the reserves, which gave us a depletion factor that was applicable to the acreage released. The company, for bookkeeping purposes, for reduction of the book costs to cover retirements, adopted the policy of taking the total cost as reflected by the books of all of the acreage and dividing that by the number of acres we owned on January 1, 1933, and arrived at a purely arbitrary average cost of $65.548 per acre.

We did not understand at that time that there would be no more acreage released after January 1, 1933. We knew we had already at that time released quite a number of acres, and there would still be more acres to release later. We had been releasing acreage all through the year 1933 and 1934 up to the time we fixed this retirement. We knew that that acreage already released was not in the property account at the time we made the adjustment. It was not our thought that we had released all of the acreage as of the time we adopted that policy that we would release. We realized we would release more as time went on. It was not our thought at that time that the acreage which we had released during 1933 and 1934 and which would be released after the time we adopted this policy was on the first day of January, 1933 worth $65.548 per acre. (Objection by Commission counsel overruled.) That we had no such thought is substantiated by the fact that we released it in place of selling it. We would have sold it if it had had value.

The amount of $65.548 set up on the books was the total cost of all of the acreage divided by the number of acres on hand at that date, namely, January 1, 1933. As far as the books are concerned, we have reduced the book costs for the acreage retired since January 1, 1933 at the 1920 rate of $65.548 per acre. Charging that off the books as we released it does not get our money back. The property account, so far as that acreage is concerned, in my opinion, does not reflect the cost of the acreage which we still retain.

Cross-Examination Interposed by Mr. Slaff.

When any utility retires any property, that act does not get it its money back.

Examination by Mr. Morgan Resumed.

With reference to the depletion rate set up at the same time, the same policy has been continued down to the present time. The only variation has been due to the fact that other acreage has been acquired at a different price than $65.548. In adjusting the total acreage cost to an average which would take into account acreage subsequently acquired, we have continued exactly the same method of calculating our rate of depletion.

Recross Examination Interposed by Mr. Slaff.

As a matter of fact that adjustment for subsequently acquired acreage makes a very small difference in the depletion.

Redirect Examination by Mr. Morgan Resumed.

This entry for depletion is made monthly. We set up in the depletion account just the amount of gas the company actually produces from its own wells. It is not the understanding of the management that that is all the gas that is going out from under that acreage. (Objection by Commission counsel overruled.)

We have made no correction or adjustment to take account of gas which may have been drained to or from the leaseholds of Texoma, so far as our book records are concerned. We have not known until recently any figure on that, and the expense of determining such a figure is quite a large sum of money. Since it did not affect the operations of Texoma, we did not see any necessity for correcting that figure. Whether there was provision made for the depletion or depreciation either, or however we handled our retirements, whatever was left after meeting the operating expenses from the operations of those companies belonged to the same people; namely, the stockholders, who also owned the bonds. Therefore, we have not in our bookkeeping dealing with those three matters, the retirement of acreage, depreciation and depletion, sought to conform our book figures to the actual physical conditions that obtained in the property of these two companies.

In Exhibit 141 and the revised sheet which has been marked Exhibit 210 depletion was taken into account in the cost of gas reserves less depletion, to January 1, 1939, and is reflected in line 21. The figure of $12,402,884 reflected in line 21, column 1, was determined by taking the aggregate cost of the companies' acreage to January 1, 1939 less any salvage that might have been obtained. I mean the cash salvage or property which we could utilize, and reducing that by the ratio between the reserves under that acreage as of August 1, 1931, as testified to by Mr. Dickinson, who brought in the figures on that point, prepared by Mr. Peterson. We used the reserves under those same leases as of January 1, 1939, as testified to by Mr. Peterson. That ratio, I believe, was 78.0374.

As near as it has been possible to do so through our Geological Department, we have ascertained the original reserves as of the time that we bought them underlying the leases which we owned on January 1, 1939, and have accounted for the actual depletion of those leases as determined by the quantity of gas remaining now under them. Had we used our book depletion only, the figure we would have gotten instead of $12,402,884 would have amounted to $14,740,659, or $2,337,775 more than that set up in Exhibits 141 and 210.

1921 *Cross-Examination by Mr. Booth.*

The book depreciation at the end of 1938 was $11,620,210. That is the figure you asked for in Exhibits 141 and 210. As I compute the book cost, after deducting the book reserve as of December 31, 1938, the plant account for property other than leaseholds or reserves would be $38,210,269. If that amount be added to the total gas reserves, less the depletion reserve, in the amount of $14,740,659, the sum of those two figures would be $52,950,928, instead of a total of $59,748,824 for the capital expenditures per books for the physical property, including gas reserves in line 19, less viewed depreciation and less depletion. Under your computation, the total would be about 62 million dollars, if the book depreciation and depletion had been deducted from the cost of the physical property plus the original cost of the gas reserves.

Redirect Examination Interposed by Mr. Morgan.

I have used in my Exhibits 141 and 142 and in Exhibits 210 and 211 the actual original cost less the actual depreciation and depletion instead of the book entries dealing with those subjects. That is the long and the short of it. I took the actual depreciation from other testimony. I took Mr. Biddison's testimony of viewed depreciation as the actual depreciation.

Cross-Examination by Mr. Booth Resumed.

I don't believe I am in a position to say that I have studied the report of the Special Committee on Depreciation which I read into the record this morning at Mr. Morgan's request sufficiently to express an opinion on it. Yes, one of the statements I read into the record bearing upon the sinking fund interest rate read as follows:

"Probably the nearest approach to a general rule is that the sinking fund interest rate might reasonably lie somewhere between the rate of bond interest on the low side and the rate of return on the high side."

The rate of interest on the bonds of Natural Gas Pipeline Company of America is 6 percent. I believe the rate of return which defendants claim they are entitled to in this proceeding is 8 percent. I cannot tell you what amortization allowance I would have arrived at in Exhibit 210 if I had computed the amortization allowance on a sinking fund method, had I used 8 percent instead of 2 percent interest, compounded semi-annually. I don't have with me a table which would show the figures for me. I did not bring that along.

We did not use a standard book or Moody's tables in computing the 2 percent interest compounded semi-annually computation. That was computed out in detail. I am not familiar with what the general practice in a matter of that sort is. I have never been concerned with the sinking fund procedure, and I can not answer what the general practice is. I know that such annuity tables exist. I know they are used in computing amortization. If I had such a table available to me, I could try to make the computation.

1922 (At this point the document described as mimeographed copies of Exhibit 209 which was received in evidence, as appeared on page 9725 of the transcript, were substituted for the original exhibit. A mimeographed copy was marked by the reporter, at the direction of the Examiner, as Exhibit 209 and was received in evidence, without objection.)

The computation stated in Exhibits 141 and 210, whereby in line 33 I arrived at the amortization allowance in the sum of $4,134,51, was made by one of my assistants and not by me. As I explained in my testimony concerning the exhibit, it was made under my supervision but I did not compute the figure. I could not state definitely just how he did proceed. I would use the regular amortization tables, and then check it. It would be necessary to check it, which he did.

You have handed me Financial Handbook, Second Edition, R. H. Montgomery, Editor. Beginning at page 1413 there are tables similar to those to which I have referred. I believe I could state approximately by the use of that table how I would arrive at the figure of $4,134,551, as shown in Exhibit 210. I think this table is on a semiannual basis. I don't know how long it will take me to make this computation. I am not familiar with this particular table. It is not the table I thought it was when I first looked at it.

Yes, you introduced an exhibit under Exhibit No. 187 by Mr. Kleinman which showed that defendants had paid a dividend of $1,500,000 during the first 8 months of 1939. The company has paid an additional dividend during 1939 in the amount of $1.45 per share, and I think that figures $2,175,000 or a total of $3,675,000 for the year. These dividends have been declared and paid.

Mr. Morgan: I have one other matter. Mr. Examiner, on December 12, 1939, we offered in evidence the contracts on file with the Federal Power Commission of all of the pipeline companies taking gas from the Panhandle field and conveying natural gas in interstate commerce, namely, the Colorado Interstate, the Cities Service, the Panhandle Eastern, the Northern Natural, the Lone Star and the Consolidated Gas Utilities Corporation, I believe the name is.

In that same connection, we offered the schedules and contracts referred to in paragraph numbered A of Order No. 53 of the Federal Power Commission, dated July 5, 1938, and the information requested in paragraph D of the same order which was filed with the Federal Power Commission by the same companies above named. That offer appears at about 9736 of the record and was a re-offer of the same contracts, although the other material was not offered before referred to in the transcript of another hearing and shown at page 5610. These contracts were offered and request was made that they be incorporated in the record by reference, since the contracts and the other material offered in connection with them are matters of record and found among the files of the Federal Power Commission.

We desire to renew the offer of those contracts and the other material offered in connection with them, and in this connection we wish to point out that the pipelines whose contracts are requested to be placed in evidence and the material taken from their reports to the Commission, which we desire to offer later, are pipelines which produce gas in the same field from which these defendants produce and transport their gas. The record shows that one of them transports gas to the city of Denver, and the Commission will, of course, take judicial notice of the distance between that field and the city of Denver.

The Cities Service transports gas from the same field and from other intervening fields to the city of Kansas City and to intervening points.

The Panhandle Eastern produces gas in the Panhandle, and also in an intervening field, namely, the Hugoton, and purchases gas in both of those fields, and transports it to a point at Dana, Indiana, and to intervening points.

The Northern Natural produces gas in the Panhandle, as this record shows, and from Hugoton and from Otis, another field in western Kansas, and transports that gas to Minneapolis, Minnesota, and to a number of cities along the way.

The Lone Star Gas Company, the record shows produces gas in the eastern part of that field and transports in the southeasterly direction across the southwest corner of Oklahoma to cities in northern Texas, including the city of Wichita Falls, the city of Ft. Worth, and the city of Dallas.

The Consolidated Gas Utilities Corporation produces gas in the eastern part of that field and transports that gas from that field and from other fields in western Oklahoma to points in western Oklahoma and southwest Kansas or southern Kansas, which is a comparatively short distance from the Panhandle field, as the Commission would see from the notice it would take of the geography.

We submit that when we have shown that these pipelines are producing gas from the same fields and transporting it, some of them over the same general territory, and others over territory that is not shown to be different in material respects from the territory over which we are transporting gas, and certainly such differences as there are, namely, that as between Amarillo and Denver, there are no large streams, and companies like the Northern and the Cities Service and the Consolidated and the Lone Star, none of them transport gas across the Mississippi River, and I think only one of them crosses the Missouri River,—that we have made a different showing, a prima facie showing of comparable conditions entitling us to place that information in this record and to make admissible the rates which they charge and the prices which they charge for the sale of natural gas at wholesale.

In this connection, we point out that three of the witnesses who testified for the two commissions, namely, Messrs. Knapp and Ostrander and I think Smith—I am not sure whether it was Smith or Kleinman, but one of those two—testified that in a rate investigation, it was useful to the one who was charged with the responsibility for the inquiry, to have the charges of the other companies that are rendering similar service for the sale of a similar commodity.

In the light of those facts, we offer this evidence and submit that if that evidence be received, it will show that although our pipeline is conveying gas more than 950 miles, it is selling gas of all classes for less than any of them with the exception of one or two classifications of gas which are sold at a slightly lower rate by the Consolidated, which is a very short line.

And we renew our offer of that testimony and urge that it be admitted in evidence.

(Stamp) Federal Power Commission Docketed Jan 20 1940 HTS Docket Section Secretary's Office 100-2 S-109 F.

Air Mail

Jan 20 1940.

S. A. L. Morgan, Esquire,
c/o Natural Gas Pipeline Co. of America,
20 North Wacker Drive,
Chicago, Illinois.

Dear Sir:

Pursuant to my telegram of today, this letter is addressed to your offer in evidence of the material referred to at pages 10390-4 of the transcript in the proceedings re F. P. C. Dockets G-109 and G-112. This offer embraces: "the contracts on file with the Federal Power Commission of all of the pipe line companies taking gas from the Panhandle field and conveying natural gas in interstate commerce, namely, the Colorado Interstate, the Cities Service, the Panhandle Eastern, the Northern Natural, the Lone Star, and the Consolidated Gas Utilities Corporation * * *" (T. 10390); that is, "the schedules and contracts referred to in paragraph numbered A of Order No. 53 of the Federal Power Commission, dated July 5, 1938, and the information requested in paragraph numbered D of the same order which was filed with the Federal Power Commission by the same companies * * *" (T. 10390-1).

Counsel immediately amended his offer (T. 10399) to include certain maps filed by the six companies pursuant to Subdivision 7 of Order 51. This offer, save for the amendment, is in substance the same as a previous one (T. 9736 also 5610) denied by the Examiner on grounds already stated in the record (T. 9890-2).

Counsel submits that if these pipe lines produce gas from the same fields and transport it over the same general territory or territory not shown to be different in material respects from the territory over which the two respondent companies are transporting gas, there is a sufficient or prima facie showing of comparable conditions to make admissible the rates which they charge for the sale of natural gas at wholesale (T. 10392-3).

Counsel has stated in connection with the pending offer that at least four of these six companies produce gas from fields other than the Amarillo field as well as from the latter field (T. 10391-2). A fact somewhat in contrariety to the substance and theory of counsel's previous statement pertaining to prima facie comparability.

The Rules of Practice and Regulations of the Federal Power Commission (under the Natural Gas Act) provide in Section 50.44, with respect to offers in evidence of matter contained in a report or other document on file with the Commission, that while such document need not be produced or marked for identification, nevertheless the provisions of the preceding Section (50.43) will apply. That preceding section requires that when relevant and material matter is offered in evidence by a party which is embraced in a document containing other matter not material or relevant, the relevant or material matter must be plainly designated, etc. Order No. 53 (paragraphs A and D) and Order No. 51 (Subdivision 7), require the filing of comprehensive rate and charge schedules and data, the monthly amounts of natural gas sold over a given twelve-month period with the charges therefor under each rate applicable, and the maps referred to by counsel.

The Examiner does not believe, having in view counsel's statement of the purpose for which such evidence was offered (T. 10393), that such an agglomerate offer complies with the requirements of the Commission's Rules (Sections 50.44, 50.43), above referred to. The Examiner, further, has taken the pains to ascertain the volume of material the six companies have filed and with respect to which counsel's offer apparently relates. The volume of this material is great and the offer must be deemed to conflict with the end that the Commission's rules referred to are designed to attain. Counsel's statement of purpose, that while the subject companies transport natural gas to a greater distance than any of the six companies its rates in all classes are less with few exceptions, does not present a practical formula by which the bulk of the matter offered can be reduced to feasible size. In short, counsel has not complied with the rules of the Commission applicable to an offer of such genre. But beyond this the Examiner is convinced the proposed offer is subject to the same objections mentioned in his ruling above referred to which denied a previous offer of such material. The Examiner, therefore, hereby denies the offer of counsel to incorporate by reference the schedules and contracts filed by the six companies pursuant to paragraph A of Order No. 53 and the information filed by those companies pursuant to paragraph D of the same order, as well as the maps filed pursuant to Subdivision 7 of Order No. 51.

The Examiner also denies the offer of counsel for the Federal Power Commission of his exhibit for identification No. 212.

A copy of this letter is being filed with the Secretary of the Federal Power Commission for docketing as a formal document in the proceedings in re F. P. C. Dockets Nos. G-109 and G-112.

Yours very truly,
/s/ Ewing G. Simpson,
Trial Examiner.

EGS/SG
1/19/40

cc—Commissioner Draper
Chief Examiner Hampton
Mr. Slaff
Mr. Booth
Secretary (3)
Files (2).

An exception is hereby given counsel for the two companies with respect to the ruling adverse to his offer; and to counsel for the two Commissions with respect to the ruling on Exhibit 212.

Ewing G. Simpson,
Trial Examiner.

1923 S. E. CAMPBELL, Recalled, Testified:

(January 10, 1940.)

Recross Examination by Mr. Booth.

Yes, Mr. Booth, I have completed my determination by the application of this table. I can make the same check for the 8 percent with these same figures and determine what the annual amortization allowance would be, approximately, on the basis of an 8 percent sinking fund interest rate rather than the 2 percent. That will be the approximate figure derived on the slide rule.

Applying the 8 percent interest to the sinking fund and compounding it semi-annually, I arrived at the annual amount to be set aside in 32 semi-annual payments, beginning June 30, 1939, of approximately, $2,470,000 as compared with the $4,134,000 on the 2 percent basis.

1924 ROBERT H. DELAFIELD, recalled for further cross-examination, testified:

(January 10, 1940.)

Recross Examination by Mr. Booth.

The figures beginning in line 14, at page 10,085 of the record, reading "$500,000" is obviously an error. It should be "$500,000,000." I have corrected my testimony, and while there are many minor mistakes that I won't point out, there are 6 or 8 that I might point out to you. It might affect your examination like the one I just referred to.

If you will look at page 10,106, the third line from the bottom, the third word is "of" not "off". The word "properties" should follow the word "producing", so that the expression would read "producing properties".

On page 10,123, line 16, the second word "not" should be stricken. I do agree.

On page 10,133, the last part of the long paragraph, there is one nought too many on each figure. It should read "Now, if you multiply that by a million, that is 6,000 MCF which at 50 cents is $3,000." The figure in line 14 should be "$3,000" and not "$30,000."

On page 10,145, the 14th line, the second word should be "peak" and not "big".

On page 10,147, the first line, the third word is "were".

In the line directly below that word, the word "piped" should be "heated".

I do not think it is important, but on page 10,078, line 14, the record shows a question by Mr. Booth: "What were they?" I have a very distinct memory that the question was by the Examiner, and was "What was the percent increase?"

At page 10,088, line 6, appears the statement, "and obviously a serial of 100 percent." That should read "a serial and 100 percent sinking fund issue."

At page 10,115 and the following page, I stated:

"Well, he is most concerned with the risks that are of daily occurrence in the business and constant to the business, but I should qualify that answer, of course, by saying that the first thing that an investor would look at would be the management today, to ascertain whether it was a good management. Bad management is the worst kind of a day-to-day risk."

You ask why an investor would be concerned with the character of management. The first consideration
1925 in an investment, Mr. Booth, is credit, whether you are buying an equity or making an investment in a loan. The first consideration of credit is character. And the character of a company is its management. To use a loan for an example, a dishonest management would not be a good credit risk to the lender. Yes, I assume that the management, with respect to most of the large companies and utilities in the country, is honest. That is my position. The reason I said that the first thing an investor would look at would be the management is because, if the management is bad, I should think that that would debar, on the part of the investor, investment in a good property.

Even if the management was honest, that would also be the situation if it was incompetent. That would be incompetent management. The management is the character of a business. It is the directing genius of the business, the spirit of the business. If you remove management in the broad sense of the term, there is nothing left but the bare bones or the shell. The management is competent to undertake the various problems from time to time, and in fact every day which affect ordinarily the profitableness and the success of the business. Whether or not that in turn very seriously affects the risk of the investor in the enterprise, my answer is yes, that is the risk of bad management, which I was eliminating here.

Yes, it is the relative skill and ability and competence of the management in facing day by day problems that seriously affect the successful character of the enterprise and affects the risk of the investor. And if the management is unusually competent and able, they are better able to decide day by day problems which confront the management in determining whether or not the enterprise and the business is going to be successful and thus affect the risk of the investor who has put his money in the enterprise.

It is perfectly obvious that the management of ordinary businesses, unregulated businesses, the steel business or the candy business, must undertake day to day problems and decide those problems properly in order that the business may be successful, and that directly affects the risk of the investor in an enterprise. We are talking in all of this about management.

From that standpoint, it is the problems that the management must face and decide day to day which determine the success of the enterprise and affects the risk of the investor in the business.

I may have made a rather broad statement at page 10,113, when I said "risk is a possible future event which may be adverse to a business," but the risk in a given business, assuming, as I stated at the top of page 10,116, a reasonably good management which is the first step always, is the risk inherent in that particular business itself.

Now, if I may exemplify. A good management in an airplane business will run it well. A good management in a gas business will run it well, and we can see that the risks in the two businesses arise from totally different things and are different. No, it is not true as between industries. No, as between industries, it is not the quality of the management as to whether or not it is competent, able and skillful in deciding the day by day problems which constantly confront it, which determine the sucess-
1926 ful character of the enterprise, and directly affects the risk of the investor in the business.

I will answer a little more broadly, Mr. Booth. The position I am taking here is that if you assume good management of a large group of industries, then you cease to consider the risk of management in comparing those industries. If you assume a bad management of a large group of industries, you do not need to consider the risk of management in comparing those industries.

Redirect Examination Interposed by Mr. Morgan.

That is because good management, as I have stated, in the airplane business will run a good airplane business if it is possible, and good management in the gas business will run a good gas business, but that does not change the comparability of the fundamental risks in those businesses, nor do the investors so consider.

If the investor had knowledge that a management was bad, it is obviously that you could not get a cent for the business anywhere. I might qualify that by saying, bad enough. I suppose there is a degree of badness that other attractions might overcome.

Recross Examination Resumed by Mr. Booth.

Yes, it is true that the investor might not know anything about the character of the management. It is possible that the management might be skillful enough to conceal its charaster from an investor.

Redirect Examination Interposed by Mr. Morgan.

The risk of management ordinarily obtains in no greater degree in one class of business than in another. There are some few very simple industries where less skillful management is obviously required, but ordinarily, no.

Recross Examination by Mr. Booth (Resumed).

You ask me to assume that some additional natural gas reserves were discovered in the State of Ohio, and the management of our company was confronted with the problem as to whether or not its business made it desirable to acquire part of this additional quantity of natural gas acreage in this new field, and to further assume that our company had an investigation made of its present reserves and prospects of business during the next few years and decided not to make that additional investment or the investment in the additional acreage. You also ask me to assume that a few years later the business of the company grew somewhat more than had been anticipated by the company, and it did not have enough natural gas reserves. You ask me to state whether or not the decision which the management made at that time directly affected the risk of the investors who had put their money in the business of our company.

I think that that illustrates my point perfectly, in that had it not been the natural gas business, no question of purchasing or not purchasing reserves, no question of the future supply of gas, would have arisen. The risk, to my way of thinking, arises from its being the natural gas 1927 business, and not from the management. Certainly, the question of whether or not the management decided on a certain day not to put any money into that additional acreage has a direct effect upon the risk of the investor; but if it were not in the natural gas business, they never would have to make that decision. Any management has to make comparable decisions, and, therefore, I eliminate the question of management in trying to compare the businesses.

No, I am not denying that the management of ordinary business is not confronted with day by day decisions in the conduct of that business which directly affect the profitableness of the business; but the same is true of the natural gas business.

Recross Examination Interposed by Mr. Slaff.

I have not said that there is no difference in degree between the natural gas business and any other business as to that element of risk. I could not say that. There is a difference in degree as to that risk among all businesses. It might be very hard to decide just what the degree was, but there is. I think there is a difference in degree between the natural gas business and unregulated industry as such.

You ask if it is my positions that the risk of the day to day decisions is greater in the natural gas industry than in unregulated industry, or less in the natural gas industry than in unregulated industry. In one type of decision it would be greater. In another type of decision it would be less. In the case of the natural gas business, if I may borrow Mr. Booth's example, it is a greater decision for a natural gas management to have to decide whether they will buy a huge inventory of a product, to go over an extended period of years, than it is for the flour miller to decide to buy an inventory of wheat which he hedges simultaneously. In that particular instance, the risk is in favor of the gas company. Now, as against that, if I may go on, it is less of a decision, perhaps, to decide whether or not they will buy $5,000 worth of pipe today than it is for the man in the chemical business to decide whether he will buy a newly invented retort.

Recross Examination by Mr. Booth (Resumed).

You ask me if, when this company decided in 1931 and 1932 to acquire certain acreage with which it intended to have an adequate supply to serve the City of Chicago and the territory that it contemplated serving for a period of 15 or 20 or 25 years, they made that decision, and therefore were not called upon to decide that problem again after they had a survey made of the gas acreage which was or was not profitable. I think you are wrong on that, Mr. Booth. The moment they made that decision, they had a continuing problem as to what they should do with that reserve acreage. In other words, they had to determine whether they should continue to carry reserve acreage by rentals and thus reduce their profits, or whether they should take on additional acreage to meet possible future demand which did not exist at the moment. That acreage from that time on is a constant problem.

It might be a little exaggeration as to a producing company to say that they had to make day by day decisions as to the handling of that acreage and that such day by day decisions affect the enterprise. It is a constant problem. Your acreage problem is a constant problem, and your reserve problem, of course is too. Acreage is an incident of the natural gas business.

1928 You ask if it is the decisions that the management is called upon to make which affect the profitableness of the enterprise and the risk of the investors in the business. We take a different position on that, Mr. Booth. I say that the fact that acreage is an incident to the gas business produces the necessity for decision. Yes, the decision of a bad management will ruin the company, but I always assume good management.

It is the act of the management in deciding the acreage problem one way or the other which is going to have an effect upon the profitableness of a business. It is true; but if it were not for the risks that are inherent in the natural gas business, that decision would never have to be made. The problem seems to me to be easier if you look back to the fundamental risks rather than to some in the intermediate stage. The risk in the gas business is the necessity of maintaining acreage, maintaining a balance between acreage and producing lands, being able to have enough reserves ahead, and being sure that you won't lose your gas. Those are problems inherent in the natural gas business. I don't know how much additional acreage this company has acquired since 1930. I may have known, but I don't remember.

(At this point the witness was excused to permit S. E. Campbell to conclude his testimony. Thereupon, Robert H. Delafield resumed the stand and his cross examination was continued by Mr. Booth.)

No, I do not know approximately how many strikes there are in the utility business generally in the course of a year. I can remember the strike on the Consumers Power Company at the Thornapple plant which shut that down. We had a strike during the same year in our gas plant in Toledo. During the same year, we had a threatened strike and were under guard in the State of Kentucky. Those were all within a one-year period, which year I should say was 1934. We had one strike and walk-out that same year in a compressor station of the Manufacturers Light & Heat Company, which shut the station down. I am not quite certain that that was 1934, but it was all within that same period.

In the number of disturbances, the ones I have mentioned are much less than those in the automobile industry. I should say that in the utility industry, generally speaking, there are fewer strikes than in the automhile industry. I said in the number of strikes. In the same one-year period I previously mentioned, we had a strike in an electric generating station in Dayton. They come to your mind pretty fact when you try to remember them. I could not answer as to the number of labor disturbances that did not result in strikes. Prior to that period, we were very disturbed because of the character of labor in our experience in the gas business in the Appalachian region, and we had a very hard time.

I think it is true that, generally speaking, the labor problems are much more serious in character in unregulated businesses like the automobile business and the steel business, than in the utility business.

I take issue, Mr. Booth, with your word "regulated." I do not think it is the regulation that reduces the number of strikes in the utility business. That has nothing to do with it. I think it is true as I have said that labor strikes
and labor disturbances over the history of the utility
1929 business are relatively less than the labor problems
in unregulated businesses like the automobile busi-

ness and the steel business, but I could not prove it. I said that is true. May I supplement my answer, Mr. Booth, by remaking the point that the seriousness of a labor disturbance or strike is not always in its frequency or the number of men involved. That is especially true of the difficulty we have with labor in our business.

Recross Examination Interposed by Mr. Slaff.

It is the difference in the character of the business between so-called regulated and unregulated businesses which account to a large extent for the difference in the number of strikes and labor disturbances, in that the regulated industries are those normally in which the public at large is considered to have a large stake in the regular maintenance of service as contrasted with unregulated industries. That is the greatest deterrent to strikes in the business.

It might be true that another great deterrent to strikes in the utility industries is that the wage levels are generally pretty high, higher than in business normally. I am not at all sure that it is true. It might be true. It is not necessarily true that employment is more regular in the natural gas business, on account of the large amount of casual labor which you use.

Recross Examination by Mr. Booth (Resumed).

You ask concerning a credit loss suffered by Natural Gas Pipeline Company of America as a result of rate reduction. It is my impression that there never had been any determination by regulation of that rate, but it is also my impression that when this line was built and went into the business of supplying Chicago with natural gas, that the question of regulating the rate at the city gates was not up. It is my impression that this company at that time was free of regulation. I may be wrong in that. The controversy arose over the efforts of the State of Illinois to pass upon the reasonableness of the price paid by the Peoples Gas Light & Coke Company to Chicago District Pipeline Company.

You ask if it isn't a fact that the loss of money did not arise from what is known as an ordinary credit loss, but arose from the fact that the State of Illinois was endeavoring to determine what constituted a reasonable price for natural gas. Well, a credit loss arises because the debtor has not the money to pay, and this debtor did not have the money to pay and a loss resulted. I do not seek beyond the fact that the debtor did not have the money to pay.

No, I don't think there would have been any question about the Peoples Gas Light & Coke Company's and the Chicago District Pipeline Company's ability to pay the contract price if the State of Illinois had found the price fixed in the contract to be fair and reasonable.

At page 10,105, beginning with line 13, I testified: "In other words, when a company goes and buys new acreage, they must do it with their own money. They cannot borrow money for that purpose." That means they cannot borrow money for that purpose. Al I meant by that statement was with that restriction in the mortgage indenture, the company could not borrow money for that purpose under that issue.

1930 At page 10,095, line 2, I testified: "In addition to which, the enormous increase in the use of natural gas, if anything, adds to the risk of depetion and exhaustion." The problem of depletion is not substantially taken care of if adequate allowance is made for depletion and depreciation. If you figure on creating a depletion reserve over a 14 year life of a field, and the life is only 10 years, and that gas is all gone, you are just as short in your depletion reserve as if—

You ask if provision for depletion is made on a unit basis, the amount of natural gas that is withdrawn or sold, then the problem of depletion is substantially taken care of. No, because it is not a problem within the control of this company that I had in mind. A great many companies are operating in this field, and they are taking out a great deal of gas. All of the reserves and all of the amortization is figured on a basis that so much will be taken out, and the increased use of gas increases the risk that the life of the field will be shortened, in which case your depletion or your amortization period will not be completed before exhaustion.

The amount of depletion is not determined on a basis of so much for each thousand cubic feet of natural gas that is taken out of the field. Each company operating in a field takes gas out of it. This company figures that it will take out so many million feet, and that the other companies will take out so many million feet, and based on an estimate of the life of the property, they fix a unit amount per unit taken out. Now, the other company comes along, say there are only two in that field, and it takes out ten times as much gas as this company thought the other was going to take out, and the exhaustion of the field is therefore much quicker, and this company may have taken out exactly the number of units that it thought it was going to take out and charged exactly the depletion charge to each individual unit, and it would still have lost out.

One company does not charge for each thousand cubic feet of natural gas withdrawn by the other people in the field; only for the thousand cubic feet withdrawn by them. You ask whether or not if all the natural gas is withdrawn by some or all of the companies, and if they all charge on a unit basis according to the amount of natural gas that is in fact withdrawn by them, then do they take care of the depletion of the entire field. They take care of the depletion of the entire field, but the first company I mentioned here gets approximately one-tenth of its depletion reserve, and the second company ten times its depletion reserve.

If the first company loses some of its natural gas, it is of course possible that it is taking natural gas from some other company. I am not saying that it is true in this case. I am simply giving an example. That would not be true if there were just two of these people. The example I used assumed that there were two of these people, and number 2 gets out part of what number 1 was going to take, because he took out 10 times as much as was contemplated. In that case, number 1 would not be compensated for what he lost to number 2.

You ask how the normal temperatures to which I referred are arrived at. We use four or five principal cities in our territory where there are United States Weather Bureaus and where weather records exist back until I think 1852. We consider as normal for that general territory the temperatures as shown for those cities. At this moment I am sorry I do not know whether I used the average or the mean. I have the table here which I will be glad to give you. The figures I read yesterday are the monthly devia-
tion from normal, the month being from the 15th to
1931 the 15th, corresponding to the billing month, and are
the composite figures for the cities of Cincinnati,
Pittsburgh, and Toledo. Normal is an average for a period

which I think goes back to 1852 on down to the present. It has changed, as I remember it, not at all in that time. It may change from year to year, but over a period, the normal temperature has not changed as much as one degree.

Recross Examination by Mr. Slaff.

At the end of 1938 there were 12,304,282 shares of Columbia common stock outstanding. There has been no appreciable change since then. I don't know what Columbia common stock is selling at today. It closed last night at 6¾. It has been selling around 6 for the last week or two. It rose to a high of either 7⅛ or 7¼ on Monday, and has since gone off to 6¾.

947,845 shares of 6 per cent preferred, $100 par value, are outstanding in our company. We also have a $5 preferred, or rather a 5 per cent preferred. There are 40,466 shares of this 5 per cent preferred stock outstanding. The par value is $100 per share. My recollection is that the 5 per cent last sold at about 70. It is very inactive. I do not believe it sold yesterday. The bid and asked was 76 and 78, I think.

The 6 per cent preferred is selling at about 10 per cent off. That sold yesterday as I remember it at 90¾. That stock has risen quite rapidly in the last two weeks.

We have three outstanding bond issues, all bearing 5 per cent; a very small issue is due in 1952; a $50,000,000 issue is due in the same year; and a $50,000,000 issue is due in 1961. I think both large issues are selling at a premium. At present they are selling at from 104 to 104½.

There is one other issue of preferred stock there. We have 123,600 shares of 5 per cent, $100 par value, preferred stock listed on the New York Curb, and the last sale I saw I think was 65.

Question by the Examiner.

That is the complete financial structure of Columbia.

Redirect Examination by Mr. Morgan.

That 5 per cent preferred which I first mentioned is selling at about 70. That is a $100 share. It is a different series of the same issue as the 6 per cent preferred. The stock which sold at 6¾ yesterday is a no par value stock with a stated value on the books of $1, and a book value due to the capitalization of the company under orders from the Securities and Exchange Commission of approximately $14. I do not have that exact figure. It is selling at a little less than 50 cents on the dollar.

Recross Examination by Mr. Slaff.

During my direct testimony, I mentioned Godfrey Cabot
and that organization. You ask if they had operated carbon
black plants in the eastern fields. They used to, Mr.
1932 Slaff, operate carbon black plants in West Virginia,
and I think in eastern Kentucky. I am not so sure of
the latter; but to the best of my knowledge, they have not
operated any carbon black plants in the Appalachian fields
for some years.

I am under the impression that their ceasing to manufacture carbon black in the east was due to the law, though I am not sure that the manufacture of carbon black in West Virginia is prohibited by law. I am not sure that it is in Kentucky. The price of gas in the fields in that section of the Appalachian area, to the best of my knowledge, has not changed a great deal in the last 15 years. It has changed a great deal in the last 30 years, but not going back to 1926 and 1927.

Redirect Examination by Mr. Morgan.

Yes, I have run into some strikes among regulated concerns in my travelling around, like taxi companies, street railways and railroads, and companies of that kind. I am speaking over a period and not just at this particular time.

Cross-Examination Interposed by Mr. Slaff.

No, I did not happen to see the report of the Railway Mediation Board the other day that there were no strikes under its jurisdiction except one short airplane walk-out of the ground crews during this past year.

Mr. Booth asked me about the risk involved in the day to day decisions. Those are not the kind of risks that I have taken into account in arriving at a proper rate of return, the risk that management might make a bad decision because of incompetence or deliberately do it because of a lack of character.

The risk that I have considered is the risk that however competent the management and however wise the decision may seem to be at the time the management makes it, that because of the character of the business and the circumstances that surround the business, it may turn out to be a bad decision. A decision to invest $15,000,000 in a gas reserve would subject the company whose money the decision affected to as much danger of loss as would 15,000 decisions involving $1,000 each.

I never heard of a regulated concern applying to a regulatory body for an increased rate of return, as compensation for risk because of the danger that the management might turn out to be bad or incompetent. (Objection by Commission Counsel overruled.)

1933 JOHN A. COOKE, a witness for defendants recalled for further cross examination, testified:

(January 10, 1940.)

Recross Examination by Mr. Booth.

You have asked me to read into the record the definition of depreciation appearing at page 2 of the Federal Power Commission Uniform System of Accounts for Natural Gas Companies. The definition appearing on that page under No. 14 reads:

"Depreciation as applied to depreciable gas plant means the loss in service value not restored by current maintenance incurred in connection with the consumption or prospective retirement of gas plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand, and requirements of public authorities, and in the case of natural gas companies, the exhaustion of the natural resources."

You ask if in determining the amount of depreciation which should be set up for this company, if I was auditing its books, would I be guided by that definition of depreciation. At the present time no, but if it were under a regulatory commission and the accounts were under regulation, we would have to be guided in determining the company's action by the instructions contained here if they have not been upset for some reason or other by law. It is a question of the manner of keeping the accounts. If these are the regulations, then the company must comply with them for its books.

No, I do not know that this company is now subject to the jurisdiction of the Federal Power Commission. I have not seen the classification of accounts applying to these companies, which you say the Federal Power Commission has recently promulgated. I will take your word for it that it has been issued in the last few weeks. I don't know. If that were true, then that definition of depreciation would be followed for accounting purposes, in accordance with the Commission's requirements.

Redirect Examination by Mr. Morgan.

When I said it would be followed if the company was under the regulations, I meant the accounting regulations. The regulations pertaining to the company in question, meaning that that would be applied under those regulations of the Commission as being the proceedings and accountings which they must follow.

No, I do not know that there is a motion for rehearing pending before the Commission going to those accounting rules. I think I covered that possibility when I said that "unless it was upset" it would apply as it was written—unless it was upset by legal proceedings.

Recross Examination by Mr. Slaff.

1934 No, I am not familiar with definitions of depreciation as they occur in other systems of accounts, such as the Federal Power Commission System for Licensees and Public Utilities, the Federal Communications Commission and similar systems.

I do not keep the books, but check them to see that the company has carried out the generally accepted principles of accounting. When I certify a balance sheet or an income statement, I attempt to have that reflect as accurately as I can the actual financial facts of the company within the observed or accepted limits. I have to say that, because there are certain things in there which by reason of our limitations we can not cover.

1935 W. C. GILMAN, a witness for defendants, recalled for further cross-examination, testified:

(January 10, 1940.)

Recross Examination by Mr. Booth.

Yes, I have repeatedly referred in my testimony to the fact that the securities of natural gas pipeline companies provide for the retirement through the sinking fund method and are of rather short terms. I have characterized the sinking fund requirements as of a heavy character. I am not implying that that feature was disadvantageous to the company which was issuing the securities and made it difficult for it to sell the securities. As a matter of fact, it makes it easier for them to sell the securities and makes the securities more attractive to investors,—a particular type of investor.

That is a specific characteristic which gives them their peculiar attractiveness at this time. Institutions, like insurance companies, which have a continual or almost continual inflow of funds from their policy holders, must put their money at work to earn a return. In times of low interest rates as we are in now, where bonds are sold with a 3¼, 3½ or 3¾ per cent coupon, the investing officials of insurance companies, through past experience, are generally of the opinion that we will pass through this phase of very low money rates, and maybe in 5 or 8 years get back to a period where they will again be able to get good first mortgage bonds on a 5 per cent basis. Therefore, they are naturally anxious not to tie up their funds any longer than possible in these low coupon bonds, and a natural gas pipeline issue that has a total maturity of 15 years, with 100 per cent payout, has an average maturity of only 7½ years, so they have got their money to work at a rate low admittedly, but in 7½ years they will have half of their money back, and perhaps at that time they can be putting it into 4, 4½ per cent or 5 per cent securities.

The issuing company at this time has its choice of either a public offering or a private sale to institutions. Just thinking quickly here, I would say that probably in the last five years there have been more of those bonds in volume placed with institutions at private sales than sold through public offerings. Even in the case of public offerings, institutions of the character that I have referred to are frequently very large buyers of this class of securities.

Redirect Examination by Mr. Morgan.

In my replies to the last few questions by Mr. Booth, I have been talking about bonds. The whole discussion has been on bonds.

You ask what the fact that these attractive features have been added to the bonds of the natural gas business has done to the risks, so far as the equity holder is concerned. The equity holder, the person who buys the common stock of any company, owns the company, and he essentially carries the risk of the enterprise. If he wishes to borrow money from a lender and meets the lender's terms and promises to pay the money back well in advance, or substantially in advance, of the estimated life of the supply, in the case of natural gas companies, the buyer of the bond is, to that extent, shifting the risk to the equity holder, or at least keeping the risk with the equity holder.

1936 You ask what the effect of that has been on the issuance of original equity securities or the refinancing of equity securities. In recent years, there have been practically no offerings to the public of equity securities of pipeline companies.

There are always continuous tradings of the common stocks of pipeline companies whose securities are listed on the Exchanges; but that does not bring out any new securities.

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SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1941

No. 265

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, PETITIONERS

vs.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY

No. 268

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, PETITIONERS

vs.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT

Petitions for certiorari filed July 12, 1941, July 14, 1941

Certiorari granted October 13, 1941

IN THE

United States Circuit Court of Appeals
For the Seventh Circuit

No. 7454

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND TEXOMA NATURAL GAS COMPANY,
Petitioners,
vs.
FEDERAL POWER COMMISSION AND ILLINOIS
COMMERCE COMMISSION,
Respondents.

**Petition for Review of Interim Order of the Federal
Power Commission.**

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163 Pages 8, 9, 10 from Registration Statement filed with S. E. C. by Panhandle Eastern Pipeline Co. covering Ralph E. Davis Production Property and Gas Reserves (I. C. C.) 3408

167 Exhibit 49 in case of Chgo. District Pipeline Co. v. Lindheimer, et al., comparing present market price of issuance of Natural Gas Bonds (F. P. C.) 3413

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169 Pages a55 to a61, inclusive of Moody's Manual of Investments 1939 (F. P. C.) 3428

170 Page 250 from American Gas Association Monthly, August, 1939, "Expanding Markets for Gas Industry Make Investments Sound," by P. S. Young (F. P. C.) 3458

171 Pages 19-20-37 from "Gas"—July, 1939, article by Percy S. Young entitled "The Investment Attributes of Gas Utility Securities" (F. P. C.) . 3460

172 Pages 251-255 of American Gas Association Monthly issue of July-August, 1939, article, "A Banker Analyzes Natural Gas Industry Investment Values," by Frank R. Denton (F. P. C.) .. 3468

173 Pages 37, 38, 43 of "Gas," May, 1939, issue, article, "A Stock Broker Analyzes the Natural Gas Industry," by John Nickerson III (F. P. C.) 3471

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176 Pages 253-255, incl. from issue of July-August, 1939, of American Gas Association Monthly article, "The Fifth Big Job," by Charles R. Bellamy (F. P. C.) 3486
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1937

EXHIBIT NO. 3.

Texoma Natural Gas Company.

Production & B.T.U. by Fields.

For Year Ending June 30, 1938.

Months	Texas Panhandle Field M:C.F.—16.4# Pres. Base	B.T.U.
July—1937	4,339,311	1,082
August	4,519,949	1,081
September	4,379,420	1,086
October	4,776,896	1,083
November	4,523,216	1,085
December	4,745,975	1,083
January—1938	4,771,493	1,080
February	3,413,690	1,081
March	4,758,776	1,079
April	4,391,363	1,083
May	4,098,429	1,081
June	3,570,521	1,075
	52,259,039	1,082

1938

EXHIBIT NO. 4.

Texoma Natural Gas Company.
Gas Sold or Delivered by Companies.
For Year Ending June 30, 1938.

Company	Quantity M.C.F. 16.4#	Point of Delivery	Use of Gas
Natural Gas Pipeline Company of America	49,616,993	Sec. 21, Twp. 1N, R 20E, Beaver County, Oklahoma	For Resale — for domestic, commercial & industrial
Lone Star Gas Company	460,315	Mouth of Well—Wheeler County, Texas	For Resale — for domestic, commercial & industrial
Coltexo Corporation	380,654	Mouth of Well—Gray County, Texas	Gasoline Plant Fuel
Hinermann & Hermann	15,059	Various Connections—Gathering Lines	Drilling Gas
W. J. and John J. Moran	4,340	Various Connections—Gathering Lines	Drilling Gas
Phoenix Drilling Company	800	Various Connections—Gathering Lines	Drilling Gas
	50,478,161		

EXHIBIT NO. 5.

Texoma Natural Gas Company.
Consolidated Operating Analysis.
Gas Balance—M.C.F.—16.4# Pressure Basis.

	Total for Year Ending December 31 1934	1935	1936	1937	1938
Gas Produced	33,119,200	40,915,860	51,017,401	*62,252,650	51,383,791
Correction for Deviation	830,031	983,178	1,258,002	1,376,666	1,279,722
Gas received from Canadian River Gas Co. at Fritch	11,206,998	13,862,916	17,304,503	18,321,309	16,998,560
Gas received for exchange	1,316,304	965,375	672,867	589,055	3,460,823
Total to account for	46,472,533	56,727,322	70,252,773	82,539,680	73,122,896
Sales to pipe lines	31,865,440	39,360,264	48,795,294	52,742,027	48,263,244
Sales to industrial consumers	360,762	443,439	350,894	7,966,723	799,064
Gas transported for Canadian River Gas Co. at Gray	10,980,487	13,585,769	16,958,412	17,954,884	16,658,587
Gas delivered for exchange	1,318,401	962,600	873,533	584,809	3,443,368
Free gas	25,217	22,400	5,714	12,359	266
Gas used by company	1,032,740	1,333,034	1,880,511	1,825,470	1,792,508
Gas lost in process	632,061	1,075,100	1,309,503	1,444,121	1,489,012
Change in line pack	*3,296*	24,026	466	5,324	*3,222*
Gas lost and unaccounted for	244,254	*79,323*	278,446	3,963	640,071
Repressuring	26,467	—	—		
Total accounted for	46,472,533	56,727,329	70,252,773	82,539,660	73,122,896

* Includes gas delivered to Coltexo Corporation from January 1, 1934, to September 15, 1937.
Figures in italics, red in original.

Exhibit No. 6.

EXHIBIT NO. 6.

Texoma Natural Gas Company
Natural Gas Division.
Earnings Analysis.

	Total for Year Ending December 31				
	1934	1935	1936	1937	1938
Industrial sales					
Lone Star Gas Company....	$ 6,495.44	$ 5,862.90	$ 10,456.88	$ 14,638.64	$ 16,071.92
Texas Company	386.64	—	—	—	—
Coltexo Corporation	—	—	—	60,403.04	5,274.23
Miscellaneous	523.03	1,331.77	2,994.36	784.80	1,062.92
Drilling wells	—	4,058.28	—	—	—
Testing lines	—	372.64	—	—	—
Texas Pipeline Co.	—	239.84	—	—	—
Total industrial sales.........	7,405.11	11,865.43	13,451.24	75,626.48	22,409.07
Natural Gas Pipeline Company (at Gray Junction)..........	2,850,472.56	3,208,837.89	3,813,368.97	3,103,981.72	3,510,632.99
Total gas sales.............	2,857,877.67	3,220,403.32	3,826,820.21	3,179,608.20	3,533,042.06
Other operating income					
Leased facilities (C. R. G. Co.)	138,402.31	177,640.41	231,760.23	217,022.51	213,481.98
Sales of materials.........	*1,773.24*	*281.58*	608.79	639.82	*85.53*
Miscellaneous	294.42	48.80	253.35		210.00
Total other operating income...	136,923.49	177,407.63	232,622.37	217,662.38	213,606.45
Total Natural Gas Division.....	2,994,801.16	3,397,810.95	4,059,442.58	3,397,470.53	3,746,648.51

Figures in italics, red in original.

EXHIBIT NO. 7.

Natural Gas Pipeline Company of America.
Gas Sold or Delivered—By Companies.
For Year Ending June 30, 1936.

Company	Quantity M.C.F. 14.65 Pres. Base	Point of Delivery					Use of Gas
		Sec.	Twp.	R	County	Near	
Chicago District Pipeline Co.	62,447,383	18	35N	10E	Will	Joliet, Ill.	Resale—For Domestic, Commercial & Industrial
		14	34N	4E	LaSalle	Ottawa, Ill.	Resale—For Domestic, Commercial & Industrial
Central Power Co.	240,977	3	9N	11E	Otoe	Nebraska City, Neb.	Resale—For Domestic, Commercial & Industrial
Central States Electric Co.	262,755	31	74N	31W	Adair	Greenfield, Iowa	Resale—For Domestic
		19	75N	19W	Marion	Knoxville, Iowa	Resale—For Domestic
		9	76N	2W	Muscatine	Muscatine, Iowa	Resale—For Domestic, Commercial & Industrial
Iowa Power & Light Co.	50,849	13	74N	28W	Madison	Winterset, Iowa	Resale—For Domestic
		36	75N	24W	Warren	Indianola, Iowa	Resale—For Domestic
		11	75N	16W	Mahaska	Oskaloosa, Iowa	Resale—For Domestic
United Gas Service Co.	12,563	18	8S	4W	Cloud	Glasco, Kansas	Resale—For Domestic
Cedar Rapids Gas Co.	2,174,062	20	76N	6W	Washington	Evans, Iowa	Resale—For Domestic, Comm. & Ind.
Iowa Nebraska Light & Pr. Co.	339,144	35	73N	38W	Montgomery	Red Oak, Iowa	Resale—For Domestic, Comm. & Ind.
Peoples Light Company	2,705,133	23	77N	2E	Scott	Davenport, Iowa	Resale—For Domestic, Comm. & Ind.
Peoples Power Company	1,250,544	3	16N	1W	Rock Island	Moline, Illinois	Resale—For Domestic, Comm. & Ind.
Ottumwa Gas Company	124,056	3	75N	15W	Mahaska	Oskaloosa, Iowa	Resale—For Domestic
Iowa City Light & Power Co.	246,704	20	76N	6W	Washington	Evans, Iowa	Resale—For Domestic, Comm. & Ind.
Mineral Point Zinc Co.	914,784	35	16N	10E	Bureau	Depue, Illinois	Zinc Refining
Darby Petroleum Company	12,151	16	16S	12W	Barton	Beaver, Okla.	Lease Operation & Well Drilling
Stanolind Pipeline Co.	418	16	16S	12W	Barton	Beaver, Okla.	Oil Pump Station Operation
Northern Gravel Co.	6,804	15	76N	2W	Muscatine	Muscatine, Iowa	Sand Drying
Palmer Oil Corp.	4,030	16	16S	12W	Barton	Beaver, Okla.	Lease Operation & Well Drilling
Cities Service Gas Co.	3,045	2	12S	8W	Lincoln	Lincoln, Kansas	Resale—For Domestic, Commercial & Industrial
	70,795,402						

Exhibit No. 7.

NATURAL GAS PIPELINE CO. OF AMERICA

Exhibit 8

PURCHASED GAS

(MCF 16.4# Basis)	1934 MCF	1934 COST	1935 MCF	1935 COST	1936 MCF	1936 COST
Texoma Natural Gas Co.	31,865,440	$2,850,472.56	$39,360,284	$3,208,537.89	48,795,294	$3,813,368.97
Colorado Interstate Gas Co.						
Gross delivery	11,204,579	- - -	13,862,916	- - - -	17,304,503	- - - -
Less - gasoline extraction	224,092	- - -	277,147	- - - -	346,091	- - - -
Net delivery	10,980,487	- - -	13,585,769	- - - -	16,958,412	- - - -
Interruptable supply gas	3,989,571	154,609.71	3,764,984	151,664.06	5,580,160	279,008.00
Firm gas	6,990,916	489,364.13	9,820,785	687,454.95	11,378,252	796,477.64
Transportation charge	- - -	138,402.31	- - -	177,640.41	- - - -	231,760.23
Total Colorado Interstate Gas Co.	10,980,487	782,376.15	13,585,769	1,016,759.42	16,958,412	1,307,245.87
Total gas purchased	42,845,927	3,632,848.71	52,946,053	4,225,297.31	65,753,706	5,120,614.84

GAS USED BY COMPANY

(MCF 14.65# Basis)	1934 MCF	1934 COST	1935 MCF	1935 COST	1936 MCF	1936 COST
Gas used by company	1,533,460	107,343.60	2,457,951	$172,056.57	3,858,506	$270,095.42

Exhibit 8

PURCHASED GAS

1935		1936		1937		1938	
MCF	COST	MCF	COST	MCF	COST	MCF	COST
$39,360,284	$3,208,537.89	$48,795,294	$3,813,368.97	52,742,027	$3,103,981.72	48,263,244	$3,510,632.99
13,862,916	- - - -	17,304,503	- - - -	18,321,309	- - - -	16,998,560	- - - -
277,147	- - - -	346,091	- - - -	366,425	- - - -	339,973	- - - -
13,585,769	- - - -	16,958,412	- - - -	17,954,884	- - - -	16,658,587	- - - -
3,764,984	151,664.06	5,580,160	279,008.00	6,328,203	316,410.15	5,237,098	261,854.90
9,820,785	687,454.95	11,378,252	796,477.64	11,626,681	813,867.67	11,421,489	799,504.23
- - -	177,640.41	- - - -	231,760.23	- - - -	217,022.51	- - - -	213,481.98
13,585,769	1,016,759.42	16,958,412	1,307,245.87	17,954,884	1,347,300.33	16,658,587	1,274,841.11
52,946,053	4,225,297.31	65,753,706	5,120,614.84	70,696,911	4,451,282.05	64,921,831	4,785,474.10
2,457,951	$172,056.57	3,858,506	$270,095.42	4,442,840	$ 310,998.80	3,673,997	$257,179.7[illegible]

EXHIBIT NO. 9.

Natural Gas Pipeline Company of America.
Consolidated Operating Analysis.
Gas Purchases and Sales—M.C.F.

	Total for Year Ending December 31 1934	1935	1936	1937	1938
Gas Purchased—MCF—16.4# Pres. Basis					
Texoma Natural Gas Co.	31,865,440	39,360,284	48,795,294	52,742,027	48,263,244
Colorado Interstate Gas Co.	10,980,487	13,585,769	16,958,412	17,954,884	16,658,587
Total Gas Purchased	42,845,927	52,946,053	65,753,706	70,696,911	64,921,831
Gas Balance—MCF—14.65# Pres. Basis					
Gas Purchased					
Texoma Natural Gas Co.	35,671,770	44,061,869	54,623,894	59,042,267	54,028,477
Colorado Interstate Co.	12,292,104	15,208,590	18,984,094	20,099,666	18,648,520
Total gas to account for	47,963,874	59,270,459	73,607,988	79,141,933	72,676,997
Gas Sales					
Chicago District Pipeline Co.	39,615,086	49,321,075	61,631,788	66,272,216	60,181,360
Other distribution centers	3,993,125	6,418,037	6,903,435	6,845,161	7,442,804
Industrial consumers & Pipelines	*2,268,597	527,922	703,454	924,016	853,216
Total gas sales	45,876,808	56,267,034	69,238,677	74,041,393	68,477,360
Gas used by company	1,533,460	2,457,951	3,858,506	4,442,840	3,673,997
Change in line pack	63,559	35,368	*20,495*	12,918	*21,670*
Gas lost and unaccounted for	490,027	510,106	531,300	644,782	547,290
Total gas accounted for	47,963,874	59,270,459	73,607,988	79,141,933	72,676,997

* No deliveries to pipelines during 1934.

Figures in italics, red in original.

NATURAL GAS PIPELINE CO. OF AMERICA

Exhibit 10

1944

GAS SALES - 14.65# PRESSURE BASE

TOTAL FOR YEAR ENDING DECEMBER 31

	1934		1935		1936	
	MCF - GAS	AMOUNT	MCF - GAS	AMOUNT	MCF - GAS	AMOUNT
CHICAGO DISTRICT PIPELINE CO.						
Demand contract	26,241,145	$6,811,667.98	38,364,879	$9,364,882.17	48,238,711	$10,109,728.38
Interruptable supply contract (boiler fuel)	9,987,368	1,087,897.87	7,488,088	798,461.68	8,362,838	888,383.98
84¢ excess gas contract	—	—	—	—	25,419	5,987.88
Glass contract	—	—	1,482,382	183,888.28	1,609,772	212,565.04
Calcining contract	—	—	—	—	226,414	20,728.23
Process gas purchased contract	1,281,151	170,382.97	—	—	—	—
Tin plate contract	—	—	—	—	114,960	12,102.62
Industrial processing contract	—	—	—	—	166,838	20,802.75
Standard Oil contract	—	—	—	—	—	—
Steel mill contract (Youngstown)	694,413	91,680.38	310,386	40,861.39	—	—
42.8¢ gas contract	988,302	429,737.07	—	—	—	—
Republic steel contract	482,329	46,082.20	1,321,800	140,674.08	—	—
Illinois steel contract	—	—	419,894	61,880.38	9,802,883	1,283,941.10
Total sales: Chicago District Pipeline Co.	38,616,088	8,306,976.17	49,381,075	10,408,388.88	61,831,785	12,962,308.15
OTHER DISTRIBUTION CENTERS						
Central Power Co.	308,387	40,287.91	288,176	45,932.04	398,013	56,119.72
Central States Electric Co.	196,771	41,861.28	282,923	43,424.06	271,144	50,795.43
Iowa Power & Light Co.	36,686	9,402.79	46,480	10,996.20	48,821	13,512.60
United Gas Service Co.	6,718	2,607.20	9,930	3,946.15	11,694	4,553.75
United Light & Power Co.						
Cedar Rapids Gas Co.	2,060,860	261,777.47	2,384,305	376,893.83	3,227,840	484,888.82
Iowa-Nebraska Light & Power Co.	132,623	26,690.74	163,309	28,589.89	197,812	46,036.83
Peoples Light Co.	1,372,231	190,469.15	2,304,985	371,483.26	2,638,864	393,389.88
Peoples Power Co.	—	—	—	—	99,787	26,861.89
Ottumwa Gas Co.	—	—	—	—		
Iowa City Light & Power Co.	—	—	—	—		
Total sales: Other Distribution Centers	3,995,135	592,176.34	5,418,087	868,408.10	6,903,433	1,084,777.38
INDUSTRIAL CONSUMERS						
Dewey Portland Cement Co.	1,903,388	190,512.80	—	—	—	—
*New Jersey Zinc Co.	364,362	37,186.34	479,907	53,211.92	652,940	107,161.42
Gypsy Oil Co.	770	182.80	5,608	1,084.57	—	—
Darby Petroleum Corp.	—	—	16,900	3,221.00	19,880	3,720.20
Stanolind Pipeline Co.	—	—	282	47.88	404	76.76
Palmer Oil Corporation	—	—	—	—	—	—
Larie Oil & Gas Co.	—	—	6,011	1,142.09	—	—
Keeler & Thier, incorporated	—	—	—	—	1,981	364.99
Smith & Ash Oil & Gas Co.	—	—	—	—	5,763	1,094.97
Northern Gravel Co.	—	—	—	—	1,259	314.76
J. E. Mabee Co.						
Total sales: Industrial Consumers	2,268,520	227,881.94	508,708	58,677.15	681,887	112,733.09
Pipeline sales	—	—	19,340	2,418.63	21,387	2,696.35
Total gas sales	43,876,808	9,116,044.55	55,367,084	11,488,068.75	69,238,677	13,782,817.01

*Formerly Mineral Point Zinc Co.

Exhibit 10

GAS SALES - 14.65# PRESSURE BASE

TOTAL FOR YEAR ENDING DECEMBER 31

1955		1956		1957		1958	
MCF - GAS	AMOUNT	MCF - GAS	AMOUNT	MCF - GAS	AMOUNT	MCF - GAS	AMOUNT
39,364,679	$9,364,882.17	42,238,711	$10,109,728.88	42,407,686	$10,121,066.82	41,752,821	$9,998,677.92
7,485,036	795,481.65	8,262,855	835,883.86	7,110,866	751,248.39	6,312,483	665,635.67
—	—	35,419	8,957.86	—	—	—	—
1,482,382	185,886.26	1,689,772	212,862.06	3,577,948	416,289.30	2,114,182	259,686.06
—	—	236,414	30,725.23	397,711	52,029.77	248,365	32,440.30
—	—	—	—	—	—	5,771,684	848,684.54
—	—	114,960	12,102.62	1,256,175	132,761.73	986,850	97,750.63
—	—	166,826	20,802.75	3,016,282	379,832.41	2,559,863	321,406.40
—	—	—	—	353,979	27,943.46	496,442	37,386.35
310,386	40,861.90	—	—	—	—	—	—
—	—	—	—	—	—	—	—
1,321,800	140,674.08	—	—	—	—	—	—
419,864	61,880.35	8,808,883	1,263,941.30	9,151,880	1,358,241.30	—	—
49,381,075	10,488,886.88	61,651,785	12,557,306.[illegible]	66,272,218	13,215,083.[illegible]	60,181,380	12,328,606.90
238,176	46,882.84	296,013	56,119.72	264,289	56,049.21	254,386	52,414.84
232,923	45,484.05	271,144	55,795.43	268,319	57,366.31	243,342	54,380.80
44,489	10,796.39	68,821	13,512.60	68,000	15,023.12	51,109	13,257.19
9,930	2,948.15	11,484	4,083.75	12,973	5,189.20	12,109	4,843.80
2,884,305	376,885.85	3,327,840	484,888.82	2,300,261	306,244.42	2,123,867	334,437.94
163,309	33,689.88	197,812	46,084.83	346,490	89,087.70	325,137	63,826.68
2,804,985	371,483.26	2,683,884	396,389.83	2,259,521	362,471.98	2,843,687	411,412.17
—	—	99,787	36,881.89	1,087,388	250,797.49	1,163,486	267,162.82
—	—			60,238	14,324.52	161,880	34,426.07
—	—			100,872	15,408.73	294,489	51,479.29
6,418,087	888,488.10	6,906,483	1,084,777.35	6,848,161	1,302,842.70	7,442,804	1,277,641.08
—	—	—	—	—	—	—	—
479,007	85,221.92	652,940	107,161.42	867,808	149,789.48	830,651	147,876.16
8,608	1,064.57	—	—	—	—	—	—
16,900	3,211.00	19,580	3,730.20	12,445	2,364.17	8,994	1,706.86
252	47.88	404	76.76	416	79.04	407	241.70
—	—	—	—	1,258	239.02	6,918	1,697.32
6,011	1,142.09	—	—	—	—		
—	—	1,921	364.99	—	—		
—	—	5,763	1,094.97	—	—		
—	—	1,259	314.75	7,314	1,828.50	6,246	1,561.50
				5,378	1,021.82		
506,878	88,677.16	681,867	112,783.08	894,318	155,391.08	853,216	152,987.35
19,349	2,418.83	21,357	2,698.35	29,701	5,910.88		
55,357,084	11,423,069.72	69,238,677	13,752,817.01	74,041,338	14,378,817.42	68,477,380	13,759,434.41

45

EXHIBIT NO. 11.

Natural Gas Pipeline Company of America. Natural Gas Sales Agreements.

Customer	Date of Agreement	Effective Date	Filing Date	FPC No.
icago District Pipeline Co.	7-25-31	10-16-31	8-22-38	FPC No. 1
icago District Pipeline Co.	7-25-31		8-22-38	Exh. A to FPC No. 1
icago District Pipeline Co.	9-28-33	7-25-31	8-22-38	Supp. 1
icago District Pipeline Co.	9-28-33	7-25-31	8-22-36	Exh. A to Supp. 1
icago District Pipeline Co.	12-31-35	1- 1-35	8-22-38	Supp. 2
icago District Pipeline Co.	5- 2-38	8-23-28	8-22-38	Supp. 3
icago District Pipeline Co.	1- 2-36	1- 2-36	8-22-38	*Supp. 4
icago District Pipeline Co.	10-29-37	10-29-37	8-22-38	*Supp. 1 to Supp. 4
icago District Pipeline Co.	3-10-36	3-10-36	8-22-38	*Supp. 5
icago District Pipeline Co.	3-11-36	12-31-36	8-22-38	*Supp. 6
icago District Pipeline Co.	7-31-36	11- 1-36	8-22-38	*Supp. 7
icago District Pipeline Co.	4-26-37	4-26-37	8-22-38	Supp. 8
icago District Pipeline Co.	11- 1-37	1- 1-38	8-22-38	Supp. 9
icago District Pipeline Co.	3-14-38	8- 1-38	8-22-38	Supp. 10
ited Gas Service Co.	8-27-31	9-25-31	8-22-38	FPC No. 2
tral States Electric Co.	9-25-31	11-16-31	8-22-38	FPC No. 3
tral States Electric Co.	1-28-36	12-25-34	8-22-38	Supp. 1
tral States Electric Co.	8-25-36	8-25-36	8-22-38	Supp. 2
tral States Electric Co.	8-25-36	9-25-36	8-22-38	Supp. 3
tral States Electric Co.	7- 6-38	12-31-38	8-22-38	Supp. 1 to Supp. 3
tral States Electric Co.	11- 1-37	11- 1-38	8-22-38	Supp. 4
tral Power Co.	10-21-31	12-28-31	8-22-38	FPC No. 4
tral Power Co.	10-20-31	10-20-31	8-22-38	Supp. 1
tral Power Co.	11- 1-33	11- 1-33	8-22-38	Supp. 2
tral Power Co.	1-20-36	1- 1-35	8-22-38	Supp. 3
tral Power Co.	8-25-36	8-25-36	8-22-38	Supp. 4
tral Power Co.	10- 1-36	10-21-36	8-22-38	Supp. 5
tral Power Co.	7- 1-38	8- 1-38	8-22-38	Supp. 1 to Supp. 5
tral Power Co.	11-30-37	11-30-37	8-22-38	Supp. 6
tral Power Co.	10-13-38	12- 1-38	10-25-38	Supp. 1 to Supp. 6

6

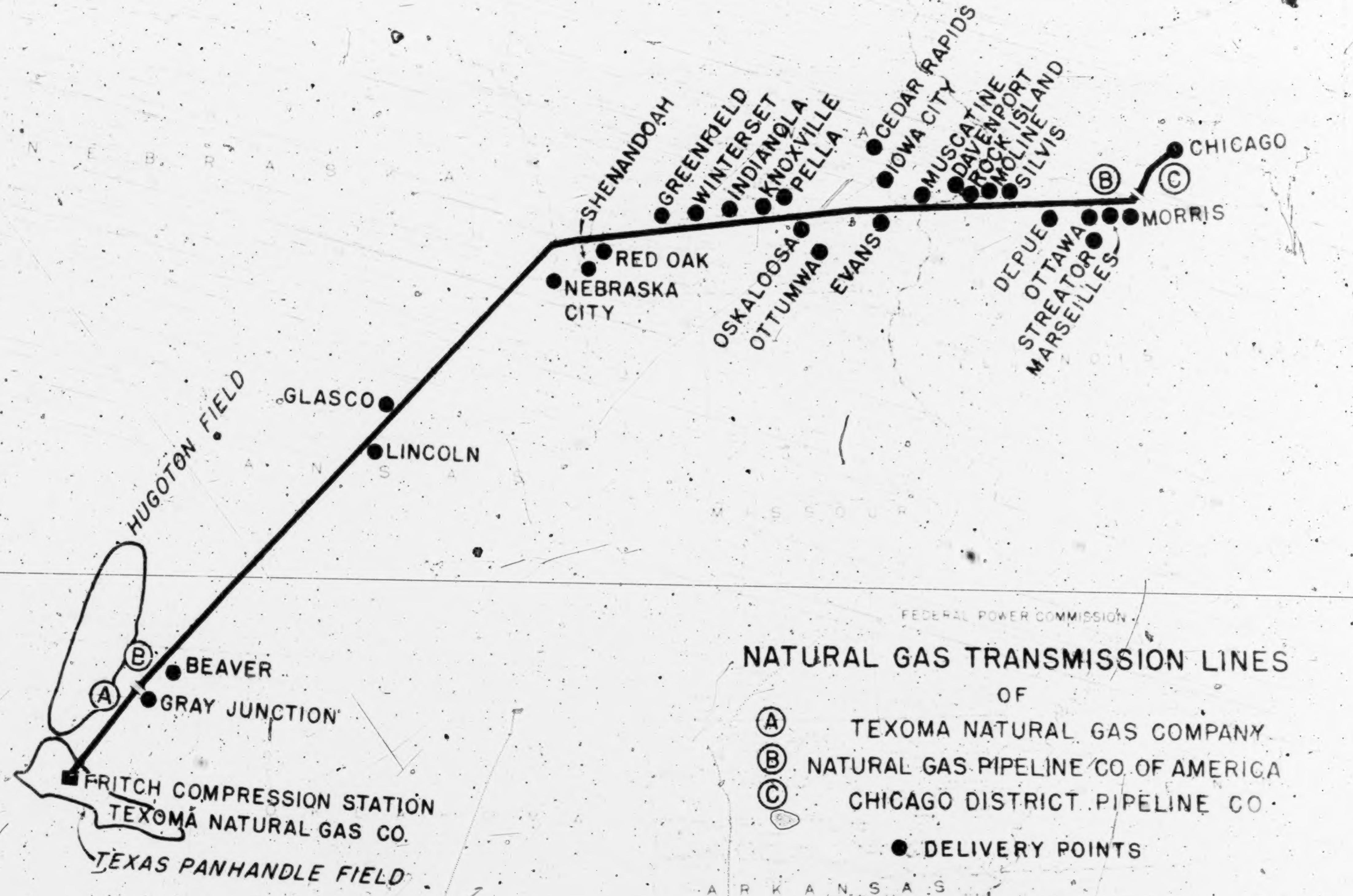
Customer	Date of Agreement	Effective Date	Filing Date	FPC No.
oples Light Co.	11-15-33	1-14-34	8-22-38	FPC No. 5
oples Light Co.	1- 1-36	1- 1-36	8-22-38	Supp. 1
oples Light Co.	5-31-36	6- 1-36	8-22-38	Supp. 2
oples Light Co.	9- 1-36	9- 1-36	8-22-38	Supp. 3
oples Light Co.	11-28-36	1- 1-37	8-22-38	Supp. 4
oples Light Co.	6-30-38	8- 1-38	8-22-38	Supp. 1 to Supp. 4
oples Light Co.	11-15-38	1- 1-39	11-21-38	Supp. 1 to Supp. 3
a Nebraska Lt. & Pr. Co.	11-15-33	11-15-33	8-22-38	FPC No. 6
a Nebraska Lt. & Pr. Co.	1- 1-36	1- 1-36	8-22-38	Supp. 1
a Nebraska Lt. & Pr. Co.	7- 1-38	7- 1-38	8-22-38	Supp. 2

xpired by their own terms on December 31, 1938.

Exhibit No. 11.

Customer	Date of Agreement	Effective Date	Filing Date	FPC No.
Cedar Rapids Gas Co.	11-15-33	2-22-34	8-22-38	FPC No. 7
Cedar Rapids Gas Co.	1- 1-36	1- 1-36	8-22-38	Supp. 1
Cedar Rapids Gas Co.	5-31-36	6- 1-36	8-22-38	Supp. 2
Cedar Rapids Gas Co.	12-18-36	12-31-36	8-22-38	Supp. 3
Cedar Rapids Gas Co.	6-30-38	8- 1-38	8-22-38	Supp. 1 to Supp.
Cedar Rapids Gas Co.	9- 9-38	9- 9-38	9-17-38	Supp. 2 to Supp.
Cedar Rapids Gas Co.	10- 1-37	10- 1-37	8-22-38	Supp. 4
Cedar Rapids Gas Co.	1- 1-38	1- 1-38	8-22-38	Supp. 5
Cedar Rapids Gas Co.	11-18-38	1- 1-39	11-23-38	Supp. 1 to Supp.
Iowa Power & Light Co.	12- 4-33	12- 4-33	8-22-38	FPC No. 8
Iowa Power & Light Co.	12- 4-33	12- 4-33	8-22-38	Supp. 1
Iowa Power & Light Co.	1-28-36	12-25-34	8-22-38	Supp. 2
Iowa Power & Light Co.	9-25-36	9-25-36	8-22-38	Supp. 3
Peoples Power Co.	8-12-36	10-19-36	8-22-38	FPC No. 9
Peoples Power Co.	8-12-36		3-23-39	Exh. A to FPC No
Peoples Power Co.	8-12-36	8-12-36	8-22-38	Supp. 1
Peoples Power Co.	8-12-36	8-12-36	8-22-38	Supp. 2
Peoples Power Co.	8-12-36	8-12-36	8-22-38	Supp. 3
Peoples Power Co.	8-12-36	8-12-36	8-22-38	Supp. 4
Peoples Power Co.	6-30-38	8- 1-38	8-22-38	Supp. 1 to Supp.
Peoples Power Co.	8-12-36	8-12-36	8-22-38	Supp. 5
Peoples Power Co.	8-12-36	8-12-36	8-22-38	Supp. 6
Peoples Power Co.	10-18-37	10-18-37	8-22-38	Supp. 7
Ottumwa Gas Co.	2- 1-37	7-12-37	8-22-38	FPC No. 10
Ottumwa Gas Co.	10-20-37	10-20-37	8-22-38	Supp. 1
Ottumwa Gas Co.	7- 7-38	10-16-38	8-22-38	Supp. 2
1947				
Cities Service Gas Co.	4-20-37	4-23-37	8-22-38	FPC No. 11
Iowa City Lt. & Pr. Co.	10- 1-37	10- 1-37	8-22-38	FPC No. 12
Iowa City Lt. & Pr. Co.	10- 1-37	10- 1-37	8-22-38	Supp. 1
Iowa City Lt. & Pr. Co.	10- 1-37	10- 1-37	8-22-38	Supp. 2
Iowa City Lt. & Pr. Co.	6-30-38	8- 1-38	8-22-38	Supp. 1 to Supp.

Exhibit 14


N E B R A S K A
K A N S A S
M I S S O U R I
I O W A
I L L I N O I S
O K L A H O M A
A R K A N S A S
HUGOTON FIELD
TEXAS PANHANDLE FIELD
FRITCH COMPRESSION STATION
TEXOMA NATURAL GAS CO.
Ⓐ
Ⓑ
Ⓒ
BEAVER
GRAY JUNCTION
LINCOLN
GLASCO
NEBRASKA CITY
RED OAK
SHENANDOAH
GREENFIELD
WINTERSET
INDIANOLA
KNOXVILLE
PELLA
OSKALOOSA
OTTUMWA
CEDAR RAPIDS
IOWA CITY
EVANS
MUSCATINE
DAVENPORT
ROCK ISLAND
MOLINE
SILVIS
DEPUE
OTTAWA
STREATOR
MARSEILLES
MORRIS
CHICAGO

FEDERAL POWER COMMISSION

NATURAL GAS TRANSMISSION LINES

OF

Ⓐ TEXOMA NATURAL GAS COMPANY
Ⓑ NATURAL GAS PIPELINE CO OF AMERICA
Ⓒ CHICAGO DISTRICT PIPELINE CO
● DELIVERY POINTS

DOCKET NO. G-109 AND G-112

MAY 2, 1939

1949

EXHIBIT NO. 15.

Natural Gas Pipeline Company of America.
Texoma Natural Gas Company.

Earnings Statements—Per Books.
Calendar Years from Commencement of Operations
to December 31, 1938.

1951

Natural Gas Pipeline Company of America.
Earnings Statement.
Calendar Years from Commencement of Operations
to December 31, 1938.

Line No.	Particulars	Cumulative Total
1		(1)
2	Earnings Statement	
3	Gross Earnings from Operation	$75,312,431.94
4	Operation & Maintenance Expense	39,891,416.91
5	Net Earnings from Operation	35,421,015.03
6	Non Operating Income	10,385,877.40
7	Net Earnings of Company	45,806,892.43
8		
9		
10		
11	Less Other Charges	
12	Interest Expense	$24,230,771.55
13	Bond Discount & Expense Amortized	1,537,165.09
14	Depreciation Expense	6,145,530.28
15	Loss on Sale of Warehouse Material	7,221.41
16	Retirement Expense	72,211.75
17		
18		
19	Total Other Charges	$31,992,900.09
20		
21		
22	Net Profit & Loss	$13,813,992.34

Source: Pg. 3 Company's Monthly Financial Statements.
(*) Red Figures.
Line 3—See Pg. 2, Line 9.
Line 4—See Pg. 2, Line 22.
Line 6—See Pg. 4, Line 18.

1952

Line No.	1931 October 15 to December 31	Year 1932	Year 1933	Year 1934	Year 1935	Year 1936	Year 1937	Year 1938
1	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
2								
3	$1,050,303.50	$5,649,787.89	$5,984,269.02	$9,116,100.23	$11,433,175.42	$13,734,635.51	$14,576,969.67	$13,767,190.70
4	291,019.44	3,532,891.13	3,331,443.51	5,577,418.24	6,028,723.49	7,150,030.58	6,826,288.00	7,153,602.52
5	759,284.06	2,116,896.76	2,652,825.51	3,538,681.99	5,404,451.93	6,584,604.93	7,750,681.67	6,613,588.18
6	66,318.25	1,523,071.39	1,547,045.83	1,585,231.74	1,549,871.10	1,481,059.20	1,370,228.28	1,263,051.61
7	825,602.31	3,639,968.15	4,199,871.34	5,123,913.73	6,954,323.03	8,065,664.13	9,120,909.95	7,876,639.79
8								
9								
10								
11								
12	154,540.60	3,712,858.54	3,780,692.77	3,717,919.32	3,553,040.49	3,288,754.53	3,009,518.36	2,923,446.94
13	—	—	256,972.68	256,685.19	256,876.85	256,876.85	254,876.76	254,876.76
14	—	—	—	1,141,602.56	1,152,413.53	1,162,667.23	1,179,201.27	1,509,645.69
15	—	—	7,221.41	—	—	—	—	
16	—	—	—	6,997.78	20,925.01	8,784.21	29,402.31	6,102.45
17								
18								
19	154,540.60	3,712,858.54	4,044,886.86	5,123,204.85	4,983,255.88	4,717,082.82	4,562,998.70	4,694,071.84
20								
21								
22	671,061.71	72,890.39*	154,984.48	708.88	1,971,067.15	3,348,581.31	4,557,911.25	3,182,567.95

1953 **Natural Gas Pipeline Company of America.**

Gross Earnings from Operation—Operation & Maintenance Expense—Gas Account,

Calendar Years from Commencement of Operations to December 31, 1938.

Line No.	Particulars	Cumulative Total
1		(1)
2	Gross Earnings—Gas Sales	
3	Chicago District Pipe Line Co.	$69,303,258.08
4	Other Distribution Centers	5,149,367.15
5	Industrial Consumers	860,185.70
6	Total Sales	75,312,810.93
7	Other Operating Income	274.92
8	Allowance	653.91*
9	Gross Earnings from Operation	75,312,431.94
10		
11	Operation & Maintenance Expense	
12	Purchased Gas	27,055,136.38
13	Pipeline Division	1,877,833.52
14	Compressor Station	3,753,037.77
15	Telephone Division	418,828.26
16	General Expense	6,416,736.51
17	Marketing Expense (New Business)	1,549,486.08
18		
19	Gross Operation and	
20	Maintenance Expense	41,071,058.52
21	Less: Credit Gas Used	1,179,641.61
22	Net Operation & Maintenance	39,891,416.91
23		

Source: Pg. 4 of Company's Monthly Financial Statement.

(*) Red Figures.

Line 6—See Pg. 3, Line 38.
Line 7—See Pg. 4, Line 8.
Line 12—See Pg. 5, Line 27.

Line No.	Particulars	Cumulative Total
24	Gas Account	
25	Gas Purchased Texoma Natural	
26	Gas & Colorado Interstate Gas	
27	M. C. F. 16.4 #Pressure Basis	350,997.237
28		
29	Total Gas to Account for	
30	M. C. F. 14.65 #Pressure Basis	392,924,388
31		
32	Gas Sales	
33	Chicago District Pipeline Co.	333,870,228
34	Other Distribution Centers	32,306,982
35	Industrial Consumers & Pipelines	6,681,954
36	Total Gas Sales	372,859,164
37	Gas Used by Company	16,851,828
38	Change in Line Pack	215,182
39	Gas Lost & Unaccounted for	2,998,214
40		
41	Total Gas Accounted For	392,924,388

1954

Line No.	1931 October 15 to December 31	Year 1932	Year 1933	Year 1934	Year 1935	Year 1936	Year 1937	Year 1938
1	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
2						10,650,340 3,082,112	10,801,601 3,775,215	10,699,918 3,069,485
3	$1,049,458.76	$5,609,274.40	$5,736,842.95	$8,305,978.17	$10,485,556.53	$12,562,288.15	$13,215,053.13	$12,338,805.99
4	844.74	40,479.49	104,479.10	582,176.54	886,406.10	1,054,777.39	1,202,562.70	1,277,641.09
5	--	--	143,559.08	227,890.14	61,096.09	115,451.47	159,201.59	152,987.33
6	1,050,303.50	5,649,753.89	5,984,881.13	9,116,044.85	11,433,058.72	13,732,517.01	14,576,817.42	13,769,434.41
7		34.00	41.80	55.38	116.70	2,118.50	152.25	2,243.71*
8			653.91*					
9	1,050,303.50	5,649,787.89	5,984,269.02	9,116,100.23	11,433,175.42	13,734,635.51	14,576,969.67	13,767,190.70
10								
11								
12	136,219.33	2,426,984.75	2,276,415.29	3,632,848.71	4,225,297.31	5,120,614.84	4,451,282.05	4,785,474.10
13	106,336.03	332,798.52	190,257.49	167,139.96	206,927.45	319,016.16	244,045.79	311,312.12
14	41,064.42	145,387.59	141,512.32	424,422.35	584,651.74	773,065.50	902,449.53	740,484.32
15	7,855.30	50,934.90	59,417.45	62,995.22	62,065.80	55,092.86	59,286.38	61,180.35
16		518,231.02	546,190.68	508,918.89	813,831.58	1,070,913.73	1,464,107.57	1,494,543.24
17	5,381.65	85,050.96	147,283.81	888,436.91	308,006.18	81,422.91	16,115.48	17,788.18
18								
19								
20	296,856.73	3,559,387.74	3,361,077.04	5,684,761.84	6,200,780.06	7,420,126.00	7,137,286.80	7,410,782.31
21	5,337.29	26,496.61	29,633.53	107,343.60	172,056.57	270,095.42	310,998.80	257,179.79
22	291,019.44	3,532,891.13	3,331,443.51	5,577,418.24	6,028,723.49	7,150,030.58	6,826,288.00	7,153,602.52
23								
24								
25								
26								
27	5,061,021	25,474,804	23,296,984	42,845,927	52,946,053	65,753,706	70,696,911	64,921,831
28								
29								
30	5,665,560	28,517,770	26,079,807	47,963,874	59,270,459	73,607,988	79,141,933	72,676,997
31								
32								
33	5,491,705	27,951,835	23,405,163	39,615,086	49,321,075	61,631,788	66,272,216	60,181,360
34	2,575	220,666	481,179	3,993,125	6,418,037	6,903,435	6,845,161	7,442,804
35			1,404,749	2,268,597	527,922	703,454	924,016	853,216
36	5,494,280	28,172,501	25,291,091	45,876,808	56,267,034	69,238,677	74,041,393	68,477,380
37	83,390	378,754	422,910	1,533,480	2,457,951	3,858,506	4,442,840	3,673,997
38	60,333	40,665*	125,834	63,559	35,368	20,495*	12,918	21,670*
39	27,557	7,180	239,972	490,027	510,106	531,300	644,782	547,290
40								
41	5,665,560	28,517,770	26,079,807	47,963,874	59,270,459	73,607,988	79,141,933	72,676,997

[illegible]
Firm
[illegible]

Natural Gas Pipeline Company of America.

Sales in M.C.F. and Revenue.

Calendar Years from Commencement of Operations to December 31, 1938.

Line No.	Particulars	Cumulative Total
		(1)
1	Sales in M.C.F.	
2	Chicago District Pipeline Co.	
3	Firm Sales	234,802,948
4	Interruptible Supply	51,756,607
5	Excess Gas Contract	1,305,717
6	Glass Contract	9,187,770
7	Calcining Contract	881,490
8	Steel Mill Contracts	26,993,931
9	Tin Plate Contract	2,297,983
10	Industrial Processing Contract	5,742,971
11	Standard Oil Contract	849,421
12	Total Sales Chicago Dist. Pipeline Co.	333,818,838
13	Total All Other Gas Sales	38,988,936
14	Total Sales (M.C.F. @ 14.65 Basis)	372,807,774
15	Revenues	
16	Chicago District Pipeline Co.	
17	Commodity Charge	
18	Firm Sales	$14,206,226.60
19	Interruptible Supply	5,426,540.84
20	Excess Gas Contract	560,245.06
21	Glass Contract	1,327,300.85
22	Calcining Contract	115,198.20
23	Steel Mill Contracts	3,857,774.65
24	Tin Plate Contract	242,615.17
25	Industrial Processing Contract	721,841.56
26	Standard Oil Contract	65,329.81
27	Total Commodity Charge	$26,523,072.74
28	Demand Charge	42,780,185.34
29	Total Revenue—Chicago.	
30	District Pipeline Company	$69,303,258.08

Source: Pg. 6 of Company's Monthly Financial Statements.

Line No.	Particulars	Cumulative Total
31	All Other Gas Customers	
32	Commodity Charge	4,131,685.44
33	Demand Charge	1,788,128.34
34	Other Charges—Peoples Light Co.	74,475.81
35	Interruptible Supply Gas	15,263.26
36	Total Revenue All Other Gas	
37	Customers	6,009,552.85
38	Total Gas Revenue	$75,312,810.93

Line No.	1931 October 15 to December 31 (A)	Year 1932 (B)	Year 1933 (C)	Year 1934 (D)	Year 1935 (E)	Year 1936 (F)	Year 1937 (G)	Year 1938 (H)
1								
2								
3	3,605,049	19,871,999	20,326,263	26,241,143	38,364,579	42,233,711	42,407,683	41,752,521
4	1,835,266	8,079,836	2,665,221	9,937,348	7,453,055	8,362,833	7,110,565	6,312,483
5	--	--	282,096	998,202	--	25,419	--	--
6	--	--	32,371	1,321,151	1,452,351	1,689,772	2,577,943	2,114,182
7	--	--	--	--	--	235,414	397,711	248,365
8	--	--	99,212	1,117,242	2,051,090	8,802,853	9,151,880	5,771,654
9	--	--	--	--	--	114,960	1,256,173	926,850
10	--	--	--	--	--	166,826	3,016,282	2,559,863
11	--	--	--	--	--	--	353,979	495,442
12	5,440,315	27,951,835	23,405,163	39,615,086	49,321,075	61,631,788	66,272,216	60,181,360
13	2,575	220,666	1,885,928	3,261,722	6,945,959	7,606,889	7,769,177	8,296,020
14	5,442,890	28,172,501	25,291,091	45,876,808	56,267,034	69,238,677	74,041,393	68,477,380
15								
16								
17								
18	$ 216,302.94	$1,192,319.94	$1,241,775.38	$1,595,888.70	$2,332,354.92	$2,549,728.98	$2,561,036.82	$2,516,818.92
19	181,540.94	810,242.37	283,432.37	1,057,597.57	793,481.68	883,363.88	751,248.36	665,633.67
20	--	--	121,550.44	429,737.07	--	8,957.55	--	--
21	--	--	5,343.28	170,322.97	183,926.28	212,563.04	415,259.20	339,886.08
22	--	--	--	--	--	30,728.23	52,029.77	52,440.20
23	--	--	13,088.64	136,652.58	243,226.40	1,283,941.10	1,335,241.39	845,624.54
24	--	--	--	--	--	12,102.62	132,761.72	97,750.83
25	--	--	--	--	--	20,902.75	379,532.41	321,406.40
26	--	--	--	--	--	--	27,943.46	37,386.35
27	397,843.88	2,002,562.31	1,665,190.11	3,390,198.89	3,552,989.28	5,002,288.15	5,655,053.13	4,856,946.99
28	651,614.88	3,606,712.09	4,071,652.84	4,915,779.28	6,932,567.25	7,560,000.00	7,560,000.00	7,481,859.00
29								
30	1,049,458.76	5,609,274.40	5,736,842.95	8,305,978.17	10,485,556.53	12,562,288.15	13,215,053.13	12,338,805.99
31								
32	627.90	8,141.17	185,992.13	620,850.09	696,007.92	811,489.80	895,887.51	912,688.92
33	216.84	17,075.06	62,046.05	174,740.78	236,494.27	343,739.06	450,876.78	502,939.50
34	--	--	--	14,475.81	15,000.00	15,000.00	15,000.00	15,000.00
35		15,263.26	--	--	--	--		
36	844.74	40,479.49	248,038.18	810,066.68	947,502.19	1,170,228.86	1,361,764.29	1,430,628.42
37								
38	$1,050,303.50	$5,649,753.89	$5,984,881.13	$9,116,044.85	$11,433,058.72	$13,732,517.01	$14,576,817.42	$13,769,434.41

Exhibit No. 15.

1957 **Natural Gas Pipeline Company of America.**

Other Operating Income and Non-Operating Income.

Calendar Years from Commencement of Operations to December 31, 1938.

Line No.	Particulars	Cumulative Total
		(1)
1		
2	Other Operating Income	
3		
4	Leased Facilities	$ 484.88
5	Sale of Stock Material	2,209.96*
6	Miscellaneous	2,000.00
7		
8	Total Other Operating Income	274.92
9		
10	Non-Operating Income	
11		
12	Rents	83,913.06
13	Interest Earned	10,292,551.63
14	Miscellaneous Income	4,541.79
15		
16	Purchase Discount	4,870.92
17		
18	Total Non-Operating Income	$10,385,877.40

Source: Pg. 8 of Company's Financial Statement.

(A) Services of Engineering Department of Company assisting Worthington Pump Company.

(*) Red Figures.

LINE NO.	1931 OCTOBER 15 TO DECEMBER 31 (A)	YEAR 1932 (B)	YEAR 1933 (C)	YEAR 1934 (D)	YEAR 1935 (E)	YEAR 1936 (F)	YEAR 1937 (G)	YEAR 1938 (H)
1								
2	$	$	$	$	$	$	$	$
3								
4		34.00	41.80	55.38	116.70	118.50	118.50	
5							33.75	2,243.71*
6						2,000.00(A)		
7								
8		34.00	41.80	55.38	116.70	2,118.50	152.25	2,243.71*
9								
10								
11								
12	3,588.82	16,541.69	13,295.03	17,034.90	19,196.51	18,849.49	6,746.44	11,339.82*
13	62,729.43	1,505,080.37	1,532,167.93	1,566,341.88	1,528,968.32	1,459,683.19	1,363,232.92	1,274,347.59
14		207.82	768.15	402.36	344.18	2,526.52	248.92	43.84
15								
16		1,241.51	814.72	1,452.60	1,362.09			
17								
18	$ 66,318.25	$1,523,071.39	$1,547,045.83	$1,585,231.74	$1,549,871.10	$1,481,059.20	$1,370,228.28	$1,263,051.61

1959 Natural Gas Pipeline Company of America.

Purchased Gas and Gas Used by Company.

Calendar Years from Commencement of Operations to December 31, 1938.

Line No.	Particulars	Cumulative Total (1)
1		
2	M. C. F. 16.4#	
3	Texoma Natural Gas Company	262,665,960
4		
5	Colorado Interstate Gas Co.	
6	Gross Delivery	90,131,600
7	Less Gasoline Extraction	1,800,323
8	Net Delivery	88,331,277
9	Interruptible Supply Gas	27,701,990
10	Firm Gas	60,629,287
11		
12	Total Colorado Interstate Gas Co.*	88,331,277
13		
14	Total Purchased Gas	350,997,237
15		
16	Amount	
17		
18	Texoma Natural Gas Co.	$20,393,629.52
19		
20	Colorado Interstate Gas Co.	
21	Interruptible Supply Gas	1,274,649.23
22	Firm Gas	4,237,427.11
23	Transportation Charge	1,149,430.52
24		
25	Total Colorado Interstate Gas	$ 6,661,506.86
26		
27	Total Purchased Gas	$27,055,136.38
28		
29	Gas Used by Company	
30	M.C.F. 14.65# Basis	16,851.828
31		
32	Amount	$ 1,179,641.61

Source Pg. 7 of Company's Monthly Financial Statements

(*) Gas Purchased from Colorado Interstate Gas Co. in 1931 was used in testing lines.

LINE NO.	1931 OCTOBER 15 TO DECEMBER 31 (A)	YEAR 1932 (B)	YEAR 1933 (C)	YEAR 1934 (D)	YEAR 1935 (E)	YEAR 1936 (F)	YEAR 1937 (G)	YEAR 1938 (H)
1								
2								
3	4,951,015	19,328,268	17,360,388	31,865,440	39,360,284	48,795,294	52,742,027	48,263,244
4								
5								
6	110,006	6,271,977	6,057,750	11,204,579	13,862,916	17,304,503	18,321,309	16,998,560
7	--	125,441	121,154	224,092	277,147	346,091	366,425	339,973
8	110,006	6,146,536	5,936,596	10,980,487	13,585,769	16,958,412	17,954,804	16,658,587
9		1,765,637	1,036,337	3,989,571	3,764,984	5,580,160	6,328,203	5,237,098
10	110,006	4,380,899	4,900,259	6,990,916	9,820,785	11,378,252	11,626,681	11,421,489
11								
12	110,006	6,146,536	5,936,596	10,980,487	13,585,769	16,958,412	17,954,804	16,658,587
13								
14	5,061,021	25,474,804	23,296,984	42,845,927	52,946,053	65,753,706	70,696,911	64,921,831
15								
16								
17								
18	$ 136,219.33	$1,958,856.26	$1,811,559.80	$2,850,472.56	$3,208,537.89	$3,813,368.97	$3,103,981.72	$3,510,632.99
19								
20								
21	--	70,625.48	40,476.93	154,609.71	151,664.06	279,008.00	316,410.15	261,854.90
22	--	307,740.36	343,018.13	489,364.13	687,454.95	796,477.64	813,867.67	799,504.23
23	--	89,762.65	81,360.43	138,402.31	177,640.41	231,760.23	217,022.51	213,481.98
24								
25	$ --	$ 468,128.49	$ 464,855.49	$ 782,376.15	$1,016,759.42	$1,307,245.87	$1,347,300.33	$1,274,841.11
26								
27	$ 136,219.33	$2,426,984.75	$2,276,415.29	$3,632,848.71	$4,225,297.31	$5,120,614.84	$4,451,282.05	$4,785,474.10
28								
29								
30	83,390	378,754	422,910	1,533,480	2,457,951	3,858,506	4,442,840	3,673,997
31								
32	$ 5,837.29	$ 26,496.[illegible]	$ 29,633.53	$ 107,343.60	$ 172,056.57	$ 270,095.42	$ 310,998.80	$ 257,179.79

Natural Gas Pipeline Company of America

Adjustments to Income Accounts

Calendar Years from Commencement of Operations to December 31, 1938

Line No.	Particulars	Cumulative Total
		(1)
1	Made Direct to Surplus	
2	Gas Purchased—Texoma	$ 24,499.61
3	Gas Purchased—Colorado Interstate	544.26
4	Pipeline Expense	2,209.75*
5	Compressor Station Expense	493.73
6	Telephone Expense	11,638.16
7	New Business Expense	73,542.83
8	General Expense—Excluding Taxes	9,818.67
9	General Expense—Taxes	2,031.20*
10	Total Operating & Maintenance Expense	$ 116,296.31
11	Non-Operating Income—Interest Revenues	1,465.49
12	Depreciation	2,661,828.68
13	Retirements	1,435.17
14	Amortization of Bond Discount & Expense	256,972.68
15	Organization Expense Written Off	25,895.69
16	Loss on Milwaukee Right-of-Way Expired	10,245.11
17	Total Adjusted in 1933	256,972.68
18	Total Adjusted in 1934	2,368,450.68
19	Total Adjusted in 1935	13,592.51*
20	Total Adjusted in 1936	4,526.90*
21	Total Adjusted in 1937	434,001.62
22	Total Adjusted in 1938	32,833.56
23	Total Adjustments made direct to Surplus	$3,074,139.13

(*) Red Figures

Line No.	Particulars	Cumulative Total
24	Adjusted by Memorandum Entries	
25	Gas Purchased—Texoma	
26	Pipeline Expense	
27	Compressor Station Expense	
28	Telephone Expense	
29	New Business Expense	
30	General Expense—Excluding Taxes	1,463.00*
31	General Expense—Taxes	
32	Miscellaneous Charges—Settlement of Nolan Case	1,463.00
33	Total Operation & Maintenance Expense	
34	Adjusted by Memorandum of Entries	
35	Adjusted Direct to "Preliminary Operations"	
36	Gas Purchased—Texoma	82,346.24*
37	Total Operation & Maintenance Expense	82,346.24*
38	Non-Operating Income—Interest Revenues	1,465.49*
39	Interest on Construction Notes	752,163.16
40	Amortization of Bond Discount & Expense	10,707.20
41	Total Adjustments made direct to	
42	Preliminary Operations	679,058.63
43	Total Adjustments to Income Accounts	$3,753,197.76

(*) Red Figures

Line No.	1931 October 15 to December 31 (A)	Year 1932 (B)	Year 1933 (C)	Year 1934 (D)	Year 1935 (E)	Year 1936 (F)	Year 1937 (G)	Year 1938 (H)
1								
2	$	$ 24,299.71	$ 23,679.16*	$ 3,586.20	$ 7,350.00	$ 12,942.86	$ --	$
3		--	544.26	--	--	--	--	
4		2,575.20*	2,178.49	1,774.29*	38.75*	--	--	
5		--	500.00	--	--	6.27*	--	
6		11,100.50	400.61	137.05	--	--	--	
7		--	72,919.31	623.52	--	--	--	
8		1,372.25	9,520.72	1,074.30*	--	--	--	
9			4,118.66	22,794.80*	11,876.90*	9,103.02*	37,624.86	
10		34,197.26	66,502.89	21,296.62*	4,565.65*	3,833.57	37,624.86	
11		1,465.49						
12		1,128,161.12	1,134,956.50	192.08*			398,903.14	
13		2,066.78	432.93*	1,729.63	534.92*	567.40*	826.09*	
14		256,972.68						
15	5,979.02						19,916.67	
16							10,245.11	
17		256,972.68						
18		1,166,647.34	1,201,803.34					
19	5,979.02	183.02*	203.11*	19,185.40*				
20					4,526.90*			
21						3,839.84	430,161.78	
22		573.67*	573.67*	573.67*	573.67*	573.67*	35,701.91	
23	5,979.02	1,422,863.33	1,201,026.56	19,759.07*	5,100.57*	3,266.17	465,863.69	
24								
25		57,940.19*	57,940.19					
26		2,575.96	2,575.96*					
27		497.89	497.89*					
28		189.26	189.26*					
29		1,053.80	1,053.80*					
30		1,297.98	2,760.98*					
31								
32			1,463.00					
33								
34		52,325.30*	52,325.30					
35								
36	82,346.24*							
37	82,346.24							
38	1,465.49*							
39	752,163.16							
40	10,707.20							
41								
42	679,058.63							
43	$ 685,037.65	$1,370,538.03	$1,253,351.86	$ 19,759.07*	$ 5,100.57*	$ 3,266.17	$ 465,863.69	

1963

Natural Gas Pipeline Company of America
Surplus Account

Calendar Years from Commencement of Operations to December 31, 1938

Line No.	Particulars	Cumulative Total
1		(1)
2	Balance Transferred from Profit & Loss	$13,813,992.34
3	Less: Dividends	9,150,000.00
4	Net Balance	4,663,992.34
5	Less: Adjustments to Income	
6	Accounts made Direct to Surplus	
7	per page 6, Line 17 to 22, Inclusive	3,074,139.13
8	Balance	1,589,853.21
9	Less: Transfer fo 1931 Profit to Ac-	
10	count 1019—Preliminary Operations	671,061.71
11	Net Change in Surplus	918,791.50
12	Balance Beginning of Year	—
13	Balance End of Year—Per Books	918,791.50
14		
15	Adjustments Between Years Per Page	
16	6, Line 43	3,753,197.76*
17		
18	Balance Transferred from Profit & Loss	13,813,992.34
19	Adjusted Net Profits	10,060,794.58
20		
21	Dividends Declared	9,150,000.00
22	Balance Transferred to Surplus	910,794.58
23	Less 1931 Income Transferred to Ac-	
24	count 1019—Preliminary Operations	7,996.92*
25	Net Change in Surplus—Adjusted	918,791.50
26	Balance Beginning of Year—Adjusted	—
27	Balance End of Year—Adjusted	918,791.50

(*) Red Figures.

Line No.	1931 October 15 to December 31	Year 1932	Year 1933	Year 1934	Year 1935	Year 1936	Year 1937	Year 1938
1	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
2	$671,061.71	$ 72,890.39*	$ 154,984.48	$ 708.88	$1,971,067.15	$3,348,581.31	$4,557,911.25	$3,182,567.95
3						2,775,000.00	4,125,000.00	2,250,000.00
4	671,061.71	72,890.39*	154,984.48	708.88	1,971,067.15	573,581.31	432,911.25	932,567.95
5								
6								
7			256,972.68	2,368,450.68	13,592.51*	4,526.90*	434,001.62	32,833.56
8	$671,061.71	$ 72,890.39*	$ 101,988.20*	$2,367,741.80*	$1,984,659.66	$ 578,108.21	$ 1,090.37*	$ 899,734.39
9								
10			671,061.71					
11	671,061.71	72,890.39*	773,049.91*	2,367,741.80*	1,984,659.66	578,108.21	1,090.37*	899,734.39
12		671,061.71	598,171.32	174,878.59*	2,542,620.39*	557,960.73*	20,147.48	19,057.11
13	671,061.71	598,171.32	174,878.59*	2,542,620.39*	557,960.73*	20,147.48	19,057.11	918,791.50
14								
15								
16	685,037.65*	1,370,538.03*	1,253,351.86*	19,759.07	5,100.57	3,266.17*	465,863.69*	...
17								
18	671,061.71	72,890.39*	154,984.48	708.88	1,971,067.15	3,348,581.31	4,557,911.25	3,182,567.95
19	13,975.94*	1,443,428.42*	1,098,367.38*	20,467.95	1,976,167.72	3,345,315.14	4,092,047.56	3,182,567.95
20								
21						2,775,000.00	4,125,000.00	2,250,000.00
22	13,975.94*	1,443,428.42*	1,098,367.38*	20,467.95	1,976,167.72	570,315.14	32,952.44*	932,567.95
23								
24	7,996.92*							
25	5,979.02*	1,443,428.42*	1,098,367.38*	20,467.95	1,976,167.72	570,315.14	32,952.44*	932,567.95
26	--	5,979.02*	1,449,407.44*	2,547,774.82*	2,527,306.87*	551,139.15*	19,175.99	13,776.45*
27	5,979.02*	1,449,407.44*	2,547,774.82*	2,527,306.87*	551,139.15*	19,175.99	13,776.45*	918,791.50

1965

Texoma Natural Gas Company

Earnings Statement

Calendar Years from Commencement of Operations to December 31, 1938

Line No.	Particulars	Cumulative Total
1		(1)
2	Gross Earnings from Operations	
3		
4	Natural Gas Division	$21,694,333.79
5	Gasoline Division	3,315,513.07
6	Gross Earnings from Operation	$25,009,846.86
7		
8	Operation and Maintenance	
9		
10	Natural Gas Division	$ 5,292,972.81
11	Gasoline Division	935,240.95
12	Total Operation and Maintenance	$ 6,228,213.76
13		
14	Net Earnings from Operation	
15		
16	Natural Gas Division	$16,401,360.98
17	Gasoline Division	2,380,272.12
18	Total Net Earnings from Operation	$18,781,633.10
19		
20	Non Operating Income	112,643.06
21		
22	Net Earnings of Company	$18,894,276.16
23		
24	Less Other Charges	
25		
26	Interest Expense	$10,100,260.44
27	Bond Expense, Amortized	6,841.30
28	Depreciated Expense	2,116,422.78
29	Depletion Expense	1,248,853.23
30	Retirement Expense	4,028,379.82
31		
32	Total Other Charges	$17,500,757.57
33		
34	Net to Profit and Loss	$ 1,393,518.59

Source: Pg. 3 of Company's Financial Statements

(*) Red Figures.

1966

Line No.	1931 October 15 to December 31 (A)	Year 1932 (B)	Year 1933 (C)	Year 1934 (D)	Year 1935 (E)	Year 1936 (F)	Year 1937 (G)	Year 1938 (H)
1								
2								
3								
4	$137,778.31	$2,057,347.84	$1,903,033.91	$2,994,801.16	$3,397,810.95	$4,059,442.58	$3,397,470.53	$3,746,648.51
5	43,852.14	198,977.00	225,129.07	326,860.28	511,687.56	670,066.18	753,714.38	585,226.46
6	181,630.45	2,256,324.84	2,128,162.98	3,321,661.44	3,909,498.51	4,729,508.76	4,151,184.91	4,331,874.97
7								
9								
10	$101,730.30	$659,701.03	$508,512.52	$599,560.37	$735,351.45	$870,074.86	$938,016.80	$880,025.48
11	23,960.40	89,196.74	84,745.40	112,478.21	131,469.14	160,573.55	168,521.85	164,295.66
12	125,690.70	748,897.77	593,257.92	712,038.58	866,820.59	1,030,648.41	1,106,538.65	1,044,321.14
14								
15								
16	$36,048.01	$1,397,646.81	$1,394,521.39	$2,395,240.79	$2,662,459.50	$3,189,367.72	$2,459,453.73	$2,866,623.03
17	19,891.74	109,780.26	140,383.67	214,382.07	380,218.42	509,492.63	585,192.53	420,930.80
18	55,939.75	1,507,427.07	1,534,905.06	2,609,622.86	3,042,677.92	3,698,860.35	3,044,646.26	3,287,553.83
20	6,560.25	63,149.33	16,891.92	6,502.30	7,652.24	7,317.09	1,124.94*	5,694.87
21								
22	62,500.00	1,570,576.40	1,551,796.98	2,616,125.16	3,050,330.16	3,706,177.44	3,043,521.32	3,293,248.70
23								
24								
25								
26	$62,500.00	$1,570,576.40	$1,548,103.06	$1,522,921.91	$1,467,035.66	$1,395,572.57	$1,292,210.15	$1,241,340.69
27	--	--	3,693.92	5.10*	1,202.04	1,202.04	374.20	374.20
28	--	--	--	360,922.58	395,154.79	437,712.40	456,649.67	465,983.34
29	--	--	--	178,792.07	220,199.45	267,676.71	320,526.96	261,658.04
30	--	--	--	386,050.06	780,735.42	1,324,008.63	547,426.44	990,159.27
31								
32	$62,500.00	$1,570,576.40	$1,551,796.98	$2,448,681.52	$2,864,327.36	$3,426,172.35	$2,617,187.42	$2,959,515.54
33								
34	--			167,443.64	186,002.80	230,005.09	426,333.90	333,733.16

1967

Texoma Natural Gas Company

Gross Earnings from Operations

Natural Gas Division and Gasoline Division and Non-Operating Income

Calendar Years from Commencement of Operations to December 31, 1938

Line No.	Particulars	Cumulative Total
1		(1)
2	Natural Gas Division	
3	Industrial Sales	
4	Lone Star Gas Company	$ 71,423.80
5	Texas Pipeline Company	2,640.36
6	Miscellaneous	7,006.38
7	Drilling Wells	4,058.28
8	Testing Lines	372.64
9	Coltexo Corporation	65,846.97
10	Total Industrial Sales	$ 151,348.43
11	Pipeline Sales	
12	Natural Gas Lipeline Co. (at	
13	Gray Junction)	$20,393,629.52
14	Total Gas Sales	$20,544,977.95
15	Other Operating Income	
16	Leased Facilities	$ 1,149,461.12
17	Sales of Material	1,161.83*
18		
19	Miscellaneous	1,056.55
20	Total Other Operating Income	$ 1,149,355.84
21	Total Natural Gas Division	$21,694,333.79
22		

Source: Pg. 6 of Company's Monthly Financial Statements.

(*) Red Figures. Line 21, see Pg. 8, Line 4

Line No.	Particulars	Cumulative Total
23	Gasoline Division	
24	Gasoline Sales	$ 3,817,066.94
25	Gasoline Allowances	68.30*
26	Sales Discount	8,413.15*
27	Net Gasoline Sales	$ 3,808,585.49
28	Other Operating Income	132.00
29	Gasoline Plant Operating	
30	Agreement	493,204.42*
31	Total Gasoline Division	$ 3,315,513.07
32		
33		
34	Non-Operating Income	
35		
36	Rents	$ 34,823.29
37	Interest Earned	73,566.15
38	Miscellaneous	1,611.74
39	Cash Purchase Discounts	2,641.88
40	Total Non-Operating Income	$ 112,643.06

(*) Red Figures.

Line 31, see Pg. 8, Line 5
Line 40, see Pg. 8, Line 20

No. 1	1931 October 15 to December 31 (A)	Year 1932 (B)	Year 1933 (C)	Year 1934 (D)	Year 1935 (E)	Year 1936 (F)	Year 1937 (G)	Year 1938 (H)
2								
3	$	$	$	$	$	$	$	$
4	1,376.78	7,880.76	8,640.48	6,495.44	5,862.90	10,456.88	14,638.64	16,071.92
5	--	1,233.30	780.58	386.64	239.84	--	--	
6	12.50	24.00	273.00	523.03	1,331.77	2,994.36	784.80	1,062.92
7	--	--	--	--	4,058.28	--	--	--
8	--	--	--	--	372.64	--	--	--
9	169.70	--	--	--	--	--	60,403.04	5,274.23
10	1,558.98	9,138.06	9,694.06	7,405.11	11,865.43	13,451.24	75,826.48	22,409.07
11								
12								
13	136,219.33	1,958,856.26	1,811,559.80	2,850,472.56	3,208,537.89	3,813,368.97	3,103,981.72	3,510,632.99
14	$137,778.31	$1,967,994.32	$1,821,253.86	$2,857,877.67	$3,220,403.32	$3,826,820.21	$3,179,808.20	$3,533,042.06
15								
16	--	89,793.25	81,360.43	138,402.31	177,640.41	231,760.23	217,022.51	213,481.98
17	--	689.71*	419.62	1,773.24*	281.53*	606.79	639.82	85.53*
18								
19		249.98		294.42	48.80	253.35		210.00
20		89,353.52	81,780.05	136,923.49	177,407.63	232,622.37	217,662.33	213,606.45
21	$137,778.31	$2,057,347.84	$1,903,033.91	$2,994,801.16	$3,397,810.95	$4,059,442.58	$3,397,470.53	$3,746,648.51
22								
23								
24	$ 44,203.22	$ 197,624.48	$ 262,633.91	$ 365,662.63	$ 596,062.30	$ 792,017.15	$ 893,807.30	$ 665,055.95
25	--	--	13.06*	34.94*	20.30*			
26	387.08*	1,949.47*	2,364.77*	3,711.83*				
27	$ 43,816.14	$ 195,675.01	$ 260,256.08	$ 361,915.86	$ 596,042.00	$ 792,017.15	$ 893,807.30	$ 665,055.95
28	36.00		96.00	--	--	--	--	
29								
30	--	3,301.99	35,223.01*	35,055.58*	84,354.44*	121,950.97*	140,092.92*	79,829.49*
31	$ 43,852.14	$ 198,977.00	$ 225,129.07	$ 326,860.28	$ 511,687.56	$ 670,066.18	$ 753,714.38	$ 585,226.46
32								
33								
34								
35								
36	$ 2,040.35	$ 9,130.37	$ 6,641.80	$ 6,433.30	$ 7,023.06	$ 7,027.23	$ 1,382.21*	$ 2,090.61*
37	4,504.60	52,087.16	9,188.91	--	--	--	--	7,785.48
38	15.30	39.55	311.58	69.00	629.18	289.86	257.27	
39	--	1,892.25	749.63	--	--	--	--	
40	$ 6,560.25	$ 63,149.33	$ 16,891.92	$ 6,502.30	$ 7,652.24	$ 7,317.09	$ 1,124.94*	$ 5,694.87

1969 **Texoma Natural Gas Company**

Earnings Analysis—Gas Sales Statistics

Calendar Years from Commencement of Operations to December 31, 1938

Line No.	Particulars	Cumulative Total
1		(1)
2	Natural Gas Division (M.C.F.)	
3	Industrial Sales	
4	Lone Star Gas Co.	2,586,030
5	Texas Pipeline Co.	75,869
6	Miscellaneous	143,934
7	Drilling Wells	101,457
8	Testing Lines	9,316
9	Coltexo Corp.	7,955,315
10	Total Industrial Sales	10,871,921
11		
12	Pipeline Sales	
13	Natural Gas Pipeline Co.	
14	(at Gray Junction)	262,665,960
15	Total Gas Sales	273,537,881
16		
17	Gasoline Division	
18	Gasoline Sales (Gallons)	124,538,152

Source: Pg. 6 of Company's Financial Statements.

1970

LINE No.	1931 OCTOBER 15 TO DECEMBER 31	YEAR 1932	YEAR 1933	YEAR 1934	YEAR 1935	YEAR 1936	YEAR 1937	YEAR 1938
1	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
2								
3								
4	70,535	394,038	432,474	324,772	293,145	303,302	365,966	401,798
5		35,881	22,946	11,046	5,996	--	--	
6			1,680	14,944	33,525	47,592	19,620	26,573
7				--	101,457	--	--	
8				--	9,316	--	--	
9	3,485			--	--	--	7,581,137	370,693
10	74,020	429,919	457,100	350,762	443,439	350,894	7,966,723	799,064
11								
12								
13								
14	4,951,015	9,328,268	17,360,388	31,865,440	39,360,284	48,795,294	52,742,027	48,263,244
15	5,025,035	19,758,187	17,817,488	32,216,202	39,803,723	49,146,188	60,708,750	49,062,308
16								
17								
18	1,768,318	9,629,782	7,381,065	14,370,142	17,577,163	21,472,941	24,864,500	27,[illegible] ~~49,062,308~~

Texoma Natural Gas Company

Natural Gas and Gasoline Statistics

Calendar Years from Commencement of Operations to December 31, 1938

Line No.	Particulars	Cumulative Total (1)
1		
2	Gas Balance M. C. F.	
3	16.4# Pressure Basis	
4		
5	Gas Produced	282,174,503
6	Correction for Deviation	6,895,832
7	Gas Received from Canadian River	
8	Gas Company at Fritch	90,134,019
9	Gas Received for Exchange	8,358,201
10	Total to Account for	387,562,555
11		
12	Sales to Pipelines	262,665,960
13	Sales to Industrial Consumers	10,871,921
14	Gas Transorted from Canadian River	
15	Gas Co. at Gray	88,331,277
16	Gas Delivered for Exchange	8,193,445
17	Free Gas	141,467
18	Gas Used by Company	9,233,735
19	Gas Lost in Process	6,563,054
20	Change in Line Pack	20,171
21	Gas Lost and Unaccounted for	1,515,058
22	Re-Pressuring Tests	26,467
23	Total Accounted for	387,562,555
24		
25	Gasoline Balance—Gallons	
26	Storage First of Period	1,987,248
27	Net Production	127,838,649
28	Purchases (Naptha)	13,635
29	Total to Account for	129,839,532
30		
31	Sales (Raw and Blend)	124,538,152
32	Losses	3,298,762
33	Storage End of Period	2,002,618
34	Total Accounted for	129,839,532

2729

1972

Line No.	1931 October 15 to December 31	Year 1932	Year 1933	Year 1934	Year 1935	Year 1936	Year 1937	Year 1938
1	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
2								
3								
4		20,185,564					62,252,650	51,383,791
5	5,223,881	~~20,269,296~~	18,139,156	33,119,200	40,915,860	51,017,401	~~63,629,316~~	~~52,663,513~~
6	158,246	572,969	437,218	830,031	963,178	1,258,002	1,376,666	1,279,722
7								
8	110,006	6,271,977	6,057,750	11,206,998	13,862,916	17,304,503	18,321,309	16,998,560
9	--	607,889	745,888	1,316,304	965,375	672,867	589,055	3,460,823
10	5,492,133	27,[illegible]	25,380,012	46,472,533	56,727,329	70,252,773	82,539,680	73,122,896
11								
12	4,951,015	19,328,268	17,360,388	31,865,440	39,360,284	48,[illegible]95,294	52,742,027	48,263,244
13	74,020	429,919	457,100	350,762	443,439	350,894	7,966,723	799,064
14								
15	110,006	6,146,536	5,936,596	10,980,487	13,585,769	16,958,412	17,954,884	16,658,587
16	--	[illegible]	757,745	1,318,401	962,600	673,533	584,809	3,443,368
17	15,401	29,470	30,640	25,217	22,400	5,714	12,359	266
18	215,595	613,621	540,258	1,032,740	1,333,034	1,880,511	1,825,470	1,792,506
19	61,396	308,461	243,410	632,061	1,075,100	1,309,503	1,444,121	1,489,012
20	6,375	8,214*	1,288*	3,296*	24,026	466	5,324	3,222*
21	58,335	274,[illegible]49	55,163	244,254	79,323*	278,446	3,963	680,071
22	--	--	--	26,467	--	--	--	--
23	5,492,133	27,[illegible]	25,380,012	46,472,533	56,727,329	70,252,773	82,539,680	73,122,896
24								
25								
26	89,282	67,095	137,340	573,317	265,547	217,241	255,939	381,487
27	1,781,907	10,335,153	8,075,386	14,420,109	17,889,037	22,216,896	25,495,306	27,624,855
28	--	13,635	--	--	--	--	--	
29	1,871,189	10,415,883	8,212,726	14,993,426	18,154,584	22,434,137	25,751,245	28,006,342
30								
31	1,768,318	9,629,783	7,381,065	14,370,142	17,577,163	21,472,941	24,864,500	27,474,240
32	35,776	648,760	258,344	357,737	360,180	705,257	505,258	427,450
33	67,095	137,340	573,317	265,547	217,241	255,939	381,487	104,652
34	1,871,189	10,415,883	8,212,726	14,993,426	18,154,584	22,434,137	25,751,245	28,006,342

(*) Red Figures.

1973

Texoma Natural Gas Company

Operation and Maintenance Expenses—Natural Gas Division

Calendar Years from Commencement of Operations to December 31, 1938

Line No.	Particulars	Cumulative Total
1		(1)
2	Operation and Maintenance Expense	
3		
4	Natural Gas Division	
5	Production Division	$2,392,062.63
6	Pipeline Division	544,196.19
7		
8	Compressor Station	1,212,451.43
9	Telephone Division	40,108.69
10	General Expense	1,668,098.71
11	Gross Operation and Maintenance	
12	Expense	$5,856,917.65
13	Less Credits Gas Used	563,944.84
14	Net Operation and Maintenance	
15	Expense—Natural Gas Division	$5,292,972.81

Source: Pg. 4 of Company's Financial Statements
Line 15, see Pg. 8, Line 10

1974

LINE NO.	1931 OCTOBER 15 TO DECEMBER 31	YEAR 1932	YEAR 1933	YEAR 934	YEAR 1935	YEAR 1936	YEAR 1937	YEAR 1938
1	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
2								
3								
4								
5	$ 79,474.65	$ 298,134.52	$ 262,255.92	$ 295,173.80	$ 328,573.54	$ 381,992.98	$ 374,873.35	$ 371,583.87
6	18,042.96	81,811.66	59,754.33	53,307.31	82,079.80	84,954.03	81,012.94	83,233.16
7								
8	14,540.01	50,555.78	44,845.9	90,856.65	172,052.14	263,767.25	317,401.44	258,432.25
9	1,689.10	6,945.43	5,749. 9	5,557.87	6,128.43	4,630.36	4,703.86	4,704.45
10	—	$ 244,425.57	155,877.2	196,907.20	239,815.85	262,737.30	284,644.88	283,690.64
11								
12	$113,746.72	$ 681,872.96	$ 528,482.62	$ 641,802.83	$ 828,649.76	$ 998,081.92	$ 062,636.47	$1,001,644.37
13	12,016.42	22,171.93	19,970.10	42,242.46	93,298.31	128,007.06	124,619.67	121,618.89
14								
15	101,730.30	659,701.03	508,512.52	599,560.37	735,351.45	870,074.86	938,016.80	880,025.48

Texoma Natural Gas Company

Operation and Maintenance Expense

Calendar Years from Commencement of Operations to December 31, 1938

Line No.	Particulars	Cumulative Total
		(1)
1	Gasoline Plant	
2	Operation Expense	
3	Operation Labor	$217,198.99
4	Operation Materials	300,553.74
5	Damages	350.00
6	Office Salaries—Chicago	3,769.44
7	Traveling Expenses	14.58
8	Station Operating Fuel	107,937.28
9	Lubricating Oils & Greases	9,271.03
10		
11	Absorbing Medium	64,178.44
12	Blending Supplies	944.63
13	Laboratory Expense	41,978.59
14	Total Operation Expense	$746,196.72
15	Maintenance Expense	
16	Equipment Labor	$ 7,939.59
17	Equipment Materials	18,989.90
18	Auxiliary Engine Labor	3,317.85
19	Auxiliary Engine Materials	8,455.25
20	Yard Piping	15,545.10
21	Building and Grounds	6,337.78
22	Job Order Maintenance	5,815.22
23	Total Maintenance Expense	$ 66,400.69
24	Total Gasoline Plant Expense	$812,597.41

Source: Pg. 10 of Company's Monthly Financial Statements.

Line No.	Particulars	Cumulative Total
25	Refrigerating Plant	
26	Operation Expense	
27	Operation Labor	$ 77,530.60
28	Operation Materials	10,722.68
29	Office Salaries—Chicago	1,052.27
30	Traveling Expenses	
31	Station Operating Fuel	12,122.78
32	Lubricating Oils and Greases	4,895.59
33	Total Operation Expense	$106,323.92
34	Maintenance Expense	
35	Equipment Labor	$ 1,860.45
36	Equipment Materials	2,542.25
37	Auxiliary Engine Labor	2,258.21
38	Auxiliary Engine Materials	3,925.48
39	Yard Piping	4,721.44
40	Building and Grounds	692.03
41	Job Order Maintenance	319.76
42	Total Maintenance Expense	$ 16,319.62
43	Total Refrigerating Plant Expense	$122,643.54
44	Total Gasoline Division Expense	$935,240.95

Line 44—see Pg. 8, Line 11

Line No.	1931 October 15 to December 31 (A)	Year 1932 (B)	Year 1933 (C)	Year 1934 (D)	Year 1935 (E)	Year 1936 (F)	Year 1937 (G)	Year 1938 (H)
1								
2								
3	$ 5,506.12	$ 28,635.99	$ 24,310.89	$ 29,178.32	$ 30,483.19	$ 3[illegible],800.14	$ 33,931.26	$ 34,303.08
4	5,851.88	26,294.07	25,202.35	35,895.05	40,947.37	49,715.29	55,792.10	60,855.63
5	--	--	[illegible].00	--	--	--	--	50.00
6	150.28	1,894.23	846.50	455.75	422.68		--	--
7	--	--	--	14.58	--	--	--	--
8	5,037.69	6,772.59	6,[illegible]77.16	12,322.57	18,372.76	20,810.16	19,596.78	18,847.57
9	135.83	1,418.70	1,288.67	1,3[illegible]7.90	1,3[illegible]9.59	1,493.59	1,305.72	991.03
10	--		--	--			--	--
11	1,609.30	4,692.04	4,589.45	6,118.94	10,556.55	4,940.6[illegible]	11,628.70	10,042.85
12	--	944.63	--		--			--
13	[illegible],193.58	6,995.7[illegible]	7,362.6[illegible]	5,645.23	4,4[illegible]8.25	3,713.56	6,069.43	6,580.02
14	$ 9,484.68	$ 77,697.96	$ 70,0[illegible].33	$ 89,948.34	$ 106,520.39	$ 122,473.35	$ 128,323.99	$ 13[illegible],670.18
15								
16	$ 245.02	$ 920.69	$ 8[illegible].94	$ 409.69	$ 851.15	$ 1,272.39	$ 1,813.35	$ 2,345.36
17	302.87	835.05	691.21	1,6[illegible]9.46	1,920.56	7,831.78	3,879.98	1,908.99
18	60.56	415.75	124.64	65.05	378.08	406.57	625.45	1,241.75
19	1,729.47	738.[illegible]2	[illegible]9.45	619.77	814.67	1,909.49	1,327.12	1,077.16
20	64.99	729.43	626.7[illegible]	1,[illegible]67.18	1,7[illegible]0.30	3,72[illegible].18	4,576.42	2,948.87
21	3[illegible].9[illegible]	827.21	132.45	35.37	452.51	1,732.55	650.86	2,424.92
22	--	--		1,147.07	58.42	631.35	3,903.31	75.07
23	$ 2,434.82	$ 4,466.25	$ 4,946.42	$ 5,053.59	$ 16,185.59	$ 17,505.31	$ 16,776.49	$ 12,022.12
24	$21,919.50	$ 82,164.21	$ 72,024.25	$ 95,011.93	$112,706.06	$139,978.66	$145,100.48	$143,692.30
25								
26								
27	$ 1,572.37	$ 4,904.67	$ 3,924.25	$ 11,514.32	$ 1[illegible],603.35	$ 2,242.33	$ 13,523.57	$ 13,245.74
28	16[illegible].39	646.53	1,198.31	1,838.41	1,777.51	2,149.47	1,479.50	1,471.56
29	238.80	285.24	243.96	140.06	139.21	--	--	--
30		--						
31	[illegible]	393.64	683.25	1,381.06	1,833.58	2,718.87	2,600.92	2,51[illegible].46
32	--	306.78	598.02	831.11	[illegible]13.96	1,294.32	593.58	[illegible].82
33	$ 972.56	$ 6,536.86	$ 1,552.79	$ 5,704.96	$ 16,485.61	$ 18,404.99	$ 18,[illegible]97.57	$ 17,368.58
34								
35	$ 22.58	$ 76.35	$ 55.7[illegible]	$ 57.49	$ 290.36	$ 163.28	$ 564.88	$ 629.80
36	--	--	114.26	467.76	506.72	444.01	682.42	327.08
37	--	92.87	162.99	76.56	249.43	186.47	1,052.77	537.12
38	--	252.54	463.48	677.84	557.54	448.93	1,121.96	398.19
39	45.76	46.72	164.46	423.83	59[illegible].09	825.58	1,787.77	836.23
40	--	27.19	.85	57.84	82.31	21.63	--	402.21
41	--	--	20.[illegible]6	--	--	--	14.00	104.15
42	$ 68.34	$ 495.67	$ [illegible]4,068.36	$ 1,76[illegible].32	$ 2,277.45	$ 2,189.90	$ 5,223.80	$ 3,234.78
43	$ 2,040.90	$ 7,032.53	$ 12,[illegible]21.15	$ 7,466.28	$ 18,763.06	$ 20,594.89	$ 23,421.37	$ 20,603.36
44	$23,960.40	$ 89,[illegible]96.74	$ 84,745.40	[illegible]9.21	$13[illegible],469.14	$160,573.55	$168,521.85	$164,295.66

Texoma Natural Gas Company

Adjustments to Income Accounts

Calendar Years from Commencement of Operations to December 31, 1938

Line No.	Particulars	Cumulative Total
		(1)
1	Made Direct to Surplus	
2	Pipeline Sales—Natural Gas Pipeline Co.	$ 199.90*
3	Operation & Maintenance—Natural Gas Division	
4	Production Expense	$ 27,287.34*
5	Pipeline Expense	4,980.58
6	Compressor Station Expense	1,937.72
7	General Expense—Excluding Taxes	11,440.09
8	General Expense—Taxes	7,350.00
9	Total Operation & Maintenance Natural Gas Div.	$ 1,578.95*
10	Operation & Maintenance—Gasoline Division	1,778.85
11	Total Operation & Maintenance	$ 199.90
12	Net Earnings from Operations	
13	Depreciation	$ 686,552.82
14	Depletion	208,424.53
15	Retirements	2,351,340.74
16	Total	$3,246,318.09(A)
17	Adjustment by Memorandum Entry	
18	Pipeline Sales—Natural Gas Pipeline Gas	$ 24,299.71*

Legend: (*) Red Figures

(A)	1934 Adjustment	$3,247,311.32
	1937 Adjustment	993.23*
		$3,246,318.09

Line No.	Particulars	Cumulative Total
19	Operation & Maintenance—Natural Gas Division	
20	Production Expense	$ 24,386.84
21	Pipeline Expense	—
22	Compressor Station Expense	—
23	General Expense—Excluding Taxes	3,658.62*
24	General Expense—Taxes	3,571.49
25	Total Operation & Mainenance—Natural Gas Div.	$ 24,299.71
26	Operation & Maintenance—Gasoline Division	—
27	Total Operation & Maintenance	$ 24,299.71
28	Net Earnings from Operations	—
29	Amortization of Bond Discount & Expense	—
30	Total	$ —
31		
32	Adjusted on Books of Natural Gas Pipeline Co.	
33	Pipeline Sales—Natural Gas Pipeline Co.	
34	Operation & Maintenance—Natural Gas Division	
35	Production Expense	
36	Net Earnings from Operations	
37	Non-Operating Income—Interest	
38	Total Earnings	
39	Interest Paid	
40	Total	
41	Total	$3,246,318.09

Legend; (*) Red Figures.

1978

LINE No.	1931 OCTOBER 15 TO DECEMBER 31 (A)	YEAR [illegible] (B)	YEAR 1933 (C)	YEAR 1934 (D)	YEAR 1935 (E)	YEAR 1936 (F)	YEAR 1937 (G)	YEAR 1938 (H)
1								
2	$	$	$ 23,679.16	$ 3,586.20*	$ 7,350.00*	$ 12,942.86*	$	$
3								
4			27,322.27*			34.93		
5			59[illegible].99			4,388.59		
6			962.06	750.00		225.66		
7			1,[illegible]46.41	2,000.00		8,293.68		
8					7,350.00			
9	$	$	$ 24,62[illegible].81*	$ 2,750.00	$ 7,350.00	$ 12,942.86	$	$
10			942.65	836.20	--	--		
11	$	$	$ 23,679.16*	$ 3,586.20	$ 7,350.00	$ 12,942.86	$	$
12								
13	$	$340,958.67	$ 346,574.73	12.65	--	993.23*		
14		109,9[illegible]6.86	98,507.67					
15			2,250,088.69	[illegible],252.05				
16	$	$450,875.53	$2,695,[illegible].09	$101,264.70	$	$ 993.23*	$	$
17								
18	$	$ 33,540.48	$ 57,942.19*	$	$	$	$	$
19								
20	$	$ 3[illegible],155.68*	$ 32,553.70	$	$	$	$	$
21	$	$ 439.15	$ 439.16*	$	$	$	$	$
22	$	$ 595.32	$ 595.32*	$	$	$	$	$
23	$	$ 42[illegible].5[illegible]	$ 5,0[illegible]0.29*	$	$	$	$	$
24	$	$ 30,442.72*	$ 34,0[illegible]4.2[illegible]	$	$	$	$	$
25	$	$ 35,153.[illegible]3*	$ 60,452.84	$	$	$	$	$
26	$	$ 665.59	$ 665.59*	$	$	$	$	$
27	$	$ 35,487.44*	$ 59,[illegible]37.15	$	$	$	$	$
28		[illegible]646.96*	845.96	$	$	$	$	$
29		646.96	845.96*					
30	$	$	$	$	$	$	$	$
31								
32								
33	$82,346.24	$	$	$	$	$	$	$
34								
35	24,386.84*							
36	$57,959.40							
37	4,540.60							
38	[illegible]	$	$	$	$	$	$	
39	$62,500.00*							
40	$	$	$	$	$	$	$	$
41	$	$450,875.53	$2,695,[illegible].09	$101,264.70	$ --	$ 993.23*	$	$

1979 **Texoma Natural Gas Company**

Surplus Income

Calendar Years from Commencement of Operations to December 31, 1938

Line No.	Particulars	Cumulative Total
1		(1)
2	Balance Transferred from Profit & Loss	$1,393,518.59
3	Adjustments per footnote Page 14	3,246,318.09*
4	Adjustment Later Reversed	—
5	Net Change in Surplus	$1,852,799.50*
6	Balance Beginning of Year	—
7	Balance End of Year—Per Books	$1,852,799.50*
8		
9		
10	Adjustments between Years	
11	Per Page 14, Line 41—Year Affected	$3,246,318.09*
12	Balance Transferred from Profit & Loss	1,393,518.59
13	Adjusted Net Change in Surplus	$1,852,799.50*
14	Balance at Beginning of Year—Adjusted	—
15		
16	Balance End of Year—Adjusted	$1,852,799.50*

(*) Red Figures
Line 2—See Pg. 8, Line 34

LINE NO. 1	1931 OCTOBER 15 TO DECEMBER 31 (A)	YEAR 1932 (B)	YEAR 1933 (C)	YEAR 1934 (D)	YEAR 1935 (E)	YEAR 1936 (F)	YEAR 1937 (G)	YEAR 1938 (H)
2								
3				$ 167,443.64	$ 186,002.80	$ 280,005.09	$ 426,333.90	$ 333,733.16
4				3,247,311.32*			993.23	
5				1,274.99	1,274.99*			
5				$3,078,592.69*	$ 184,727.81	$ 280,005.09	$ 427,327.13	$ 333,733.16
7					3,078,592.69*	2,893,864.88*	2,613,859.79*	2,186,532.66*
8				$3,078,592.69*	$ 2,893,864.88*	$ 2,613,859.79*	$ 2,186,532.66*	$ 1,852,799.50*
9								
10								
11								
12		$450,875.53*	$ 2,695,171.09*	$ 101,264.70*	$ --	$ 993.23	$ --	$ --
13				67,443.64	186,002.80	280,005.09	426,333.90	333,733.16
14		$450,875.53	$ 2,695,171.09*	$ 66,178.94	$ 186,002.80	$ 280,998.32	$ 426,333.90	$ 333,733.16
15		--	450,875.53*	3,146,046.62*	3,079,867.68*	2,893,864.88*	2,612,866.56*	2,186,532.66*
16		$450,875.53*	$ 3,146,046.62*	$3,079,867.68*	$ 2,893,864.88*	$ 2,612,866.56*	$ 2,186,532.66*	$ 1,852,799.50*

1981 **Natural Gas Pipeline Company of America & Texoma Natural Gas Company**

Combined Surplus—Net Profits

Calendar Years from Commencement of Operations to December 31, 1938

Line No.	Particulars	Cumulative Total (1)
1	Gross Earnings from Operations	
2	Gas Sales	
3	Chicago District Pipeline Co.	$69,303,258.08
4	Other Distribution Centers	5,148,713.24
5	Industrial Sales	1,011,534.13
6	Total Gas Sales	$75,463,505.45
7	Gasoline Division Income	3,315,513.07
8	Other Operating Income	169.64
9	Gross Earnings from Operations	78,779,188.16
10	Operations & Maintenance Expense	
11	Purchased Gas—Colorado Interstate Co.	$ 5,512,590.00
12	Production Expense	2,364,775.29
13	Pipeline Expense	2,424,794.27
14	Compressor Station Expense	4,967,926.92
15	Telephone Expense	470,575.11
16	Marketing Expense—New Business Expense	1,623,028.91
17	General Expense—Excluding Taxes	3,096,012.90
18	General Expense—Taxes	5,015,312.75
19	Gas Used by Company	1,743,586.45*
20	Total Natural Gas	$23,731,429.70
21	Gasoline Expense	937,019.80

(*) Red Figures

(**) After eliminating outstanding Intercompany items and after reflecting adjustments recorded on Book of the two companies.

Line No.	Particulars	Cumulative Total
22	Total Operations & Maintenance Expense	$24,668,449.50
23	Net Earnings from Operations	54,110,738.66
24	Non-Operating Income	375,256.51
25.	Total Earnings	$54,485,995.27
26	Other Charges	
27	Depreciation	11,610,334.56
28	Depletion	1,457,277.76
29	Retirement Expense	4,102,026.75
30	Loss on Property	2,361,585.85
31	Sundry	33,117.10
32	Total Other Charges	$19,564,342.02
33	Balance Available for Interest & Dividends	$34,921,653.25
34	Interest Deductions	
35	Interest Paid	$24,901,971.90
36	Amortization of Bond Discount & Expense	1,811,686.27
37	Total Interest Deductions	$26,713,658.17
38	Balance Available for Dividends	$ 8,207,995.08
39	Dividends Declared	9,150,000.00
40	Surplus & Net Profits	$ 942,004.92*

See page 16a for footnotes.

1983

Footnotes

Legend:

(A) Surplus Natural Gas Pipeline Co. of America	$ 918,791.50
Less: 1931 Deficit charged to Account 1019—Preliminary Operations	7,996.92
	$ 910,794.58
Deficit Texoma Natural Gas Co.	1,852,799.50*
Per above	$ 942,004.92*

(*) Red Figures.

Line No.	1931 October 15 to December 31 (A)	Year 1932 (B)	Year 1933 (C)	Year 1934 (D)	Year 1935 (E)	Year 1936 (F)	Year 1937 (G)	Year 1938 (H)
1								
2								
3	$1,049,458.76	$5,609,274.40	$5,736,842.95	$8,305,978.17	$10,485,556.53	$12,562,298.15	$13,215,053.13	$12,338,805.99
4	844.74	40,479.49	103,825.19	582,176.54	886,406.10	1,054,777.39	1,202,562.70	1,277,641.09
5	1,558.98	9,138.06	153,253.14	235,295.25	72,961.52	128,902.7[illegible]	235,028.07	175,396.40
6	$1,051,862.48	$5,658,891.95	$5,993,921.28	$9,123,449.96	$11,444,924.15	$13,745,968.25	$14,652,843.90	$13,791,843.48
7	43,852.14	198,977.00	225,129.07	326,860.28	511,627.56	670,066.18	753,714.38	585,226.46
8	--	405.73*	461.42	1,423.44*	116.08*	2,980.64	792.07	2,119.24*
9	$1,095,714.62	$5,857,463.22	$6,219,511.77	$9,448,886.80	$11,956,495.63	$14,419,015.07	$15,407,150.35	$14,374,950.70
10								
11	$ --	$ 378,335.24	$ 384,039.32	$ 643,973.84	$ 239,[illegible]	$ 1,075,485.64	$ 1,130,277.82	$ 1,061,359.13
12	55,087.81	289,967.66	267,487.35	295,[illegible]73.30	328,573.54	392,027.91	374,873.35	371,583.87
13	124,378.99	415,050.10	249,757.18	218,672.98	299,968.50	408,352.51	325,058.73	394,545.28
14	55,604.43	197,036.88	186,726.78	516,029.00	756,703.88	1,037,058.41	1,219,850.97	998,916.57
15	9,544.40	69,170.09	65,377.99	68,690.14	68,194.23	59,723.22	63,990.24	65,884.80
16	5,381.65	85,104.76	219,149.32	889,060.43	308,006.18	81,422.91	16,115.48	17,788.18
17	--	430,911.30	390,327.28	371,359.66	373,356.46	392,332.37	479,695.84	658,029.99
18	--	305,394.47	354,162.40	312,597.13	675,764.07	940,509.32	1,306,681.47	1,120,203.89
19	17,253.71*	48,868.54*	49,603.63*	149,586.06*	265,354.[illegible]8*	398,102.48*	435,618.47*	378,796.68*
20	$ 232,143.57	$2,123,301.96	$2,067,433.99	$3,165,970.9[illegible]	[illegible]	$ 3,978,809.81	$ 4,480,925.43	$ 4,309,513.03
21	23,960.40	89,862.43	85,022.36	113,314.41	131,469.14	160,573.55	168,521.85	164,295.66
22	$ 256,103.97	$2,213,164.39	$2,152,456.35	$3,279,285.33	$ 3,504,800.13	$ 4,139,383.36	$ 4,649,447.28	$ 4,473,808.69
23	839,610.65	3,644,298.83	4,067,055.42	6,169,601.47	8,451,695.50	10,279,631.71	10,757,703.07	9,901,142.01
24	69,803.39	33,362.31	29,401.69	58,551.45	73,966.39	60,749.91	37,461.70	11,959.77
25	909,414.04	3,677,661.14	4,096,457.11	6,228,152.92	8,525,661.89	10,340,381.52	10,795,164.77	9,913,101.78
26								
27		1,469,119.79	1,491,531.23	1,502,345.71	1,547,568.32	1,599,386.40	2,034,754.08	1,975,629.03
28		109,916.86	98,507.67	178,792.07	220,199.45	267,676.71	320,526.96	261,658.04
29		2,066.78	432.83*	394,777.47	801,125.51	1,332,225.44	576,002.66	996,261.72
30			2,250,088.69	101,252.05			10,245.11	--
31	5,979.02		7,221.41				19,916.67	--
32	$ 5,979.02	$1,581,103.43	$3,836,916.17	$2,177,167.30	$ 2,568,893.28	$ 3,199,288.55	$ 2,961,445.48	$ 3,233,548.79
33	$ 903,435.02	$2,096,557.71	$ 259,540.94	$4,050,985.62	$ 5,956,768.61	$ 7,141,093.07	$ 7,833,719.29	$ 6,679,552.99
34								
35	$ 906,703.76	$3,732,042.02	$3,794,259.77	$3,707,658.64	$ 3,536,519.20	$ 3,256,700.72	$ 3,060,086.87	$ 2,908,000.92
36	10,707.20	258,819.64	258,819.64	256,680.09	258,078.89	258,078.89	255,250.96	235,250.96
37	$ 917,410.96	$3,990,861.66	$4,053,079.41	$3,964,338.73	$ 3,794,598.09	$ 3,514,779.61	$ 3,315,337.83	$ 3,163,251.88
38	13,975.94*	1,894,303.95*	3,793,538.47*	86,646.89	2,162,170.52	3,626,313.46	4,518,381.46	3,516,301.11
39	--				--	2,775,000.00	4,125,000.00	2,250,000.00
40	$ 13,975.94*	$1,894,303.95*	$3,793,538.47*	$ 86,646.89	$ 2,162,170.52	$ 851,313.46	$ 393,381.46	$ 1,266,301.11

1984 Natural Gas Pipeline Company of America

and

Texoma Natural Gas Co.

Combined

Net Earnings from Operations (Before Depreciation, Depletion & Retirements) Per Books After Reflecting in the Years to Which Applicable All Surplus Adjustments and Memorandum Entries Affecting Income.

Calendar Years from Commencement of Operations to December 31, 1938

Line No.	Particulars	Cumulative Total
1		(1)
2	Natural Gas Pipeline Company of America	
3	Net Earnings from Operation Page 1, Line 5	$35,421,015.03
4	Adjustments to Income Accounts Page 6, Line 10	116,296.31*
5	Adjustments to Income Accounts Page 6, Line 34	—
6		
7	Net Earnings from Operations (Before	
8	Depreciation, Depletion & Retirements)	$35,304,718.72
9		
10	Texoma Natural Gas Company	
11	Net Earnings from Operation Page 8, Line 18	$18,781,633.10
12	Adjustments to Income Accounts Page 14, Line 28	—
13	Adjustments to Income Accounts Page 14, Line 35	24,386.84
14		
15	Net Earnings from Operations	
16	(Before Depreciation, Depletion & Retirements)	$18,806,019.94
17		
18	Combined Net Earnings from Operations	
19	(Before Depreciation, Depletion	
20	and Retirements) Page 16, Line 23	$54,110,738.66

(*) Red Figures.

1985

Line No.	1931 October 15 to December 31	Year 1932	Year 1933	Year 1934	Year 1935	Year 1936	Year 1937	Year 1938
1	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
2								
3	$ 759,284.06	$2,116,896.76	$2,652,825.51	$3,538,681.99	$5,404,451.93	$6,584,604.93	$7,750,681.67	$6,613,588.18
4	--	34,197.26*	66,502.89*	21,296.62	4,565.65	3,833.57*	37,624.86*	--
5	--	52,325.30	52,325.30*					--
6								
7								
8	$ 759,284.06	$2,135,024.80	$2,533,997.32	$3,559,978.6	$5,409,017.58	$6,580,771.36	$7,713,056.81	$6,613,588.18
9								
10								
11	$ 55,939.75	$1,507,427.07	$1,534,905.06	$2,609,622.86	$3,042,677.92	$3,698,860.35	$3,044,646.26	$3,287,553.83
12	--	1,846.96	1,846.96*					--
13	24,386.84							--
14								
15								
16	$ 80,326.59	$1,509,274.03	$1,533,058.10	$2,609,622.86	$3,042,677.92	$3,698,860.35	$3,044,646.26	$3,287,553.83
17								
18								
19								
20	$ 839,610.65	$3,644,298.83	$4,067,055.42	$6,169,601.47	$8,451,695.50	$10,279,631.71	$10,757,703.07	$9,901,142.01

1986

Natural Gas Pipeline Company of America

Statement of Regulatory Commission Expenses Included in General and Miscellaneous Expenses for Year 1938

Line No.	Particulars	Item	Total
		(A)	(B)
1	**Legal Expenses**		
2	Morgan, Culton, Morgan & Britian	$39,357.89	$
3	Miscellaneous Legal Expenses	39.49	39,397.38
4			
5	**Audit Fees**		
6	Peat Marwick Mitchell & Co.		1,730.00
7			
8			
9	**Engineers, Geologists, Economists, Etc.**		
10	Electric Advisers, Inc.	58,527.39	
11	Ford Bacon & Davis, Inc.	20,593.82	
12	Standard Statistics, Inc.	12,717.15	
13	R. J. Wallace	6,682.13	
14	C. Don Hughes	5,597.60	
15	Ralph E. Davis, Inc.	5,105.15	
16	Parker Foram Knade, Etc.	4,067.02	
17	P. McDonald Biddison	3,483.03	
18	Stanley Gill	3,455.25	
19	J. D. Thompson	2,877.45	
20	Melchoir Palvi	1,032.00	
21	C. H. Dunlap—Exhibits	148.50	124,287.49
22			
23			
24	**Miscellaneous**		
25	Company Payroll, Expenses, and		
26	Miscellaneous Charges, Etc.		25,373.60
27			
28			
29	**Total Regulatory Commission Expenses**		$190,788.47

1987

EXHIBIT NO. 28.

Natural Gas Reserves
Texas Panhandle

Pressure Base Used—16.4 Lbs.
C. J. Peterson—Witness.

Total original recoverable reserves of the Panhandle field at the following assumed wellhead abandonment pressures:

(a)	0 lbs.	16,955,758,431	MCF
(b)	25 "	15,991,092,936	"
(c)	50 "	14,989,327,612	"
(d)	75 "	13,987,579,763	"
(e)	100 "	13,022,914,269	"

Recoverable reserves of the Panhandle field as of January 1, 1939, at the following assumed wellhead abandonment pressures:

(a)	0 lbs.	9,799,519,611	MCF
(b)	25 "	8,834,854,116	"
(c)	50 "	7,833,088,792	"
(d)	75 "	6,831,340,943	"
(e)	100 "	5,866,675,449	"

Total original recoverable reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939, at the following assumed wellhead abandonment pressures:

(a)	0 lbs.	2,744,518,086	MCF
(b)	25 "	2,588,373,970	"
(c)	50 "	2,426,224,748	"
(d)	75 "	2,264,078,354	"
(e)	100 "	2,107,934,239	"

Recoverable reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939, as of the latter date at the following assumed wellhead abandonment pressures:

(a)	0 lbs.	1,989,662,119	MCF
(b)	25 "	1,833,518,003	"
(c)	50 "	1,671,368,781	"
(d)	75 "	1,509,222,387	"
(e)	100 "	1,353,078,272	"

1988 Tabulation showing the gas that has gone out of the formations underlying Texoma Natural Gas Company's acreage owned on January 1, 1939, including gas produced from its wells and that drained to other wells, broken down so as to show the production from Texoma Natural Gas Company's wells and the drainage to other wells or areas separately:

Original recoverable reserves 0 lbs.	2,744,518,086	MCF
Recoverable reserves (January 1, 1939) 0 lbs.	1,989,662,119	"
Total loss to Texoma Natural Gas Company's reserves	754,855,967	"
Gas produced from Texoma Natural Gas Company's wells	284,852,785	"
Gas drained from Texoma Natural Gas Company's property	470,003,182	"

$$\text{Percent lost by drainage } \frac{470{,}003{,}182}{754{,}855{,}967} = 62.26\%$$

1989

EXHIBIT NO. 36.

Natural Gas Reserves
Texas Panhandle

Pressure Base Used—16.4 Lbs.
J. D. Thompson, Jr.—Witness

Total original recoverable reserves of the Panhandle field at the following assumed wellhead abandonment pressures:

(a)	0	lbs.	17,695,139,321	MCF
(b)	25	"	16,688,266,642	"
(c)	50	"	15,642,913,130	"
(d)	75	"	14,597,377,474	"
(e)	100	"	13,590,686,940	"

Recoverable reserves of the Panhandle field as of January 1, 1939, at the following assumed wellhead abandonment pressures:

(a)	0	lbs.	10,538,900,501	MCF
(b)	25	"	9,532,027,822	"
(c)	50	"	8,486,674,310	"
(d)	75	"	7,441,138,654	"
(e)	100	"	6,434,448,120	"

Total original recoverable reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939, at the following assumed wellhead abandonment pressures:

(a)	0	lbs.	2,691,093,013	MCF
(b)	25	"	2,537,966,858	"
(c)	50	"	2,378,988,572	"
(d)	75	"	2,219,982,551	"
(e)	100	"	2,066,884,132	"

1990 Recoverable reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939, as of the latter date at the following assumed wellhead abandonment pressures:

(a)	0	lbs.	1,942,752,938	MCF
(b)	25	"	1,789,626,783	"
(c)	50	"	1,630,648,497	"
(d)	75	"	1,471,642,476	"
(e)	100	"	1,318,544,057	"

Tabulation showing the gas that has gone out of the formations underlying Texoma Natural Gas Company's acreage owned on January 1, 1939, including gas produced from its wells and that drained to other wells, broken down so as to show the production from Texoma Natural Gas Company's wells and the drainage to other wells or areas separately:

Original reserves at 0 lbs. wellhead	2,691,093,013	MCF
Reserve as of January 1, 1939 at 0 lbs. wellhead	1,942,752,938	"
Total loss to Texoma Natural Gas Company's reserves	748,340,075	"
Production from Texoma Natural Gas Company's wells to January 1, 1939	284,852,785	"
Loss to Texoma Natural Gas Company by drainage	463,487,290	"

$$\text{Percent lost by drainage} \; \frac{463{,}487{,}290}{748{,}340{,}075} = 61.94\%$$

1991 EXHIBIT NO. 41.

Natural Gas Reserves

Texas Panhandle

Pressure Base Used—16.4 Lbs.
C. Don Hughes—Witness.

Total original recoverable reserves of the Panhandle field at the following assumed wellhead abandonment pressures:

(a)	0 lbs.	17,310,166,137	MCF
(b)	25 "	16,325,198,631	"
(c)	50 "	15,302,587,914	"
(d)	75 "	14,279,798,799	"
(e)	100 "	13,295,009,700	"

Recoverable reserves of the Panhandle field as of January 1, 1939, at the following assumed wellhead abandonment pressures:

(a)	0 lbs.	10,153,927,317	MCF
(b)	25 "	9,168,959,811	"
(c)	50 "	8,146,349,094	"
(d)	75 "	7,123,559,979	"
(e)	100 "	6,138,770,880	"

Total original recoverable reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939, at the following assumed wellhead abandonment pressures:

(a)	0 lbs.	2,667,595,516	MCF
(b)	25 "	2,515,806,395	"
(c)	50 "	2,358,216,240	"
(d)	75 "	2,200,598,593	"
(e)	100 "	2,048,836,965	"

1992 Recoverable reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939, as of the latter date at the following assumed wellhead abandonment pressures:

(a)	0 lbs.	1,937,102,695	MCF
(b)	25 "	1,785,313,574	"
(c)	50 "	1,627,723,419	"
(d)	75 "	1,470,105,772	"
(e)	100 "	1,318,344,144	"

Tabulation showing the gas that has gone out of the formations underlying Texoma Natural Gas Company's acreage owned on January 1, 1939, including gas produced from its wells and that drained to other wells, broken down so as to show the production from Texoma Natural Gas Company's wells and the drainage to other wells or areas separately:

Original 0 lbs. wellhead rerecoverable	2,667,595,516	MCF	
Present (January 1, 1939) 0 lbs. wellhead recoverable	1,937,102,695	"	
Difference	730,492,821	"	
Gas produced and marketed from wells now owned by Texoma Natural Gas Company	284,852,785	"	—39%
Loss other than by production	445,640,036	"	—61%

1993 EXHIBIT NO. 43.

Explanation of Reserve Calculations.

C. J. Peterson, Witness.

This estimate is based on personal experience and continual study of the conditions in the Texas Panhandle field. My study in the field commenced prior to 1926, but my time has been devoted entirely to a study of this field during the past eight years. Actual experience in the field has been supplemented by reference to publications on the field by the American Institute of Mining & Metallurgical Engineers, the American Association of Petroleum Geologists, the United States Bureau of Mines, and the Texas Railroad Commission. I have also been in continual touch with the other geologists working in the field. All of these factors have entered into my interpretation of structural conditions and analysis of the gas productivity of the field which is the basis for this estimate.

In working out details in the field, elevations used are furnished by Laughlin & Simmons, of Tulsa, Oklahoma, who are engaged in running elevations of wells in the Mid-Continent area and Texas. Detailed log information is obtained from the records of the Texas Railroad Commission, the files of the various operating oil and gas companies in the field, the reports of log records collected by the oil and gas company scouts in the field, and from a local well log service, which has access to the information obtained by the oil and gas company scouts. I have a large collection of logs, including all available logs on the gas wells in the field and a considerable portion of the oil wells drilled in the field. I continually keep in touch with the details of the formations encountered in the wells by microscopic examinations of well cuttings which I am continually collecting. In this connection, over 12,830 samples have been examined and I have on file over 60,000 samples.

In calculating the reserves of the Texas Panhandle field, I have divided the field into two areas. The area colored yellow on Exhibit No. 20 contains 1,033,970 acres of gas lands, which I consider the best commercial gas area of the field. The remaining area is shown in gray on Exhibit No. 20 and contains 432,967 acres of gas lands, and I term this area the marginal gas area.

I determined the average porosity and the average pay thickness for the area designated in yellow and applied the porosity thickness method to determine the reserves in this area. To illustrate: after much laborious effort, to which I have already testified, I determined the average thickness of pay for this area to be 70 feet, and the average porosity to be 20%.

In determining the thickness of pay for the yellow colored area, which is the area of best commercial gas production, the yellow area was divided up into fifteen separate divisions and the thickness of the pay determined as shown in the logs of 627 wells and the weighted thickness of pay obtained per acre. In figuring absolute reservoir pressures, the method used by the United States Bureau of Mines in determining the pressure exerted by the column of gas in the well was employed. In determining the average depth of the gas column in the Panhandle field, the weighted average per acre of the depth of the wells to the middle of the pay was determined. This weighted average depth was 2618 feet. These factors having been
1994 determined, the following controls were used in making my estimate:

Recovery factor 90%
Porosity factor 20%
Thickness of pay 70 feet

Reservoir pressure 471# per sq. in. absolute
Sq. ft. per acre 43,560
Total voids equals 43560 x 70 ft. x 20% = 609,840 cu. ft. per acre

Expressed in cubic feet at an absolute pressure of 16.4#, we have 471 divided by 16.4 x 609,840 cu. ft. = 17,514,000 cu. ft. per acre.

Total number of acres 1,033,970
Total indicated reserves in area = 17,514,000 x 1,033,970 = 18,108,950,580 MCF

In calculating the reserves in the marginal area colored gray in Exhibit No. 20, I found that this area was distributed widely and that the information available for control was not satisfactory to permit the averaging of this area in with the best commercial gas acreage or to permit the calculations of the reserves under this area by treating the area in total. Consequently, I first divided the 432,967 acres in the gray area into fourteen separate areas. I then made a study of all the available information in regard to each of these areas. This information consisted of any dry holes that had been drilled outside the boundary of the field and adjacent to the particular sector of the gray area that I was studying; all wells, whether dry or producing, that had been drilled in the sector; any wells that had been drilled in the yellow area adjacent to the sector, and the general location of this particular sector on the geological structure. Taking all of this information into account, plus anything I had learned or observed in my many years in the field, I arrived at my estimate of the average thickness of pay and the average porosity for each sector. I then calculated the original reserves of each of these areas by the thickness-porosity method which I have already illustrated and which I applied to the acreage colored yellow on Exhibit No. 20. I then added the calculated reserves of each of these sectors together to determine the reserves of the total area colored in gray. This reserve quantity, when added to the quantity determined for the yellow area, gives the total indicated reserves for the entire field.

I further illustrate the various steps in my method as far as the gray area is concerned by making reference to the attached table, which pertains only to the gray area and sets out the number of sectors into which I divided the gray area, the number of acres in each sector, the average thickness of pay in each sector, the average porosity in each sector, the average per acre reserve of each sector and the total reserves of each sector. The sum of the reserves of all of these sectors is an indicated reserve of 1,307,928,318 MCF. The indicated reserve for the gray area added to the indicated reserve for the yellow area gives a total of 19,416,878,898 MCF.

1995 To determine the original recoverable reserves for the entire field at any given abandonment pressure, I illustrate my method by showing the calculations for a wellhead abandonment pressure of 0#. Atmospheric pressure in the Texas Panhandle for the purpose of these calculations is considered to be 13# per square inch absolute. The weight of a column of gas for the average depth of well, namely 2618 feet, is 1 pound at 0# wellhead gauge. Therefore, the reservoir pressure at 0# wellhead gauge would be 13 + 1 = 14# absolute reservoir pressure.

The absolute pressure of 471# was obtained in the same way as the above pressure at 0# wellhead gauge was obtained, except that the wellhead gauge pressure, which was the original rock pressure in the Panhandle field, was 430# gauge. Adding to this atmospheric pressure of 13# and the weight of a column of gas 2618 feet deep at a wellhead pressure of 430 lbs., which amounts to 28 lbs., the total of 471 lbs. absolute reservoir pressure is obtained.

Since the absolute reservoir pressure of the reservoir is 471# and at an abandonment pressure of 0# wellhead gauge the reservoir pressure would be 14#, the amount of pressure in pounds per square inch used to leave a pressure of 14 pounds in the reservoir would be 471 pounds minus 14 pounds, which is 457 pounds. Thus the proportion of gas or gas reserves which could be expected at an abandonment pressure of 0# wellhead gauge would be 457/471, or .970276 of the amount of gas in the reservoir represented by 471# pressure, which, expressed in another way, is the amount of gas present in the reservoir at 0# absolute.

As noted above the total reserve of the field at 0# absolute was 19,416,878,898 MCF. Applying the factor .970276 gives a reserve of 18,839,731,590 MCF. Applying a recovery factor of 90% makes the reserve at the abandonment pressure mentioned amount to 16,955,758,431 MCF. This last amount represents the total original recoverable reserves of the Panhandle field at an assumed wellhead abandonment pressure of 0# gauge at the wellhead. I make similar calculations for any other wellhead abandonment pressure, making the necessary corrections.

In obtaining recoverable reserves of the Panhandle field as of January 1, 1939, at any assumed wellhead abandonment pressure, the total cumulative withdrawals for the field as of January 1, 1939, are subtracted from the total original recoverable reserves previously estimated for the several abandonment pressures. For example, the remaining reserve as of January 1, 1939, to an average wellhead abandonment pressure of 0# per square inch gauge was estimated by subtracting from 16,955,758,431 MCF, the estimated original recoverable reserve, an amount of 7,156,238,820 MCF, being the estimated accumulated total withdrawal of gas from the field up to this date. This figure is shown on Exhibit No. 25 entitled "Gas Produced From Texas Panhandle Field," which exhibit lists the authority for the various items entering into this total.

In calculating the reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939, I followed exactly the same method, namely, the porosity-thickness method, as I followed when I calculated the reserves in the yellow area, except that I did not apply
1996 the same factors for thickness and porosity. I had
very definite and specific information available regarding Texoma's acreage, and I divided this acreage into a large number of individual tracts and considered with each of these tracts all the information available in regard to thickness of pay and porosity. Having determined the thickness of pay and porosity of each tract, I then calculated the reserves of each of these tracts individually. In making this estimate Texoma's acreage was divided into approximately 506 tracts. The total reserve for Texoma's acreage was then determined by adding up the reserves figured for all these tracts. In this manner was determined the total original recoverable reserves underlying the acreage owned by Texoma Natural Gas Company as of January 1, 1939. As in the case of the yellow acreage mentioned above, a 90% recovery factor was applied to the reserves just mentioned. It will be noted on Exhibit No. 28 that the total original recoverable reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939, to an assumed wellhead abandonment pressure of 0# gauge was 2,744,518,086 MCF. At the time that these original recoverable reserves were figured there was also determined the amount of gas which would remain in the reservoir at the assumed wellhead abandonment pressures designated and with a 90% recovery factor applied.

In figuring the recoverable reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939, as of the latter date, at the assumed wellhead abandonment pressures designated on Exhibit No. 28, the actual absolute reservoir rock pressure was determined as of January 1, 1939, and the proportion of this absolute rock pressure, to the original 471# rock pressure applied to the original reserves underlying each tract as of January 1, 1939. Then the reserves determined for all the tracts were totaled and from this amount was subtracted the amount of gas which would be left in the reservoir at the designated pressures with a 90% recovery factor. This process resulted in the amounts noted in Exhibit No. 28 at the various designated wellhead abandonment pressures, and it will be noted that this reserve at an assumed wellhead abandonment pressure of 0# gauge was 1,989,662,119 MCF.

Referring to page 2 of Exhibit No. 28, it will be noted that the original recoverable reserves at 0# wellhead abandonment pressure gauge was 2,744,518,086 MCF, as shown on page 1, and that the recoverable reserves January 1, 1939, to the same assumed wellhead abandonment pressure, as shown on page 1, was 1,989,662,119 MCF. Subtracting the last amount from the first amount gives a loss to Texoma Natural Gas Company's reserves of 754,855;967 MCF. Subtracting from this amount the total gas produced from Texoma's wells, which includes the gas produced from Texoma's wells which have been bought by the company prior to their acquirement by Texoma and subsequent to this acquirement, which amounts to 284,852,785 MCF, the gas drained from Texoma Natural Gas Company's property amounts to the difference between 754,855,967 MCF and 284,852,785 MCF, which is 470,003,182 MCF. It must be noted that this latter amount includes the amount of gas which was wasted to the air during the drilling of Texoma Natural Gas Company's wells. Using this amount as shown in Exhibit No. 28, the total percent lost by drainage would be 62.26%. Allowing for the gas wasted to the air in the drilling of Texoma's wells, the percent actually lost by drainage would be approximately 61.26%.

Exhibit 44

DETAILS OF RESERVE ESTIMATE
MARGINAL GAS ACREAGE
Texas Panhandle Gas Field.

C. J. Peterson - Witness

Index No. of Area	Description	No. Acres	Average Thickness Feet	Porosity %	Reserves Per Acre MCF	0# Absolute 16.4# Base Reserves for the Area. MCF	No. of Wells Used	No. Dry Holes In Area
	West Field							
1	Carson County - Sweet Gas Area	33,990	35	4.72	2,068	70,291,320	5	1
2	Gray County - Sweet Gas Area	68,920	44	7.96	4,382	302,007,440	15 (a)	13
3	Moore County - Sweet Gas Area	365	44	4.39	2,416	881,840	0	0
4	Potter County - Sweet Gas Area	24,804	39	5.66	2,762	68,508,648	1	0
5	Carson County - Sour Gas Area	5,190	49	7.62	4,671	24,242,490	4 (b)	1
6	Gray County - Sour Gas Area	3,890	30.5	11.69	4,460	17,349,400	8 (c)	0
7	Hartley County- Sour Gas Area	16,844	44.0	4.39	2,416	40,695,104	3	0
8	Hutchinson Co.- Sour Gas Area	57,444	38.8	4.51	2,189	125,744,916	10	5
9	Moore County - Sour Gas Area	67,580	45.0	5.06	2,849	192,535,420	4	0

DETAILS OF RESERVE ESTIMATE
MARGINAL GAS ACREAGE
Texas Panhandle Gas Field
(Continued)

C. J. Peterson - Witness

Index No.of Area	Description	No. Acres	Average Thickness Feet	Porosity %	Reserves Per Acre MCF	0# Absolute 16.4# Base Reserves for the Area. MCF	No. of Wells Used	No. Dry Holes In Area
	(West Field)							
10	Oldham County - Sour Gas Area	80	44	4.39	2,416	193,280	0	0
11	Potter County - Sour Gas Area	640	44	4.39	2,416	1,546,240	0	0
	East Field							
12	Collingsworth Co.-Sweet Gas Area	12,900	22.46	10.35	2,907.6	37,508,390	2	0
13	Gray County - Sweet Gas Area	82,580	39	6.13	2,991	246,996,780	14 (d)	25
14	Wheeler County -Sweet Gas Area	57,740	24	10.35	3,107.5	179,427,050	8	21
Total						1,307,928,318	74	66

Notes:-

Note (a) Of the 15 wells only 9 had complete enough data to be used - Partial data shown in the other 6 wells

Note (b) Only 3 wells had exact enough data to be used.

Note (c) Only 2 wells had complete gas information. The other wells confirmed information used.

Note (d) Of 14 wells only 6 had complete gas data. Average on others was below average of wells used.

1999 EXHIBIT NO. 53.

Errata—Exhibit No. 15.

Page	Line	Column	Shown As	Should Read
6	20	E	$ 4,526.90	$ 4,526.90*
6	39	1	$ 752,136.16	$ 752,163.16
9	31	1	$3,315,513.09	$3,315,513.07
10	9	"Particulars"	Coltexo Gasoline Co.	Cotexo Corp.
10	18	1	146,126,220 gal.	124,538,152 gal.
10	18	H	49,062,308 "	27,474,240 "
11	5	1	284,971,623 MCF	282,174,503 MCF
11	5	B	20,263,296 "	20,122,564 "
11	5	G	63,629,316 "	62,252,650 "
11	5	H	52,663,513 "	51,383,791 "
11	6	1	4,243,764 "	6,895,832 "
11	6	B	577,089 "	572,769 "
11	6	G	—	1,376,666 "
11	6	H	—	1,279,722 "
11	10	1	387,707,607 "	387,562,555 "
11	10	B	27,720,251 "	27,575,199 "
11	16	1	8,338,497 "	8,193,445 "
11	16	B	598,041 "	452,989 "
11	23	1	387,707,607 "	387,562,555 "
11	23	B	27,720,251 "	27,575,199 "
13	33	1	$ 10,632.92	$ 106,323.92
16	12	1	$2,374,775.29	$2,364,775.29
16	12	F	$ 392,027.91	$ 382,027.91

2000 EXHIBIT NO. 54.

Natural Gas Pipeline Company of America
Texoma Natural Gas Company

Balance Sheets

Per Books

At

December 31, 1934 to 1938, Both Inclusive

Line No.	Particulars	1934 (a)	1935 (b)	1936 (c)	1937 (d)	1938 (e)
	ASSETS					
1	PLANT AND INVESTMENTS					
2	Plant and Equipment	$35,983,698.75	$36,160,922.37	$36,458,214.70	$37,119,110.68	$37,587,837.21
3	Construction Work in Progress	35,553.97	194,281.26	487,644.06	4,039.89	590.39
4	Investments	24,700,000.00	23,750,000.00	22,600,000.00	21,250,000.00	19,650,000.00
5	Treasury Securities	1,000.00	1,000.00	1,000.00	--	--
6	Total Plant and Investments	$60,720,252.72	$60,106,203.63	$59,546,858.76	$58,373,150.57	$57,238,427.60
7	CURRENT ASSETS					
8	Cash	$ 38,136.59	$ 26,237.35	$ 58,605.00	$ 110,083.87	$ 98,768.10
9	Gas Accounts Receivable	1,005,479.70	1,615,326.86	1,225,264.69	1,232,848.76	1,242,869.21
10	Accounts Receivable	2,243.29	1,734.89	52,178.66	1,940.03	3,038.07
11	Notes Receivable	303,624.98	320,134.13		--	--
12	Materials and Supplies	162,732.11	128,111.70	144,815.18	180,221.69	219,303.11
13	Gas in Lines	24,238.38	24,238.38	24,238.38	24,238.38	24,238.38
14	Interest Receivable Accrued	86,127.34	85,137.95	33,475.93	751.34	--
15	Prepaid Expenses	41,762.73	34,901.33	33,452.28	41,253.02	47,026.34
16	Texoma Natural Gas Company	141,015.11	346,133.37		6,080.36	64,558.87
17	Lateral Line Advances	493,349.79	509,560.81	516,695.30	509,236.83	-
18	Total Current Assets	$ 2,298,710.02	$ 3,091,516.77	$ 2,088,725.42	$ 2,106,654.28	$ 1,699,802.08
19	DEFERRED CHARGES					
20	Unamortized Bond Discount and Expense	$ 3,071,814.96	$ 2,814,938.11	$ 2,558,061.26	$ 2,283,267.83	$ 2,028,391.07
21	Total Assets	$66,090,777.70	$66,012,658.51	$64,193,645.44	$62,763,072.68	$60,966,620.75
22	LIABILITIES					
23	CAPITAL STOCK	$ 3,000,000.00	$ 3,000,000.00	$ 3,000,000.00	$ 3,000,000.00	$ 3,000,000.00
24	Funded Debt 15 yr 1st Mtge Pipeline Coll 6%					
25	Gold Bonds, Series A, due Dec 15, 1946	$59,000,000.00	$56,500,000.00	$52,600,000.00	$50,300,000.00	$46,500,000.00
26	CURRENT LIABILITIES					
27	Wages and Salaries Payable	$ 16,787.45	$ 18,216.48	$ 24,351.81	$ 21,210.13	$ 22,870.18
28	Gas Accounts Payable	342,157.90	376,458.53	413,628.35	500,213.27	506,674.35
29	Accounts Payable	135,766.47	101,432.99	213,874.38	47,439.77	43,661.94
30	Notes Payable	2,355,769.17	1,414,970.00	1,200,000.00	525,000.00	300,000.00
31	Interest Payable Accrued	207,481.17	145,396.60	131,500.00	125,750.00	116,250.00
32	Taxes Accrued	176,493.19	480,254.82	744,531.83	1,007,805.40	859,095.93
33	Texoma Natural Gas Company			163,053.82	--	-
34	Total Current Liabilities	$ 3,234,455.35	$ 2,536,729.42	$ 2,895,940.19	$ 2,227,418.57	$ 1,848,552.40
35	RESERVE FOR DEPRECIATION	$ 3,398,942.74	$ 4,533,889.82	$ 5,677,557.77	$ 7,216,597.00	$ 8,699,276.85
36	SURPLUS	$ 2,542,620.39#	$ 557,960.73#	$ 20,147.48	$ 19,057.11	$ 918,791.50
37	Total Liabilities	$66,090,777.70	$66,012,658.51	$64,193,645.44	$62,763,072.68	$60,966,620.75

(*) Per Books

(#) Red figures

NATURAL GAS PIPELINE COMPANY OF AMERICA

STATEMENT OF PLANT AND EQUIPMENT*
AT DECEMBER 31, 1934 TO 1938, BOTH INCLUSIVE

Line No.	Particulars	1934 (a)	1935 (b)	1936 (c)	1937 (d)	1938 (e)
1	PLANT AND EQUIPMENT					
2	Organization Expenses	$ 5,979.02	$	$	$	$
3	Pipeline Right-of-Way	1,474,713.13	1,475,541.84	1,477,585.89	1,476,106.71	1,481,841.22
4	Telephone System	655,236.59	655,231.48	655,264.16	657,878.53	663,112.93
5	Preliminary Operations	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92
6	Main Line	26,910,586.17	26,960,464.57	27,132,219.90	27,412,912.82	27,671,219.52
7	Lands in Fee	89,944.81	89,944.81	89,944.81	97,210.83	96,950.83
8	Compressor Stations	6,431,179.28	6,553,405.19	6,663,043.16	7,009,601.22	7,133,536.33
9	Branch Lines	148,305.94	151,140.62	151,186.17	160,861.20	161,226.07
10	Furniture and Fixtures	60,136.41	60,975.33	63,165.83	67,014.66	69,671.08
11	Automobiles	45,182.79	47,082.36	49,594.11	50,901.66	80,261.94
12	Meter and Regulator Stations	36,015.57	36,656.05	38,012.42	40,992.47	40,981.62
13	Operating Department Tools	40,024.91	43,99[illegible].21	50,353.90	49,963.66	87,658.06
14	Other Main Line Structures	68,663.36	68,782.07	70,113.68	77,936.15	83,564.70
15	General Laboratory Equipment	9,133.85	9,133.85	9,133.85	9,133.85	9,815.99
16	Total Plant and Equipment	$35,985,698.75	$36,160,922.37	$36,458,214.[illegible]	$[illegible],119,110.58	$[illegible],587,837.21

(*) [illegible]

Line No.	Particulars	1934 (a)	1935 (b)	1936 (c)	1937 (d)	1938 (e)
	ASSETS					
1	PLANT					
2	Plant and Equipment	$23,436,672.14	$23,638,159.89	$22,569,794.03	$22,290,540.21	$21,592,311.5
3	Construction Work in Progress	63,651.37	38,517.85	24,341.08	23,132.53	17,103.5
4	Total Plant	$23,500,323.51	$23,676,677.74	$22,594,135.11	$22,313,672.74	$21,609,415.0
5	CURRENT ASSETS					
6	Cash	$ 70,893.12	$ 128,103.85	$ 64,803.90	$ 34,243.48	$ 65,193.6
7	Special Deposit with Trustee	—	58,600.00	—	—	—
8	Gas Accounts Receivable	256,999.82	261,555.10	296,337.67	380,522.81	388,906.7
9	Gasoline Accounts Receivable	28,045.70	36,752.84	43,445.04	50,339.31	51,567.3
10	Accounts Receivable	4,119.39	8,203.78	5,533.34	2,314.39	2,543.8
11	Notes Receivable	"	—	28,000.00	26,470.65	25,697.
12	Materials and Supplies	229,821.96	90,926.02	97,115.08	148,937.76	171,445.45
13	Gas in Lines	3,667.32	3,667.32	3,667.32	3,667.32	3,667.32
14	Interest Receivable Accrued	—	—	1,200.84	26.47	108.50
15	Prepaid Expenses	54,023.89	43,104.12	34,781.41	34,315.72	28,740.76
16	Natural Gas Pipeline Co. of America	—	—	163,053.82	—	—
17	Total Current Assets	$ 647,571.20	$ 630,913.03	$ 737,938.42	$ 660,837.91	$ 737,870.7
18	DEFERRED CHARGES					
19	Unamortized Bond Expense	$ 14,424.24	$ 13,222.20	$ 12,020.16	$ 3,352.28	$ 2,978.0
20	Total Assets	$24,162,318.95	$24,320,812.97	$23,344,093.69	$22,977,862.93	$22,350,263.9
21	**LIABILITIES**					
22	CAPITAL STOCK (Authorized and Issued)	$ 500,000.00	$ 500,000.00	$ 500,000.00	$ 500,000.00	$ 500,000.00
23	FUNDED DEBT					
24	Bonds Outstanding - Gas and Pipeline 1st Mtge. 6% Gold Bonds, Series A due December 15, 1946	$24,700,000.00	$23,750,000.00	$22,600,000.00	$21,250,000.00	$19,650,000.00
25	CURRENT LIABILITIES					
26	Wages and Salaries Payable	$ 6,331.30	$ 8,501.76	$ 8,421.96	$ 10,037.93	$ 9,775.43
27	Royalties Payable	16,983.55	22,060.54	25,430.47	27,180.98	27,662.92
28	Accounts Payable	25,759.93	112,592.91	51,807.46	28,598.78	25,135.24
29	Vouchers Payable	7,870.02	20,632.82	19,371.45	24,763.54	5,455.88
30	Notes Payable	303,624.98	320,134.13	—	—	—
31	Interest Payable Accrued	61,750.00	59,375.00	56,500.00		—
32	Taxes Accrued	53,097.95	58,155.80	86,778.07	74,977.99	64,639.38
33	Natural Gas Pipeline Co. of America	141,015.11	346,133.37	—	6,080.36	64,558.87
34	Total Current Liabilities	$ 616,432.84	$ 947,586.33	$ 248,309.41	$ 171,639.58	$ 197,227.72
35	RESERVES					
36	Reserve for Depreciation	$ 1,041,834.83	$ 1,422,513.85	$ 1,833,443.40	$ 2,261,468.05	$ 2,702,981.61
37	Reserve for Depletion	358,933.99	550,661.89	723,039.81	981,287.96	1,152,854.09
38	Total Reserves	$ 1,400,768.82	$ 1,973,175.74	$ 2,556,483.21	$ 3,242,756.01	$ 3,855,835.70
39	DEFERRED CREDITS - Coltexo Agreement	23,709.98	43,915.78	53,160.86	—	—
40	SURPLUS	$ 3,078,592.69#	$ 2,893,864.88#	$ 2,613,859.79#	$ 2,186,532.66#	$ 1,852,799.50
41	Total Liabilities	$24,162,318.95	$24,320,812.97	$23,344,093.69	$22,977,862.93	$22,350,263.92

(*) Per Books. (#) Red Figures.

2004

TEXOMA NATURAL GAS COMPANY

STATEMENT OF PLANT AND EQUIPMENT*
AT DECEMBER 31, 1934 to 1938, BOTH INCLUSIVE

ne o.	Particulars	1934 (a)	1935 (b)	1936 (c)	1937 (d)	1938 (e)
1.	PLANT AND EQUIPMENT					
2	Pipleine Rights-of'Way	$ 127,924.93	$ 127,656.67	$ 128,949.77	$ 129,093.65	$ 129,876.21
3	Telephone System	132,306.06	132,774.89	129,668.66	131,019.03	131,019.03
4	Wells	2,261,093.13	2,593,074.16	2,797,746.03	3,011,787.47	3,185,974.36
5	Gathering Lines	3,003,304.78	3,229,873.69	3,305,734.71	3,376,652.73	3,418,137.29
6	Gasoline Plant	814,335.39	849,916.73	863,794.93	884,716.44	888,833.22
7	Main Line	2,239,789.51	2,239,789.51	2,228,189.28	2,228,189.28	2,227,350.84
8	Compressor Stations	1,594,152.21	1,897,006.85	1,926,054.01	1,943,396.98	2,002,512.53
9	Drilling and Cleanout Tools	---	94,974.14	84,061.52	52,995.47	50,359.52
10	Furniture and Fixtures	21,984.99	22,212.17	22,606.58	23,596.75	23,818.51
11	Automobiles	24,784.85	23,748.22	25,201.43	24,139.43	27,613.31
12	Leaseholds	13,107,446.04	12,315,009.3[illegible]	10,939,113.92	10,362,916.98	9,367,363.86
13	Lands in Fee	8,218.64	8,218.[illegible]	8,218.64	8,218.64	8,218.64
14	Meters and Regulaters	21,135.34	23,[illegible]	26,006.22	27,723.29	30,194.44
15	Other Main Line Structures	57,114.29	59,[illegible]	65,718.20	67,808.64	[illegible]0,484.86
16	Tools	16,065.34	15,848.9[illegible]	11,[illegible]13.49	11,268.79	16,398.68
17	General Laboratory Equipment	7,016.64	7,016.64	7,016.64	7,016.64	7,359.53
18	Booster Stations			--	--	6,796.70
19	Total Plant and Equipment	$23,436,672.14	$23,638,159.89	$22,569,794.03	$22,290,540.21	$21,592,311.53

(*) Per Books.

AFTER [illegible] INTERCOMPANY INVESTMENTS AND OTHER INTERCOMPANY [illegible]

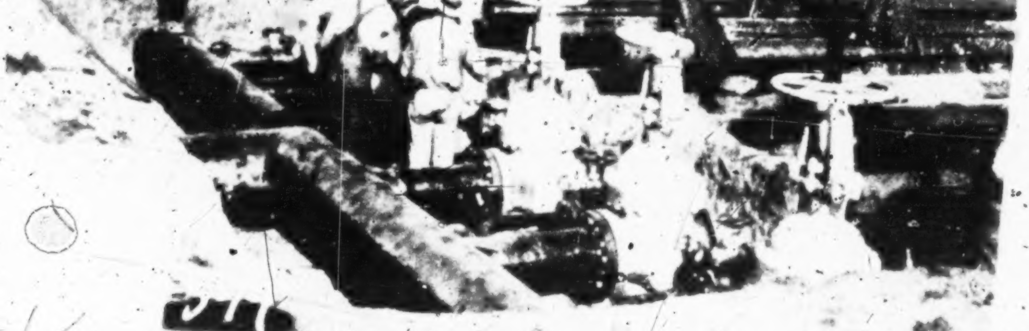
Line No	Particulars	1934 (a)	1935 (b)	1936 (c)	1937 (d)	1938 (e)
	ASSETS					
1	PLANT					
2	Plant and Equipment	$59,420,370.89	$59,799,082.26	$59,028,008.73	$59,409,650.89	$59,180,148.74
3	Construction Work in Progress	99,205.34	232,799.11	511,985.14	27,172.42	17,693.95
4	Total Plant	$59,519,576.23	$60,031,881.37	$59,539,993.87	$59,436,823.31	$59,197,842.69
5	CURRENT ASSETS					
6	Cash	$ 109,029.71	$ 154,341.20	$ 123,408.90	$ 144,327.35	$ 163,961.78
7	Special Deposits with Trustee		58,600.00			
8	Gas Accounts Receivable	1,006,246.98	1,615,326.86	1,225,264.69	1,232,848.76	1,242,877.57
9	Gasoline Accounts Receivable	28,045.70	36,752.84	43,445.04	30,339.31	51,567.37
10	Accounts Receivable	6,362.68	9,938.67	7,712.00	4,254.42	5,581.87
11	Notes Receivable			28,000.00	26,470.65	25,697.11
12	Materials and Supplies	392,554.07	219,037.72	241,930.26	329,159.45	390,748.60
13	Gas in Lines	27,905.70	27,905.70	27,905.70	27,905.70	27,905.70
14	Interest Receivable Accrued	24,377.34	25,762.95	28,176.77	777.81	108.50
15	Prepaid Expenses	95,786.62	78,005.45	68,233.69	75,568.74	75,767.10
16	Lateral Line Advances	493,349.79	509,560.81	516,695.30	509,236.83	
17	Total Current Assets	$ 2,183,658.59	$ 2,735,232.20	$ 2,310,772.35	$ 2,380,889.02	$ 1,984,215.60
18	DEFERRED CHARGES					
19	Unamortized Bond Discount and Expense	$ 3,086,239.20	$ 2,828,160.31	$ 2,570,081.42	$ 2,286,620.11	$ 2,031,369.15
20	TOTAL ASSETS	$64,789,474.02	$65,595,273.88	$64,420,847.64	$64,104,332.44	$63,213,427.44
21	**LIABILITIES**					
22	CAPITAL STOCK	$ 3,500,000.00	$ 3,500,000.00	$ 3,500,000.00	$ 3,500,000.00	$ 3,500,000.00
23	FUNDED DEBT					
24	15 yr. 1st Mtge. Pipeline Coll. 6% Gold Bonds, Series A,					
25	due December 15, 1946	$58,999,000.00	$56,499,000.00	$52,599,000.00	$50,300,000.00	$46,500,000.00
26	CURRENT LIABILITIES					
27	Wages and Salaries Payable	$ 23,118.76	$ 26,718.24	$ 32,773.77	$ 31,248.06	$ 32,645.61
28	Royalties Payable	16,983.55	22,060.54	25,430.47	27,180.98	27,662.92
29	Gas Accounts Payable	72,202.69	99,813.61	103,330.38	97,070.98	95,996.20
30	Accounts Payable	175,249.07	229,115.72	284,642.14	98,658.03	90,576.97
31	Vouchers Payable	7,870.02	20,632.82	19,371.45	24,763.54	5,455.88
32	Notes Payable	2,355,769.17	1,414,970.00	1,200,000.00	525,000.00	300,000.00
33	Interest Payable Accrued	207,481.17	145,396.60	131,500.00	125,750.00	116,250.00
34	Taxes Accrued	229,591.14	538,410.62	831,309.90	1,082,783.39	923,735.31
35	Total Current Liabilities	$ 3,088,265.56	$ 2,497,118.15	$ 2,628,358.11	$ 2,012,454.98	$ 1,592,322.89
36	RESERVES					
37	Depreciation	$ 4,440,777.57	$ 5,956,403.67	$ 7,511,001.17	$ 9,478,065.05	$11,402,258.46
38	Depletion	358,933.99	550,661.89	723,039.81	981,287.96	1,152,854.09
39	Total Reserves	$ 4,799,711.56	$ 6,507,065.56	$ 8,234,040.98	$10,459,353.01	$12,555,112.55
40	DEFERRED CREDITS - Coltexo Agreement	$ 23,709.98	$ 45,915.78	$ 53,160.86	$	$
41	SURPLUS	$ 5,621,213.08#	$ 3,451,825.61#	$ 2,593,712.31#	$ 2,167,475.55#	$ 934,008.00
42	Total Liabilities	$64,789,474.02	$65,595,273.88	$64,420,847.64	$64,104,332.44	$63,213,427.44

(#) Red Figures.

Exhibit 78

Exhibit 79

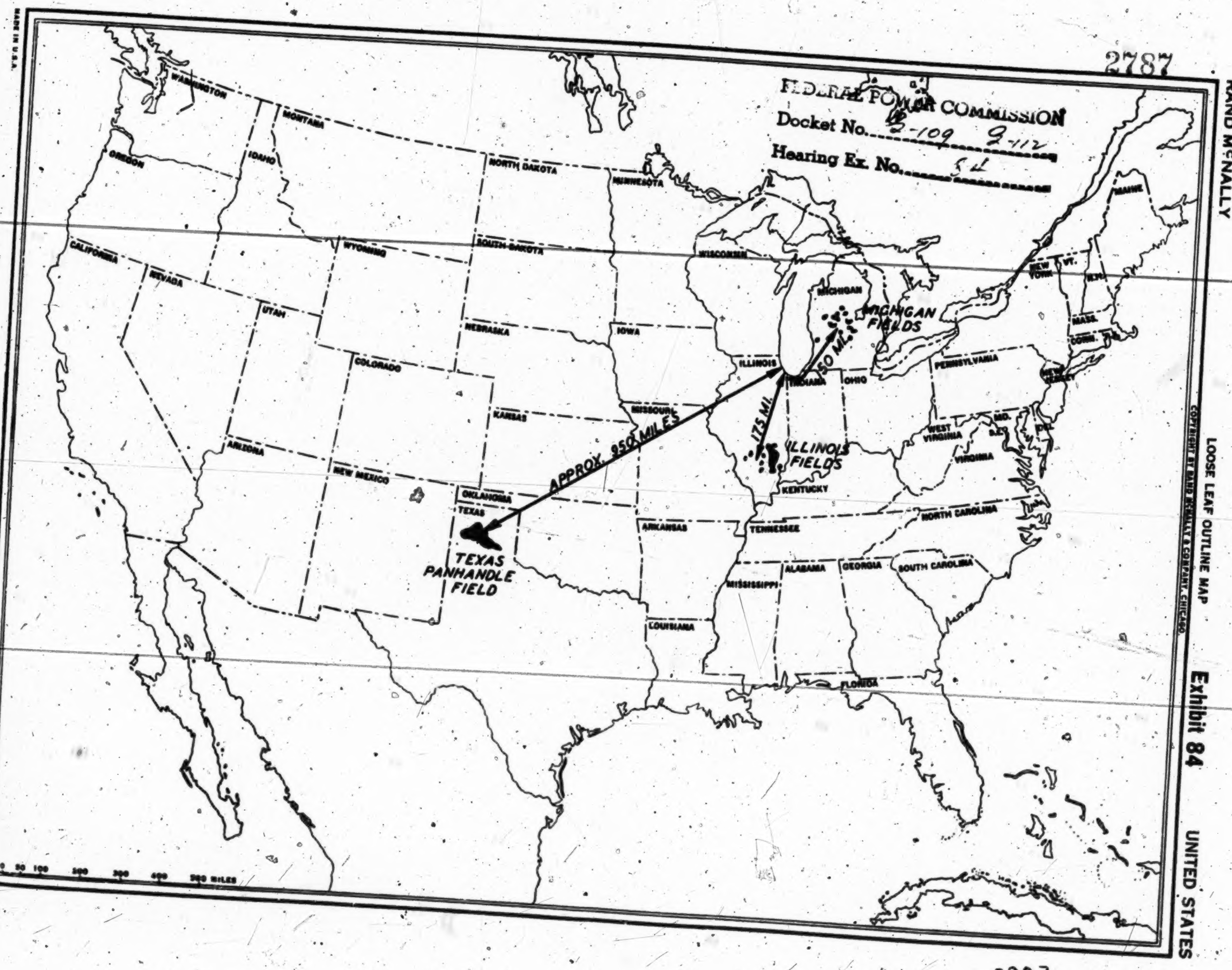
CANADIAN RIVER. SHOWING TYPICAL SUBMERGED PIPELINE CROSSING UNDER CONSTRUCTION. THE 24" MAINLINE HAS BEEN REDUCED THRU MANIFOLD CONNECTIONS TO 6 - 12" LINES.



TYPICAL MANIFOLD FOR SUBMERGED PIPELINE RIVER CROSSING, SHOWING VALVE ASSEMBLY, AND HEADER CONNECTION TO 24" MAINLINE.

FEDERAL POWER COMMISSION
Docket No. G-109 G-112
Hearing Ex. No. 54

Exhibit 84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LOOSE LEAF OUTLINE MAP
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UNITED STATES
WASHINGTON
MONTANA
OREGON
IDAHO
NORTH DAKOTA
MINNESOTA
WYOMING
SOUTH DAKOTA
WISCONSIN
CALIFORNIA
NEVADA
UTAH
NEBRASKA
IOWA
MICHIGAN
COLORADO
ILLINOIS
INDIANA
OHIO
PENNSYLVANIA
KANSAS
MISSOURI
ARIZONA
NEW MEXICO
OKLAHOMA
TEXAS
ARKANSAS
KENTUCKY
TENNESSEE
WEST VIRGINIA
VIRGINIA
NORTH CAROLINA
SOUTH CAROLINA
MISSISSIPPI
ALABAMA
GEORGIA
LOUISIANA
FLORIDA
MAINE
VT.
N.H.
NEW YORK
MASS.
CONN.
R.I.
NEW JERSEY
DEL.
MD.
D.C.
MICHIGAN FIELDS
ILLINOIS FIELDS
TEXAS PANHANDLE FIELD
APPROX. 950 MILES
175 MI.
150 MI.
0 50 100 200 300 400 500 MILES

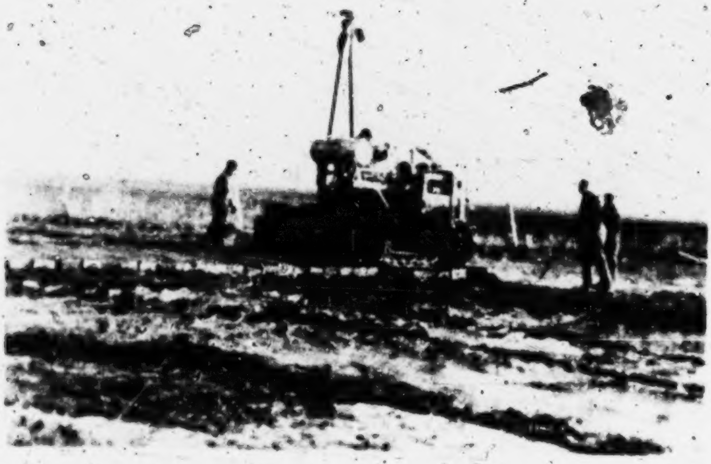
EXHIBIT NO. 85.

Photographs of Scenes
at Pipeline Break
Near Sheffield, Illinois

February, 1938

2.

Caterpillar tractor mired. Soil resembled peat.

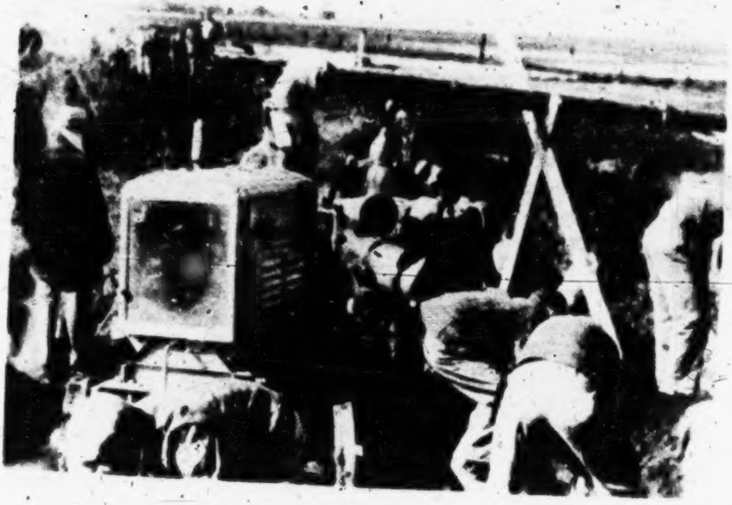


4.

Scene of line failure. Crater formed by release of gas when line failed. Main line gates have been closed each side of failure. Small amount of gas leaving line when picture was taken.

6.

Another view of the large crater.



8.

Line has been cut.
Moving in short joint
to make repair.

10.

General view of repair crew and sacked material used to weight the line after repair.

Exhibit 86

STATEMENT OF OPEN FLOWS AND ROCK PRESSURES ON DATE WELLS WERE ABANDONED

ELDORADO & AUGUSTA FIELDS-BUTLER CO., KANSAS

			Initial		Last Test Before Abandonment		
Well Name	No.	Location	R.Press.	Open Flow	R.Press.	Open Flow	Date Abandoned
Stapleton	22	C SE SE Sec. 29-25-5E	350 #	800 M	93 #	22 M	Sept. 29, 1937
"	23	C SW SE " 29-25-5E	360	2,000	94	25	Oct. 3, 1937
Wilson	92	C NE SW " 8-25-5E	450	10,000	23	62	Sept. 23, 1937
"	104	C NW SE " 8-25-5E	450	500	119	19	Sept. 13, 1937
Feltham	1	C SW/4 " 10-28-4E	595	2,800	85	53	June 15, 1937
"	2	C SE NW " 10-28-4E	565	1,800	86	35	June 22, 1937
"	5	NE NW SW" 10-28-4E	575	1,500	102	44	June 11, 1937
Pierpont	35	C SE NW " 33-25-5E	300	1,400	129	98	Aug. 4, 1937
"	36	C NE NW " 33-25-5E	275	2,400	96	24	July 29, 1937
Robinson	27	SE SE SW" 31-25-5E	200	2,500	142	71	Oct. 17, 1737
Stokes	46	NE NE SE" 33-25-5E	300	1,250	73	63	Aug. 14, 1937
"	47	SE SE NE" 33-25-5E	350	2,500	93	19	Aug. 19, 1937
"	51	C SW NE " 33-25-5E	425	3,500	87	29	Aug. 8, 1937
"	52	C NE NE " 33-25-5E	425	1,000	110	42	Aug. 21, 1937
"	53	C NW NE " 33-25-5E	325	3,000	111	41	Aug. 9, 1937
Scully	1	SE SE SW" 21-27-4E	450	1,250	55	22	June 28, 1937
"	2	NE NE NW" 28-27-4E	475	1,825	48	31	June 19, 1937
Chesney	2	C NE SE " 21-25-5E	500	7,000	76	196	Sept.14, 1937
"	3	C SW SE " 21-25-5E	510	16,000	71	201	Sept. 2, 1937
"	5	C SW NE " 21-25-5E	500	3,000	125	201	Oct. 1, 1937
"	13	C S/2 " 21-25-5E	380	21,000	69	483	Aug. 29, 1937
"	29	C SE SE " 21-25-5E	465	2,725	95	38	Aug. 25, 1937
"	30	C SE NE " 21-25-5E	432	1,500	115	59	Sept.23, 1937
Hedberg	3	C NW/4 " 28-25-5E	450	1,000	77	47	Sept. 2, 1937
Enyart	11	C NW NW " 12-26-4E	360	2,000	190	140	Oct. 23, 1937
Hedberg *	28	C NW NE " 28-25-5E	505	2,000		Dead ?	Oct. 6, 1937
Marsh *	33	C NW NE " 6-25-5E	300	2,000		"	Aug. 3, 1937
Moler	19	C SE NW " 32-25-5E	325	1,500	90	31	Oct. 11, 1937
Martin	1	NE NW NW" 2-28-4E	565	807	55	98	Oct. 27, 1937
Miller	1*	NE NE SW" 2-28-4E	560	2,836	104	67	July 13, 1937

* These wells were drowned out and loaded with water, else there would have been average rock pressures on these wells.

Exhibit 92

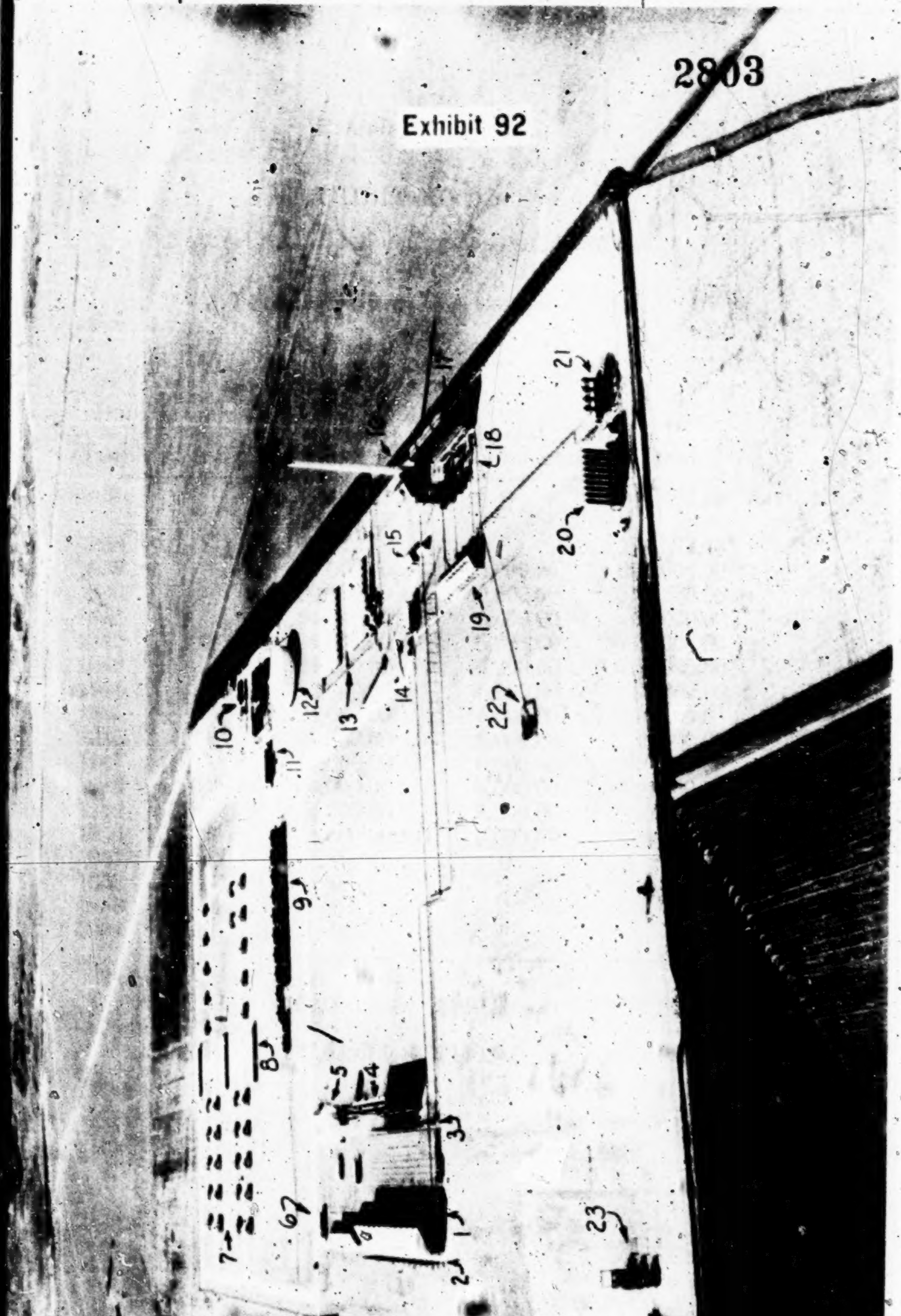

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EXHIBIT NO. 114.

Natural Gas Pipeline Company of America
and
Texoma Natural Gas Company

Regulatory Expense

Year	Natural Gas Pipeline Company of America	Texoma Natural Gas Company	Total
1937	$ 41,467.63	$ 0	$ 41,467.63
	190,788.47		
1938	175,572.13	0	175,572.13
1939	200,000.00	50,000.00	250,000.00
1940	120,000.00	30,000.00	150,000.00
1941	24,000.00	6,000.00	30,000.00
1942	24,000.00	6,000.00	30,000.00
1943	24,000.00	6,000.00	30,000.00
1944	24,000.00	6,000.00	30,000.00
1945	24,000.00	6,000.00	30,000.00
1946	24,000.00	6,000.00	30,000.00
1947	24,000.00	6,000.00	30,000.00
1948	24,000.00	6,000.00	30,000.00
1949	24,000.00	6,000.00	30,000.00
1950	24,000.00	6,000.00	30,000.00
1951	0	0	0
1952	0	0	0
1953	0	0	0
1954	0	0	0
Total 1939-1954 Incl.	$560,000.00	$140,000.00	$700,000.00
Total 1937-1954 Incl.	$777,039.76	$140,000.00	$917,039.76

2017

EXHIBIT NO. 116.

General Expense
Taxes

New Business Expense
R. M. Bussard—Witness

2018 Page No. 1

Natural Gas Pipeline Company of America

New Business Division Expense

	Office & Sales Expense	Development Expense	Total Division Expense
1932	$ 14,500.34	$ 71,604.42	$ 86,104.76
1933	207,912.24	11,237.08	219,149.32
1934	874,007.09	15,053.34	889,060.43
1935	296,011.64	11,994.54	308,006.18
1936	70,186.89	11,236.02	81,422.91
1937	4,990.43	11,125.05	16,115.48
1938	6,783.18	11,005.00	17,788.18
1939	9,335.00	6,356.00	15,691.00
1940	6,835.00	3,600.00	10,435.00
1941	6,835.00	3,600.00	10,435.00
1942	6,835.00	3,600.00	10,435.00
1943	6,835.00	3,600.00	10,435.00
1944	6,835.00	3,600.00	10,435.00
1945	6,835.00	3,600.00	10,435.00
1946	6,835.00	3,600.00	10,435.00
1947	6,835.00	3,600.00	10,435.00
1948	6,835.00	3,600.00	10,435.00
1949	6,835.00	3,600.00	10.435.00
1950	6,835.00	3,600.00	10,435.00
1951	6,835.00	3,600.00	10,435.00
1952	6,835.00	—	6,835.00
1953	6,835.00	—	6,835.00
1954	6,835.00	—	6,835.00
Average 1939-1954	6,991.00	3,097.00	10,088.00
Total 1932-1954	$1,586,251.81	$192,811.45	$1,779,063.26

Note: 1932 to 1938, inclusive, reflect actual expenditures.

Page No. 2

Natural Gas Pipeline Company of America
and
Texoma Natural Gas Company
Combined

Summary of Taxes

	Texoma Natural Gas Co.	Natural Gas Pipeline Co.	Total
1932	$ 93,260.67	$ 225,649.43	$ 318,910.10
1933	92,766.26	273,625.99	366,392.25
1934	117,279.00	218,300.01	335,579.01
1935	136,700.26	532,128.58	668,828.84
1936	150,592.08	796,658.50	947,250.58
1937	176,080.53	1,130,600.94	1,306,681.47
1938	168,031.97	955,138.22	1,123,170.19
1939	177,766	961,309	1,139,075
1940	509,452	862,622	1,372,074
1941	495,269	913,870	1,409,139
1942	647,545	875,165	1,522,710
1943	594,071	993,395	1,587,466
1944	673,449	990,470	1,663,919
1945	752,234	1,020,903	1,773,137
1946	883,280	979,784	1,863,064
1947	226,809	1,778,937	2,005,746
1948	233,031	1,795,962	2,028,993
1949	240,381	1,813,641	2,054,022
1950	244,761	1,797,267	2,042,028
1951	249,239	1,819,718	2,068,957
1952	249,581	1,811,275	2,060,856
1953	224,213	1,362,812	1,587,025
1954	196,422	420,414	616,836
Average 1939-1954	412,344	1,262,346	1,674,690
Total 1932-1954	$7,532,213.77	$23,329,645.67	$31,861,859.44

2920

TEXOMA NATURAL GAS COMPANY

SUMMARY OF TAXES

Line No.	Description	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942
1	Ad Valorem Taxes	$ 78,920.20	$ 74,244.74	$79,804.79	$ 79,186.51	$ 90,170.06	$ 89,669.89	$ 87,146.39	$ 91,333	$ 94,686	$100,581	$105,093
2	Franchise Taxes	93.50	71.00	71.00	71.00	121.00	100.60	1,663.90	1,200	1,200	1,200	1,200
3	Gross Receipts Tax (3)	13,515.63	12,229.85	22,981.88	31,897.85	36,939.02	56,310.80	52,551.59	54,099	61,913	62,000	62,067
4	Unemployment Taxes - Federal & State	-	-	-	-	3,261.14	7,067.83	10,908.29	11,659	10,912	11,068	11,469
5	Capital Stock Tax	-	6,220.67	14,421.33	25,221.00	19,896.00	19,560.00	12,427.00	16,135	16,035	14,090	20,633
6	Old Age Benefit Tax	-	-	-	-	-	3,133.41	3,210.45	3,340	3,519	3,569	3,696
7	Federal Gasoline Production Tax (1)	-	-	-	323.90	204.86	238.00	124.35	-	-	-	-
8	Automobile Licenses (2)	731.34	-	-	-	-	-	-	-	-	-	-
9	Income Taxes (Federal and State)	-	-	-	-	-	-	-	-	321,187	302,761	443,387
10	TOTAL ALL TAXES	$93,260.67	$92,766.26	$117,279.00	$136,700.26	$150,592.08	$176,080.53	$168,031.97	$177,766	$509,452	$495,269	$647,545

Line No.	Description	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	Average ~~Total~~ 1939-1954	Total 1932-1954
1	Ad Valorem Taxes	$110,611	$114,644	$119,000	$123,778	$129,907	$135,106	$139,067	$142,388	$145,481	$147,310	$147,648	$147,654	$124,643	$2,573,430
2	Franchise Taxes	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	21,392
3	Gross Receipts Tax (3)	62,252	62,297	70,065	70,374	70,717	70,878	71,076	71,284	71,259	67,930	43,489	19,555	61,953	1,217,682
4	Unemployment Taxes - Federal & State	11,647	11,939	12,281	13,[illegible]15	13,856	14,337	14,793	15,229	15,958	16,897	16,248	14,267	13,473	236,806
5	Capital Stock Tax	22,696	21,160	24,090	29,545	1	1	1	1	1	1	1	1	10,275	262,138
6	Old Age Benefit Tax	7,504	7,689	7,905	10,463	11,128	11,509	14,244	14,659	15,346	16,243	15,627	13,745	10,012	166,530
7	Federal Gasoline Production Tax (1)	-	-	-	-	-	-	-	-	-	-	-	-	-	891
8	Automobile Licenses (2)	-	-	-	-	-	-	-	-	-	-	-	-	-	731
9	Income Taxes (Federal and State)	378,161	454,520	517,693	634,905	-	-	-	-	-	-	-	-	190,788	3,052,614
10	TOTAL ALL TAXES	$594,071	$673,449	$752,234	$883,280	$226,809	$233,031	$240,381	$244,761	$249,239	$ 249,581	$224,213	$196,422	$412,344	$7,532,214

NOTES:--

(1) Expired.
(2) Charged to automobile expense after 1932.
(3) 1932-1935 transferred from Well Operation Expense.
(4) Averages for 1936-1938 are not shown because of rate changes, new taxes which became effective during the period.

ense.
of rate changes, new taxes, etc.,

Line No.		1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	Average 1939-1954	Total 1932-1954
1	Ad Valorem Taxes	$222,845.82	$227,384.49	$190,753.49	$210,006.77	$218,389.42	$ 235,369.64	$249,962.40	$253,083	$254,628	$256,147	$259,561	$262,340	$263,757	$264,481	$265,226	$ 265,756	$ 266,404	$ 266,606	$ 266,681	$ 266,757	$ 266,760	$ 266,763	$266,768	$ 263,232	$ 5,766,430.03
2	Franchise Taxes (State)	2,184.99	4,372.00	3,795.00	7,566.00	3,787.00	3,790.87	3,805.21	3,796	3,796	3,796	3,796	3,796	3,796	3,796	3,796	3,796	3,796	3,796	3,796	3,796	3,796	3,796	3,796	3,796	90,037.07
3	Pipeline Permit Tax (Iowa)	--	3,013.50	1,510.25	1,545.25	1,545.75	1,545.75	1,545.25	1,545	1,545	1,545	1,545	1,545	1,545	1,545	1,545	1,545	1,545	1,545	1,545	1,545	1,545	1,545	1,545	1,545	35,425.75
4	Capital Stock Tax (Federal)	--	38,856.00	17,596.50	50,028.45	41,200.00	40,643.00	36,167.00	45,000	47,245	31,950	33,945	34,996	34,960	37,256	39,702	74,684	80,952	87,278	75,282	81,810	88,225	53,819	58,000	56,569	1,129,594.95
5	Use Taxes (State)	--	--	--	--	--	1,923.13	476.87	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	10,400.00
6	Unemployment Taxes (State and Federal)	--	--	--	--	7,433.35	16,959.33	26,014.36	23,062	21,251	21,968	22,028	21,798	23,413	23,280	24,354	26,048	25,757	26,503	26,638	26,639	24,871	17,894	14,362	23,117	420,273.04
7	Old Age Benefits Tax	--	--	--	--	--	7,585.36	7,735.93	7,731	8,281	8,508	8,527	16,908	17,931	17,847	23,158	24,499	24,269	29,831	29,960	29,960	28,281	21,652	18,297	19,727	330,961.29
8	Mortgage Registration	--	--	1,233.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,233.67
9	Automobile Licenses & Miscellaneous (1)	618.62	--	--	1.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	619.63
10	Federal and State Income Tax	--	--	3,411.10	262,981.10	518,785.71	762,526.38	629,431.20	626,592	525,376	589,456	545,263	651,512	644,568	672,198	621,503	1,382,109	1,392,739	1,397,582	1,392,865	1,408,711	1,397,297	996,843	57,146	893,860	16,478,895.49
11	Excess Profits Tax (Federal)	--	--	--	--	--	55,620.94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	55,620.94
12	Undistributed Profits Tax (Federal)	--	--	--	--	5,517.27	4,636.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10,153.81
13	TOTAL	$225,649.43	$273,625.99	$218,300.01	$532,128.58	$796,658.50	$1,130,600.94	$955,138.22	$961,309	$862,622	$913,870	$875,165	$993,395	$990,470	$1,020,903	$979,784	$1,778,937	$1,795,962	$1,813,641	$1,797,267	$1,819,718	$1,811,275	$1,362,812	$420,414	$1,262,346	$24,329,645.67

NOTES:

(1) Now charged to departmental expenses.
(2) 1936-1938 averages are not shown because changing rates, new taxes, etc., affect the figures materially.
(3) 1932 to 1938, inclusive, reflect actual expenditures.

Income bond
paid off prior
[illegible]

Natural Gas Pipeline Company of America

and

Texoma Natural Gas Company (Combined)

Summary of General Expenses

	Texoma Natural Gas Company	Natural Gas P' Line Company of America	Total
1932	$ 157,391.20	$ 331,880.34	$ 489,271.54
1933	111,740.39	316,102.55	427,842.94
1934	110,927.53	297,072.39	407,999.92
1935	122,570.13	292,125.05	414,695.18
1936	106,651.25	277,387.44	384,038.69
1937	108,564.35	329,663.86	438,228.21
1938	118,192.86	351,582.85	469,775.71
Avg. 1936-1938	115,889.51	334,216.00	450,105.51
1939	147,266.00	408,119.00	555,385.00
1940	146,305.00	411,994.00	558,299.00
1941	147,925.00	413,966.00	561,891.00
1942	145,448.00	414,875.00	560,323.00
1943	140,733.00	404,851.00	545,584.00
1944	141,811.00	383,321.00	525,132.00
1945	143,188.00	383,988.00	527,176.00
1946	143,745.00	383,368.00	527,113.00
1947	146,053.00	388,120.00	534,173.00
1948	147,891.00	387,967.00	535,858.00
1949	147,017.00	384,472.00	531,489.00
1950	145,243.00	381,141.00	526,384.00
1951	145,094.00	377,246.00	522,340.00
1952	145,625.00	370,416.00	516,041.00
1953	142,501.00	354,323.00	496,824.00
1954	136,679.00	344,115.00	480,794.00
Avg. 1939-1954	144,533.00	387,018.00	531,551.00
Total 1932-1954	$3,148,561.71	$8,388,096.48	$11,536,658.19

Line No.		1932	1933	1934	1935	1936	1937	1938	Average 1936-1938
1	Executive Salaries (2)	$ 36,759.97	$ 27,180.00	$ 23,440.00	$ 20,330.00	$ 19,115.00	$ 19,534.98	$ 19,709.96	$ 19,453.00
2	Clerical Salaries	20,976.41	12,782.99	13,871.03	14,564.04	16,044.96	17,096.27	17,506.45	16,883.00
3	Engineering & Supts.' Salaries (3)	20,622.48	12,918.01	11,263.09	12,077.17	13,469.66	17,022.31	18,326.66	16,273.00
4	Office Supplies and Expense	2,457.32	1,664.19	1,569.88	1,268.00	1,198.66	1,351.56	1,537.30	1,363.00
5	Stationery and Printing	3,694.44	1,654.88	1,217.66	1,268.57	1,311.22	1,194.65	1,164.12	1,223.00
6	Legal Expense (4)	33,408.46	22,709.19	17,836.64	35,071.63	19,171.91	14,249.41	12,045.47	15,156.00
7	Injuries and Damages	4,341.92	3,037.71	3,510.76	5,139.66	5,256.15	6,793.64	8,042.14	6,697.00
8	Insurance	7,129.41	9,556.05	12,931.20	13,015.68	13,303.58	16,191.84	16,586.07	15,361.00
9	Rent	11,412.00	8,912.62	8,817.60	7,205.86	5,866.62	5,230.41	5,521.95	5,540.00
10	Miscellaneous	4,874.95	5,271.96	9,966.07	7,515.91	6,962.74	6,252.30	6,725.42	6,647.00
11	Traveling	5,292.36	2,016.06	2,442.31	2,989.38	2,884.26	1,829.94	2,025.60	2,247.00
12	Telephone and Telegraph	2,453.44	1,316.26	1,187.56	1,500.12	1,283.44	1,140.42	1,129.73	1,185.00
13	Drafting	1,045.18	336.81	355.97	379.67	434.46	401.66	482.50	440.00
14	Auto	1,374.34	897.16	544.91	208.41	244.09	255.36	262.78	254.00
15	Bonus	1,548.50	1,486.50	1,138.37	-	-	-	-	-
16	Engineering and Research	-	-	834.48	36.03	104.50	19.60	1.20	42.00
17	Employees' Retirement Plan	-	-	-	-	-	-	7,125.51	7,125.51
18	TOTAL GENERAL EXPENSE (5)	$157,391.20	$111,740.39	$110,927.53	$122,570.13	$106,651.25	$108,564.35	$118,192.86	$115,889.51

Line No.		1939	1940	1941	1942	1943	1944	1945	1946
1	Executive Salaries (2)	$ 20,200	$ 20,200	$ 20,200	$ 20,200	$ 20,200	$ 20,200	$ 20,200	$ 20,200
2	Clerical Salaries	17,628	17,628	17,628	17,628	17,628	17,628	17,628	17,628
3	Engineering & Supts.' Salaries (3)	19,668	19,668	19,668	19,668	19,668	19,668	19,668	19,668
4	Office Supplies and Expense	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450
5	Stationery and Printing	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
6	Legal Expense (4)	23,848	21,000	21,000	21,000	21,000	21,000	21,000	21,000
7	Injuries and Damages	8,367	8,817	8,940	9,259	9,400	9,631	9,902	10,484
8	Insurance	16,992	17,944	19,311	20,124	22,019	22,599	23,391	24,345
9	Rent	6,134	6,147	6,147	6,147	6,147	6,147	6,147	6,147
10	Miscellaneous	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000
11	Traveling	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200
12	Telephone and Telegraph	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
13	Drafting	450	450	450	450	450	450	450	450
14	Auto	260	260	260	260	260	260	260	260
15	Bonus	-	-	-	-	-	-	-	-
16	Engineering and Research	50	50	50	50	50	50	50	50
17	Employees' Retirement Plan	20,619	21,091	21,221	17,612	10,861	11,128	11,442	10,463
18	TOTAL GENERAL EXPENSE (5)	$147,266	$146,305	$147,925	$145,448	$140,733	$141,811	$143,188	$143,745

Line No.		1947	1948	1949	1950	1951	1952	1953	1954	Average 1939-1954	Total 1932-1954
1	Executive Salaries (2)	$ 20,200	$ 20,200	$ 20,200	$ 20,200	$ 20,200	$ 20,200	$ 20,200	$ 20,200	$ 20,200	$ 489,269.91
2	Clerical Salaries	17,628	17,628	17,628	17,628	17,628	17,628	17,628	17,628	17,628	394,890.15
3	Engineering & Supts.' Salaries (3)	19,668	19,668	19,668	19,668	19,668	19,668	19,668	19,668	19,668	420,387.38
4	Office Supplies and Expense	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450	34,246.91
5	Stationery and Printing	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	30,705.54
6	Legal Expense (4)	21,000	21,000	21,000	18,000	16,000	14,000	12,000	10,000	18,991	458,340.71
7	Injuries and Damages	11,152	11,534	11,895	12,241	12,815	13,565	13,050	11,478	10,783	208,651.98
8	Insurance	25,319	26,394	27,173	27,777	28,596	29,778	29,576	28,585	24,370	478,636.83
9	Rent	6,147	6,147	6,147	6,147	6,147	6,147	6,147	6,147	6,146	151,306.06
10	Miscellaneous	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	159,569.35
11	Traveling	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	54,679.93
12	Telephone and Telegraph	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	29,210.97
13	Drafting	450	450	450	450	450	450	450	450	450	10,636.25
14	Auto	260	260	260	260	260	260	260	260	260	7,947.05
15	Bonus	-	-	-	-	-	-	-	-	-	4,173.37
16	Engineering and Research	50	50	50	50	50	50	50	50	50	1,795.81
17	Employees' Retirement Plan	11,129	11,510	9,496	9,772	10,230	10,829	10,422	9,163	12,937	214,113.51
18	TOTAL GENERAL EXPENSE (5)	$146,053	$147,891	$147,017	$145,243	$145,094	$145,625	$142,501	$136,679	$144,533	$3,148,561.71

NOTES:
(1) 1932 to 1938, inclusive, reflect actual expenditures.
(2) Includes such Executive Salaries as were charged to Amarillo Office Expense in 1932.
(3) Includes such amounts as were charged to Operations, as Chicago Office Salaries, during 1932 to 1935, inclusive.
(4) Includes such amounts as have been allocated to Amarillo Office Expense in the past, and also includes such amounts as may be allocated in the future.
(5) Taxes and Regulatory Expense have been eliminated for the purpose of this exhibit and are shown on other exhibits.

ce Expense in 1932.
Office Salaries, during 1932
Expense in the past, and also
of this exhibit and are shown

NATURAL GAS PIPELINE COMPANY OF AMERICA

GENERAL EXPENSE

Line No.	Description	1932	1933	1934	1935	1936	1937	1938	Average 1936-38
1	Executive Salaries	$ 79,806.65	$ 72,720.00	$ 58,880.00	$ 50,880.00	$ 52,459.96	$ 54,139.95	$ 54,839.96	$ 53,813
2	Clerical Salaries	61,117.45	51,744.13	55,565.10	58,256.15	64,179.88	69,386.77	70,025.77	67,864
3	Engineering & Sup't Salaries (1)	71,574.97	54,642.31	50,254.34	55,624.68	53,878.61	67,204.26	73,306.66	64,797
4	Office Supplies & Expense	6,813.35	5,512.63	5,885.26	5,155.57	4,969.11	5,595.84	6,050.19	5,538
5	Stationery & Printing	5,193.81	2,938.16	3,616.28	3,550.89	3,485.05	3,305.02	3,652.03	3,481
6	Legal Expense	24,448.98	37,824.91	34,292.98	33,414.31	17,189.04	44,457.15	30,369.61	30,672
7	Injuries & Damages	4,397.82	5,376.68	6,321.00	9,296.44	9,533.04	10,169.17	11,442.49	10,382
8	Insurance	10,977.82	16,861.22	21,466.10	24,222.01	24,108.21	27,826.56	28,002.65	26,646
9	Rent	33,336.00	35,880.08	35,451.80	28,969.50	23,695.06	20,978.55	22,087.73	22,254
10	Miscellaneous	5,697.54	9,549.74	7,984.82	8,874.52	10,249.01	13,171.72	13,884.23	12,435
11	Traveling Expense	9,687.18	8,192.87	6,013.32	7,437.14	7,627.60	7,895.11	9,178.24	8,234
12	Telephone & Telegraph	5,977.34	4,403.23	3,234.71	3,962.97	3,331.91	3,203.26	3,682.58	3,406
13	Drafting Room Supplies	3,007.68	1,816.32	1,485.09	1,381.09	1,613.71	1,248.97	1,929.99	1,598
14	Automobile Expense	4,213.24	3,742.57	2,447.29	955.12	1,068.36	1,003.15	1,120.62	1,064
15	Bonus Expense	5,129.38	4,897.38	2,538.25	-	-	-	-	-
16	Employees' Retirement Plan	-	-	-	-	-	-	22,005.30	22,005
17	Engineering & Research	501.13	.32	1,636.05	144.66	R 1.11	78.40	4.80	27
18	Total General Expense (2)	$331,880.34	$316,102.55	$297,072.39	$292,125.05	$277,387.44	$329,663.86	$351,582.85	$334,216 (3)

Line No.	Description	1939	1940	1941	1942	1943	1944	1945	1946
1	Executive Salaries	$ 57,040	$ 57,040	$ 57,040	$ 57,040	$ 57,040	$ 57,040	$ 57,040	$ 57,040
2	Clerical Salaries	68,398	68,398	68,398	68,398	68,398	68,398	68,398	68,398
3	Engineering & Sup't Salaries (1)	78,816	78,816	78,816	78,816	78,816	78,816	78,816	78,816
4	Office Supplies & Expense	5,536	5,536	5,536	5,536	5,536	5,536	5,536	5,536
5	Stationery & Printing	3,481	3,481	3,481	3,481	3,481	3,481	3,481	3,481
6	Legal Expense	35,663	35,663	35,663	35,663	35,663	35,663	35,663	35,663
7	Injuries & Damages	11,434	12,247	12,583	12,611	12,503	13,259	13,197	13,700
8	Insurance	30,354	31,371	32,184	32,996	33,831	34,979	35,871	37,084
9	Rent	24,538	24,589	24,589	24,589	24,589	24,589	24,589	24,589
10	Miscellaneous	12,435	12,435	12,435	12,435	12,435	12,435	12,435	12,435
11	Traveling Expense	8,234	8,234	8,234	8,234	8,234	8,234	8,234	8,234
12	Telephone & Telegraph	3,406	3,406	3,406	3,406	3,406	3,406	3,406	3,406
13	Drafting Room Supplies	1,598	1,598	1,598	1,598	1,598	1,598	1,598	1,598
14	Automobile Expense	1,064	1,064	1,064	1,064	1,064	1,064	1,064	1,064
15	Bonus Expense	-	-	-	-	-	-	-	-
16	Employees' Retirement Plan	66,122	68,116	68,939	69,008	58,257	34,823	34,660	32,324
17	Engineering & Research	-	-	-	-	-	-	-	-
18	Total General Expense (2)	$408,119	$411,994	$413,966	$414,875	$404,851	$383,321	$383,988	$383,368

Line No.	Description	1947	1948	1949	1950	1951	1952	1953	1954	Average 1939-54	Total 1932-54
1	Executive Salaries	$ 57,040	$ 57,040	$ 57,040	$ 57,040	$ 57,040	$ 57,040	$ 57,040	$ 57,040	$ 57,040	$1,336,366.52
2	Clerical Salaries	68,398	68,398	68,398	68,398	68,398	68,398	68,398	68,398	68,398	1,524,643.25
3	Engineering & Sup't Salaries (1)	78,816	78,816	78,816	78,816	78,816	78,816	78,816	78,816	78,816	1,687,541.81
4	Office Supplies & Expense	5,536	5,536	5,536	5,536	5,536	5,536	5,536	5,536	5,536	128,557.95
5	Stationery & Printing	3,481	3,481	3,481	3,481	3,481	3,481	3,481	3,481	3,481	81,437.24
6	Legal Expense	35,663	35,663	35,663	32,000	28,000	24,000	19,500	15,000	31,925	732,789.98
7	Injuries & Damages	14,493	14,357	14,706	14,770	14,770	13,942	10,674	9,200	13,028	264,982.64
8	Insurance	39,172	39,476	39,779	39,919	40,023	39,695	37,975	37,108	36,363	735,201.57
9	Rent	24,589	24,589	24,589	24,589	24,589	24,589	24,589	24,589	24,586	593,771.72
10	Miscellaneous	12,435	12,435	12,435	12,435	12,435	12,435	12,435	12,435	12,435	268,371.58
11	Traveling Expense	8,234	8,234	8,234	8,234	8,234	8,234	8,234	8,234	8,234	187,775.46
12	Telephone & Telegraph	3,406	3,406	3,406	3,406	3,406	3,406	3,406	3,406	3,406	82,292.00
13	Drafting Room Supplies	1,598	1,598	1,598	1,598	1,598	1,598	1,598	1,598	1,598	38,050.85
14	Automobile Expense	1,064	1,064	1,064	1,064	1,064	1,064	1,064	1,064	1,064	31,574.35
15	Bonus Expense	-	-	-	-	-	-	-	-	-	12,565.01
16	Employees' Retirement Plan	34,195	33,874	29,727	29,855	29,856	28,182	21,577	18,210	41,108	679,730.30
17	Engineering & Research	-	-	-	-	-	-	-	-	-	2,364.25
18	Total General Expense (2)	$388,120	$387,967	$384,472	$381,141	$377,246	$370,416	$354,323	$344,115	$387,018	$8,388,096.48

Notes: (1) Includes amounts charged to Operations as Chicago Office Salaries, during 1932 to 1935 inclusive.

(2) Taxes and regulatory expense have been eliminated for the purpose of this exhibit and are shown on other exhibits.

(3) Average Total General Expense 1936-1938 is an accumulation of the figures above it.

(4) 1932 to 1938 inclusive reflect actual expenditures.

2025

EXHIBIT NO. 117.

Summary of Additional Capital Expenditures and Operation and Maintenance

R. M. Busard—Witness

	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	Total 1939-1954
Additional Capital Investment																	
Texoma Natural Gas Co.	*$664,950	$1,016,858	$ 689,064	$ 898,357	$604,216	$575,123	$ 728,696	$ 897,410	$692,525	$607,519	$479,303	$503,241	$387,886	$229,649	$50,387	$6,380	$ 9,031,564
Natural Gas Pipeline Co.	* 298,138	305,336	626,053	492,026	334,323	258,360	315,324	270,366	181,190	109,531	63,921	50,868	43,584	39,332	24,311	-	3,412,663
Total	$963,088	$1,322,194	$1,315,117	$1,390,383	$938,539	$833,483	$1,044,020	$1,167,776	$873,715	$717,050	$543,224	$554,109	$431,470	$268,981	$74,698	$6,380	$12,444,227
Book Cost of Property Retired																	
Texoma Natural Gas Co.	*$140,779	$ 110,689	$ 102,839	$ 58,046	$ 28,333	$ 26,290	$ 95,686	$ 66,265	$ 66,647	$ 67,608	$ 30,385	$ 49,398	$ 51,183	$152,014	$31,257	$4,941	$ 1,082,360
Natural Gas Pipeline Co.	* 68,705	79,780	119,043	79,312	123,883	150,774	204,724	191,595	85,007	79,592	52,783	39,613	43,169	38,817	23,599	-	1,380,396
Total	$209,484	$ 190,469	$ 221,882	$ 137,358	$152,216	$177,064	$ 300,410	$ 257,860	$151,654	$147,200	$ 83,168	$ 89,011	$ 94,352	$190,831	$54,856	$4,941	$ 2,462,756
Salvage																	
Texoma Natural Gas Co.	*$ 27,406	$ 11,369	$ 10,168	$ 14,302	$ 7,286	$ 8,792	$ 15,567	$ 13,771	$ 10,988	$ 10,959	$ 9,661	$ 13,078	$ 10,240	$112,016	$11,278	$ 954	$ 287,835
Natural Gas Pipeline Co.	* 23,426	11,110	43,735	27,440	24,892	10,568	15,506	15,859	12,371	13,899	12,046	10,892	11,010	12,051	8,613	-	253,418
Total	$ 50,832	$ 22,479	$ 53,903	$ 41,742	$ 32,178	$ 19,360	$ 31,073	$ 29,630	$ 23,359	$ 24,858	$ 21,707	$ 23,970	$ 21,250	$124,067	$19,891	$ 954	$ 541,253

NOTE: *Includes 1938 carryover as follows:

Additional Capital Investment	
Texoma Natural Gas Co.	$23,384
Natural Gas Pipeline Co.	953
Total	$24,337
Investment Retired	
Texoma Natural Gas Co.	$ 3,432
Natural Gas Pipeline Co.	221
Total	$ 3,653
Salvage	
Texoma Natural Gas Co.	$ 3,077
Natural Gas Pipeline Co.	-
Total	$ 3,077

NOTE: *Includes 1938 carryover as follows:

Additional Capital Investment
Texoma Natural Gas Co. $23,384
Natural Gas Pipeline Co. 953
Total $24,337

Investment Retired
Texoma Natural Gas Co. .... $ 3,432
Natural Gas Pipeline Co. 221
Total .... $ 3,653

Salvage
Texoma Natural Gas Co. .... $ 3,077
Natural Gas Pipeline Co. .... -
Total .... $ 3,077

Exhibit No.	Description	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1	1947	1948	1949	1950	1951	1952	1953	1954	Total 1939-1954
97	Compressor Station Department	$132,357	$149,482	$287,216	$ 45,521	$ 21,202	$ 80,071	$ 99,104	$ 85,442	$ 87,889	$ 39,814	$17,152	$10,740	$	87,889	$ 39,814	$17,152	$10,740	$ –	$ –	$ –	$ –	$1,055,990
105	Pipeline Department	138,856	125,058	307,353	405,744	260,910	151,084	181,190	152,866	38,686	14,846	9,365	4,586	10	38,686	14,846	9,365	4,586	10,380	4,866	–	–	1,805,790
112	Telephone Department	–	5,666	–	–	11,750	–	5,666	–	–	6,000	–	5,666		–	6,000	–	5,666	–	–	–	–	34,748
115	Automotive & Transportation Equipment	21,366	21,840	28,240	36,996	37,150	24,426	24,909	27,969	51,085	46,140	34,160	25,886	29	51,085	46,140	34,160	25,886	29,960	31,286	21,000	–	462,413
113	Furniture & Fixtures	4,606	3,290	3,244	3,765	3,311	2,779	4,455	4,089	3,530	2,731	3,244	3,990	3	3,530	2,731	3,244	3,990	3,244	3,180	3,311	–	52,769
	Total	$297,185	$305,336	$626,053	$492,026	$334,323	$258,360	$315,324	$270,366	$181,190	$109,531	$63,921	$50,868	$43	81,190	$109,531	$63,921	$50,868	$43,584	$39,332	$24,311		$3,411,710

Completion Costs of Work in Progress January 1, 1939	1939	Total 1939-1954
Compressor Station Dept.	$ 233	$ 233
Pipeline Department	720	720
Total	$ 953	$ 953
Total Including Completion Costs	$298,138	$3,412,663

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NATURAL GAS PIPELINE COMPANY OF AMERICA

SUMMARY OF BOOK COST OF PROPERTY RETIRED

Exh. No.	Description	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	
97	Compressor Station Department	$22,279	$39,243	$43,744	$ 6,320	$12,202	$45,921	$77,274	$62,807	$54,288	$16,475	$ 7,109	$
105	Pipeline Department	23,299	17,965	55,407	43,896	78,584	78,313	92,965	97,395	1,149	8,978	8,815	4
112	Telephone Department	-	-	-	-	9,568	-	5,666	-	-	6,000	-	5
115	Automotive & Transportation Equipment	19,622	19,947	17,193	25,996	20,830	24,426	24,909	27,969	26,585	46,140	34,160	25
113	Furniture & Fixtures	3,284	2,625	2,699	3,100	2,699	2,114	3,910	3,424	2,985	1,999	2,699	3
	TOTAL	$68,484	$79,780	$119,043	$ 79,312	$123,883	$150,774	$204,724	$191,595	$ 85,007	$ 79,592	$ 52,783	$ 39
	Retirement Incident to Work in Progress, Jan. 1, 1939 Compressor Station Department	$ 221											
		$68,705											

1947	1948	1949	1950	1951	1952	1953	Total 1939-1954
$54,288	$16,475	$ 7,109	$ 800	$ 800	$ 800	$ ---	$ 390,062
1,149	8,978	8,815	4,036	9,810	4,316	---	524,928
-	6,000	-	5,666	-	-	-	26,900
26,585	46,140	34,160	25,886	29,960	31,286	21,000	395,909
2,985	1,999	2,699	3,225	2,599	2,415	2,599	42,376
$ 85,007	$ 79,592	$ 52,783	$ 39,613	$ 43,169	$ 38,817	$ 23,599	$1,380,175
							$ 221
							$1,380,396

NATURAL GAS PIPELINE COMPANY OF AMERICA

SUMMARY OF SALVAGE

Exh. No.	Description	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	Total 1939-1954
97	Compressor Station Department	$ 690	$ -	$13,526	$ 40	$ -	$ -	$3,693	$2,559	$ -	$ -	$ 277	$ -	$ -	$ -	$ -	$ 20,785
105	Pipeline Department	13,101	2,332	21,969	16,870	15,741	805	1,516	2,810	-	645	900	350	1,050	350	-	78,439
112	Telephone Department	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
115	Automotive & Transportation Equipment	9,147	8,413	7,851	10,111	8,762	9,474	9,708	10,006	11,976	12,989	10,480	10,053	9,571	11,382	8,224	148,147
113	Furniture & Fixtures	488	365	389	419	389	289	589	484	395	265	389	489	389	319	389	6,047
		$23,426	$11,110	$43,735	$27,440	$24,892	$10,568	$15,506	$15,859	$12,371	$13,899	$12,046	$10,892	$11,010	$12,051	$ 8,613	$ 253,418

Completion Cost of Work in Progress January 1, 1939 — N O N E

TEXOMA NATURAL GAS COMPANY

SUMMARY OF ADDITIONAL CAPITAL EXPENDITURES

2030

Exh. No.	Description	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1
93	Compressor Station	$ 68,433	$ 68,943	$ 14,299	$ 23,413	$ 10,428	$ 12,586	$ 8,454	$134,699	$ 8,766	$ 18,181	$ 4,693	$ 10,430	$
93	Gasoline Plant	30,480	9,013	50	50	50	50	50	50	562	14,450	50	50	
93	Refrigerating Plant	31	48	279	90,251	-	-	-	-	-	5,471	-	-	
93	Laboratory Apparatus	197	50	50	50	50	50	50	50	50	50	50	50	
102	Production Department	421,520	461,309	429,143	467,925	460,285	430,688	404,185	397,800	402,195	340,816	264,491	207,073	6
105	Main line	-	129,861	128,626	2,305	-	-	-	-	-	-	-	-	
105	Gathering System	102,832	317,004	95,384	216,891	78,114	104,675	131,693	150,595	110,132	79,861	48,432	39,328	1
105	Booster Stations	-	10,640	-	69,566	15,315	1,051	148,475	183,295	142,185	122,195	132,835	210,375	28
105	Tools	500	500	928	2,693	12,308	553	806	5,424	500	2,499	2,093	500	
112	Telephone Department	-	2,334	-	3,019	-	-	9,806	-	-	-	-	2,334	
115	Automotive & Transportation Equipment	14,856	14,696	17,028	19,696	25,400	22,942	22,326	23,323	25,542	21,610	23,596	30,812	2
113	Furniture & Fixtures	2,717	2,460	3,277	2,498	2,266	2,528	2,851	2,174	2,593	2,386	3,063	2,289	
	Total Additional Capital Expenditures	$641,566	$1,016,858	$689,064	$898,357	$604,216	$575,123	$728,696	$897,410	$692,525	$607,519	$479,303	$503,241	$38

Completion Costs of Work in Progress January 1, 1939

Compressor Station	$ 1,201
Gasoline Plant	3,109
Production Department	8,691
Main Line	73
Gathering System	10,310
Total in Progress	$ 23,384
Grand Total	$664,950

2	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	Total 1939-54
413	$ 10,428	$ 12,586	$ 8,454	$134,699	$ 8,766	$ 18,181	$ 4,693	$ 10,430	$ 150	$ -	$ -	$ -	$ 383,475
50	50	50	50	50	562	14,450	50	50	50	-	-	-	54,955
251	-	-	-	-	-	5,471	-	-	-	-	-	-	96,080
50	50	50	50	50	50	50	50	50	50	-	-	-	797
925	460,285	430,688	404,185	397,800	402,195	340,816	264,491	207,073	67,692	17,571	17,571	-	4,790,264
305	-	-	-	-	-	-	-	-	-	-	-	-	260,792
391	78,114	104,675	131,693	150,595	110,132	79,861	48,432	39,328	10,338	6,983	5,057	6,380	1,503,699
566	15,315	1,051	148,478	183,295	142,185	122,195	132,835	210,375	285,175	172,975	-	-	1,494,082
593	12,308	553	806	5,424	500	2,499	2,093	500	1,236	500	500	-	31,540
019	-	-	9,806	-	-	-	-	2,334	-	-	-	-	17,493
596	25,400	22,942	22,326	23,323	25,542	21,610	23,596	30,812	21,210	29,446	24,786	-	337,269
98	2,266	2,528	2,851	2,174	2,593	2,386	3,063	2,289	1,985	2,174	2,473	-	37,734
57	$604,216	$575,123	$728,696	$897,410	$692,525	$607,519	$479,303	$503,241	$387,886	$229,649	$50,387	$6,380	$9,008,180
													$ 1,201
													3,109
													8,691
													73
													10,310
													$ 23,384
													$9,031,564

Exhibit No.	Description	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	Total 1939-1954
93	Compressor Station	$ 9,461	$ 14,016	$ 1,785	$ 950	$ 7,968	$ 2,147	$ 7,327	$26,003	$ 100	$18,099	$ 100	$ 8,996	$ 100	$ -	$ -	$ -	$ 97,052
93	Gasoline Plant	6,789	341	50	50	50	50	50	50	562	15,548	50	50	50	-	-	-	23,690
93	Refrigerating Plant	-	-	133	-	-	-	-	-	-	5,494	-	-	-	-	-	-	5,627
93	Laboratory Apparatus	194	25	25	25	25	25	25	25	25	25	25	25	25	-	-	-	494
102	Production Department	104,729	26,182	26,182	26,138	-	-	15,180	-	-	-	-	-	22,770	-	-	-	221,181
105	Main Line	-	55,376	53,964	-	-	-	-	-	-	-	-	-	-	-	-	-	109,340
105	Gathering System	-	1,863	2,484	14,402	1,242	621	46,370	10,314	38,908	3,037	2,301	3,084	4,171	3,369	3,998	4,941	141,105
105	Booster Station	-	-	-	-	-	-	-	-	-	-	-	-	-	116,875	-	-	116,875
105	Tools	150	150	538	150	2,265	203	456	4,714	150	2,149	1,743	1,808	872	150	-	-	15,498
112	Telephone Department	-	-	-	-	-	-	2,334	2,792	-	-	-	2,334	-	-	-	-	7,460
115	Automotive & Transportation Equipment	13,893	10,751	15,205	14,346	15,010	21,144	21,586	20,193	24,802	20,870	23,596	30,812	21,210	20,446	24,786	-	307,650
113	Furniture & Fixtures	2,131	1,985	2,473	1,985	1,773	2,100	2,358	2,174	2,100	2,386	2,570	2,289	1,985	2,174	2,473	-	32,956
	Total Retirements	$137,347	$110,689	$102,839	$58,046	$28,333	$26,290	$95,686	$66,265	$66,647	$67,608	$30,385	$49,398	$51,183	$152,014	$31,257	$4,941	$1,078,928
	Retirement incident to work in progress Jan. 1, 1939																	
	Compressor Station	875																875
	Gasoline Plant	1,634																1,634
	Refrigerating Plant	3,432																3,432
	Grand Total	143,288																$1,084,869

TEXOMA NATURAL GAS COMPANY

SUMMARY OF SALVAGE

Exh. No.	Description	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	Total 1939-1954
93	Compressor Station	$ 57	$ -	$ -	$ -	$ -	$ 200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 257
93	Gasoline Plant	4,481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,481
93	Refrigerating Plant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
93	Laboratory Apparatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
102	Production Department	13,235	5,863	3,615	2,273	-	-	-	-	-	-	-	-	-	-	-	-	24,986
105	Main Line	-	172	172	-	-	-	-	-	-	-	-	-	-	-	-	-	344
105	Gathering System	-	342	456	4,698	228	114	5,994	5,106	1,546	858	466	634	1,448	694	808	954	24,346
105	Booster Station	-	-	-	-	-	-	-	-	-	-	-	-	-	99,875	-	-	99,875
105	Tools	-	-	-	-	175	-	-	458	-	201	175	-	-	-	-	-	1,009
113	Telephone Department	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
113	Automotive & Trans. Equip.	6,256	4,687	5,527	7,026	6,608	8,150	9,198	7,902	9,114	9,565	8,615	12,116	8,487	11,142	10,072	-	124,465
113	Furniture and Fixtures	300	305	398	305	275	328	375	305	328	335	405	328	305	305	398	-	4,995
	Total Salvage	$24,329	$11,369	$10,168	$14,302	$7.286	$8,792	$15,567	$13,771	$10,988	$10,959	$9,661	$13,078	$10,240	$112,016	$11,278	$954	$284,758

Salvage Incident to Work in Progress Jan. 1, 1939

Gasoline Plant	$ 585
Refrigerating Plant	2,492
GRAND TOTAL	$27,406

NATURAL GAS PIPELINE COMPANY OF AMERICA

And

TEXOMA NATURAL GAS COMPANY

(Combined)

SUMMARY OF OPERATION AND MAINTENANCE EXPENSE

2033

Exh. No.	Description	1932	1933	1934	1935	1936	1937	1938
102	**Operation Expense**							
	Purchased Gas-Colorado Interstate Gas Co.	$ 378,365.84	$ 384,039.32	$ 643,973.84	$ 839,119.01	$1,075,485.64	$1,130,277.82	$1,061,359.13
102	Amarillo Office Expense	42,415.12	32,013.60	31,014.30	32,683.78	30,864.60	30,018.01	30,549.04
102	Land & Lease Dept. Expense	116,924.59	102,533.53	93,742.66	88,016.29	61,236.95	61,084.19	50,448.40
102	Well Operation Expense	106,439.64	88,950.00	146,221.99	203,427.30	284,248.68	280,512.77	279,190.54
110	Booster Stations Expense	--	--	--	--	--	--	776.28
110	Gathering System Expense	30,771.88	29,957.92	28,786.49	32,143.07	43,520.71	42,345.31	44,893.69
110 & 98	Compressor Station Expense	162,826.47	164,623.36	429,787.92	606,952.21	785,877.91	879,214.16	793,600.31
94	Gasoline Plant Expense	76,363.49	69,563.08	90,242.59	106,097.71	122,473.35	128,323.99	131,670.18
94	Refrigeration Plant Expense	6,304.62	11,380.22	15,651.10	16,346.40	18,404.99	18,197.57	17,368.58
110	Mainline System Expense	125,787.91	92,062.21	95,732.32	93,029.68	99,933.13	102,105.41	112,884.96
112	Telephone System Expense	40,171.76	39,828.29	38,650.08	40,399.67	41,388.22	42,334.89	42,289.31
116	Taxes	318,910.10	366,392.25	335,579.01	668,828.84	947,250.58	1,306,681.47	1,123,170.19
114	Regulatory	--	--	--	--	--	41,467.63	190,788.47
116	General	489,271.54	427,842.94	407,999.92	414,695.18	384,038.69	438,228.21	469,775.71
116	New Business	86,104.76	219,149.32	889,060.43	308,006.18	81,422.91	16,115.48	17,788.18
	Total Operation Expense	$1,980,657.72	$2,028,336.04	$3,246,442.65	$3,449,745.32	$3,976,146.36	$4,516,906.91	$4,366,552.27
	Maintenance Expense							
102	Well Maintenance Expense	$ 2,974.00	$ 9,586.37	$ 1,212.97	$ 4,446.17	$ 5,642.75	$ 3,258.36	$ 8,861.70
110	Booster Stations Expense	--	--	--	--	--	--	196.13
110	Gathering System Expense	24,276.30	15,569.53	11,281.20	30,125.58	28,386.08	24,573.23	24,136.38
110 & 98	Compressor Station Expense	20,437.15	11,159.62	76,784.28	138,270.91	251,209.16	340,636.81	205,316.26
94	Gasoline Plant Expense	4,506.15	1,925.00	5,063.59	6,185.69	17,505.31	16,776.49	12,022.12
94	Refrigeration Plant Expense	508.70	1,058.60	1,761.32	2,277.45	2,189.90	5,223.80	3,234.78
110	Mainline System Expense	212,833.55	96,490.72	63,355.10	111,996.61	236,518.86	156,034.78	211,657.84
112	Telephone System Expense	20,046.16	18,382.24	22,970.28	20,172.05	18,335.00	21,655.35	23,595.49
	Total Maintenance Expense	$ 285,582.01	$ 154,172.08	$ 182,428.74	$ 313,474.46	$ 559,787.06	$ 568,158.84	$ 489,020.70
	TOTAL GROSS OPERATION & MAINTENANCE	$2,266,239.73	$2,182,508.12	$3,428,871.39	$3,763,219.78	$4,535,933.42	$5,085,065.75	$4,855,673.67

Exh. No.	Description	Average 1936-38	1939	1940	1941	1942	1943	1944	1945
102	**Operation Expense**								
	Purchased Gas-Colorado Interstate Gas Co.	$1,089,041	$1,086,803	$1,089,905	$1,093,051	$1,210,152	$1,212,008	$1,212,415	$1,213,080
102	Amarillo Office Expense	30,477	31,824	33,261	36,773	36,893	38,727	38,748	40,107
102	Land & Lease Dept. Expense	57,590	44,175	40,105	39,857	39,160	39,184	39,207	39,230
102	Well Operation Expense	281,317	274,528	309,742	312,592	315,277	318,472	321,102	356,196
110	Booster Stations Expense	259	603	603	1,808	1,808	9,645	11,453	11,453
110	Gathering System Expense	43,587	51,137	56,201	62,079	66,784	71,548	75,752	80,318
110 & 98	Compressor Station Expense	819,564	819,765	827,281	829,050	830,600	832,383	834,065	836,037
94	Gasoline Plant Expense	127,489	128,967	142,010	143,207	143,511	143,801	144,103	144,391
94	Refrigeration Plant Expense	17,990	18,300	18,300	18,300	18,300	18,300	18,300	18,300
110	Mainline System Expense	104,974	114,741	117,481	123,475	124,759	126,162	127,231	128,938
112	Telephone System Expense	42,004	42,680	42,680	42,680	42,780	42,880	42,980	44,380
116	Taxes	1,125,700	1,139,075	1,372,074	1,409,139	1,522,710	1,587,466	1,663,919	1,773,137
114	Regulatory	190,788(1)	250,000	150,000	30,000	30,000	30,000	30,000	30,000
116	General	450,105	555,385	558,299	561,891	560,323	545,584	525,132	527,176
116	New Business	17,788(1)	15,691	10,435	10,435	10,435	10,435	10,435	10,435
	Total Operation Expense	$4,398,673(2)	$4,573,674	$4,768,377	$4,714,337	$4,953,492	$5,026,595	$5,094,842	$5.253,178
	Maintenance Expense								
102	Well Maintenance Expense	$ 5,921	$ 16,011	$ 16,455	$ 18,260	$ 20,018	$ 21,494	$ 23,499	$ 25,510
110	Booster Stations Expense	66	250	250	750	750	4,000	4,750	4,750
110	Gathering System Expense	25,698	33,422	36,627	43,915	52,222	51,021	59,358	68,150
110 & 98	Compressor Station Expense	265,721	274,993	312,358	284,938	286,082	274,126	284,141	291,010
94	Gasoline Plant Expense	15,435	10,453	10,397	9,455	11,228	12,650	13,597	11,501
94	Refrigeration Plant Expense	3,550	2,983	3,721	3,246	3,684	3,133	3,469	3,011
110	Mainline System Expense	201,404	242,010	216,498	416,880	311,141	403,057	386,418	388,909
112	Telephone System Expense	21,195	26,640	26,920	27,050	27,050	27,050	27,650	28,975
	Total Maintenance Expense	$ 538,990	$ 606,762	$ 623,226	$ 804,494	$ 712,175	$ 796,531	$ 802,882	$ 821,016
	TOTAL GROSS OPERATION & MAINTENANCE	$4,937,663(2)	$5,180,436	$5,391,603	$5,518,831	$5,555,667	$5,823,126	$5,897,724	$6,074,994

Exh. No.	Description	1946	1947	1948	1949	1950	1951	1952	1953	1954
102	**Operation Expense**									
	Purchased Gas-Colorado Interstate Gas Co.	$1,214,994	$1,215,297	$1,215,304	$1,216,288	$1,217,188	$1,217,667	$1,146,877	$ 714,675	$ 303,616
102	Amarillo Office Expense	40,129	41,491	41,514	43,361	43,386	43,556	43,556	43,556	43,556
102	Land & Lease Dept. Expense	39,254	39,277	39,301	39,324	37,097	35,121	33,621	31,621	31,121
102	Well Operation Expense	359,818	363,610	366,855	370,005	372,773	374,490	359,324	244,420	131,897
110	Booster Stations Expense	28,934	51,238	69,322	84,995	101,873	128,999	165,770	173,004	124,780
110	Gathering System Expense	85,599	91,363	95,693	99,343	102,056	104,169	104,119	104,596	104,606
110 & 98	Compressor Station Expense	838,226	839,415	839,415	839,415	839,415	839,415	787,549	324,232	83,671
94	Gasoline Plant Expense	144,692	144,992	144,992	144,989	144,988	144,985	142,832	104,588	71,487
94	Refrigeration Plant Expense	18,300	18,300	18,300	18,300	18,300	18,300	18,134	15,866	13,083
110	Mainline System Expense	131,334	147,409	147,596	148,971	150,232	150,385	149,805	150,464	150,089
112	Telephone System Expense	44,380	44,380	44,380	44,380	44,380	44,380	44,380	44,380	44,380
116	Taxes	1,863,064	2,005,746	2,028,993	2,054,022	2,042,028	2,068,957	2,060,856	1,587,025	616,836
114	Regulatory	30,000	30,000	30,000	30,000	30,000	-	-	-	-
116	General	527,113	534,173	535,858	531,489	526,384	522,340	516,041	496,824	480,794
116	New Business	10,435	10,435	10,435	10,435	10,435	10,435	6,835	6,835	6,835
	Total Operation Expense	$5,376,272	$5,577,126	$5,627,958	$5,675,317	$5,680,535	$5,703,199	$5,579,999	$4,042,086	$2,206,751
	Maintenance Expense									
102	Well Maintenance Expense	$ 41,994	$ 44,926	$ 47,714	$ 50,190	$ 52,066	$ 53,484	$ 53,677	$ 53,719	$ 53,778
110	Booster Stations Expense	12,000	21,250	28,750	35,250	42,250	53,500	72,875	71,750	51,750
110	Gathering System Expense	72,832	78,696	80,555	83,726	87,896	95,234	101,110	99,467	100,058
110 & 98	Compressor Station Expense	285,963	295,307	269,361	266,685	222,535	214,253	147,069	50,180	10,951
94	Gasoline Plant Expense	13,273	11,614	10,082	13,318	9,696	9,741	9,800	6,696	2,834
94	Refrigeration Plant Expense	3,658	3,470	3,916	3,371	3,266	3,466	3,446	2,686	978
110	Mainline System Expense	448,476	504,287	511,860	552,663	587,819	594,577	568,466	551,135	534,564
112	Telephone System Expense	38,775	38,900	39,300	39,300	39,400	39,400	39,400	39,400	39,400
	Total Maintenance Expense	$ 916,971	$ 998,450	$ 991,538	$1,044,503	$1,044,928	$1,063,655	$ 995,843	$ 875,033	$ 794,313
	TOTAL GROSS OPERATION & MAINTENANCE	$6,293,243	$6,575,576	$6,619,496	$6,719,820	$6,725,463	$6,766,854	$6,575,842	$4,917,119	$3,001,064

NOTE: (1) Not an average.
(2) Not an average - sum of figures above.

TEXOMA NATURAL GAS COMPANY

SUMMARY OF OPERATION AND MAINTENANCE EXPENSE

Line No.		1932	1933	1934	1935	1936	1937	1938	Average 1936-38	1939	1940	1941	1942	1943	1944	1945	1946
	Operation Expenses																
1	Compressor Station Operation	$ 41,984.20	$ 41,265.26	$ 77,830.63	$139,115.92	$ 195,849.15	$ 196,711.58	$ 187,114.40	$ 193,225	$ 185,690	$ 193,206	$ 194,975	$ 196,525	$ 198,308	$ 199,990	$ 201,962	$ 204,151
2	Gasoline Plant Operation	76,363.49	69,563.08	90,242.59	106,097.71	122,473.35	128,323.99	131,670.18	127,489	128,967	142,010	143,207	143,511	143,801	144,103	144,391	144,692
3	Refrigeration Plant Operation	6,304.62	11,380.22	15,651.10	16,346.40	18,404.99	18,197.57	17,368.58	17,990	18,300	18,300	18,300	18,300	18,300	18,300	18,300	18,300
4	Amarillo Office Expense	42,415.12	32,013.60	31,014.30	32,683.78	30,864.60	30,018.01	30,549.04	30,477	31,824	33,261	36,773	36,893	38,727	38,748	40,107	40,129
5	Land and Lease Department Expense	116,924.59	102,533.53	93,742.66	88,016.29	61,236.95	61,084.19	50,448.40	57,590	44,175	40,105	39,857	39,160	39,184	39,207	39,230	39,254
6	Well Operation	106,439.64	88,950.00	146,221.99	203,427.30	284,248.68	280,512.77	279,190.54	281,317	274,528	305,742	312,592	315,277	318,472	321,102	356,196	359,818
7	Mainline (District #2) Operation	7,758.27	4,849.30	4,590.63	3,274.89	4,055.73	4,304.86	6,627.12	4,996	5,240	5,260	5,319	5,371	5,424	5,588	5,693	5,798
8	Gathering System (District #1) Operation	30,771.88	29,957.92	28,786.49	32,143.07	43,520.71	42,345.31	44,893.69	43,587	51,137	56,201	62,079	66,784	71,548	75,752	80,318	85,599
9	Booster Station Operation	-	-	-	-	-	-	776.28	259	603	603	1,808	1,808	9,645	11,453	11,453	28,934
10	Telephone System Operation	1,346.27	1,387.81	1,077.39	1,317.17	1,826.56	1,450.95	1,372.64	1,550	1,780	1,780	1,760	1,780	1,780	1,780	1,780	1,780
11	Regulatory Expense	-	-	-	-	-	-	-	-	50,000	30,000	6,000	6,000	6,000	6,000	6,000	6,000
12	Taxes	93,260.67	92,766.26	117,279.00	136,700.26	150,592.08	176,080.53	168,031.97	164,901	177,766	509,452	495,269	647,545	594,071	673,449	752,234	883,280
13	General	157,391.20	111,740.39	110,927.53	122,570.13	106,651.25	108,564.35	118,192.86	115,889(1)	147,266	146,305	147,925	145,448	140,733	141,811	143,188	143,745
14	Total Operation Expense	$680,959.95	$586,407.37	$717,364.31	$881,692.92	$1,019,724.05	$1,047,594.11	$1,036,235.70	$1,039,270(2)	$1,117,276	$1,486,225	$1,465,884	$1,624,402	$1,585,993	$1,677,283	$1,800,852	$1,961,480
	Maintenance Expenses																
15	Compressor Station Maintenance	$ 7,813.58	$ 3,138.62	$ 13,350.68	$ 32,497.73	$ 68,178.69	$ 120,689.86	$ 71,317.85	$ 86,729	$ 65,419	$ 87,359	$ 73,778	$ 75,763	$ 56,368	$ 55,261	$ 64,084	$ 56,914
16	Gasoline Plant Maintenance	4,506.15	1,925.00	5,063.59	6,185.69	17,505.31	16,776.49	12,022.12	15,435	10,453	10,397	9,455	11,228	12,650	13,597	11,501	13,273
17	Refrigeration Plant Maintenance	508.70	1,058.60	1,761.32	2,277.45	2,189.90	5,223.80	3,234.78	3,550	2,983	3,721	3,246	3,684	3,133	3,469	3,011	3,658
18	Well Maintenance	2,974.00	9,586.37	1,212.97	4,446.17	5,642.75	3,258.38	8,861.70	5,921	16,011	16,455	18,260	20,018	21,494	23,499	25,510	41,994
19	Mainline Maintenance	14,110.58	4,691.61	4,485.74	11,953.59	13,380.10	9,789.54	6,603.56	9,924	13,801	15,356	18,243	20,182	20,895	25,208	26,135	27,561
20	Gathering System Maintenance	24,276.30	15,569.53	11,281.20	30,125.58	28,386.08	24,573.23	24,136.38	25,698	33,422	36,627	43,915	52,222	51,021	59,358	68,150	72,832
21	Booster Station Maintenance	-	-	-	-	-	-	196.13	66	250	250	750	750	4,000	4,750	4,750	12,000
22	Telephone System Maintenance	3,671.50	3,058.88	3,347.43	3,589.77	2,803.80	3,252.91	3,331.81	3,129	4,440	4,720	4,850	4,850	4,850	5,050	5,675	6,275
23	Total Maintenance Expense	$ 57,860.81	$ 39,028.61	$ 40,502.93	$ 91,075.98	$ 138,086.63	$ 183,564.21	$ 129,704.33	$ 150,452	$ 146,779	$ 174,885	$ 172,497	$ 188,697	$ 174,411	$ 190,192	$ 208,816	$ 234,507
24	TOTAL GROSS OPERATION & MAINTENANCE	$738,820.76	$625,435.98	$757,867.24	$972,768.90	$1,157,810.68	$1,231,158.32	$1,165,940.03	$1,189,722(2)	$1,264,055	$1,661,110	$1,638,381	$1,813,099	$1,760,404	$1,867,475	$2,009,668	$2,195,987

Notes: (1) Not an average.
(2) Not an average. Sum of figures above.
(3) 1932 to 1938 inclusive reflect actual expenditures.

1946	1947	1948	1949	1950	1951	1952	1953	1954	Average 1939-54	Total 1932-54
$ 204,151	$ 205,340	$ 205,340	$ 205,340	$ 205,340	$ 205,340	$ 201,802	$ 135,889	$ 61,391	$ 187,537	$ 3,880,460.14
144,692	144,992	144,992	144,989	144,988	144,985	142,832	104,588	71,487	136,159	2,903,269.39
18,300	18,300	18,300	18,300	18,300	18,300	18,134	15,866	13,083	17,811	388,636.48
40,129	41,491	41,514	43,361	43,386	43,556	43,556	43,556	43,556	40,027	969,996.45
39,254	39,277	39,301	39,324	37,097	35,121	33,621	31,621	31,121	37,916	1,180,641.61
359,818	363,610	360,855	370,005	372,773	374,490	359,324	244,420	131,897	321,944	6,540,091.92
5,798	6,297	6,297	6,349	6,402	6,461	6,520	6,625	6,624	5,954	130,728.80
85,599	91,363	95,693	99,343	102,056	104,169	104,419	104,596	104,606	84,729	1,608,082.07
28,934	51,238	69,322	84,995	101,873	128,999	165,770	173,004	124,780	60,393	967,064.28
1,780	1,780	1,780	1,780	1,780	1,780	1,780	1,780	1,780	1,780	38,256.79
6,000	6,000	6,000	6,000	6,000	-	-	-	-	8,750	140,000.00
883,280	226,809	233,031	240,381	244,761	249,239	249,581	224,213	196,422	412,344	7,532,213.77
143,745	146,053	147,391	147,017	145,243	145,094	145,625	142,501	136,679	144,533	3,148,561.71
$1,961,480	$1,342,550	$1,376,316	$1,407,184	$1,429,999	$1,457,534	$1,472,964	$1,228,659	$ 923,426	$1,459,877	$29,328,005.41
$ 56,914	$ 59,434	$ 61,087	$ 56,378	$ 50,926	$ 48,185	$ 40,358	$ 22,343	$ 8,272	$ 55,120	$ 1,198,916.01
13,273	11,614	10,082	13,318	9,696	9,741	9,800	6,696	2,834	10,396	230,319.35
3,658	3,470	3,916	3,371	3,266	3,466	3,446	2,686	978	3,219	67,758.55
41,994	44,926	47,714	50,190	52,066	53,484	53,677	53,719	53,778	37,049	628,777.34
27,561	32,548	32,548	33,262	33,975	36,358	39,255	26,965	36,963	28,078	514,269.72
72,832	78,396	80,555	83,726	87,896	95,234	101,110	99,467	100,058	71,519	1,302,637.30
12,000	21,250	28,750	35,250	42,250	53,500	72,875	71,750	51,750	25,305	405,071.13
6,275	6,400	6,800	6,800	6,900	6,900	6,900	6,900	6,900	5,951	118,266.10
$ 234,507	$ 258,338	$ 271,452	$ 282,295	$ 286,975	$ 306,868	$ 327,421	$ 300,526	$ 261,533	$ 236,637	$ 4,466,015.50
$2,195,987	$1,600,888	$1,647,768	$1,689,479	$1,716,974	$1,764,402	$1,800,385	$1,529,185	$1,184,959	$1,696,514	$33,794,020.91

NATURAL GAS PIPELINE COMPANY OF AMERICA

SUMMARY OF OPERATION AND MAINTENANCE EXPENSES

Line No.		1932	1933	1934	1935	1936	1937	1938	Average 1936-1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	Average 1939-1954	Total 1932-1954
1	Operation Expense																										
	Purchased gas from																										
2	Colorado Interstate Gas Co.(1)	$ 378,365.84	384,039.32	643,975.84	839,119.01	$1,075,485.64	$1,130,277.82	1,061,359.13	$1,089,041	$1,086,803	$1,089,905	$1,093,051	$1,210,152	$1,212,008	$1,212,415	$1,213,080	$1,214,994	$1,215,297	$1,215,304	$1,216,288	$1,217,188	$1,217,667	$1,146,877	$ 714,675	$ 303,616	$1,098,708	$ 23,091,940.60
3	Texoma Natural Gas Co. (1)	2,014,372.88	1,926,575.71	2,993,672.17	3,398,828.30	4,044,478.38	3,321,004.23	3,724,114.97	3,696,533	4,179,695	5,029,298	4,767,519	5,184,103	4,728,685	5,034,587	5,164,273	5,677,992	1,616,338	1,566,043	1,479,143	1,524,101	1,454,647	1,241,749	1,118,407	940,418	3,169,187	72,130,044.64
4	Compressor Station Operation	120,642.27	123,358.10	351,957.29	467,836.29	590,028.76	682,502.58	606,485.91	626,339	634,075	634,075	634,075	634,075	634,075	634,075	634,075	634,075	634,075	634,075	634,075	634,075	634,075	585,747	138,343	22,230	564,959	11,982,356.20
5	Pipeline Department Operation	118,029.64	87,212.91	91,141.69	89,754.79	95,377.40	97,800.55	106,257.84	99,978	109,501	112,221	118,156	119,388	120,738	121,643	123,245	125,536	141,112	141,299	142,622	143,330	143,924	143,285	143,839	143,465	130,863	2,779,578.82
6	Telephone Department Operation	38,825.49	38,440.48	37,572.69	39,082.50	39,561.66	40,883.94	40,916.67	40,454	40,900	40,900	40,900	41,000	41,100	41,200	42,600	42,600	42,600	42,600	42,600	42,600	42,600	42,600	42,600	42,600	41,994	947,283.43
7	Regulatory Expense	--	--	--	--	--	41,467.63	190,788.47	190,788(2)	200,000	120,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	--	--	--	--	35,000	792,256.10
8	Tax Expense	225,649.43	273,625.99	218,300.01	532,128.58	796,658.50	1,130,600.94	955,138.22	960,799	961,309	862,622	913,370	875,165	993,395	990,470	1,020,903	979,784	1,778,937	1,795,962	1,813,641	1,797,267	1,315,715	1,311,275	1,362,312	420,414	1,262,346	24,329,645.67
9	General Expense	331,880.34	316,102.55	297,072.39	292,125.05	277,387.44	329,663.86	351,532.85	334,216(2)	408,119	411,994	413,966	414,875	404,851	383,321	383,968	383,368	385,120	387,967	364,472	381,141	377,246	370,416	354,323	344,115	387,016	5,388,096.48
10	New Business Expense	86,104.76	219,149.32	889,060.43	308,006.18	81,422.91	16,115.48	17,788.18	17,788(2)	15,691	10,435	10,435	10,435	10,435	10,435	10,435	10,435	10,435	10,435	10,435	10,435	10,435	6,835	6,835	6,835	10,083	1,779,063.26
11	TOTAL OPERATION EXPENSE	$3,314,070.65	3,368,504.38	5,522,750.51	5,966,880.70	7,000,900.69	6,790,317.03	7,054,432.24	7,055,936(3)	7,636,093	8,311,450	8,015,972	8,513,193	8,169,287	8,452,146	8,616,599	9,092,784	5,850,914	5,817,685	5,747,276	5,774,637	5,700,312	5,346,764	3,931,834	2,223,743	6,700,163	146,220,565.20
12	Maintenance Expenses																										
13	Compressor Station Maintenance	12,623.57	8,021.00	63,433.60	105,773.48	183,030.47	219,946.95	133,998.41	178,992	209,574	224,999	211,160	210,319	217,758	236,880	226,926	229,049	235,873	206,274	210,307	171,609	166,066	106,711	27,837	2,679	180,501	3,614,850.15
14	Pipeline Department Maintenance	198,722.97	91,799.11	58,869.36	100,043.02	223,138.76	146,245.24	205,054.28	191,430	229,209	201,142	398,637	290,959	382,162	361,210	362,774	420,915	471,739	479,312	519,401	553,844	556,219	529,211	514,170	497,601	423,094	7,793,377.74
15	Telephone Department Maintenance	16,374.66	15,323.36	19,622.85	16,582.28	15,531.20	18,402.44	20,263.68	18,066	22,200	22,200	22,200	22,200	22,200	22,600	23,300	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	25,083	571,500.47
16	TOTAL MAINTENANCE EXPENSE	227,721.20	115,143.47	141,925.81	222,398.48	421,700.43	384,594.63	359,316.37	388,538	459,983	448,341	631,997	523,478	622,120	612,690	613,000	682,464	740,112	720,086	762,203	757,953	756,787	668,422	574,507	532,780	631,683	11,979,725.39
17	TOTAL GROSS OPERATION & MAINTENANCE	$3,541,791.85	$3,483,647.85	$5,664,676.32	$6,189,279.18	$7,422,601.12	$7,174,911.66	$7,413,748.61	$7,444,474(3)	$8,096,076	$8,759,791	$8,647,969	$9,036,671	$8,791,407	9,084,836	$9,229,599	$9,775,248	$6,591,026	$6,537,771	$6,509,434	$6,532,590	$6,457,099	$6,017,206	$4,506,341	$2,756,523	$7,331,846	$153,200,293.59

Note: (1) Transportation charge has been transferred from Colorado Interstate to Texoma for the purpose of this exhibit.

(2) Not an average.

(3) Not an average but is sum of figures above.

2037 EXHIBIT NO. 122. Page No. 1

Natural Gas Pipeline Company of America

Recap of Salvage
as of 6-1-39

Investment Items	Total Salvage	Cost to Reclaim	Net Salvage
Acct. #1000—Lands in Fee	$ 3,488	$ 32,400	*$ 28,912
Acct. #1002—Right-of-way & Damages (57 crossings)		14,250	* 14,250
Acct. #1005—Main Lines	8,529	6,691	1,838
Acct. #1006—Compressor Station:			
(a)—Steel frame buildings	12,373	—	12,373
(b)—Wood frame buildings (117)	11,700	—	11,700
(c)—Water Well Equipment	4,421	—	4,421
(d)—Main Engines, Boilers, & Scrubbers	95,663	126,043	* 30,380
(e)—Engines, motors, & Generators	19,236	738	18,498
(f)—Tanks	4,877	3,062	1,815
(g)—Cooling Sections	6,028	—	6,028
(h)—Piping	65,728	49,296	16,432
(i)—Electrical Materials	3,048	764	2,284
(j)—Miscellaneous Equipment	2,223	—	2,223
Acct. #1008—Telephone System	150,629	53,561	97,068
Acct. #1009—Meters & Regulators	4,255	—	4,255
Acct. #1010—Structures	2,671	—	2,671
Acct. #1011—Branch Lines	7,411	5,558	1,853
Acct. #1013—Tools	8,885	—	8,885
Acct. #1014—Laboratory Equipment	1,412	—	1,412
Acct. #1015—Automotive Equipment	24,366	—	24,366
Acct. #1016—Furniture & Fixtures	11,927	—	11,927
Totals	$448,870	$292,363	$156,507

Note: * = red figure.

Natural Gas Pipeline Company of America

Recap of Salvage
Added After 6-1-39

Investment Items	Total Salvage	Cost to Reclaim	Net Salvage
Acct. #1000—Lands in Fee	$ 0	$ 0	$ 0
Acct. #1002—Right of Way and Damages	0	0	0
Acct. #1005—Main Lines	738	553	185
Acct. #1006—Compressor Station	—	—	—
a—Steel Frame Buildings	1,065	—	1,065
b—Wood Frame Buildings (32)	3,200	—	3,200
c—Water Well Equipment	3,159	—	3,159
d—Main Engines, Boilers, and Scrubbers	1,633	2,066	*—433
e—Engines, Motors, and Generators	6,477	—	6,477
f—Boilers, Tanks	175	—	175
g—Cooling Sections	—	—	—
h—Piping	13,900	10,426	3,474
i—Electrical Materials	334	64	270
j—Miscellaneous Equipment	135	153	*—18
Acct. #1008—Telephone System	0	—	0
Acct. #1009—Meters and Regulators	25	—	25
Acct. #1010—Structures	0	—	0
Acct. #1011—Branch Lines	0	—	0
Acct. #1013—Tools	7,292	—	7,292
Acct. #1014—Laboratory Equipment	0	—	0
Acct. #1015—Automotive Equipment	18,475	—	18,475
Acct. #1016—Furniture & Fixtures	856	—	856
Total	$ 57,464	$ 13,262	$ 44,202

Note: * denotes red figure

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Texoma Natural Gas Company

Recap of Salvage

as of 6-1-39

T.N.G. Account Number	Total Salvage	Cost to Reclaim	Net Salvage
1000—Lands in Fee	$ 380	$ 11,032	*$ 10,652
1002—Right of Way & Damages (7 Railroad Crossings)		1,750	* 1,750
1003—Gas Wells, 159 wells	130,770	95,253	35,517
1004—Gathering System	110,562	82,921	27,641
1005—Main Line	371	278	93
1006—Compressor Station:			
(a)—Steel Frame Buildings	3,320	—	3,320
(b)—Wood Frame Buildings (40)	4,000	—	4,000
(c)—Water Wells	—	—	—
(d)—Main Engine Scrubbers	28,770	46,491	* 17,721
(e)—Generators, motors, et cetera	7,146	111	7,035
(f)—Tanks	1,282	407	875
(g)—Cooling Facilities	1,459	—	1,459
(h)—Piping	13,251	9,938	3,313
(i)—Electrical Material	419	104	315
(j)—Miscellaneous Equipment	802	—	802
1007—Gasoline & Refrigerating Plant:			
(a)—Steel Frame Buildings	1,387	—	1,387
(b)—Loading Rack	233	—	233
(c)—Railroad Siding	1,509	2,016	* 507
(d)—Absorbers (9)	9,000	—	9,000
(e)—Compressors, Motors, et cetera	3,028	351	2,677
(f)—Tankage, Boilers	8,195	—	8,195
(g)—Cooling Facilities	1,475	—	1,475
(h)—Piping	10,410	7,808	2,602
(i)—Electrical Material	283	78	205
(j)—Miscellaneous Equipment	650	—	650
(k)—Miscellaneous Scrap	854	1,290	* 436
1008—Telephone System	21,744	6,223	15,521
1009—Meters and Regulators	5,108	—	5,108
1010—Structures	2,383	5,577	* 3,194
1012—Drilling & Cleanout Tools	3,577	—	3,577
1013—Tools	1,703	—	1,703
1014—Laboratory Equipment	985	—	985
1015—Automotive Equipment	8,477	—	8,477
1016—Furniture & Fixtures	4,764	—	4,764
1024—Booster Stations:			
(a)—Compressors & Engines	227	—	227
(b)—Piping	36	29	7
Total to June 1, 1939	$388,560	$271,657	$116,903

Note: * = Red figure.

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Texoma Natural Gas Company

Recap of Salvage Added After 6-1-39

	Total Salvage	Cost to Reclaim	Net Salvage
Account 1000 Lands in Fee	$ 47	$ 200	$ *—153
Account 1002 Right of Way and Damages	0		0
Account 1003 Gas Wells (197)	133,909	117,730	16,179
Account 1004 Gathering System	111,569	83,677	27,892
Account 1005 Main Line	72	54	18
Account 1006 Compressor Station			
(a) Steel Frame Buildings	800	—	800
(b) Wood Frame Buildings (18)	1,800	—	1,800
(c) Water Wells	—	—	—
(d) Main Engine Scrubbers	2,413	3,848	*—1,435
(e) Generators, Motors, etc.	508	24	484
(f) Tanks	748	863	*—115
(g) Cooling Facilities	134	—	134
(h) Piping	2,182	1,637	545
(j) Electrical Material	60	6	54
(j) Miscellaneous Equipment	48	—	48
Account 1007 Gasoline & Refrigeration Plant			
(a) Steel Frame Buildings	0	0	0
(b) Loading Rack	0	0	0
(c) Railroad Siding	0	0	0
(d) Absorbers	0	0	0
(e) Compressors, Motors, etc.	436	92	344
(f) Tankage, Boilers	1,985	—	1,985
(g) Cooling Facilities	0		0
(h) Piping	1,582	1,187	395
(i) Electrical Material	0		0
(j) Miscellaneous Equipment	128	—	128
(k) Miscellaneous Scrap	0	0	0
Account 1008 Telephone System	782	271	511
Account 1009 Meters & Regulators	5,154	—	5,154
Account 1012 Structures	4,547	3,973	574
Account 1012 Drilling & Cleanout Tools	5,006	—	5,006
Account 1013 Tools	1,604	—	1,604
Account 1014 Laboratory Equipment	0	0	0
Account 1015 Automotive Equipment	8,542	—	8,542
Account 1016 Furniture & Fixtures	956	—	956
Account 1024 Booster Station			
(a) Compressors & Engines	63,293	1,423	61,870
(b) Piping	8,129	6,097	2,032
Total to 6-1-39	$356,434	$221,082	$135,352

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*—denotes red figure.

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Natural Gas Pipeline Company of America

Warehouse Stock

Item	Total Weight	Total Salvage	Cost to Reclaim	Net Salvage
As of June 1, 1939				
Compressor Sta. Eng. Parts	203.72T	$2,318.00	$1,508.00	$ 810.00
Com. Sta. Pipe & Fittings—12" & under	9.40T	188.00	28.00	160.00
P. L. Dept. Pipe & Ftgs. 12" & Under	201.63T	4,033.00	605.00	3,428.00
P. L. Dept. Pipe & Ftgs. Over 12"	663.59T	7,552.00	4,911.00	2,641.00
Electrical Materials	2611#	196.00	10.00	186.00
Net Salvage as of 6-1-39				$7,225.00
After June 1, 1939				
6" Pipe from Beatrice Water L.	77.0 T	1,540.00	231.00	1,309.00
18" & 24" Pipe & Clamps—Salvaged	249.18T	2,836.00	1,844	992.00
Net Salvage Added After 6-1-39 to End of Project				$2,301.00

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Texoma Natural Gas Company

Warehouse Stock

Item	Total Weight	Total Salvage	Cost to Reclaim	Net Salvage
As of 6-1-39				
Compressor & Gaso. Plant Eng. Parts	207.37T	$2,360.00	$2,115.00	$ 245.00
P. L. Dept. Pipe & Fittings—12" & Under	403.06T	8,061.00	1,209.00	6,852.00
P. L. Dept. Pipe & Fittings—Over 12"	62.62T	713.00	639.00	74.00
Prod. Dept. Whse. Stock—Pipe, Etc.	447.83T	8,957.00	1,343.00	7,614.00
Prod. Dept. Misc. Material	3.00T	34.00	31.00	3.00
Net Salvage as of 6-1-39				$14,788.00

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Natural Gas Pipeline Company of America
and
Texoma Natural Gas Company

Recap of Salvage Values
(Recap of pgs 1-6 incl.)

Line No.	Natural Gas Pipeline Co. of America	Plant & Stock Account as of June 1, 1939	Added from 6-1-39 to Dec. 31, 1954	Plant & Stock Account Existing Dec. 31, 1954
1	Salvage Value of Plant	$156,507	$ 44,202	$200,709
2	Salvage Value of Stock	7,225	2,301	9,526
3	Total N. G. P. L. Co.	$163,732	$ 46,503	$210,235
	Texoma Natural Gas Company			
4	Salvage Value of Plant	$116,903	$135,352	$252,255
5	Salvage Value of Stock	14,788	0	14,788
6	Total T. N. G. Co.	$131,691	$135,352	$267,043
7	Total Both Companies			$477,278

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Scrap Market at Chicago—No. 1 Heavy Melting Steel
(From Chicago Journal of Commerce)
(Quotations are in dollars per gross ton, 2240 Lbs.)

Aug. 31, 1925	$16.50 — $17.00
Aug. 31, 1926	14.00 — 14.50
Aug. 31, 1927	12.00 — 12.50
Aug. 31, 1928	12.75 — 13.25
Aug. 31, 1929	15.25 — 15.75
Aug. 31, 1930	12.50 — 13.00
Aug. 31, 1931	8.00 — 8.50
Aug. 31, 1932	6.00 — 6.50
Aug. 31, 1933	10.00 — 10.50
Aug. 31, 1934	8.75 — 9.25
Aug. 31, 1935	12.50 — 13.00
Aug. 31, 1936	15.50 — 16.00
Aug. 31, 1937	19.50 — 20.00
Aug. 31, 1938	13.50 — 14.00

Mean average for past 14 years	12.88 per gross ton
Mean average for past 14 years	11.50 per net ton
Price per net ton June 1, 1939, Aver.	12.75 per gross ton
Price per net ton June 1, 1939, Aver.	11.38 per net ton

Note: Mixed scrap is $2.00 per ton less.

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Minimum Carlots (75,000 Lbs.)—Scrap Iron & Steel From Shipping Points Given below to Chicago

Station	#1	Fritch, Texas	$7.20 net ton
Station	#2	Perryton, Texas	7.00 net ton
Station	#3	Minneola, Kans.	5.80 net ton
Station	#4	Heizer, Kans.	5.40 net ton
Station	#5	Glasco, Kans.	5.00 net ton
Station	#6	Beatrice, Nebr.	4.40 net ton
Station	#7	Hastings, Iowa	3.80 net ton
Station	#8	Truro, Iowa	3.20 net ton
Station	#9	Harper, Iowa	2.80 net ton
Station	#10	Geneseo, Ill.	2.00 net ton
		Joliet, Ill.	1.06 net ton

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#1 Scrap Copper Market Prices at Chicago (From Chicago Journal of Commerce)

	Cents per Pound	
August 31, 1925	11.75 —	12.00
August 31, 1926	10.75 —	11.25
August 31, 1927	9.50 —	10.00
August 31, 1928	11.00 —	11.50
August 31, 1929	14.00 —	14.50
August 31, 1930	9.00 —	9.25
August 31, 1931	5.25 —	5.75
August 31, 1932	3.50 —	3.75
August 31, 1933	6.37 —	6.62
August 31, 1934	5.75 —	6.00
August 31, 1935	6.25 —	6.50
August 31, 1936	7.50 —	7.75
August 31, 1937	11.25 —	11.50
August 31, 1938	7.50 —	7.75
14-year average	8.53 —	8.87
June 1, 1939	7.25 —	7.75

(Averaging 7.5c/lb.)

2047 **Page No. 11**

N.G.P. Co.

Acct. #1000—Lands in Fee

Location	Total Acreage	Number of Acres Salable	Price per Acre	Cash from Salable Acreage	Cost to Demolish and Clear Foundations
Compressor Station No. 2, Oklahoma	30	7.5	$ 15	$ 112	$ 3,600
Compressor Station No. 3, Kansas	30	7.5	18	135	3,600
Compressor Station No. 4, Kansas	80	20.	18	360	3,600
Compressor Station No. 5, Kansas	30	7.5	30	225	3,600
Compressor Station No. 6, Nebraska	30	7.5	30	225	3,600
Compressor Station No. 7, Iowa	43.1	10.77	45	485	3,600
Compressor Station No. 8, Iowa	40	10.	45	450	3,600
Compressor Station No. 9, Iowa	35.39	8.85	60	531	3,600
Compressor Station No. 10, Illinois	30	7.5	100	750	3,600
Red Oak Warehouse Site, Iowa	1.322			15	
Strip on Main Line Marion County, Iowa	20.1	No Salvage			
*Joliet Regulator Station, Illinois	2.				
*Joliet Meter Station, Illinois	10.				
Ottawa Warehouse Site, Illinois	City Lots	3 Lots		250	50
Total as of 6-1-39				$3,538	$ 32,450
	No investment added after 6-1-39				$ 3,538
				Net Salvage	$ †28,912

* To be disposed of with building, etc. of Account 1010.

Note: † = red figure.

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N.G.P. Co.

1002 Right of-Way

As of 6-1-39

	Net Salvage
No salvage on right-of-way.	
57 R.R. Crossings will cost $250 each to place in orig. condition in accordance with crossing contracts	$*14,250
No expenditures 6-1-39 to end of project	$ 0

Note: * Denotes red figure.

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N.G.P. Co.

1005—Maintenance

As of 6-1-39

	Length	Weight	Total Salvage	Cost to Reclaim	Net Salvage
24" Mainline	4,150,141.90′	172,197.7 Tons	Not Salvageable		
18" River Lines	352,212.80′	12,431.1 Tons	Not Salvageable		
16" River Lines	35,293.00′	1,104.3 Tons	Not Salvageable		
12" River Lines	283,189.90′	7,017.7 Tons	Not Salvageable		
10" River Lines	38,158.00′	835.5 Tons	Not Salvageable		
17-24"x12"-6 Run Headers		60.5 Tons	Not Salvageable		
49-24"x18"-2 Run Headers		61.3 Tons	Not Salvageable		
22-18"x12"-3 Run Headers		30.8 Tons	Not Salvageable		
3-24"x16"-3 Run Headers		6.9 Tons	Not Salvageable		
4-18"x10"-5 Run Headers		7.5 Tons	Not Salvageable		
90-24" OS&Y Flgd. Gate Valves		243.0 Tons	Not Salvageable		
98-18" OS&Y Flgd. Gate Valves		228.3 Tons	Not Salvageable		
18-16" OS&Y Glgd. Gate Valves		6.9 Tons	Not Salvageable		
			$20/Ton	$15/Ton	$ 5/Ton
104-¾" Gate Valves		1,456#			
106-1" Gate Valves		3,604#			
13-2" Gate Valves		1,300#			
9-2" Merco Valves		720#			
762-3" Gate Valves		114,500#			
119-3" Merco Valves		15,946#			
7-4" Gate Valves		1,645#			
191-6" Gate Valves		90,725#			
8-6" Merco Valves		2,480#			
1-8" Merco Valve		458#			
23-10" Gate Valves		31,050#			
34-10" Merco Valves		23,086#			
209-12" Gate Valves		386,650#			
Sub-Total		673,620#			
Pipe & Fittings 12" & Under Joliet M. & R. Stas.					
4-2" Tube Turns		8#			
18-3" Tube Turns		288#			
8-3" Flgd. Ells		48#			
4-4" Flanges		120#			
32-6" Flanges		1,408#			
8-6" Tube Turns		224#			
33-10" Tube Turns		3,135#			
66-10" Flanges		6,006#			
6-10" C. S. Tees		3,240#			
6" Seamless Pipe	372′	7,163#			
8" Seamless Pipe	100′	2,860#			
10" Seamless Pipe	531′	21,240#			
12" Seamless Pipe	120′	5,952#			
Sub-total		51,752#			
Total		362.66T	$7253	$5440	$1813

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N.G.P. Co.

1005—Maintenance (Continued)

	Length	Weight	Total Salvage	Cost to Reclaim	Net Salvage
Brot. For'd.			$7253	$5440	$1813
Joliet Regulator Sta. Scrap Mat'l.			$11.38/Ton	$11.06/Ton	$.32/Ton
3-60" Scrubbers		110,000#			
Charging Tanks & Platform.		9,520#			
18-16" Gate Valves		69,300#			
12-16" Steel Tees		16,200#			
3-16" Ells. Ser 40		2,700#			
2-16" Ells. Ser 60		2,670#			
4-16" Tube Turns		1,000#			
9-16" Flanges		2,277#			
16" Seamless Pipe	200′	12,520#			
Sub-Total		226,187#			
		113.09T	$1276	$1251	$ 25
Total as of 6-1-39			$8529	$6691	$1838

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N.G.P. Co.

1005—Mainline

Added after 6-1-39

Description	Units	Unit Wt. Lbs.	Total Wt.	Total Salvage	Cost to Reclaim	Net Salvage
18" Pipe	1,820′	70.589	64.20T	No Salvage	......	......
16" Pipe	11,100′	62.579	347.30T	No Salvage	......	......
12" Pipe	17,600′	49.562	436.10T	No Salvage	......	......
3" Ser. 40 Gates	19	150	2,850			
6" Ser. 40 Gates	97	458	44,426			
12" Ser. 40 Gates	8	1850	14,800			
12" Auto. 40 Gates	6	1950	11.700			
Total Lbs.			73,776			
Total Tons			36.89T	$737.80	$553.35	$184.45

N.G.P. Co.

Acct. 1006-a Steel Frame Bldgs.—As of 6-1-39

	Original Cost	Salvage
Recap. Steel Frame cor. ir. bldgs. (transite rooms Sta. 4 & 10)		
Main Compressor Bldgs. all stations	$ 89,303	$ 4,465
Auxiliary and other steel bldgs. at all stations	79,080	7,908
Total	$168,383	$12,373

Main Compressor Bldgs.			Original Cost	
				*28' Extension
Sta. 2	Mississippi Valley Str. Steel Co.	68x168x28'-9"	$ 9,602	$ 2,435
3	Mississippi Valley Str. Steel Co.	68x168x28'-9"	9,286	2,333
4	Mississippi Valley Str. Steel Co.	68x140x28'-9"	7,398	2,373
5	Mississippi Valley Str. Steel Co.	68x140x28'-9"	7,265	2,353
6	Mississippi Valley Str. Steel Co.	68x140x28'-9"	7,059	2,286
7	Mississippi Valley Str. Steel Co.	68x140x28'-9"	6,919	2,187
8	Mississippi Valley Str. Steel Co.	68x140x28'-9"	6,774	1,979
9	Mississippi Valley Str. Steel Co.	68x168x28'-9"	8,290	2,185
10	Mississippi Valley Str. Steel Co.	68x140x28'-9"	6,438	2,141
		Total	$ 69,031	$20,272
		Total		$89,303
		Salvage @ 5%		$ 4,465

* Extensions added in 1938 and 1939.

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~~N.G.P. Co.~~

1006-a Continued

Location	Building	Type	Size	Cost	
Sta. 2	Auxiliary	Miss. V. Str. S. Co.	30′x126′x16′	$ 2,716	
	Fire House	Stefco St. Co.	6′x8′x5′9″	77	
	2-Garages	Miss. V. Str. S. Co.	20′x64′x11′	2,112	
	Meter & Reg. House	Miss. V. Str. S. Co.	12′x30′x9′6″	401	
	P. L. Whse. & Gar.	Miss. V. Str. S. Co.	24′x36′x11′	954	
	Sump Pump Hse.	Miss. V. Str. S. Co.	10′x10′x9′3″	148	
	Warehouse & Gar.	Miss. V. Str. S. Co.	20′x56′x10′6″	1,046	
	Water Softener Bldg.	Miss. V. Str. S. Co.	16′x30′x12′	561	
	3-Well Hses.	Miss. V. Str. S. Co.	8′x8′x8′	330	
					$ 8,34
Sta. 3	Auxiliary	Miss. V. Str. S. Co.	30′x126′x16′	$ 2,660	
	Fire House	Stefco St. Co.	6′x8′x5′9″	73	
	2-Garages	Miss. V. Str. S. Co.	20′x56′x11′	1,890	
	Meter & Regulator	Miss. V. Str. S. Co.	12′x30′x9′6″	396	
	P. L. Whse. & Gar.	Miss. V. Str. S. Co.	24′x36′x11′	954	
	Sump Pump Hse.	Miss. V. Str. S. Co.	10′x10′x9′3″	147	
	Warehouse & Gar.	Miss. V. Str. S. Co.	20′x56′x10′6″	943	
	Water Softener Bldg.	Miss. V. Str. S. Co.	16′x32′x14′	706	
	3-Well Hses.	Miss. V. Str. S. Co.	8′x8′x8′	330	
	Emergency Whse.	Stefco St. Co.	24′x48′x8′	1,283	
					$ 9,38
Sta. 4	Auxiliary	Miss. V. Str. S. Co.	30′x126′x16′	$ 2,635	
	Fire House	Stefco St. Co.	6′x8′x5′9″	72	
	2-Garages	Miss. V. Str. S. Co.	20′x64′x11′	2,056	
	Meter & Regulator	Miss. V. Str. S. Co.	12′x30′x9′6″	393	
	P. L. Whse. & Gar.	Miss. V. Str. S. Co.	24′x48′x11′	1,165	
	Sump Pump Hse.	Miss. V. Str. S. Co.	10′x10′x9′3″	146	
	Warehouse & Gar.	Miss. V. Str. S. Co.	20′x56′x10′6″	905	
	Water Softener Bldg.	Miss. V. Str. S. Co.	18′x36′x14′	563	
	3-Well Hses.	Miss. V. Str. S. Co.	8′x8′x8′	330	
	Emergency Whse.	Stefco St. Co.	24′x48′x8′	1,267	
					$ 9,5

* * *

N.G.P. Co.

1006-a Continued.

Location	Building	Type	Size	Cost	
Sta. 5	**Auxiliary**	**Miss. V. Str. S. Co.**	30'x126'x16'	$ 2,599	
	Fire House	**Stefco St. Co.**	6'x8'x5'9"	72	
	2-Garages	**Miss. V. Str. S. Co.**	20'x56'x11'	1,882	
	Meter & Reg. Hse.	**Miss. V. Str. S. Co.**	12'x30'x9'6"	386	
	P. L. Whse. & Gar.	**Miss. V. Str. S. Co.**	24'x24'x11'	785	
	Sump Pump Hse.	**Miss. V. Str. S. Co.**	10'x10'x9'3"	146	
	Warehouse & Gar.	**Miss. V. Str. S. Co.**	20'x56'x10'6"	844	
	Water Softener Bldg.	**Miss. V. Str. S. Co.**	16'x32'x14'	692	
	3-Well Hses.	**Miss. V. Str. S. Co.**	8'x8'x8'	330	
	P. L. Whse. Extension	**Miss. V. Str. S. Co.**	24'x48'x8'	1,083	
					$ 8,819
Sta. 6	**Auxiliary**	**Miss. V. Str. S. Co.**	30'x126'x16'	$ 2,545	
	Fire House	**Stefco St. Co.**	6'x8'x5'9"	71	
	2-Garages	**Miss. V. Str. S. Co.**	20'x48'x11'	1,522	
	Meter & Reg. Hse.	**Miss. V. Str. S. Co.**	12'x30'x9'6"	380	
	P. L. Whse. & Gar.	**Miss. V. Str. S. Co.**	24'x48'x11'	1,049	
	Sump Pump Hse.	**Miss. V. Str. S. Co.**	10'x10'x9'3"	144	
	Warehouse & Gar.	**Miss. V. Str. S. Co.**	20'x72'x10'6"	1,137	
	Water Softener Bldg.	**Miss. V. Str. S. Co.**	18'x36'x14'	545	
	3-Well Hses.	**Miss. V. Str. S. Co.**	8'x8'x8'	330	
	P. L. Whse Extension	**Miss. V. Str. S. Co.**	24'x48'x8'	1,305	
					$ 9,028
Sta. 7	**Auxiliary**	**Miss. V. Str. S. Co.**	30'x126'x16'	$ 2,545	
	Fire House	**Stefco St. Co.**	6'x8'x5'9"	69	
	2-Garages	**Miss. V. Str. S. Co.**	20'x40'x11'	1,318	
	Meter & Reg. Hse.	**Miss. V. Str. S. Co.**	12'x30'x9'6"	412	
	Sump Pump Hse.	**Miss. V. Str. S. Co.**	10'x10'x9'6"	142	
	Warehouse & Gar.	**Miss. V. Str. S. Co.**	20'x72'x10'6"	1,031	
	Water Softener Bldg.	**Miss. V. Str. S. Co.**	16'x32'x17'6"	660	
	2-Well Hses.	**Miss. V. Str. S. Co.**	8'x8'x8'	220	
					$ 6,397

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N.G.P. Co.

1006-a Continued

Location	Building	Type	Size	Cost	
Sta. 8	Auxiliary	Miss. V. Str. S. Co.	30'x126'x16'	$ 2,500	
	Fire House	Stefco St. Co.	6'x8'x5'9"	68	
	2 Garages	Miss. V. Str. S. Co.	20'x64'x11'	1,934	
	Meter & Reg. Hse.	Miss. V. Str. S. Co.	12'x30'x9'6"	432	
	P. L. Whse. & Gar.	Miss. V. Str. S. Co.	24'x48'x11'	1,060	
	Sump Pump Hse.	Miss. V. Str. S. Co.	10'x10'x9'3"	142	
	Warehouse & Gar.	Miss. V. Str. S. Co.	20'x56'x10'6"	868	
	Water Softener Bldg.	Miss. V. Str. S. Co.	12'x50'x10'	753	
	3-Water Well Hses.	Miss. V. Str. S. Co.	8'x8'x8'	330	
	P. L. Whse. Extension	Miss. V. Str. S. Co.	24'x48'x8'	1,236	
					$ 9,323
Sta. 9	Auxiliary	Miss. V. Str. S. Co.	30'x126'x16'	$ 2,511	
	Fire House	Stefco St. Co.	6'x8'x5'9"	67	
	Garage	Miss. V. Str. S. Co.	20'x48'x11'	830	
	Garage	Miss. V. Str. S. Co.	20'x80'x11'	1,440	
	Meter & Reg. Hse.	Miss. V. Str. S. Co.	12'x30'x9'6"	409	
	P. L. Whse. & Gar.	Miss. V. Str. S. Co.	24'x48'x11'	1,229	
	Sump Pump Hse.	Miss. V. Str. S. Co.	10'x10'x9'3"	142	
	Warehouse & Gar.	Miss. V. Str. S. Co.	20'x80'x10'6"	1,020	
	3-Well Hses.	Miss. V. Str. S. Co.	8'x8'x8'	330	
	Emergency Whse.	Stefco St. Co.	24'x48'x8'	1,173	
					$ 9,151
Sta. 10	Auxiliary	Miss. V. Str. S. Co.	30'x126'x16'	$ 2,454	
	Fire House	Stefco St. Co.	6'x8'x5'9"	65	
	Garage	Miss. V. Str. S. Co.	20'x32'x11')		
	3-Garages	Miss. V. Str. S. Co.	20'x48'x11')	2,028	
	Meter & Reg. Hse.	Miss. V. Str. S. Co.	12'x30'x9'6"	400	
	P. L. Whse. & Gar.	Miss. V. Str. S. Co.	24'x48'x11'	1,025	
	Sump Pump Hse.	Miss. V. Str. S. Co.	10'x10'x9'3"	142	
	Warehouse & Gar.	Miss. V. Str. S. Co.	20'x72'x10'6"	996	
	Water Softener Bldg.	Miss. V. Str. S. Co.	18"x36'x15'6"	530	
	2-Well Hses.	Miss. V. Str. S. Co.	8'x8'x8'	220	
	Emergency Whse.	Stefco St. Co.	24'x48'x8'	1,144	
					$ 9,004
	Total Auxiliary and other steel bldgs.				$79,080
	Salvage @ 10%				7,908

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N.G.P. Co.

1006-a Steel Frame Bldgs.—Added after 6-1-39

ocation	Building	Type	Size	Cost	Total
ta. 2	2 Well Houses	Miss. Valley	8′x8′x8′	$ 220.00	
3	2 Well Houses	Miss. Valley	8′x8′x8′	220.00	
4	2 Well Houses	Miss. Valley	8′x8′x8′	220.00	
5	2 Well Houses	Miss. Valley	8′x8′x8′	220.00	
6	3 Well Houses	Miss. Valley	8′x8′x8′	330.00	
7	2 Well Houses	Miss. Valley	8′x8′x8′	220.00	
8	1 Well House	Miss. Valley	8′x8′x8′	110.00	
9	2 Well Houses	Miss. Valley	8′x8′x8′	220.00	
ta. 6	Shop Building	Miss. Valley	30′x126′x12′6″	5,500.00	
	4 Car Garage	Miss. Valley	20′x32′x8′	815.00	
	3-Two Car Garages	Miss. Valley	20′x16′x8′	1,400.00	
	6-Two Car Garages	Miss. Valley	20′x48′x8′	1,174.00	
	Total Added After 6-1-39				$10,649.00
	Salvage at 10%				$ 1,065.00

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Natural Gas Pipeline Company of America
Salvage Study

Acct. #1006-b—Wood Frame Buildings August 14, 1939

	Number	Salvage Value @ $100 ea.	Cost to Reclaim	Net Salvage
4-Room Cottages	75	$ 7,500		
5-Room Cottages	26	2,600		
Duplex Cottages	1	100		
Bunk Houses	3	300		
5-Room Boarding Houses	3	300		
Office Buildings	9	900		
To 6-1-39	117	$11,700		$11,700
6-1-39 to end of project	32	3,200		3,200

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N.G.P.L.

1006-C Water Well Equipment

As of 6-1-39

Motors—All Stations	Original Cost	10% Salvage
Station No. 2 2-15HP. GE 440V. 1750 RPM Motors	$ 750	
Station No. 3 1-15HP. GE 440V. 1200 RPM Motors	565	
Station No. 3 2-15HP. GE 440V. 1750 RPM Motors	750	
Station No. 4 2-20HP. GE 440V. 1750 RPM Motors	850	
Station No. 5 2-15HP. GE 440V. 1750 RPM Motors	750	
Station No. 6 3-5 HP. GE 440V. 1740 RPM Motors	750	
Station No. 7 2-20HP. GE 440V. 1750 RPM Motors	850	
Station No. 8 3-20HP. GE 440V. 1750 RPM Motors	1,275	
Station No. 9 2-30HP. GE 440V. 1750 RPM Motors	2,070	
Station No. 9 1-40HP. GE 440V. 1750 RPM Motors	1,100	
Station No. 10 2-40-50 GE 440V. 1750 RPM Motors	2,200	
Total Motors	$11,910	$1,191
Station No. 2 2-Layne Western Vert. Multi-Stage Well Pumps	$ 3,000	
Station No. 3 2-Layne Western Vert. Multi-Stage Well Pumps	3,000	
Station No. 4 2-Layne Western Vert. Multi-Stage Well Pumps	3,000	
Station No. 5 2-Layne Western Vert. Multi-Stage Well Pumps	3,000	
Station No. 6 3-Layne Western Vert. Multi-Stage Well Pumps	4,500	
Station No. 7 2-Layne Western Vert. Multi-Stage Well Pumps	3,000	
Station No. 8 3-Layne Western Vert. Multi-Stage Well Pumps	4,500	
Station No. 9 1-Layne Western Vert. Multi-Stage Well Pump	1,750	
Station No. 9 2-Layne Western Vert. Multi-Stage Well Pumps	3,000	
Station No. 10 2-Layne Western Vert. Multi-Stage Well Pump	3,500	
Station No. 2 1 Pump B owl. added	52	
Sub-Total	32,302	3,230
Total Cost Water Well Equipment	$44,212	$4,421

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Natural Gas Pipeline Company

Acct. #1006-C—Water Well Equipment

Added After 6-1-39

Motors	Original Cost	10% Salvage
2-15 H.P., 440 V. Motor	$ 750.00	$ 75.00
2-15 H.P., 440 V. Motor	750.00	75.00
2-20 H.P., 440 V. Motor	1,200.00	120.00
2-15 H.P., 440 V. Motor	750.00	75.00
2-30 H.P., 440 V. Motor	2,100.00	210.00
2-20 H.P., 440 V. Motor	1,200.00	120.00
1-20 H.P., 440 V. Motor	600.00	60.00
2-30 H.P., 440 V. Motor	2,100.00	210.00
Pumps		
2-Layne Western Vertical Multi Stage Well Pumps	$ 3,740.00	$ 374.00
2-Layne Western Vertical Multi Stage Well Pumps	2,600.00	260.00
2-Layne Western Vertical Multi Stage Well Pumps	3,680.00	368.00
2-Layne Western Vertical Multi Stage Well Pumps	2,600.00	260.00
2-Layne Western Vertical Multi Stage Well Pumps	2,000.00	200.00
2-Layne Western Vertical Multi Stage Well Pumps	3,680.00	368.00
1-Layne Western Vertical Multi Stage Well Pumps	1,840.00	184.00
2-Layne Western Vertical Multi Stage Well Pumps	2,000.00	200.00
TOTAL WATER WELL EQUIPMENT	$31,590.00	$ 3,159.00

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Natural Gas Pipeline Co.

Acct. #1006-d—Main Engines & Scrubbers—Boilers

	Weight	Total Salvage	Cost of Reclaim	Net Salvage
48-1250 h.p. Wor. Hor., G. D. Compr.	9408 T.	$88,247	$116,659	R$28,412
19-PIW & AOS Scrubbers	380 T.	4,324	5,472	R 1,148
8-Blaw Knox Scrubbers	120 T.	1,366	1,728	R362
Platform, Tanks, etc.	85644#, 42.8 T.	487	616	R129
9-98 H.P. Casey Hedges Water Tube Boilers	108.9 T.	1,239	1,568	R329
As of 6-1-39	10059.7 T.	$95,663 @ $9.38 Ton	$126,043 @ $12.40 Ton	R$30,380
9-Scrubbers	135.0 T.	1,536	1,944	R408
1-5'x75' Water Gasefication Tower, Sta. 10	8.5 T.	97	122	R25
Added after 6-1-39	143.5 T.	$ 1,633	$ 2,066	R$ 433

NOTE: R = red figure.

Natural Gas Pipeline Co.

Acct. #1006-e—Engine—Generators, Motors, Etc.

As of June 1, 1939

Description	Salvage Rate	Total Salvage	Cost of Reclaim	Net Salvage
18—Cooper-Bessemer 175 KW Gen. Plt. 3150 KW	$5.00/KW	$15,750.00	$ None	$15,750.00
18—25 H.P. Motors for air Compr., $2,885.13	10%	289.00	—	389.00
36—40 H.P. Motors for Water Pumps, $11,946.00	10% of cost	1,195.00	—	1,195.00
Machine Shop Equipment, $24,824.43	15% of cost	3,724.00	—	3,724.00
18—Robbins & Meyers Gen. Set with Panel, $3,465.00	10% of cost	347.00	—	347.00
9—Gould #1½ Elect. Sump Pump, 1½ H.P., $2,496.00	10% of cost	250.00	—	250.00
9—Gould Oil centrifuge with motor, $9,428.94	10% of cost	943.00	—	943.00
9—Centrifugal Pump 325 GPM with 20 H.P. motor, $2,665.00	10% of cost	267.00	—	267.00
3—Motors and air blowers #2-3-4, $2,359.00	10% of cost	234.00	—	234.00
		$18,499.00	—	$18,499.00
	Weight			
*18 C. P. Air compressors 8—4½x8	72,000#			
36 Dayton Dowd Cent. Pumps 8x10	52,200#			
Miscellaneous Items.	18,000#			
9—4½x2¾"x4½ Duplex Steam Pumps	6,750#			
9—5¼x4¾x5" Duplex Steam Pumps	8,100#			
	157,050#			
*$2.00/T to demolish; $3.00/T to load and haul	78.53 T.	737.00	$ 738.00	* 1
$4.40/T freight		$19,236.00	$ 738.00	$18,498.00
$9.40/T Total		@ $9.38 T		

Note: *=red figure

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N. G. Pl. Co.

1006-C Engines, Generators & Motors—Added After 6-1-39

Description		Salvage Rate	Total Salvage	Cost of Reclaim	Net Salvage
Motors & Blowers Aux. Bldgs.	7,300.00	10% of cost	$ 730.00	—	$ 730.00
Motors & Blowers M. Bldgs. #5 & 6	3,450.00	10% of cost	345.00	—	345.00
Machine Shop Equipt. Sta. #6	23,910.00	15% of cost	3,587.00	—	3,587.00
Machine Shop Equipt. All Sta.	12,100.00	15% of cost	1,815.00	—	1,815.00
		Total	$6,477.00		$6,477.00

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N. G. Pl.

1006-F—Tanks

No. of Units	Description of Tanks	Original Cost	*Salvage	Cost to Reclaim	Net
	As of 6-1-39				
18	4'x10' Air Receiver Tanks	$14,130.00	$ 706.50		$ 706.50
18	9000 Gal. Oil Storage Tanks	12,096.00	604.80		604.80
9	450 Gal. Portable Lube Oil	918.00	45.90		45.90
9	10x10 Galv. Dom. Water Tanks	1,656.00	82.80		82.80
9	100,000 Gal. Elev. Water Tanks 212.66 Tons		2,420.00	3,062.00	*642.00
	Water Treating Plant Tanks (Sta. 2, 3, 4, 5, 6, 7, 10)	16,222.00	811.00		811.00
	Water Treating Plant Tanks (Sta. 8)	4,126.00	206.00		206.00
	Totals	$49,148.00	$4,877.00	*$3,062.00	$1,815.00
	Added After 6-1-39				
	Treating Plant Tanks—Sta. 9	3,500.00	175.00		175.00

*Salvaged at 5% Net except 100,000 Gal. Elev. Tank which is salvaged @ $11.38 ton. Cost to reclaim $14.40 ton.

Note: * Denotes red figure

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N. G. P. L.

1006-9 Cooling Facilities

As of 6-1-39	Original Cost	5% Salvage
24 Size C-169 Bentube Sections	$ 13,172.64	$ 658.63
24 Size C-169 Bentube Sections	12,940.14	647.00
24 Size C-169 Bentube Sections	13,115.17	655.76
24 Size C-169 Bentube Sections	12,991.76	649.59
24 Size C-169 Bentube Sections	12,848.04	642.40
24 Size C-169 Bentube Sections	12,745.34	637.26
24 Size C-169 Bentube Sections	12,161.80	608.09
24 Size C-169 Bentube Sections	12,499.33	624.97
24 Size C-169 Bentube Sections	12,427.28	621.37
4 Size C-169 Bentube Sections	2,064.00	103.20
3 Size C-169 Bentube Sections	3,590.00	179.50
	$120,555.50	$6,027.77
Recapitulation		
Total Cost Bentube Sections to 6-1-39	$120,555.50	$6,027.77
Total Cost Bentube Sections 6-1-39 to 12-30-54	$ —	$ —

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N. G. P. L.

1006-h *Piping

	Total Weight	Salvage Value	Cost of Reclaim	Net Salvage
Main Engine, Basement, Manifold Yard Piping 3-6 unit Sta. 6-5 unit Sta. 12" and under to Jan. 1, 1938	3,252 Tons	$65,040.00	$48,780.00	$16,260.00
1-1-38 to June 1, 1939 68,859*	34.4 Tons	688.00	516.00	172.00
Total as of 6-1-39	3,286.4 Tons	$65,728.00 @$20/ton	$49,296.00 @$15/ton	$16,432.00 @$5/ton
Miscellaneous Piping all Sta. 919,499* (lb.)	459.7 Tons	9,194.00	6,896.00	2,298.00
Water Lines to wells, 470,588* (lb.)	235.3 Tons	4,706.00	3,530.00	1,176.00
Total Added After 6-1-39	695.0 Tons	$13,900.00	$10,426.00	$ 3,474.00

* All station yard piping 12" and smaller, includes valves and fittings.

N.G.Pl.

1006-I—Electrical Material (Exclusive of Motors)

		Weight	Total Salvage	Cost to Reclaim	Net Salvage
	Electrical Materials as of 6-1-39 All Stations				
	Copper Wire				
2025′	400,000 C.M. 1.24# 1 ft.	2,511			
70′	No. 0000-3 cond. 1.9215# 1 ft	134.5			
3060′	No. 0-3 cond. .9585# 1 ft	2,933			
360′	No. 0-DBRC .3195# 1 ft	115			
250′	No. 1-3 cond. .7599# 1 ft.	190			
2295′	No. 2-2 cond, .4018# 1 ft.	922			
4230′	No. 2-3 cond. .6027# 1 ft.	2,549			
2430′	No. 2-DBRC .2009# 1 ft.	488			
—	No. 2- — —	5,094			
2380′	No. 4-3 cond. .3792# 1 ft.	902			
—	No. 4-TBWP —	1,570			
3735′	No. 6-2 cond. .1592# 1 ft.	595			
—	No. 6- — —	558			
25′	No. 6-4 cond. .3184# 1 ft	8			
7620′	No. 8- — .04998# 1 ft.	381			
542′	No. 8-3 cond. .14994# 1 ft.	81			
53730′	No. 8-2 cond. .09996# 1 ft.	5,370			
—	No. 8- — —	6,472			
3600′	No. 10-DBRC .03143# 1 ft.	113			
2340′	No. 10-3 cond. .09429# 1 ft.	221			
	No. 10 — —	945			
11565′	No. 10-2 cond. 06286# 1 ft.	727			
2250′	No. 12-2 cond. .03954# 1 ft.	89			
630′	No. 12-3 cond. .05931# 1 ft.	37			
64555′	No. 14-DBRC .01243# 1 ft.	802			
1800′	No. 14-3 cond. .03729# 1 ft.	67			
1530′	No. 14-2 cond. .02486# 1 ft.	38			
2925′	No. 16-3 cond. .02346# 1 ft.	69			
—	Ground Connections	360			
	Total Copper Wire	34,341.5#			
		17.2 T	2,580.00 @ $150/ton	764.00 @ $44/ton	1,816.00 @ $106/ton
	Transformers @ 5%	Orig. Cost			
	9—250 K.V.A.	1,510.02	75.50	—	75.50
	18—250 Watt	256.50	12.82	—	12.82
	9—7½ K.V.A.	678.42	33.92	—	33.92
	2—Transformer Banks	1,700.00	85.00	—	85.00
	2—Transfotmers	254.92	12.75	—	12.75
	2—15 K.V.A. Moloney	276.82	13.84	—	13.84
	2—500 Watt	39.97	2.00	—	2.00
	Carried Forward	$4,716.65	$ 235.83	—	$ 235.83

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N.G.P.Co.

1006-I—Electrical Material (Continued).

	Weight Lbs.	Cost	Total Salvage	Cost to Reclaim	Net Salvage
Transformers—continued					
Carried Forward		$4,716.65	$ 235.83	—	$ 235.83
9—2 K.V.A.		1,701.00	85.05	—	85.05
1—7½ K.V.A.		95.75	4.78	—	4.79
6—10 K.V.A.		678.00	33.90	—	33.90
2—15 K.V.A.		286.00	14.30	—	14.30
7—Small		146.00	7.30	—	7.30
1—25 K.V.A.		202.00	10.10	—	10.10
4—50 K.V.A.		1,319.00	65.95	—	65.95
Total Transformers		$9,144.40	$ 455.72	—	$455.72
Salvage Value of Copper Wire		—	2,580.00	764.00	1,816.00
Total Electrical Materials as of 6-1-39		$ —	$3,035.72	$764.00	$2,271.72
Electrical Materials Added After 6-1-39					
Copper Wire					
225'—400,000 C.M. 1.24 #/ft.	279.00 lbs.				
130' No. 0-3 cond. .9585 #/ft.	125.00				
80' No. 2-3 cond. .6027 #/ft.	48.00				
80' No. 2-2 cond. .4018 #/ft.	32.00				
205' No. 4-3 cond. .3792 #/ft.	78.00				
25' No. 6-2 cond. .1592 #/ft.	4.00				
80' No. 8-1 cond. .04998 #/ft.	4.00				
30' No. 8-3 cond. .1494 #/ft.	4.00				
22820' No. 8-2 cond. .09996 #/ft.	2,281.00				
25' No. 10-3 cond. .09429 #0ft.	3.00				
70 No. 12-3 cond. .05931 #/ft.	4.00				
200' No. 14-3 cond. .03729 #/ft.	7.00				
Total Copper Wire	2,869.00 lbs.		$ 215.18	$ 63.69	$ 151.49
Transformers					
14—Transformers		$ 280.00	$ 14.00	—	$ 14.00
2—Transformer Banks		1,700.00	85.00	—	85.00
1—Transformer		100.00	5.00	—	5.00
2—Transformers		300.00	15.00	—	15.00
Total Transformers		$2,380.00	$119.00	—	$ 119.00
Total Electrical Materials			$334.18	$ 63.69	$ 270.49

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N.G.P.Co.

1006-J—Miscellaneous Equipment

Original Purchase	Cost	Salvage
Each Main Line Station		
4—Type 206 Angle Form 0 to 500° F. Therm.	$ 38.92	$
2—10 Ton Brown Double I Beam Crane	1,033.40	
6—2½ Gal. Fyr Fyter Extinguishers	77.67	
2—100′ Lengths 2½″ Fire Hose	102.00	
2—2½″ x 15″ Fire Hose Nozzle	5.00	
2—Type 1010—8½″ Ashcroft 0-1000# Gauge	26.10	
1—Type 1018—8½″ Ashcroft 0-100# Gauge	12.19	
1—Type 1024—8½″ Ashcroft 0-500# Gauge	11.97	
1—Type 1086—8½″ Ashcroft Clock	46.72	
1—Type 1370—American U-Gage	8.50	
1—Model 340 8″ Bristol Recording Thermometer	97.02	
44—#685 H.W. 20° to 240° F. Thermometers	31.36	
1—Type 1024—6″ Ashcroft 0-500# Gauge	7.26	
2—Type 1018—6″ Ashcroft 0-100# Gauge	13.22	
2—2½ Gal. Fyr Fyter Extinguishers	26.00	
4—1 Qt. Fire Extinguishers	22.00	
1—100′ Length 2½″ Fire Hose	51.00	
2—Model 11M Bristol Recording Gauge 0-1000#	87.79	
1—2½ Gal. Fyr Fyter Extinguisher	13.75	
1—Type 1010 4½″ Ashcroft 0 to 30# Gauge	1.82	
6—Type 1010 3″ Ashcroft Gauge	12.47	
1—1½ Ton Y & T Steel Plate Trolley	27.20	
1—1 Ton Y & T Spur Gear Chain Hoist	58.55	
5—#41213 Spread Lens Flood Lights	175.85	
Total One Station	$ 1,987.76	$ 198.78
Total Nine Stations	$17,889.84	$1,788.98
Added Job Order Purchases to 6-1-39		
6—Maihak Engine Indicators	$ 1,056.00	
3—Horse Drawn Mower	656.49	
9—150′ Length 2½″ Fire Hose	787.80	
9—Hose Cart	195.65	
9—4½″ Gauge	66.71	
1—#730 B & S Dial Test Indicator	25.86	
1—#26377 Maihak Engine Indicator	170.34	
1—3T Wright Chain Trolley Hoist	213.00	
1—Pyro Point Pyrometer	41.00	
2—4½″ Pressure Gauge	9.29	
1—Dew-point Instrument	83.09	
Carried Forward	$21,195.07	

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N.G.P. Co.

1006-J—Miscellaneous Equipment (continued)

	Cost	Salvage
Brought Forward	$21,195.07	
1—Horse Drawn Mower	92.00	
28—Motoco Dial Type Thermometer	532.74	
1—No. 34 Roto Jr. Air Driven Tube Cleaner	60.00	
1—3-Gang Horse Drawn Mower	218.29	
1—Portable Pyrometer	134.28	
Total as of 6-1-39	$22,232.38	$2,223.24
		@ 10%
Added After 6-1-39		
1—Motor Driven Mower	$ 349.00	$ 34.90

	Total Weight	Total Salvage	Cost to Reclaim	Net Salvage
Misc'l. Items—Tool Trucks, Air Filters, Etc.	8.8 T	$ 100.00 @ 11.38/Ton	$ 153.00 @ 17.40/Ton	*$ 53.00
Total Added After 6-1-39				*$ 18.00

Note: *—Denotes Red Figure.

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N.G.P. Co.

1008—Telephone System.

	Length	Weight	Total Salvage @ 7½ Cts. per #	Cost to Reclaim	Net Salvage
Oklahoma—					
# BWG Cu. Wire*	1,089,365′	89,655#		*Detail below	
Kansas—					
#8 BWG Cu. Wire	8,391,728′	690,639#			
#5 AWG Hifenso Wire	2,548′	255#			
Nebraska—					
#8 BWG Cu. Wire	2,915,410′	239,93[illegible]#			
Iowa—					
#8 BWG Cu. Wire	6,855,263′	564,188#			
#9 B & S Cu. Wire	66,886′	2,649#			
Illinois—					
#8 BWG Cu. Wire	5,116,131′	421,058#			
As of 6-1-39		2,008,382#	$150,629	$53,561	$97,068
		1004.2 T			

Beatrice to Chicago, 4 Wires CB&Q poles	623.07 Mi.	$55 Per Mi.	$34,269
Line to Sta. #10, 8 Wires, Co. Poles	21.04 Mi.	40 Per Mi.	842
Line to Sta. # 9, 4 Wires, Co. Poles	27.93 Mi.	25 Per Mi.	698
Line to Sta. # 8, 4 Wires, Co. Poles	1.50 Mi.	25 Per Mi.	38
4 Wires, CB&Q Poles	3.00 Mi.	55 Per Mi.	866
Line to Sta. # 7, 4 Wires, Co. Poles	1.70 Mi.	25 Per Mi.	42
4 Wires, CB&Q Poles	3.00 Mi.	55 Per Mi.	165
Line Hoag Jct. Sta. #6, 8 Wires, Co. Poles	5.30 Mi.	40 Per Mi.	212
Line to Sta. #2, 8 Wires, Co. Poles	1.00 Mi.	40 Per Mi.	40
Line Hoag Jct.-South, 4 Wires, Co. Poles	478.83 Mi.	25 Per Mi.	11,971
Total Cost to Reclaim*			$49,143
1004.2 Tons @ $4.40 per T. Freight			$ 4,418
Total Cost of Reclaim			$53,561
Salvage 6-1-39 To End of Project			$ —0—

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* Cost of Reclaiming Lines.

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N.G.P. Co.

1009—Meters & Regulators

	Original Cost	Salvage
Orifice Meters		
Anubis		
2—500# Static Spring	$ 300.00	$ 50.00
Metric Metal		
1— 20# Static Spring, 5B	20.88	5.00
18— 50# Static Spring	2,771.80	450.00
5—100# Static Spring	648.10	125.00
13—250# Static Spring	2,004.23	325.00
7—500# Static Spring	883.54	175.00
Domestic Meters		
Pittsburgh Equitable		
2—#1 20#	22.20	5.00
9—#2 20#	267.48	90.00
3—#2½ 100#	332.36	75.00
2—#2½ 200#	274.87	50.00
4—#2½ 500#	531.44	100.00
12—#4 500#	3,762.00	300.00
1—Type T 100#	170.08	25.00
14—Type T 200#	2,419.07	350.00
4—Type T 500#	700.00	100.00
As of 6-1-39—Total All Meters	$15,108.14	$2,225.00
Added After June 1, 1939		
1—Metric Metal (July, 1939)	$ 124.75	$ 25.00
Recap—Meters & Regulators		
Total Cost Meters as of 6-1-39	$15,108.14	$2,225.00
Total Cost Regulators as of 6-1-39 (See following)	20,295.35	2,029.55
As of 6-1-39—Total	$35,403.49	$4,254.55
Total Cost Meters Added After 6-1-39	$ 124.75	$ 25.00
Total Cost Regulators Added After 6-1-39	—	—
Total	$ 124.75	$ 25.00

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NGPCO

1009—Meters and Regulators (Continued)

	Original Cost	Salvage
Regulators		
Fisher Governor		
9— ¼"	$ 439.65	$ 43.97
9— ½"	280.98	28.10
9— ½"	670.83	67.08
6— ¾"	20.83	2.08
4—1 "	18.81	1.88
20—1 "	701.76	70.18
9—1½"	103.98	10.40
19—2 "	1,891.70	189.17
2—2½"	377.37	37.74
18—3 "	1,409.89	140.99
18—6 "	2,557.43	255.74
Pittsburgh Equitable		
4—1 "	19.05	1.91
4—1 "	61.00	6.10
1—1½"	16.00	1.60
27—2 "	3,765.79	376.58
11—6 "	3,716.54	371.65
Reynolds		
16—1 "	86.14	8.61
Chaplin Fulton		
1—1 "	17.75	1.76
1—1 "	38.46	3.85
2—1 "	100.76	10.08
2—1 "	120.71	12.07
9—1 "	76.48	7.65
1—1½"	77.60	7.76
1—2 "	102.57	10.26
1—16" head	95.78	9.58
Carried Forward	$16,767.86	$1,676.79

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NGPCO.

1009—Meters and Regulators (Continued)

	Original Cost	Salvage
Regulators Continued		
Brought Forward	$16,767.86	$1,676.79
Neilan		
7—¾"	337.09	33.71
Wilgus		
1—¾"	69.68	6.97
3— 2'	270.78	27.08
Cash		
2— 8"	926.55	92.66
2—10"	1,244.07	124.41
4—	670.32	67.03
Bastian Blessing		
1—½"	9.00	.90
As of June 1, 1939 Total All Regulators	$20,295.35	$2,029.55

Investment added after June 1, 1939

Regulators

None

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NGPCO

1010—Structures

Location	Building	Type	Size	Cost	
	Main Line Other Than Stations				
Glasco	Meter Station	Stefco	6'x11'x7'	$ 147	
	Regulator Station	Stefco	6'x11'x7'	147	
Nebraska City	Meter & Regulator Station	Stefco	10'x20'x8'	259	
Cedar Rapids	Meter & Regulator Station	Stefco	10'x16'x8'	181	
Creston	Meter & Regulator Station	Stefco	10'x20'x8'	253	
Davenport	Davenport & Dewey Cement Meter Station	Stefco	12'x16'x7'	295	
Greenfield	Meter & Regulator Station	Stefco	10'x20'x8'	265	
Indianola	Meter & Regulator Station	Stefco	10'x20'x8'	287	
Knoxville	Meter & Regulator Station	Stefco	10'x20'x8'	249	
Muscatine	Meter & Regulator Station	Stefco	10'x26'x8'	303	
Oscaloosa	Meter & Regulator Station	Stefco	10'x20'x8'	249	
Ottumwa	Meter & Regulator Station	Stefco	10'x16'x8'	190	
Red Oak	Meter & Regulator Station	Stefco	8'x10'x7'	115	
	Compressor Station W'House	Miss. V.	20'x32'x11'	777	
	P'Line W'house & Garage		24'x48'x11'	1,110	
Winterset	Meter & Regulator Station	Stefco	10'x20'x8'	290	
Davenport	Regulator Station	Stefco	12'x16'x7'	202	
De Pue	Mineral Point Zinc	Stefco	8'x12'x7'	137	
	Mineral Point Zinc	Stefco	6'x8'x7'	69	
Moline	Meter & Regulator Station	Stefco	10'x16'x8'	192	
Ottawa	Meter & Regulator Station	Stefco	10'x16'x8'	211	
	P'Line W'house & Garage		24'x48'x11'	1,050	
Joliet	Regular Station Garage	Stefco	20'x18'x8'	472	
Red Oak	Emergency Warehouse	Stefco	24'x48'x8'	1,207	
Ottawa	P'Line W'house Extension	Miss. V.	24'x48'x8'	1,215	
		Total			$9,872
Joliet	Meter Station Buildings				
	By Pass Meter House Corr.Ir.		6'3"x8'3"x9'3"	$ 70	
	Brick Garage		30'x20'x12'6"	2,014	
	Office Lab. & Meter House Brick Transite Roof		28'6"x34'6"x18'3" 8'9"x25'9"x16'	11,842	
	Well House		11'6"x11'6"x9'6"	910	$14,836
		Total Cost of Buildings			$24,708
		Salvage 10% of Cost			$ 2,471
		*Salvage of 2 Reg. Bldgs. at $100 each			200
		Total Salvage as of 6-1-39			$ 2,671

*Reg. Station Buildings	
40'9"x31'6"x15'3" Brick, Transite Roof	$6,631
31'6"x35'9"x15'3"	5,356
	$11,987

No investnment after June 1, 1939 Salvage $ ....

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1011—Branch Lines

	Feet 2"	3"	4"	6"	8"	10"	Weight Total Tons
Glasco	5,940						
Red Oak	453						
Greenfield	96						
Winterset	1,217						
Indianola	2,267						
Knoxville	233						
Total 2"	10,206'						34.12T
Northern Gravel	3,002'						2.05
Nebraska City		3.38					1.29
Ottumwa			183				
De Pue Lateral			21,563				
Muscatine			165				
Ottawa			50				
Total 4"			21,961				95.04
Cedar Rapids				226			
Davenport Lateral				49			
Davneport Lateral				1,100			
Moline Lateral				3,112			
De Pue				3			
Ottawa				6			
Total 6"				4,496			38.91
Davenport Lateral					19,534		
Moline Lateral					25		
Total 8"					19,559		165.02
Ottawa Lateral						89	
Winterset						7	
Total 10"						96	1.51
Total Tonnage							337.94T

		Weight	Total Salvage	Cost of Reclaim	Net Salvage
2"-4"-6"-8" & 10" Pipe in Branch Lines		337.94T			
*Valves & Fittings Branch Lines	36814*	18.41T			
Pipe in Branch M.&R. Houses	28380*	14.19T			
Total Salvage 6-1-39		370.54Tons	$ 7,411	$ 5,558	$ 1,853
			@$20/Ton	@$15/Ton	@$5/Ton

*205-2"-3"-4"-6"-8"-10"&12" valves with fittings

Total Salvage 6-1-39 to End of Project $ ....

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NGPCO

1014—Laboratory Equipment

	Salvageable Original Cost	Net Salvage
Supercompressibility Apparatus; Special Gas Measuring Device	$ 635.00	
Hyvac Pump	25.64	
#110 Centrifugal Pump	81.70	
Manifold Mercury Container	198.65	
#19 Chainomatic Balance w/weights	186.50	
Elevating Flask Mechanism	26.75	
Mercury Transfer Receptacle	24.00	
Recording Thermometer Complete	105.00	
Recording Thermometer—1	566.11	
Junkers Calorimeter	295.00	
Spec. dust proof metal cabinet	331.28	
Thomas Recording Calorimeter	2,015.33	
Sulphur-Amonnia test Apparatus	146.15	
Acme recording Gravitometer	331.69	
#2315-A Tycos Mico-Baragraph	156.00	
#9 Chaniomatic balance w/weights	269.28	
#112 Round Telechrom Clock	15.69	
Water Distillate Apparatus	90.00	
Gas Meter Test Bottle 1/10 cu. ft.	90.00	
Stop watch	10.00	
Freas Electric Oven	135.00	
#16 Std. Observatory barometer w/mah	152.66	
#110 Telechrom Clock	14.13	
Model 11M Recd. Pressure Gauge	53.36	
Hyvac Pump	80.00	
500# Test Gauge	18.25	
50" Std. Momometer	19.68	
Acme Gravity Balance	326.20	
100" Mercury Chamber	14.85	
Dead weight Meter Tester	441.26	
Gas Sample Tank for Super Comp. Test	93.06	
Dew Point Instrument	82.14	
5-gal. Compressed gas cylinder	31.88	
Total cost Laboratory Equipment as of 6-1-39	$ 7,062.24	$ 1,412.45
Total Cost Laboratory Equipment added after 6-1-39		......

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N.G.P.L.

1015—Automotive Equipment

	Total Investment	Total Salvage 30%	Cost to Reclaim	Net Salvage
June 1, 1939 Autos, Trucks, Trailers	$61,060.00			
June 1, 1939 Tractors	20,160.00			
Total Salvage as of 6-1-39	$81,220.00	$24,366.00	—	$24,366.00
Automotive Equipment added after Investment 6-1-39	$61,582	18,475.00		$18,475.00

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N.G.P.L.

1016—Furniture & Fixtures

	Total Investment	Total Salvage 20%	Cost to Reclaim	Net Salvage
June 1, 1939 Furniture & Fixtures Chicago Office & Field Offices	$58,282.00 @ 20%	$11,656.00		$11,656.00
Law Library	11,389.00	271.00		271.00
Salvage as of 6-1-39	69,671.00	11,927.00		11,927.00
Furniture & Fixtures added after 6-1-39				
Investment after 6-1-39 to end of project	$ 3,133.00	$ 627.00		$ 627.00
To Law Library	9,600.00	229.00		229.00
	$12,733.00	$ 856.00		$ 856.00

* These figures based on receiving $500.00 for entire law library.

Exhibit No. 122.

N.G.P.L.

1013—Tools

As of 6-1-39

Description of Tools	Original Cost Per Unit	No. of Units	Total Cost
3" Centrifugal Sterling Pumps	$ 175.57	10	$ 1,755.70
3" Centrifugal Sterling Pumps	65.62	1	65.62
3" Goulds Diaphragm Pumps	52.82	5	264.10
Trench Horse w/5 ton hand hoist	193.42	25	4,835.50
Trench Horse	70.66	2	141.32
1½ Ton Yale & Towne Chain Hoist	82.84	7	579.88
W-12 Welding Outfit—Complete	112.00	1	112.00
W-17 Welding Outfit—Complete	119.19	7	834.33
R-65 Oxygen Regulator	31.50	1	31.50
R-66 Acetylene Regulator	25.20	1	25.20
Oxweld Acetylene Welding Outfit	109.36	5	546.80
C.H. & E. Mudhen Diaphragm Pump #5	279.98	1	279.98
200 Amp. "Shield Arc" Welding Machine	1,108.96	1	1,108.96
Four Wheel Trailer	165.01	1	165.01
400 Amp. Lincoln "Shield Arc" Welder	1,572.16	5	7,860.80
200 Amp. Westinghouse "Flex Arc" Welder	451.56	1	451.56
CW-22 Cutting Attachment, 75° Head 2-nozzle	29.36	2	58.72
CM-7 Pipe Beveling Machine	78.49	1	78.49
Portable Tensile Testing Machine	277.83	1	277.83
Portable Tensile Testing Machine	760.00	7	5,320.00
Arm & Hammer Anvil	28.05	2	56.10
#404 Holland Hinged Pipe Vise	7.25	1	7.25
#54 Holland Pipe Vise	26.66	6	159.96
#2 Toledo Stock & Die	31.03	6	186.18
#16-Breakout Chain Tongs	41.40	5	207.00
Bench Grinder	106.69	2	213.38
Bench Grinder	47.51	4	190.04
5/16" Black & Decker Electric Drill and Oiler	49.87	1	49.87
Braden Winch	381.08	2	762.16
Braden Winch	418.60	5	2,093.00
Meade Morrison Winch	612.60	1	612.00
600'-½" Steel Winch Rope	55.50	1	55.50
110 Gal. Aeroil Melting Kettle	211.88	1	211.88
110 Gal. Aeroil Melting Kettle	197.57	7	1,382.99
Simplex Lifting Jack #310-15 ton	28.86	7	202.02
Bending Jack w/7 Ton-5" Hydraulic jack	50.96	7	356.72
Dead Weight Gauge Tester	155.84	1	155.84
Pierce Critical Flow Prover	113.86	1	113.86
Pierce Critical Flow Prover	135.18	1	135.18
3" Low Pressure Flow Prover	172.92	1	172.92
2" Strain Gauge & Template	124.46	1	124.46
Total to Here			$32,241.61

N.G.P.L.

1013—Tools (Continued)

Description of Tools	Original Cost Per Unit	No. of Units	Total Units
Brought Forward			$32,241.61
Electrolysis Test Set	266.55	1	266.55
Electrolysis Instrument—PH. Machine	50.00	1	50.00
Galvanometer	15.00	1	15.00
Soil Resistance Instrument Complete	30.66	1	30.66
#3 Carbic Flood Light	45.93	18	826.74
Two Man Combination Hose Mask	154.23	2	308.46
Air Compressor	1,580.00	2	3,160.00
Sealing Hammer & Connections	50.00	4	200.00
Chicago Pneumatic Rotary Grinder	110.92	3	332.76
Chicago Pneumatic Demolition Tool (C.P.111)	125.00	2	250.00
Chicago Pneumatic Demolition Tool (C.P.117)	215.00	2	430.00
Ingersoll Rand Pavement Buster (cc 45)	51.00	1	51.00
#2 Boyer Chipping Hammer	55.51	2	111.02
Concrete Paving Breaker (C.P.116)	150.00	1	150.00
Rock Drill—C.P.22	155.00	1	155.00
Underwod Portable Boring Bar	1,384.74	1	1,384.74
1" Air Reduction Valve	42.70	1	42.70
Holiday Detector	44.26	1	44.26
Special Truck Boom	55.40	2	110.80
3A Auto Kodak W/Leather Case	37.00	1	37.00
United-Tipton Line Up Clamp	59.40	1	59.40
Tulsa Portable Pumping Unit	2,412.69	1	2,412.69
Variable Resistor—400 Amp	110.74	1	110.74
Aeroil Single Torch Outfit	61.99	1	61.99
Crosby Outside Spring Indicator	238.23	1	238.23
Watchman's Clock	54.89	3	164.67
Bristol 12" Recording Thermometer (11M)	58.00	1	58.00
Typhoon Pump—2500 G.P.M.	115.00	2	230.00
Planimeter	36.21	1	36.21
Ideal B.&W. Expander W/Mandrel	62.58	1	62.58
Weston Portable A.C. Voltmeter	57.05	1	57.05
Portable Current Transformer	76.80	1	76.80
Weston A.C. Ammeter	21.84	1	21.84
Westinghouse Current Transformer	12.23	1	12.23
Weston Selective Analyzer	47.45	1	47.45
Westinghouse D.C. Ammeter	25.86	1	25.86
Biddle No. 705 Midget Megger Tester	70.35	1	70.35
1375-B, Portable Telephone	40.90	16	654.40
L.&N. Wheatstone Bridge	136.50	1	136.50
Portable Volt-Ammeter	34.75	1	34.75
#325 Pole Jack	31.80	1	31.80
#325 Pole Jack	40.18	1	40.18
Total to Here			$44,842.02

N.G.P.L.

1013 Acct.—Tools (Continued)

Description of Tools	Cost Per Unit	No. of Units	Total Cost
Brought forward			$44,842.02
D. C. Ohmmeter	$ 25.83	1	$ 25.83
Type "B" Rolling Tool	30.91	6	185.46
MC-4022-A Portable Telephone	32.71	1	32.71
MC-4022-A Portable Telephone	39.81	2	79.62
Shallcross Telephone Service Meter	68.45	1	68.45
West Test Set	43.78	1	43.78
K. & E. Transit	160.00	1	160.00
K. & E. Transit	325.00	1	325.00
Gurley Transit	160.00	1	160.00
Gurley Transit	350.00	8	2,800.00
Polar Planimeter	18.45	1	18.45
Paulin Leveling Altimeter	125.00	1	125.00
Berger Level	160.00	1	160.00
Ingersoll Rand Air Drill	51.00	1	51.00
3" Goulds Diaphragm Pump	52.82	6	105.64
4" Model 40 Rex Centrifugal Pump	642.65	9	5,783.85
6" Model 90 Rex Centrifugal Pump	1,136.14	16	18,178.24
3" Sterling Centrifugal Pump	171.22	9	1,540.98
Khaki Wall Tent	57.93	9	521.37
Adams Rotary Scraper	139.05	7	973.35
Killefer Revolving Scraper	177.69	2	355.38
Stone Boat	149.98	1	149.98
Stone Boat	96.35	3	289.05
Stone Boat	75.48	3	226.44
Stone Boat	44.28	1	44.28
Stone Boat	128.65	1	128.65
1000-watt Onan Light Plant	274.65	10	2,746.50
2 Flood Light Projectors	71.15	8	569.20
Airfloat special rowboat	47.26	5	236.30
Airfloat special rowboat	38.70	1	38.70
Graybar Light Unit	144.67	1	144.67
A.D.E.-12-CH Floodlight Projectors	27.51	1	27.51
110 Gal. Aeroil Smokeless Melting Kettle	213.56	1	213.56
Model 105 Chi. Pneumatic Air Compressor	1,732.50	2	3,465.00
Chicago Pneumatic Rotary Grinder	149.80	4	599.20
Chicago Pneumatic Rotary Grinder	125.00	1	125.00
Chicago Pneumatic Demolition Tool (C.P.111)	117.08	2	234.16
Chicago Pneumatic Demolition Tool (C.P.117)	198.08	2	396.16
#2 Boyer Chipping Hammer	61.54	2	123.08
½" Pressure Reducing Valves	36.35	1	36.35
Alemite Grease Gun	29.49	1	29.49
Carried forward			$86,359.41

2082 **Page No. 46**

N.G.P.L.

1013 Acct.—Tools (Continued)

Description of Tools	Original Cost Per Unit	No. of Units	Total Cost
Brought forward			$86,359.41
Soil Pressure Device	$ 70.77	1	70.77
Soil Corrosion Instrument	95.26	1	95.26
Dew Point Apparatus	83.09	1	83.09
R 65 Oxygen Regulator	28.74	2	57.48
R 66 Acetylene Regulator	28.74	2	57.48
Victor Water Cooled Welding Torch	144.52	2	289.04
M-2 Portable Acetylene Manifold	32.23	1	32.23
Boom for Truck	61.58	1	61.58
Boom for Truck	73.32	1	73.32
#310, 15 ton Simplex Jack	42.34	2	84.68
Duff-Norton Ball Bearing Jack	36.51	5	182.55
Engine bed for Truck and Trailer	103.30	1	103.30
Swivel Sheave	55.51	2	111.02
Tulsa #28 Winch	277.50	1	277.50
Tulsa #30 Winch	393.99	1	393.99
Gas Line Lubricator	82.78	3	248.34
Black & Decker Bench Grinder	73.23	1	73.23
Brinks Spray Paint Unit	119.83	1	119.83
Black and Decker ½" Electric Drill	70.56	1	70.56
Total as of 6-1-39			$88,844.66
Salvage @ 10%			$ 8,885

2083 **Page No. 47**

N.G.Pl.

1013 Acct.—Tools

Description of Tools	Original Cost
Paint Melting Kettle	$ 117.00
Sterling Centrifugal Pump	57.00
Electric Welding Machines	14,280.00
Air Compressor and Tools	9,022.00
½ Yd. Power Shovel & Accessories	40,000.00
Truck & Tractor Snow Plow Attachments	2,700.00
Gould Diaphragm Pumps	583.00
Bench Drill—Joliet	115.00
Pipe Cutting Machine	755.00
Misc. Small Tools	7,700.00
Retire Tula Pumping Unit (Gas Engine Driven Duplex Pump)	*2,413.00
Total added after 6-1-39	$72,916.00
Salvage @ 10%	7,292.00

Note: * Denotes Red Figure.

2084 **Page No. 48**

T.N.G.

Acct. #1000—Lands in Fee

Location	Total Acreage	No. of Acres Salable	Price per Acre	Cash from Salable Acreage	Cost to Demolish and clear foundations
Compressor Station No. 1 & Gasoline Plant, Texas	80	20	$15	$300	$10,032
Dumas Warehouse Site, Texas	10	2.5	15	38	50
Kingsmill Warehouse Site, Texas	11	2.8	15	42	50
Total as of 6-1-39				$380	$11,032
					380
Net Salvage					$*10,652
Skellytown Warehouse Site, Texas	10	2.5	$15	$ 38	$ 100
Dumas Warehouse Site, Added Acreage	2.6	.6	15	9	100
Total Added after 6-1-39				$ 47	$ 200
					47
Net Salvage					$ *153

Note: *=red figure.

2085 **Page No. 49**

T.N.G.CO.

1002—Right-of-Way

3 R.R. Crossings on 24" Main line and 4 on 24" Main Trunk Gathering System. Total 7 cost $250 ea. to place in condition $ *1,750

No further crossings anticipated from 6-1-39 to end of project $ ....

Note: * Denotes red figure.

2086 **Page No. 50-A**

TNG Co.

1003—Wells

Item	Number	Total Salvage	Cost to Reclaim	Net Salvage
	As of June 1, 1939			
Cable Tool Wells	39	$ 47,034	$ 23,517	$23,517
Rotary Tools Wells	120	83,736	71,736	12,000
Total	159	$130,770	$ 95,253	$35,517
	Added After June 1, 1939			
Rotary Tool Wells	204	$142,351	$121,951	$20,400
Cable Tool Wells (Salvaged before End of Project)	*7	* 8,442	* 4,221	*4,221
Total	197	$133,909	$117,730	$16,179

Note: * Denotes red figure.

2087

Page No. 50

T.N.G.Co.

1004—Gathering System

	Net Footage	Total Pounds	Total Tons
4" Laterals	174,835'	1,333,991	
	3,890'	42,070	
	320'	3,632	
6" Laterals	237,389'	3,059,944	
	1,224'	23,219	
	280'	4,766	
8" Laterals	179,752'	3,037,809	
	78'	1,744	
10" Laterals	98,767'	2,088,922	
		9,596.097.	4,798.05 Tons
Valves, Check Valves, etc.		213,412	106.71 Tons
			4,904.76 Tons

As of January 1, 1938

	No.		
4" Pipe		49,591'	378,379
4" Gate Valves	39		7,215
4" Check Valves	6		1,100
4" Flanges	145		3,190
4" Tube Turns	45		495
2" By-Pass Assemblies	12		1,164
Miscellaneous Material			760
Sub-total			392,313
6" Pipe		10,524'	135,654
6" Gate Valves	12		4,344
6" Check Valves	—		—
6" Flanges	30		1,170
6" Tube Turns	16		448
Drips	39		18,330
Miscellaneous Material			500
Sub-total			160,446

2088 **Page No. 51**

T.N.G.Co.

1004—Gathering System (continued)

	No.	Net Footage	Total Pounds	Total Tons
8" Pipe		5,864'	99,336	
8" Gate Valves	8		4,856	
8 x 24 Saddle 60#	1		60	
8" Flanges	14		812	
8" Tube Turns	8		440	
8" Check Valves	1		600	
Misc'l. Material			350	
Sub-total			106,454	
10" Pipe		7,917'	166,970	
Misc'l. Material			500	
Sub-total			167,470	
12" 1-12" Gate Valve			1,407	
2-12 x 24 Swages			199	
2-12" Flanges			230	
Sub-total			1,836	
Material Added in 1938			828,518	414.26 Tons
4" Lateral		23,354'	178,191	
4" Gate Valves	20		3,700	
4" Check Valves	1		185	
8" Plub Valves	13		2,860	
4" Flanges	131		2,882	
4" Tube Turns	42		462	
By-Pass Assemblies	1		97	
Sub-total			188,377	
6" Lateral		18,151'	233,966	
6" Valves	1		362	
6" Plug Valves	1		350	
6" Flanges	18		702	
6" Tube Turns	3		84	
2" Valves	28		560	
1" Valves	28		280	
Sub-total			236,304	
Deduct for Valves Reclaimed			6,539	
Total Added 1-1-39 to 6-1-39			418,142	209.07 Tons
As of 6-1-39				5,528.09 Tons

Salvage @ $200 Ton Cost to Reclaim $15/Ton Net Salvage $5/Ton= $27,641

Reclaimed Before 1954

12— 6" Valves	$4,344
2— 8" Valves	1,214
1—10" Valve	981
	$6,539

2089 **Page No. 52**

TNGCO.

1004—Gathering System

Year	Weight	Tons	Total Salvage	Cost to Reclaim	
1939	1,137,327#	359.59			
1940	1,203,559#	601.78			
1941	918.092#	459.05			
1942	1,385,054#	692.53			
1943	594,140#	297.07			
1944	857,933#	428.97			
1945	1,245,638#	622.82			
1946	1,639,082#	819.54			
1947	1,081,821#	540.91			
1948	685,555#	342.78			
1949	436,534#	218.26			
1950	342,438#	171.22			
1951	47,856#	23.93			
Added after 6-1-39		$5,578,45 Tons	$111,569	$83,677	$27,892

2090 **Page No. 53**

T.N.G. Co.

1005—Mainline

Description	Units	Unit Wt.	Total Wt.	Total Salvage	Cost to Reclaim	Net Salvage
24" Pipe	366,435.7'	82,984	15,204.10 T.	No Salvage	—	—
12" Pipe	21,938.0'	49.562	543.60 T.	No Salvage	—	—
24" x 12"-6 run	2	7,100	7.10 T.	No Salvage	—	—
24" Gate Valves	7	5,400	18.90 T.	No Salvage	—	—
¾" Gate	14	14	196	$ 20.00/T.	$ 15.00/T.	$ 5.00/T.
1" Bronze Gate	5	34	170	$ 20.00/T.	$ 15.00/T.	$ 5.00/T.
3" Ser. 40 Gate	26	150	3,900	$ 20.00/T.	$ 15.00/T.	$ 5.00/T.
3" Ser. 40 Morco	5	134	670	$ 20.00/T.	$ 15.00/T.	$ 5.00/T.
6" Ser. 40 Gate	21	458	9,618	$ 20.00/T.	$ 15.00/T.	$ 5.00/T.
12" Ser. 40 Gate	12	1,850	22,500	$ 20.00/T.	$ 15.00/T.	$ 5.00/T.
Total Lbs.			37,054			
Salvage as of 6-1-39 Total Tons			18.53	$370.60	$277.95	$92.65

2091 **Page No. 54**

T.N.G. Co.
1005 Mainline

Description	Units	Unit Wt.	Total Wt.	Total Salvage $20.00/T.	Cost to Reclaim $15.00/T.	Ne Salv $5.0
12" Pipe	1200'	49.562	29.7 T.	No Salvage	—	–
3" Ser. 40 Gate	2	150	300			
6" Ser. 40 Gate	7	458	3,206			
12" Ser. 40 Gate	2	1,850	3,700			
Total Lbs.			7,206			
Salvage added after 6-1 39			3.60	$72.00	$54.00	$18.0

2092 **Page No. 55**

T.N.G
1006A—Steel Buildings

Building	Type	Size	Original Cost	Total	Salva
			As of June 1, 1939		
Auxiliary	Miss. Valley	36'x126'x16'	$3,554.00		
4 Garages	Miss. Valley	20'x112'x11'	8,685.00		
1 Garage	Stefco	20'x114'x11'	2,538.00		
Meter & Reg. Hse.	Miss. Valley	12'x30'x9'-6"	504.00		
P.L. Whse. & Garage	Miss. Valley	30'x70'x13'-6"	1,979.00		
Sump Pump Hse.	Miss. Valley	10'x10'x9'-3"	150.00		
Whse. & Garage	Miss. Valley	20'x136'x11	3,213.00		
Emergency P.L. Whse	Stefco	24'x48'x8'	1,331.00		
Total Sta. Bldgs. Excepting Main Bldg.				$21,954.00	
Salvage at 10% on Sta. Bldgs. Other Than Main Bldg.					$2,195.0
Main Comp. Bldg.	Miss. Valley	68'x448'x28"-9"		$22,498.00	
Salvage at 5% on Main Compressor Bldg.					1,125.0
Total Investment—All Buildings				$44,452.00	
Total Salvage—All Buildings					$3,320.0
			Added After June 1, 1939		
2—6 Car Garages			$2,720.00		
12—Garage Stall Additions			2,719.00		
14—Auxiliary Bldg. Ext.			1,200.00		
3—Bay Ext. To P.L. Whse.			395.00		
Total Additional Sta. Bldgs. Less Main Bldg.				$ 7,034.00	
Salvage at 10% on Sta. Bldgs. Other than Main Bldg.					703.0
Extension to Main Bldg.				$ 1,945.00	
Salvage at 5% On Main Compressor Bldg. Ext.					97.0
Total Additional Investment—All Bldgs.				$ 8,979.00	
Total Additional Salvage—All Bldgs.					$ 800.0

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2093

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T.N.G

Acct. #1006-b—Wood Frame Buildings

	Number	Salvage Value @ $100 ea.	Cost to Reclaim	Net Salvage
4-Room Cottages	25	$2,500		
5-Room Cottages	5	500		
Duplex Cottages	3	300		
Bunk Houses, 7-Rm.	3	300		
5-Room Boarding Houses	2	200		
Office & Community Houses	2	200		
As of 6-1-39	40 @100	$4,000		$4,000
4-Room Cottages	18 @$100	$1,800		$1,800
Added After 6-1-39				$1,800

2094

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T. N. G. Co.

Acct. #1006-d—Engines—Scrubbers

	Weight	Total Salvage	Cost of Reclaim	Net Salvage
15—1250 H.P. Wor. Hor. G.D. Compressors	2940 T.	$27,577	$44,688	*$17,111
5—Old Type Scrubbers @ 20 T. ea. 100 T.				
Platform, Tanks, etc. 9516# 4.8 T.	104.8 T.	1,193	1,803	*610
Total as of 6-1-39	3044.8 T.	$28,770	$46,491	*$17,721
1—1250 H.P. Wor. Hor. G.D. Compressor	196 T.			
2—Unloaders	.8 T.			
Sub-total	196.8 T.	$ 1,846	$ 2,991	*$ 1,145
3—Blaw-Knox Scrubbers	45.0 T.			
Platform Tanks, etc.	4.8 T.			
Sub-total	49.8 T.	$ 567	$ 857	*290
Total added after 6-1-39	49.8 T.	$ 2,413	$ 3,848	*$ 1,435

Note: *=red figure.

2095

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T N G Co.

1006-e—Miscellaneous Pumps, Motors, Shop Equipment, Etc.

Description		Salvage Rate	Total Salvage	Cost of Reclaim	Net Salvage
	As of June 1, 1939				
3—Cooper-Bessemer 280 K.W.	840 K.W.	$5.00/K.W.	$4,200.00	$ —	$4,200.00
2—Chicago Pneumatic Air Comps.*	8,000#	$9.38/ton	38.00	49.00	*11.00
2—25 H.P. Motors for above	$645.14	10% of cost	65.00	—	65.00
7—Dayton-Dowd Cir. Pumps*	10,180#	$9.38/ton	48.00	62.00	*14.00
6—100 H.P. Motors for above	$5,435.76	10% of cost	544.00	—	544.00
3—5¼x4¾x5 Std. Duplex Steam Pump	426.00	10% of cost	43.00	—	43.00
Machine Shop Equipment	$8,558.03	15% of cost	1,284.00	—	1,284.00
2—Motor Generator Sets w/Panel.	801.88	10% of cost	80.00	—	80.00
1—Goulds #3 Elec. Sump Pump 1½ H.P. Motor	484.12	10% of cost	48.00	—	48.00
1—4" L—2 Centrifugal Pump w/20 H.P. Motor	524.40	10% of cost	52.00	—	52.00
1—Goulds #375 Centrifuge	1,900.41	25% of cost	475.00	—	475.00
1—Goulds 3" Sump Pump w/3 H.P. Motor	420.42	10% of cost	42.00	—	42.00
2—Blowers w/7½ H.P. Polyphase Motors	2,271.02	10% of cost	227.00	—	227.00
			$7,146.00	$111.00	$7,035.00

Salvage as of 6-1-39

*Demolition & Hauling	$5.00 Ton
Freight	7.20 Ton
Cost of Reclaim	$12.20 Ton
Total Salvage	9.38 Ton
Net Salvage	*2.82 Ton

Note: * denotes red figure.

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T N G Co

1006-e — Salvage — Miscellaneous Pumps, Motors, Shop Equipment, Etc.

Description		Salvage Rate	Total Salvage	Cost of Reclaim	Net Salvage
	Added after 6-1-39				
Machine Shop Equipment	$1,803	15% of cost	$270	$ —	$270
Air Compressor #3	4,000#	$9.38/ton	19	24	*5
PWS Air Comp.	$ 410	10% of cost	41	—	41
1—25 H.P. Motor for Comp. #3	$ 320	10% of cost	32	—	32
Dust Protection Aux. Bldg.	$1,460	10% of cost	146	—	146
			$508	$ 24	$484

Demolition & Hauling	$ 5.00 Ton
Freight	7.20 Ton
Cost of Reclaim	$12.20 Ton
Total Salvage	9.38 Ton
Net Salvage	*2.82 Ton

Note: * denotes red figure.

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T N G Co

1006-F—Tanks

No. of Units	Description of Tanks	Unit Cost	Total Cost	Salvage
	As of 6-1-39			
2—9,000	Gal. Oil Storage Tanks	$ 764	$ 1,528	
1—5'x24'	Long Oil Storage Tanks		477	
5—2'x32'	Long Air Receivers		816	
2—4'x20'	Long Air Receivers	1,019	2,038	
1—	Elevated Domestic Water Tank		408	
	Total Cost of Above Tanks		$ 5,267	
	Salvage on Above Tanks at 5% of Cost			$ 263
1—100,000	Gal. Elevated Water Tank		$ 7,223	
	Salvage at $11.38/Ton Less $17.20/Ton for Wrecking & Hauling Charges:— 47259 Lbs.	Sal. $269 Recl. Cost $407		$*138
1—55,000	Bbl. Tank		$16,289	
	Salvage			$750
	Total Tank Investment		$28,779	
	Total Salvage As of 6-1-39			$ 875
	Added After 6-1-39			
2—1,000	Bbl Wooden Tanks		$ 1,248	
	Sand Filter Tanks		2,295	
	Total Cost of Above Tanks		$ 3,543	
	Salvage on Above Tanks at 5%			$ 177
1—200,000	Gal. Elev. Water Tank		$13,078	
	Salvage at $11.38/Ton less $17.20/Ton for Wrecking & Hauling Charges:—Wt.= 100365# (50.18T)			$*292
	Total Tank Investment After 6-1-39		$16,621	
	Total Salvage After 6-1-39			$*115

Note: * denotes red figure.

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T N G Co.

1006-G—Cooling Sections

As of 6-1-39	Cost	Salvage
28—Size C-240 Griscom-Russell Bentube Sections	$21,161.80	$1,058.09
12—G-R-A-240 Bentube Sections	8,010.00	400.50
	$29,171.80	$1,458.59
Added After 6-1-39		
4—G-R-A-240 Bentube Sections	$ 2,670.00	$ 133.50

2099 Page No. 63

T N G Co.

1006-h.—Piping

	Total Weight	Salvage Value	Cost of Reclaim	Net Salvage
As of 6-1-39				
Main Engine, Basement, Manifold & Yard piping 12" and under	662.55 Tons	$13,251	$9,938	$3,313
Added after 6-1-39				
Additions to Piping	109.12 Tons	$ 2,182	$1,637	$ 545

2100 Page No. 65

T. N. G. Co.

1006-I—Electrical Material

	Weight Lbs.	Original Cost	Total Salvage	Cost to Reclaim	Net Salvage
Copper Wire	Electrical Material Added After June 1, 1939				
50′ No. 0000 DBRC .6405#/ft.	32				
390′ No. 0 DBRC .3195#/ft.	125				
462′ No. 2 DBRC .2009#/ft.	93				
Total Copper Wire	250#		$ 18	$ 6	$ 12
Transformers					
1—12 K V A		$ 580	$ 29	$ —	$ 29
1—37½ K V A		270	13	—	13
Total Transformers		$ 850	$ 42	$ —	$ 42
Total Electrical Materials 6/1/39 to 12/30/54			$ 60	$ 6	$ 54

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2101

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T.N.G.Co.

1006-I Electrical Materials

	Weight Lbs.	Cost	Total Salvage	Cost to Reclaim	Net Salvage
Copper Wire	Electrical Materials as of June 1, 1939				
225'—400,000 CM 1.24#/ft.	279				
625'—No. 0000 DBRC .6405#/ft.	400				
495'—No. 0 DBRC .3195#/ft.	158				
165'—No. 0-3 Cond. .9585#/ft.	158				
270'—No. 2 DBRC .2009#/ft.	54				
270'—No. 2-2 Cond. .4018#/ft.	108				
80'—No. 2-3 Cond. .6027#/ft.	48				
395'—No. 4-3 Cond. .3792#/ft.	150				
— —No. 4	426				
1100'—No. 4-1 Cond. .1264#/ft.	139				
4050'—No. 6-2 Cond. .1592#/ft.	645				
— —No. 6	596				
30'—No. 8-3 Cond. .1494#/ft.	4				
650'—No. 8-2 Cond. .09996#/ft.	65				
5900'—No. 8-1 Cond. .04998#/ft.	295				
— —No. 8	351				
400'—No. 10 DBRC .03143#/ft.	13				
2500'—No. 10-2 Cond. .06286#/ft.	157				
285'—No. 10-3 Cond. .09429#/ft.	27				
— —No. 10 — —	222				
70'—No. 12-3 Cond. .05931#/ft.	4				
160'—No. 12-2 Cond. .03954#/ft.	6				
2000'—No. 12-1 Cond. .01977#/ft.	40				
10500'—No. 14 DBRC .01243#/ft.	131				
5450'—No. 14-2 Cond. .02486#/ft	135				
200'—No. 14-3 Cond. .03729#/ft.	7				
650'—No. 16-3 Cond. .02346#/ft.	15				
Total Copper Wire	4,633# 2.32 Tons		$ 348	$ 103	$ 245
Transformers					
1—75 KVA		$ 435.55		—	
3—37½ KVA		705.00		—	
1—250 Watt		14.25		—	
1—37½ KVA		245.45		—	
Total Transformers		$1,400.25	$ 70	$ —	$ 70
Total Electrical Materials as of June 1, 1939			$ 418	$ 103	$ 315

Exhibit No. 122.

2102

T.N.G.Co.

Acct. #1006-J—Misc. Equipment

	Original Cost	Salvage
10—2½ Gal. Fyr Fyter "Foam" Extinguishers	$ 118.80	
4—100′ lengths 2½″ Fire Hose	203.84	
2—2½″x15″ Fire Play Pipes	9.80	
1—Model 340 Bristol Record. Thermometer	121.28	
101—#685 H. W. Spec. Ther. 20° to 240° F.	74.13	
4—Type 1010 8½″ Ashcroft 0-1000# Gauge	51.60	
1—Type 1018 8½″ Ashcroft 0-100# Gauge	12.04	
1—Type 1024 8½″ Ashcroft 0-500# Gauge	11.82	
1—Type 1086 8½″ Ashcroft Clock	46.57	
1—Type 1024 6″ Ashcroft 0-500# Gauge	7.11	
2—Type 1018 6″ Ashcroft 0-100# Gauge	12.92	
1—Thomas Recording Calorimeter	2,007.39	
2—Brown 10 Ton Double "I" Beam Traveling	711.80	
1—20-Gal. Model #45 Fire Exting. Equipment	196.00	
1—2½ Gal. 100′ lengths Fire Hose	50.96	
1—2½[illegible]5″ Brass Hose Nozzle	2.45	
1—Type 1010—4½″ Ashcroft 0-30# Gauge	1.72	
4—Type 1010—3″ Ashcroft	8.42	
4—Model 11M 12″ Bristol Recording 0-1000# Gauge	175.59	
1—2½ Gal. Fyr Fyter Extinguisher	11.88	
1—1½ Ton Y & T Steel Plate Trolley for 10″ Beam	81.58	
1—1 Ton Y & T Spur Gear Chain Hoist	58.56	
5—#41213 Spread Lens Floodlights	175.77	
2—2½″ Fire Hose 100′ Lengths	101.92	
2—2½″x15″ Nozzles	4.90	
1—#W143 Air Compressor with 110 V. Motor	142.25	
1—2½ Gal. Fire Extinguisher	13.52	
1—Model 76 20-Gal. "Karbalay" Engine with hose	267.54	
1—Telewell Brinell Hardness Tester	125.95	
2—2½ Gal. Fire Extinguisher	29.40	
1—#675 Meg Insulation Tester	145.00	
2—Motoco Dial Type Indicating Therm.	29.60	
2—9″ Angle form Thermometers	37.51	
1—3 Gal. Fire Extinguisher	21.56	
3—6″ 0-500# Pressure Gauges	37.63	
10—#685 H. W. Thermometers	10.71	
4—American Angle Thermometers	61.28	

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T.N.G.

1006-J—Miscellaneous Equipment (Continued)

	Original Cost	Salvage
1—Brown 10 Ton Double I-Beam Crane	1,218.67	
4—2½ Gal. Fire Extinguishers	44.00	
1—Model 11 Bristol gauge	51.11	
2—0-600# Pressure Gauges	14.90	
1—Brown 10 Ton Double I-Beam Crane	1,250.00	
1—No. 200923 Midget Meg[illegible] Tester	80.86	
1—Crestlawn Mower	50.80	
1—3½' 1 horse Mower	78.75	
1—8' Hay Rake	46.25	
Total Misc. Equipment to 6-1-39	$8,016.14	$801.61
Added After 6-1-39		
2—Water Coolers	220.00	
1—Model 55 Western Voltmeter	65.00	
Gage Glasses on Dust Scrubbers	191.00	
	$ 476.00	$ 47.60

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T.N.G.

1007-A—Steel Frame Buildings

Building	Type	Size	Original Cost	Total	Salvage
As of June 1, 1939					
iler Hse.	Miss. Valley	44x112x29'-6"	4,889.00		
rip Hse.	Miss. Valley	12'x14'x10'-6"	380.00		
eter & Reg. Hse.	Miss. Valley	12'x30'x9'-6"	498.00		
l Transfer Pump Hse.	Stefco	15'x30'x12'	860.00		
ecompressor Bldg.	Miss. Valley	33'x160'x16'-6"	4,354.00		
arehouse & Garage	Miss. Valley	20x40'x10'-6"	985.00		
efrigeration Control Hse.	Miss. Valley	12x48'x10'-6"	908.00		
Total—Gasoline & Refrg. Plant Bldgs.				$12,874.00	
aboratory Bldg. (Brick)	Salvage for				100.00
lvage at 10% on Gaso. & Refrg.	Plant Bldgs.				$1,387.00

Nothing After 6-1-39

TNGCO

1007—b, c, d, Loading Rack, Siding and Absorbers

	Weight	Original Cost	Total Salvage	Cost to Reclaim	Net Salvage
As of 6-1-39					
(b)					
1-8 car double loading rack		$ 2,326	$ 233	—	$ 233
Salvage 6-1-39					$ 233
No investment after 6-1-39					$ —0—
(c) Railroad Siding					
9172' of 85# steel rails	259,873#				
1356 Tie-plates	1,695#				
2 No. 8-85# Frogs	1,250#				
40'-85# Guard Rail	1,133#				
44'-85# Switch Point	1,247#				
Total Weight	265,198#				
Salvage as of 6-1-39	132.6 Tons		$1,500	$2,016	$* 507
No investment after 6-1-39					$ —0—
(d) Absorbers					
9 Absorbers with controls		$75,375	$9,000	—	$ 9,000
Salvage to 6-1-39			@ 1000 each		
No investment after 6-1-39					$ —0—

Note: * Denotes red figure.

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TNGCO

1007-e—Miscellaneous Pumps, Motors, Clark Engines (Gasoline Plant)

scription	As of June 1, 1939	Salvage Rate	Total Salvage	Cost of Reclaim	Net Salvage
00 HP 60-Cycle motor w/compen. & Breaker	2,045.01	10% of Cost	$ 205.00	$ —	$ 205.00
25 HP 60-Cycle motor w/compen. & Breaker	1,067.35	10% of Cost	107.00	—	107.00
10 HP 60-Cycle motor w/compen. & Breaker	177.29	10% of Cost	18.00	—	18.00
"-6 stage Fig. 3360 Cent. Pump	8,850#	$ 9.38/ton	42.00	54.00	*12.00
"-1 stage Fig. 3480 Cent. Pump	625#	$ 9.38/ton	3.00	4.00	* 1.00
Dean Hill H4H 3 nozzle Horiz. turbine	4,450#	$ 9.38/ton	21.00	27.00	* 6.00
"x7"x18" Dean Bros. Horiz. Pumps	9,900#	$ 9.38/ton	46.00	60.00	*14.00
4"x7"x18" Dean Bros. Horiz. Pumps	7,400#	$ 9.38/ton	35.00	45.00	*10.00
Clark Eng. #2 Comp. S. B. 6"x20"	15,930.00	5% of Cost	797.00		797.00
Clark Eng. #3 Comp. S 10"x20"	24,327.00	5% of Cost	1,216.00	—	1,216.00
Clark Eng. #6 Comp. S 10"x12"	8,109.00	5% of Cost	405.00	—	405.00
Type 4C 1½ KW Turb. Generator	1½ Kw	$ 5.00 Kw	8.00	—	8.00
"x5"x12" Dean Bros. Horiz. Duplex Pump	5,248#	$ 9.38/ton	25.00	32.00	* 7.00
"x6"x10" Dean Bros. Horiz. Duplex Pump	2,312#	$ 9.38/ton	11.00	14.00	* 3.00
6"x4"x6" Dean Bros. Horiz. Duplex Pump	3,156#	$ 9.38/ton	15.00	19.00	* 4.00
Goulds 10" Cent. Pumps Fig. 3065	5,600#	$ 9.38/ton	26.00	34.00	* 8.00
121 Type 83 Moore Turbine	3,000#	$ 9.38/ton	14.00	18.00	* 4.00
Fig. 3480—2½" Cent. Iron Pump	625#	$ 9.38/ton	3.00	4.00	* 1.00
12"x6"x12" Dean Bros. Horiz. Pump	4,750#	$ 9.38/ton	22.00	29.00	* 7.00
6"x6"x12" Dean Bros. Horiz. Pump	1,519#	$ 9.38/ton	7.00	9.00	* 2.00
8½x120 West Stm. Air Compressor	350#	$ 9.38/ton	2.00	2.00	—
Salvage as of 6-1-39			$3,028.00	$351.00	$2,677.00

emolition and Hauling	$ 5.00	ton on items above salvaged as scrap
reight	7.20	ton
Cost of Reclaim	$12.20	ton
Total Salvage	$ 9.38	ton
Net Salvage	$*2.82	

Note: *Denotes red figure.

T.N.G.

1007-E Misc'l. Pumps, Motors, Shop Equipment, Etc.

Gasoline Plant

Description		Salvage Rate	Total Salvage	Cost of Reclaim
		Added After 6-1-39		
Water Circulating Pump	$738.	10% of Cost	$ 74.00	—
2-14"x5½"x18" Dean-Duplex 15,000#		9.38/ton	70.00	92.00
Air Filtration Equipt.	$2,920.00	10% of Cost	292.00	
		Total	$ 436.00	$ 92.00

Demolition and Hauling $ 5.00 ton on items above salvaged as scrap.

Freight	7.20	ton
Cost of Reclaim	12.20	ton
Total Salvage	9.38	ton
Net Salvage	*2.82	

Note: * Denotes red figure.

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1007-F—Tanks—Gasoline Plant

No. of Units	Description of Tanks	Unit Cost	Total Cost	Salvage
	As of 6-1-39			
40	11'x40' Gasoline Storage Tanks	$1,156	$46,240	
2	4'x10' Separator Tanks	174	348	
2	4'x25' Treating Tanks	292	584	
1	7'x28' Oil Flow Tank		600	
1	7'x28' Gasoline Make Tank	404	600	
2	10'x15' Oil Storage Tanks		808	
1	10'x15' Slop Tank		404	
1	2,000 Bbl. Water Tank		1,524	
12	#23-8-240 GR Heat Exchangers)		20,696	
6	#24-8-240 GR Reboilers)		672	
1	4'x20' Propane Accumulator		884	
1	#15-6-144 Heat Exchanger		1,076	
2	24"x30' Lubricator Tanks		60	
1	24"x10' Surge Tank		.218	
1	24"x26' CaCl, Accumulator		6,656	
1	72"x12' Vertical High Pressure Gas Eliminator		951	
1	60"x8' Liquid Fractionator Accumulator		1,659	
3	80-204 Heat Exchangers		347	
1	8-60 Preheater		2,140	
1	24"x102" Reheater		543	
1	8"x168" Superheater		3,046	
1	20"x120" Rich Oil Preheater		15,150	
7	20"x204" Heat Exchangers		1,506	
1	24"x180" Control Preheater		2,378	
1	6'x12' Fixed Gas Eliminator		2,140	
1	42" Reboiler		335	
1	36"x7'6" Gas Scrubber		394	
1	48"x7'6" Gas Scrubber		736	
1	42"x8' Vapor Fractionator Accumulator		566	
1	72"x8' Gasoline Water Separator			
1	36"x6'9" Long Lean Oil Accumulator Tank)		311	
1	24'x8' Long Lean Oil Accumulator Tank)		6,748	
	Zeolite Softener Tanks		473	
2	24"x8' Condensate Tanks		447	
1	48"x7'6" Gas Scrubber			
	Total Investment on Tanks and Heat Exchangers		$121,240	
	Salvage on Above Tanks and Heat Exchangers @ 5%			$$6,062
	2—500 H.P. Babcock and Wilcox Water Tube Boilers		$ 21,330	
			E	$2,133
	Salvage at 10% of Cost			
	Total Salvage on Tanks, Heat Exchangers, & Boilers as of 6-1-39			$8,195

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1007-F—Tanks—Gasoline Plant

No. of Units	Description of Tanks	Original Cost	Total Salvage	Cost to Reclaim	Net Total
	Added After 6-1-39				
5	60"x25' Contractors	$23,720	$1,186		$1,186
1	Preheater	500	25		25
2	4'x25' Tanks	890	45		45
1	Reboiler	2,000	100		100
	Misc'l. Reboilers & Tanks	7,200	360		360
	Zeolite Unit No. 2	5,379	269		269
	Total Cost	$39,689			
	Total Salvage on Tanks Added After 6-1-39				$1,985

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T.N.G.Co.

1007-G—Cooling Facilities—Gasoline Plant

As of 6-1-39	Original Cost	5% Salvage
35—Type C 240 Griscom Russell Bentube Cooling Sections	$24,301.70	$1,215.09
1—Type R 240 Griscom Russell Bentube Cooling Sections	340.00	17.00
5—Type A 240 Griscom Russell Bentube Cooling Sections	1,567.50	78.38
1—Single Pass Griscom Russell Bentube Cooling Sections	607.00	30.35
1—Double Pass Griscom Russell Bentube Cooling Sections	607.00	30.35
2—Type C 240 Griscom Russell Bentube Cooling Sections	1,288.00	64.40
1—Type C 240 Griscom Russell Bentube Cooling Sections	795.00	39.75
	$29,506.20	$1,475.32
Total Cost Griscom Russell Bentube Section After 6-1-39	$ —0—	$ —0—

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1007-h—Piping

	Total Weight (Tons)	Salvage Value @$20/Ton	Cost of Reclaim @$15/Ton	Net Salvage @$5/Ton
Gasoline & Refrig. Plant Piping As of June 1, 1939	520.5	$10,410	$7,808	$2,602
Gasoline & Refrig. Plant Piping Added After June 1, 1939	79.1	$ 1,582	$1,187	$ 395

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1007-I—Electrical Materials—Gasoline Plant

	Weight Lbs.	Original Cost	Total Salvage	Cost to Reclaim	Net Salvage
	As of June 1, 1939				
opper Wire					
10′ No. 0—3 cond. .9585#/ft.	2,310#				
10′ No. 2—3 cond. .6027#/ft.	187				
15′ No. 4—3 cond. .3792#/ft.	157				
60′ No. 6—3 cond. .23838#/ft.	324				
95′ No. 8—2 cond. .09908#/ft.	329				
20′ No. 8—3 cond. .14994#/ft.	48				
10′ No. 10—2 cond. .03143#/ft.	3				
00′ No. 12—1 cond. .01977#/ft.	81				
60′ No. 14—3 cond. .03729#/ft.	25				
80′ No. 14—2 cond. .02486#/ft.	37				
Total Copper Wire	3,501#		$262.58 @ $150 Ton	$ 77.72	$184.86
ransformers					
— 25 K.V.A.		$186.44	$ 9.32	—	$ 9.32
— 10 K.V.A.		196.44	9.82	—	9.82
—250 Watt		17.54	.87	—	.87
Total Transformers		$400.42	$ 20.01	—	$ 20.01
Total Electrical Materials As of June 1, 1939			$282.59	$ 77.72	$204.87
Total Electrical Materials After June 1, 1939			0	0	0

T.N.G. Co.

1007-j—Miscellaneous Equipment—Gasoline Plant

		Original Cost	Salvage
	As of 6-1-39		
2	#41212 Type ADA 14 Floodlights	$ 64.60	
1	Type 1086 8½" 8 Day Ashcroft Clock	46.57	
4	Type 1024 6" Pressure Gauge 150#	28.44	
1	Type 1024 6" Pressure Gauge 100#	7.11	
5	Type 1024 6" Pressure Gauge 500#	35.55	
3	Type 1010 6" Pressure Gauge 500#	21.48	
1	Model #2022—7002 Brown Recording Flow Meter	199.25	
200'	2½" Fire Hose	101.92	
2	2½"x15" Nozzles	4.90	
4	2½ Gal Fyr. Fyter Extinguisher	47.52	
2	1 Qt. Fyr. Fyter Extinguisher	12.48	
2	#115 Fire Hose Racks	15.68	
1	40 Gal. Fire Extinguisher	245.00	
6	Wirts Ownlee Hose Racks	9.44	
4	Metric Rate Volume Controller	1,204.41	
1	#41212 C.H. Flood light	32.09	
1	18" Type 1370 U-Gauge	8.40	
2	6" Type 1024 U-Gauge	14.92	
1	4½" Type 1018 Ashcroft Gauge	5.25	
1	8½" Type 1086 Ashcroft Clock	50.33	
7	6" Ashcroft Gauges	47.43	
1	40 Gal. Fire Extinguisher	245.00	
200'	2½" Fire Hose	101.92	
2	#115 Elk Hose Racks	15.68	
2	2½"x15" Hose Nozzles	4.90	
2	2½ Gal. Fire Extinguishers	23.76	
2	1 Qt. Fire Extinguishers	12.47	
1	2½ Gal. Fyr. Fyter Fire Extinguisher	11.88	
1	1 Qt. Fyr. Fyter Fire Extinguisher	6.23	
1	#2 American Blower Fan w/ motor	57.50	
1	2½ Gal. Fyr. Fyter Fire Extinguisher	11.88	
2	#5—5 Transparent Gauges	162.50	
2	#7—8 Transparent Gauges	150.00	
10	8½" Type 1000 Ashcroft Gauge	16.39	
1	2½ Gal. Fyr. Fyter Fire Extinguisher	11.88	
1	20 Gal. Karboloy Fire Extinguisher Engine	196.00	
1	2½ Gal. Fyr. Fyter Fire Extinguisher	11.88	
1	#6—5—6 OXP Transparent Gauge	126.13	
4	10" Round form Recorder Controller	477.74	
3	6" Type 1024 Ashcroft Gauges 300#	22.47	
5	6" Type 1010 Ashcroft Gauges 1000#	46.92	

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T.N.G. Co.

1007-j—Miscellaneous Equipment—Gasoline Plant (Continued)

		Original Cost	Salvage
	Brot. Forward:—	$3,015.90	
2	#02302 Tagliabue Thermometers 30°-240°	29.24	
3	#02302 Tagliabue Thermometers 50°-400°	52.12	
2	#02302 Tagliabue Thermometers 30°-160°	27.45	
1	Model #2053 Brown Steel Momometer	194.05	
1	6" Type 1010 Ashcroft Gauge 1000#	8.87	
3	¾" Iron Lunkenheimer Auto. Lig. Gauges	31.77	
1	6" Type 1010 Ashcroft Gauge	7.17	
1	6" Type 1024 Ashcroft Gauge 500#	7.11	
1	Tagliabue Vapor Tension Recorder Controller	213.11	
2	¾" Safeguard Oil Gauge	21.14	
2	10" Round Form Vapor Tension, Recorder Controller	362.73	
3	6" #1024 Ashcroft Gauges 300#	21.96	
7	Penberthy Safeguard Oil Level Gauge	59.92	
9	Penberthy Automatic Water Gauge	67.06	
1	2½ Gal. Fire Extinguisher	14.12	
1	1 Qt. Fire Extinguisher	12.35	
1	Tagliabue Temp. Recorder	188.52	
1	10" Tagliabue Temp. Recorder	203.08	
1	Davis Model AL—25 Safety Mask	40.96	
1	Tagliabue Temp. Recorder	169.84	
1	Motoco Therm. Model F-1	31.36	
1	Merriam Model A-203 Manometer	70.44	
200'	2½" Fire Hose	109.76	
1	Phomone Hopper w/nozzle	159.11	
1	4½" 500# Gauge	7.49	
3	300" Indicating Flow Meters	332.25	
1	Test Ring, Alco Products #C 10749	144.00	
	Total	$6,502.88	$ 650.29
	Added after 6-1-39		
1	Water Cooler	$ 77.00	
	Reflex Liquid Level Gauges	1,175.00	
1	Indicating Thermometer	31.00	
	Total	$1,283.00	$ 128.30

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T.N.G.Co.

Acct. #1007-K—Misc. Scrap (Gasoline Plant)

Item	Weight	Total Salvage	Cost to Reclaim	Net Total
Boiler Breeching) Platforms) Chlorine Rack) Tube Bundle Cleaning Apparatus) Misc. Items)	20,000#	$113.80	$172.00	*$ 58.20
Propane Distil. Equipment	8,000#	45.52	68.80	* 23.28
Steam Superheater	2,000#	11.38	17.20	* 5.82
Moorlane Drips	50,000#	284.50	430.00	* 145.50
Tracyfiers	70,000#	398.30	602.00	* 203.70
Total Salvage as of 6-1-39				*$436.50
None Added.				

Note: * = red figure.

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T.N.G.Co.

Acct. #1008—Telephone System

	Length	Weight	Total Salvage @ 7½¢ lb.	Cost to Reclaim	Net Salvage
	As of 6-1-39				
Texas					
#8 B.W.G. Cu. Wire	3,370,464	277,389#			
Oklahoma					
#8 B.W.G. Cu. Wire	152,300	12,534#			
		289,923# 145 Tons	$21,744	*$6,223	$15,521

*Cost of Reclaim:

Fritch to Amarillo 2 wires CRI&P Poles	38.35 Mi.	$19.50 Mi.	$ 748
Fritch to Kingsmill 2 wires Co. Poles	41.50 Mi.	19.50 Mi.	$ 809
Fritch to Dumas 2 wires Co. Poles	43.76 Mi.	19.50 Mi.	$ 853
E. Leg Moore Co. Line 2 wires Co. Poles	9.30 Mi.	19.50 Mi.	$ 181
Fritch to N.G.P.L. Jct. 4 wires Co. Poles	103.51 Mi.	25.00 Mi.	$2588
Cost of Salvage			$5179
145 Tons Scrap @ $7.20 per T. freight			$1044
Total Cost of Reclaim			$6223

Added After 6-1-39

	Length	Weight	Total Salvage	Cost to Reclaim	Net Salvage
Texas					
#8 B.W.G. Cu. Wire	126,720	10,429#	$782	**$271	$511
Salvage 6-1-39 to End Project.		5.2 T.			$511

**Cost of Reclaim:

Line to Skellytown, 2 wires Co. Poles	5.0 Mi.	$19.50 Mi.	$ 98
Line to Kilgore M26 2 wires Co. Poles	7.0 Mi.	$19.50 Mi.	136
Cost of Salvage			$234
5.2 Tons Scrap @ $7.20 per T. freight			$ 37
Total Cost of Reclaim			$271

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1009—Meters & Regulators

As of 6-1-39	Original Cost	Salvage
14—1000# Spr. American Meter Co. Orifice Meter Recorders	$1,750.00	$ 350.00
37— 500# Spr. American Meter Co. Orifice Meter Recorders	4,509.00	925.00
1— 500# Spr. Anubis Co. Orifice Meter Recorders	150.00	25.00
3— 50# Spr. Metric Metal Co. Orifice Meter Recorders	466.00	75.00
2— 100# Spr. Metric Metal Co. Orifice Meter Recorders	358.00	50.00
1— 250# Spr. Metric Metal Co. Orifice Meter Recorders	158.00	25.00
86— 500# Spr. Metric Metal Co. Orifice Meter Recorders	13,253.00	2,150.00
46—1000# Spr. Metric Metal Co. Orifice Meter Recorders	6,338.00	1,150.00
1— 500# Spr. Foxboro Metal Co. Orifice Meter Recorders	150.00	25.00
2— 10# Pittsburgh Equitable Domestic Meter	25.00	5.00
1— 50 Pittsburgh Equitable Domestic Meter	78.00	5.00
Total Meters	$27,235.00	$4,785.00
1— ¼" Fisher Governor	18.00	
2— ¾" Fisher Governor	31.00	
1—1 " Fisher Governor	133.00	
1—1¾" Fisher Governor	6.00	
7—2 " Fisher Governor	578.00	
2—2½" Fisher Governor	142.00	
3—3 " Fisher Governor	240.00	
2—8 " Fisher Governor	333.00	
1— ¾" Reynolds Regulators	5.00	
108—1 " Reynolds Regulators	474.00	
1— ¾" Pittsburgh Equitable Regulator	6.00	
90—1 " Pittsburgh Equitable Regulator	1,015.00	
1— ½" Chaplin Fulton Regulator	17.00	
1—4 " Chaplin Fulton Regulator	150.00	
1—1 " Reliance Regulator	86.00	
Total Regulators	3,234.00@10%	$ 323.00
Total Meters & Regulators	$30,469.00	$5,108.00
Added After 6-1-39		
Meters necessary for additional wells	$28,258.00	$4,975.00
Regulators necessary for additional wells	1,791.00@10%	179.00
Total Meters & Regulators	$30,049.00	$5,154.00

T.N.G.Co.

1010—Structures

Item	Weight	Original Cost	Total Salvage	Cost to Reclaim	Net Total
As of June 1, 1939					
Dumas Warehouse	—	$1,781	$ 178	$ —	$ 178
Kingsmill Warehouse	—	1,781	178	—	178
Gray County Check Meter	—	626	63	—	63
Moore County Check Meter	—	626	62	—	62
Gray Junction Check Meter	—	408	41	—	41
Booster Station House	—	326	33	—	33
1, 5-room and 3, 4-room houses @ $100 each		—	400	—	400
175 Well Meter Houses	—	—	—	3,500	* 3,500
Pipe Racks—Dumas, Kingsmill	50,081	—	285	431	* 146
Railroad Siding	189,387	—	1,078	1,629	* 551
Wash & Grease Rack—Kingsmill	2,000	—	11	17	* 6
Water Well Equipment		537	54	—	54
	241,468#	$6,085	$2,383	$5,577	
Total Net Salvage as of June 1, 1939..120.7 Tons					*$3,194

Added After June 1, 1939

Item	Weight	Original Cost	Total Salvage	Cost to Reclaim	Net Total
1, 6-car garage	—	$ 1,360	$ 136	$ —	$ 136
4, Garage stalls additions	—	986	99	—	99
2, 4-car garages	—	2,334	233	—	233
3, 2-car garages	—	1,980	198	—	198
1, 3-car garage	—	957	96	—	96
2, 5-car garages	—	2,583	258	—	258
1, 14-car garage	—	2,886	289	—	289
1, 1 garage stall addition	—	226	23	—	23
1, 2 garage stall addition	—	533	53	—	53
3, Bay Extension to warehouse	—	395	40	—	40
30, 4-room and 1, 5-room houses	—	—	3,100	—	3,100
197 Well Meter Houses	—	—	—	3,940	* 3,940
Pipe Racks—Skellytown	3,870	—	22	33	* 11
	1.94 T	$14,240	$4,547	$3,973	
Total Net Salvage added after June 1, 1939					$ 574

Note: * Denotes red figure.

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1012—Drilling and Production Tools

As of June 1, 1939

	Original Cost	10% Salvage
Bull Wheel Units		
5—8' Parkensburg Steel Bull Wheels	$ 2,499.75	$ 249.98
5—Sets 18" Wire Line Spool Clamps	175.79	17.58
5—Pairs Bull Wheel Posts	465.50	46.55
5—Brake Bands	68.40	6.84
5—Brake Levers	41.47	4.15
5—Brake Staples	8.67	.87
10—Brake Band Clamps	8,29	.83
Band Wheel Units		
6—Type 85 O.C.S. Universal Rig Fronts	8,386.12	838.61
3—Sets Jack Posts	433.43	43.34
3—Sets Bride Irons and Foundation Bolts	194.18	19.42
Derrick Units		
6—94' Combination Rotary Steel Derrick	6,394.50	639.45
6—24' Steel Bases	4,090.87	409.09
5—Steel Crown Blocks	539.00	53.90
48—Single Bearings	470.40	47.04
20—Roller Bearings	450.80	45.08
5—33½" Crown Sheaves for 1" Wire line	269.50	26.95
5—27½" Steel Sand Line Sheaves for ¾"	245.00	24.50
24—22" Casingh Line Sheaves for 1" Wire Line	1,199.52	119.95
Calf Wheel Units		
6—7½' Steel Calf Wheels	2,224.37	222.44
6—Calf Wheel Posts	294.00	29.40
6—Brake Bands	82.08	8.21
6—Brake Levers	49.76	4.98
6—Brake Staples	10.41	1.04
12—Brake Band Clamps	9.95	1.00
6—55' Calf Wheel Chains	474.31	47.43
6—Crank Assemblies	27.50	2.75
6—Clutch Forks	26.04	2.60
4—Clutch Hangers	5.68	.57
6—Clutch Levers	24.11	2.41
6—Clutch Pipe Reaches	23.63	2.36
6—Clutch Yokes	36.49	3.65
6—Sprockets and Clutches	585.86	58.59

T.N.G.Co.

1012—Drilling and Production Tools (continued)

	Original Cost	10% Salvage
Sand Reel Units		
6—Sand Reels with chains	$ 5,676.98	$ 567.50
Walking Beam Units		
5—26′ Steel Walking Beams	1,335.25	133.53
10—6″ Saddle Bearings	114.02	11.47
5—6″ Saddles with Stirrups	109.08	10.91
5—Steel Pitmans with Bearings	387.10	38.71
5—14″ Pitman Stirrups	96.10	9.61
3—Sampson Posts	846.54	84.65
3—Headache Posts	77.37	7.74
Machinery Supports, Engine Blocks		
3—Sets Steel Machinery Supports	2,725.38	272.54
3—Sets Mud Patterns	3,970.05	397.01
3—Engine Blocks	670.32	67.03
3—Adjustable Engine Blocks	761.77	76.18
6—Engine Sprockets	583.36	58.34
Miscellaneous Equipment		
5—6′ x 10′ Steel Tool Houses	1,044.44	104.44
5—Steel Slush Boxes	375.00	37.50
I-Beams, Spreaders, and Friction Beams	155.04	15.50
1—2-Md Hand Drilling Machine	1,200.00	120.00
1—Crown for Mast of Portable Drilling Machine	116.33	11.63
Total as of June 1, 1939	$50,059.51	$5,006.05
Added After June 1, 1939		
2—Cleanout Machines @ $5,500.00 each	$11,000.00	$1,100.00
3—Strings Cleanout Tools @ $7,590.00 each	22,770.00	2,277.00
Unitizing Old Machine	2,000.00	200.00
Total Cost of Drilling and Cleanout Tools	$35,770.00	$3,577.00

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T.N.G.

1013—Tools

Description of Tools	Original Cost Per Unit	No. of Units	Total Cost
As of 6-1-39			
#2075 Tycos Anecoid Barometer & Case	$ 33.75	2	$ 67.50
Measuring Line W/roller real—6,200′	258.49	1	258.49
Hose Mask—Complete	98.18	3	294.54
#1555 Charcoal Meter	62.60	1	62.60
Dead Weight Gauge	115.00	5	575.00
#28 Tulsa Winch & Power Take-off	435.08	1	435.08
#28 Tulsa Winch & Power Take-off	323.00	1	323.00
4″ Back Pressure Test Head & Discs	56.75	1	56.75
4″ Back Pressure Test Head & Discs	68.50	1	68.50
4″ Back Pressure Test Head & Discs	48.00	1	48.00
Acme Gravity Balance—Complete	265.87	1	265.87
One Hour Clock for Anibus Recorder	30.00	1	30.00
B. & D. ¾″ Electric Drill (2nd Hand)	48.00	1	48.00
Hydraulic Core Extractor & Testing Pump	73.50	1	73.50
#3 Carbic Flood Light	46.96	4	187.84
Acetylene Generator	247.36	1	247.36
Sunnen Cylinder Grinder	57.75	1	57.75
Sunnen Grit Remover	48.00	1	48.00
8″ x 1″ Detroit Electric Drill	107.16	1	107.16
1½ Ton Yale & Towne Chain Hoist	82.56	2	165.12
Trench Horse W/5 Ton Hand Hoist	193.84	8	1,550.72
1½ Ton Yale & Towne Chain Hoist	94.97	1	94.97
110 Gal. "Aeroil" Melting Kettle	194.04	2	388.08
#3A Eastman Kodak	29.32	1	29.32
Battery Operated Pipe Locator	80.99	1	80.99
50″ Manometer for 400# Pressure–Complete	29.20	4	116.80
Goulds Diaphragm Pump	53.47	1	53.47
Jaeger Centrifugal Pump & Motor	296.26	1	296.26
#5 C. H. & E. Mudhen Diaphragm Pump	306.23	1	306.23
#2 Toledo Stock & Die	47.50	2	95.00
High Pressure Tapping Machine	874.45	1	874.45
Extension & Cutter for Tapping Machine	290.00	1	290.00
Portable Tensile Testing Machine	708.16	1	708.16
#16 Breakout Chain Tongs	41.40	2	41.40
Telephone Test Set	39.40	1	39.40
#17 "Aeroil" Kerosine Hand Torch	27.61	3	82.83
Telephone Test Set	56.06	6	336.36
Telephone Test Set	60.20	2	120.40
Combination Pipe Vise	35.49	1	35.49
Combination Pipe Vise	26.66	1	26.66

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T.N.G.

1013—Tools

Description of Tools	Original Cost Per Unit	No. of Units	Total Cost
400 Amp. Lincoln "Shield Arc" Welder	$1,572.16	1	$ 1,572.16
W 17 Welding Outfit Complete	204.60	1	204.60
#11 Braden Winch	200.00	1	200.00
W17 Welding Outfit Complete	229.87	1	229.87
W1 Welding Outfit Complete	55.07	1	55.07
Duff Norton 15 Ton Lift Jack 1523	33.52	1	33.52
Alemite Grease Gun w/25' Air Hose	33.21	1	33.21
Chicago Pneumatic Air Compressor	1,732.50	1	1,732.50
Chicago Pneumatic Rock Drill (CP. 10)	180.00	1	180.00
Dead Weight Gage—Case & Weights	127.10	1	127.10
No. 2 Boyer Chipping Hammer	54.00	1	54.00
American Universal Swivel Sheave	56.25	1	56.25
1000 Watt Onan Portable Electric Light Plant	262.32	1	262.32
Adams Rotary Scraper	143.66	1	143.66
Chicago Pneumatic Rotary Scraper	126.52	1	126.52
Khaki Wall Tent—Complete	59.59	1	59.59
Rex Model 40-M Centrifugal Pump	631.95	1	631.95
Rex Model 90-M Centrifugal Pump	1,099.62	2	2,199.24
Emergency Lighting Circuit Equip	145.01	1	145.01
Total			$17,033.62
Salvage @ 10%			1,703.00

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T.N.G.

1013—Tools

Description of Tools	Original Cost
Added After 6-1-39	
Melting Kettles	$ 40.00
3P Jaeger Centrifugal Pump	28.00
Electric Welding Machines	1,614.00
½ Yd. Power Shovel & Accessories	8,000.00
Air Compressor and Tools	360.00
Snow Plows for Truck & Tractors	600.00
Small Tools	5,400.00
Total	$16,042.00
Salvage @ 10%	1,604.00

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T.N.G.Co.

(Laboratory Equipment

Acct. #1014—(Fritch Gasoline Plant

As of 6-1-39

	Original Cost	20% Salvage
#2 B Light Charcoal test meter	$ 65.18	
Standard Daylight Lamp	27.50	
Reid Vapor Pressure Bomb	150.27	
25 cc Platinum crucibles with covers	82.32	
150 cc Platinum evaporating dishes	162.18	
2¾ Gal. Stokes water still	65.58	
Type C 38 Microscope	202.00	
Barometer	65.31	
Hookimo muffle furnace Type FD 203	114.00	
No. 1B Autoclose	180.00	
Saybolt Calorimeter	78.00	
Hand powered centrifuge	10.50	
Saybolt viscosimeter	89.00	
Cleveland open cup flask tester	11.50	
Closed cup flask tester	108.00	
G. S. & E. 100 volt incubator	65.00	
Sargent glass calorimeter	295.00	
Standard 1/10 cu. ft. bottle	90.00	
Gravity balance No. 858	17.00	
Chainomatic Analytical Balance	150.00	
Type 32 Electric hot plate	70.00	
Freas electric oven	135.00	
Class S Analytical weights	17.00	
A. S. T. M. distillation unit	144.00	
Model A distillation analysis apparatus	589.05	
Hyvac pump	89.10	
Charles Engelhard Millevoltmeter	99.00	
Liquid air containers	188.05	
15" high pressure manometer	11.38	
13" Type "C" indicating flowmeter	44.55	
Acme gravity balance	173.25	
0-50# pressure gauge	47.50	
Charcoal test meter	193.50	
#6002 Sargent wet test meters	162.49	
Compressibility apparatus	255.02	
Crosby Style CC dead weight tester	114.75	
#2502 Torsion balance	25.00	
Steam emulsion apparatus	20.00	
Cenco—Maganac vacuum pump with motor	170.74	
Dew point instrument	77.97	
Manometer for testing Vapor pressure	70.44	
Coleman pH meter	196.87	
Total	$4,923.00	$ 984.60

No salvagable equipment added after 6-1-39

2125

T.N.G.Co. **Page No. 91**

Acct. #1015—Automotive Equipment

	Total Investment	Total Salvage 30%	Cost to Reclaim	Net Salvage
As of 6-1-39				
Autos, Trucks & Trailers	$25,941			
Tractors	2,315			
Total	$28,256	$ 8,477	$ —	$ 8,477
Added After 6-1-39				
Automobiles and tractors	$28,473	$ 8,542	$ —	$ 8,542

Acct. #1016—Furniture & Fixtures

As of 6-1-39				
Furniture & Fixtures		@20%		
Amarillo & Field Offices	$23,819	$ 4,764	$ —	$ 4,764
Added After 6-1-39				
	$ 4,778			$ 956

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T.N.G.Co. **Page No. 92**

Acct. #1024—Booster Stations

	Weight	Original Cost	Total Salvage	Cost to Reclaim	Net Salvage
As of 6-1-39					
1—40 H.P. C-B Engine		$2,266	$ 227	$ —	$ 227
Compressor Cylinders	750#	—	4	5	*1
Piping	3186# 1.59 T.		32	24	8
Total			$ 263	$ 29	$ 234
Added After 6-1-39					
311—40 H.P. C-B Gas Engines		$622,000	$62,200	—	$62,200
†311 Sets Comp. Cylinders	233250#, 116.6 T.		$ 1,093	$1,423	*330
Piping 59 Initial Installations	182,900#				
Piping 252 Add. Installations	630,000#				
Total Piping	812,900# 406.45 T.		$ 8,129	$6,097	$ 2,032
Total			$71,422	$7,520	$63,902

† Salvage of scrap cylinders based on a cost of $5 per ton hauling and loading and dismantling plus freight of $7.20 per ton, making total cost of $12.20 per ton for reclaim.

Scrap value received $9.38 per ton.

Note: * = red figure.

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T.N.G. Co.

Acct. #1024—Booster Stations

	Initial Installation	Units Added	Units Retired
1939			
40	2		
41			
42	12	1	
43	2	1	
44			
45	20	9	
46	16	21	
47	3	27	
48	1	25	
49	3	25	
50		45	
51		61	
52		37	25
53			80
54			88
	59	252	193

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N.G.P.L.

Compressor Station Eng. Parts

Warehouse Stocks

Item	Total Weight (Lbs.)	Total Weight (tons)	Total Salvage	Cost to Reclaim	Net Salvage
As of June 1, 1939					
Parts for Worthington Compressors and Cooper-Bessemer Engine-Gener. Such As:—Power Cyl. Heads, Comp. Cyl. Main Bearings, Connecting Rod Assemblies, Power Pistons and other Misc. Engine and Pump Parts. including	**407,440**	**203.72T**	**$2,318.00**	**$1,508.00**	**$ 810.00**
Pipe fitting larger than 12"					

No Stock ~~Added After 6-1-39~~

2129 Page No. 95

N.G.Pl.

Comp. Sta.—Pipe & Fittings—12" & Under

Warehouse Stocks

As of June 1, 1939

Item	Total Weight (Lbs.)	Total Weight (tons)	Total Salvage	Cost to Reclaim	Net Salvage
Misc. Pipe & Fittings, Boiler Tubes, Casing, Couplings, Gate Valves of various size, Bull Plugs, etc.	18,770#	9.4T	$ 188.00	$ 28.00	$ 160.00
In Compr. Station Warehouse Stocks Added After 6-1-39					
11,944'-6" .1875 Wall Pipe	154,000#	77.00T	$1,540.00	$ 231.00	$1,309.00

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N.G.Pl.

P. L. Dept.—Pipe & Fittings—12" & Under

Warehouse Stocks

Item	Total Weight (Lbs.)	Total Weight (tons)	Total Salvage	Cost to Reclaim	Net Salvage
	As of June 1, 1939				
Misc. P.L. Materials Such As: Pipe in sizes from 1" to 12", Gate Valves, Companion Flanges, blind Flanges, Reinf. Saddles, Split Sleeves, and other Materials	403,267#	201.63T	$4,033.00	$605.00	$3,428.00
	No Stock Added After June 1, 1939				

2131 Page No. 97

N.G.P.L.

Pipeline Dept.—Pipe & Ftgs.—Over 12"

Warehouse Stocks

Item	Total Weight (Lbs.)	Total Weight (tons)	Total Salvage	Cost to Reclaim	Net Salvage
	As of June 1, 1939				
Misc. Large Size P.L. Matl's. Such As: Pipe larger than 12" River Clamps, Large Gate Valves, Couplings, Split Sleeves, Headers, Various Type Flanges	1,327,176	663.59T	$7,552.00	$4,911.00	$2,641.00
Salvaged as Steel Scrap					
	Added After June 1, 1939				
4,600' of 18" Pipe and 3,200' of 24" Pipe	498,360#	249.18T	$2,836.00	$1,844.00	$992.00

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N.G.P.L.

Electrical Materials

Warehouse Stocks

Item	Total Weight (Lbs.)	Total Weight (tons)	Total Salvage	Cost to Reclaim	Net Salvage
As of June 1, 1939					
Copper Wire in complete Sta. Warehouse stock...	2,611#	1.31T	$ 196.00	$ 10.00	$ 186.00
Salvaged as Scrap Copper					

No Stock Added After 6-1-39

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2133

Warehouse Stocks

T.N.G.Co.

Comp. & Gaso. Plant Eng. Parts

Item	Total Weight (Lbs.)	Total Weight (tons)	Total Salvage	Cost to Reclaim	Net Salvage
As of June 1, 1939					
Parts for Worthington, Cooper-Bessemer, and Clark Engines and Compressors such as: Power Cyl. Heads, Power Cyl., Comp. Cyl. Heads, Comp. Cyl., Main & Pedestal Bearings, Connecting Rod Assemblies, Power Pistons and Other Misc. End. & Pump Parts, including Pipe Fittings larger than 12"..	414,728	207.37	$2,360.00	$2,115.00	$ 245.00

No Stock Added After June 1, 1939

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2134

Warehouse Stocks

T.N.G.Co.

P. L. Dept.—Pipe and Fittings 12" and Under

Item	Total Weight (Lbs.)	Total Weight (tons)	Total Salvage	Cost to Reclaim	Net Salvage
As of June 1, 1939					
Misc. P. L. Materials Such as: Pipe in sizes from 1" to 12", Gate Valves, Merco Plug Valves, Companion Flanges, Blind Flanges, Reinf. Saddles, Split Sleeves, and other Matl's.	806,119	403.06T	$8,061.00	$1,209.00	$6,852.00

No Stock Added After June 1, 1939

2135

Page No. 101

T.N.G.Co.

Warehouse Stocks

P.L. Dept.—Pipe & Fittings over 12"

Item	Total Weight (Lbs.)	Total Weight (tons)	Total Salvage	Cost to Reclaim	Net Salvage
As of June 1, 1939					
Misc. large size P. L. Mat'ls. such as: Pipe larger than 12", river clamps, large gate valves, couplings, split sleeves, headers, various type flanges, etc.	125,234	62.62T	$ 713.00	$ 639.00	$ 74.00

No Stock Added After June 1, 1939

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Page No. 102

T.N.G.

Production Dept.—Whse. Stock—Pipe, Etc.

Warehouse Stocks

Item	Total Weight (Lbs.)	Total Weight (tons)	Total Salvage	Cost to Reclaim	Net Salvage
As of June 1, 1939					
Misc. Well Constr. Materials Such as Various Size Casing, Liner Pipe, Nipples, Large & Small Line Pipe, Gate Valves, Drilling Valves, Etc.	895,660	447.83T	$8,957.00	$1,343.00	$7,614.00
Misc. Scrap Material	6,000	3.00T	$ 34.00	$ 31.00	$ 3.00

No Stock Added After June 1, 1939

S-1184

ary, 1935

2137

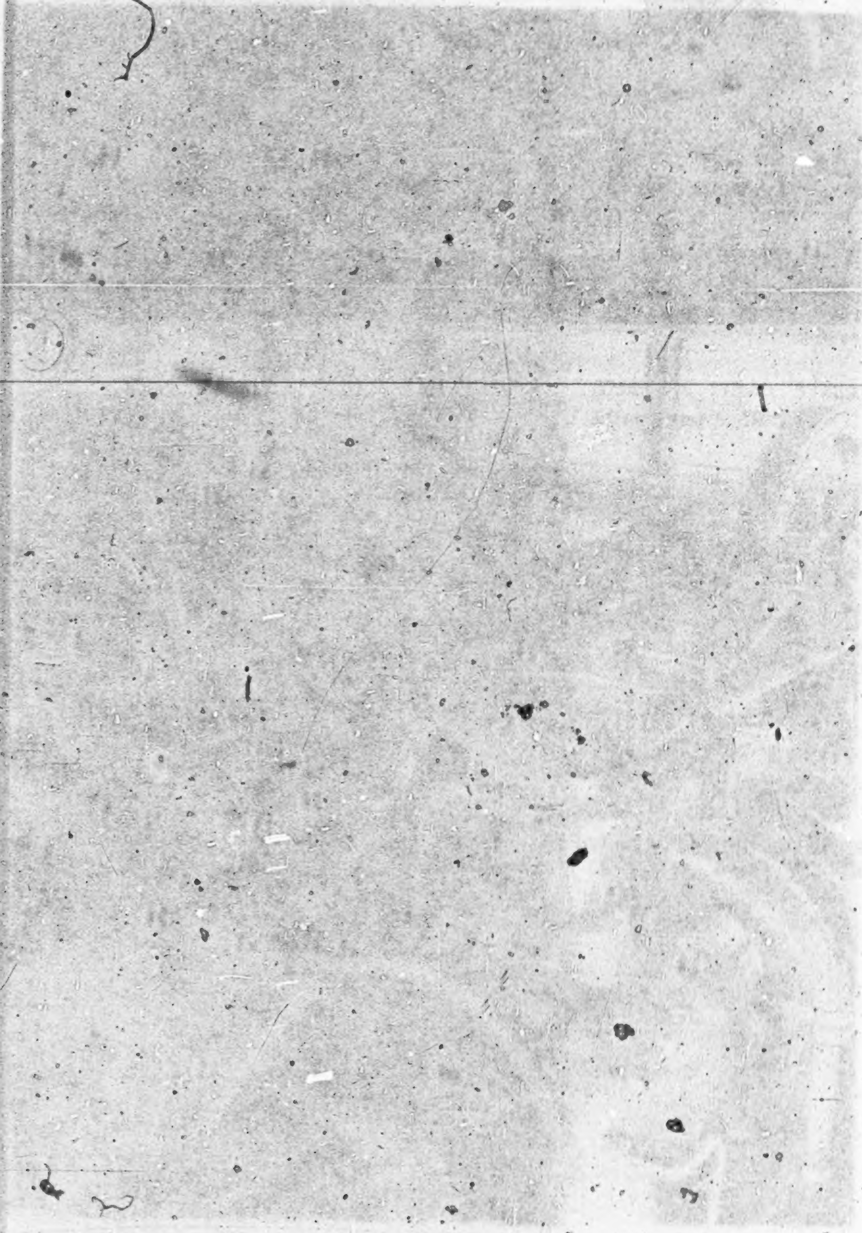
X-616
Gas

Exhibit 123

Twelve Worthington 1300-horsepower 24″ x 36″ Twin Tandem Gas Engine Gas Compressors at Fritch, Texas, Station of Amarillo-Chicago Natural Gas Line . . . Natural Gas Pipe Line Company of America

WORTHINGTON

S-590-89



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2138

EXHIBIT NO. 124.

Errata Sheets for Exhibit No. 122

2139

Errata Page No. 1

Natural Gas Pipeline Company of America
Recap of Salvage

As of 6-1-39

Investment Items	Total Salvage	Cost to Reclaim	Net Salvage
Acct. #1000—Lands in Fee	$ 3,538	$ 32,450	*$ 28,912
Acct. #1002—Right-of-way & Damages (57 crossings)		14,250	* 14,250
Acct. #1005—Main Lines	8,529	6,691	1,838
Acct. #1006—Compressor Station:			
(a)—Steel frame buildings	12,373	—	12,373
(b)—Wood frame buildings (117)	11,700	—	11,700
(c)—Water Well Equipment	4,421	—	4,421
(d)—Main Engines, Boilers, & Scrubbers	95,663	126,043	* 30,380
(e)—Engines, motors, & Generators	23,736	738	22,998
(f)—Tanks	4,877	3,062	1,815
(g)—Cooling Sections	6,028	—	6,028
(h)—Piping	65,728	49,296	16,432
(i)—Electrical Materials	3,036	764	2,272
(j)—Miscellaneous Equipment	2,223	—	2,223
Acct. #1008—Telephone System	150,629	53,561	97,068
Acct. #1009—Meters & Regulators	4,255	—	4,255
Acct. #1010—Structures	2,671	—	2,671
Acct. #1011—Branch Lines	7,411	5,558	1,853
Acct. #1013—Tools	8,885	—	8,885
Acct. #1014—Laboratory Equipment	1,412	—	1,412
Acct. #1015—Automotive Equipment	24,366	—	24,366
Acct. #1016—Furniture & Fixtures	11,927	—	11,927
Totals	$453,408	$292,413	$160,995

Note: * = red figure.

Texoma Natural Gas Company

Recap of Salvage

As of 6-1-39

T.N.G. Account Number	Total Salvage	Cost to Reclaim	Net Salvage
1000—Lands in Fee	$ 380	$ 11,032	*$ 10,652
1002—Right of Way & Damages (7 Railroad Crossings)		1,750	* 1,750
1003—Gas Wells, 159 wells	130,770	95,253	35,517
1004—Gathering System	110,562	82,921	27,641
1005—Main Line	371	278	93
1006—Compressor Station:			
(a)—Steel Frame Buildings	3,320	—	3,320
(b)—Wood Frame Buildings (40)	4,000	—	4,000
(c)—Water Wells	—	—	—
(d)—Main Engine Scrubbers	28,770	46,491	* 17,721
(e)—Generators, Motors, et cetera	7,146	111	7,035
(f)—Tanks	1,282	407	875
(g)—Cooling Facilities	1,459	—	1,459
(h)—Piping	13,251	9,938	3,313
(i)—Electrical Material	418	103	315
(j)—Miscellaneous Equipment	802	—	802
1007—Gasoline & Refrigerating Plant:			
(a)—Steel Frame Buildings	1,387	—	1,387
(b)—Loading Rack	233	—	233
(c)—Railroad Siding	1,509	2,016	* 507
(d)—Absorbers (9)	9,000	—	9,000
(e)—Compressors, Motors, et cetera	3,028	351	2,677
(f)—Tankage, Boilers	8,195	—	8,195
(g)—Cooking Facilities	1,475	—	1,475
(h)—Piping	10,410	7,808	2,602
(i)—Electrical Material	283	78	205
(j)—Miscellaneous Equipment	650	—	650
(k)—Miscellaneous Scrap	854	1,290	* 436
1008—Telephone System	21,744	6,223	15,521
1009—Meters and Regulators	5,108	—	5,108
1010—Structures	2,383	5,577	* 3,194
1012—Drilling & Cleanout Tools	5,006	—	5,006
1013—Tools	1,703	—	1,703
1014—Laboratory Equipment	985	—	985
1015—Automotive Equipment	8,477	—	8,477
1016—Furniture & Fixtures	4,764	—	4,764
1024—Booster Stations:			
(a)—Compressors & Engines	227	—	227
(b)—Piping	36	29	7
Total to June 1, 1939	$389,988	$271,656	$118,332

Note: * = Red Figure.

Errata Page No. 4

Texoma Natural Gas Company

Recap of Salvage

As of 6-1-39

		Total Salvage	Cost to Reclaim	Net Salvage
Account	1000 Lands in Fee	$ 47	$ 200	*$ 153
"	1002 Right-of-way and Damages	0		0
"	1003 Gas Wells (197)	133,909	117,730	16,179
"	1004 Gathering System	111,569	83,677	27,892
"	1005 Main Line	72	54	18
"	1006 Compressor Station	......	......	......
	(a) Steel Frame Buildings	800	—	800
	(b) Wood Frame Buildings (18)	1,800	—	1,800
	(c) Water Wells	—	—	—
	(d) Main Engine Scrubbers	2,413	3,848	*1,435
	(e) Generators, Motors, etc.	508	24	484
	(f) Tanks	748	863	*115
	(g) Cooling Facilities	134	—	134
	(h) Piping	2,182	1,637	545
	(i) Electrical Material	60	6	54
	(j) Miscellaneous Equipment	48	—	48
"	1007 Gasoline & Refrigeration Plant			
	(a) Steel Frame Buildings	0		0
	(b) Loading Rack	0		0
	(c) Railroad Siding	0		0
	(d) Absorbers	0		0
	(e) Compressors, Motors, etc.	436	92	344
	(f) Tankage, Boilers	1,985	—	1,985
	(g) Cooling Facilities	0		0
	(h) Piping	1,582	1,187	305
	(i) Electrical Material	0		0
	(j) Miscellaneous Equipment	128	—	128
	(k) Miscellaneous Scrap	0	0	0
"	1008 Telephone System	782	271	511
"	1009 Meters & Regulators	5,154	—	5,154
"	1010 Structures	4,547	3,973	574
"	1012 Drilling & Cleanout Tools	3,577	—	3,577
"	1013 Tools	1,604	—	1,604
"	1014 Laboratory Equipment	0	0	0
"	1015 Automotive Equipment	8,542	—	8,542
"	1016 Furniture & Fixtures	956	—	956
"	1024 Booster Station	......	......	......
	(a) Compressors & Engines	63,293	1,423	61,870
	(b) Piping	8,129	6,097	2,032
	Total	$355,005	$221,082	$133,923

Note: * denotes red figure.

2142 Errata Page No. 7

Natural Gas Pipeline Company of America
and
Texoma Natural Gas Company
Recap of Salvage Values.

Line No.		Plant & Stock Account as of June 1, 1939	Added from 6-1-39 to Dec. 31, 1954	Plant & Stock Account Existing Dec. 31, 1954
	Natural Gas Pipeline Co. of America			
1	Salvage Value of Plant	$160,995	$ 44,202	$205,197
2	Salvage value of Stock	7,225	2,301	9,526
3	Total N. G. P. L. Co.	$168,220	$ 46,503	$214,723
	Texoma Natural Gas Company			
4	Salvage Value of Plant	$118,332	$133,923	$252,255
5	Salvage Value of Stock	14,788	0	14,788
6	Total T. N. G. Co.	$133,120	$133,939	$267,043
7	Total Both Companies			$481,766

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N. G. P. Co.

1005—Mainlines (Continued)

	Length	Weight	Total Salvage	Cost to Reclaim	Ne Salv
	Brot. For'd.		$7,253	$5,440	$1,81
Joliet Regulator Sta.			$11.38/Ton	$11.06/Ton	$0.32,
Scrap Mat'l.					
3—60" Scrubbers		110,000#			
Charging Tanks & Platform.		9,520#			
18—16" Gate Valves		69,300#			
12—16" Steel Tees		16,200#			
3—16" Ells Ser. 40		2,700#			
2—16" Ells Ser. 60		2,670#			
4—16" Tube Turns		1,000#			
9—16" Flanges		2,277#			
16" Seamless Pipe	200'	12,520#			
Sub-Total		226,187#			
		113,09T	$1,276	$1,251	$ 2
Total as of 6-1-39			$8,529	$6,691	$1,8

Errata Page No. 24

Natural Gas Pipeline Co.

Acct. #1006-d—Main Engines & Scrubbers—Boilers.

	Weight	Total Salvage	Cost of Reclaim	Net Salvage
48—1250 h.p. Wor. Hor., G. L. Compr.	†9408 T.	$ 88,247	$116,659	*$28,412
19—PIW & AOS Scrubbers	380 T.	4,324	5,472	*$ 1,148
8—Blaw Knox "	120 T.	1.366	1,728	*362
Platform, Tanks, etc.	85644#. 42.8 T.	487	616	*129
9—98 H.P. Casey Hedges Water Tube Boilers	108.9 T.	1,239	1,568	*329
As of 6-1-39	10059.7 T.	$ 95,663	$126,043	*$30,380
9—Scrubbers	135.0 Tons	$ 1,536	$ 1,944	*$ 408
1—5′ x 75′ Water Gasefication Tower, Sta. 10	8.5 Tons	97	122	*$ 25
Added after 6-1-39	143.5 T.	$ 1,633	$ 2,066	*$ 433

Note: *=Red figure.

†$9.38/T Salvage price and $12.40/T Cost of reclaim. All other material at $11.38/T salvage price and $14.40/ cost of reclaim.

Natural Gas Pipeline Co.

Acct. #1006-e—Engine—Generators, Motors, Etc.

As of June 1, 1939

Description	Salvage Rate	Total Salvage	Cost of Reclaim	Ne Salv
18—Cooper-Bessemer 175 KW Gen. Plt. 3150 KW	$5.00/KW	$15,750.00	$ None	$15,75
18—25 H.P. Motors for air Compr., $2,885.13	10%	289.00	—	28
36—40 H.P. Motors for Water Pumps, $11,946.00	10% of cost	1,195.00	—	1,19
Machine Shop Equipment $24,824.43	15% of cost	3,724.00	—	3,72
18—Robbins & Meyers Gen. Set with Panel, $3,465.00	10% of cost	347.00	—	34
9—Gould #1½ Elect. Sump Pump, 1½ H.P., $2,496.00	10% of cost	250.00	—	25
9—Gould Oil centrifuge with motor $9,428.94	10% of cost	943.00	—	94
9—Centrifugal Pump 325 GPM with 20 H.P. Motor $2,665.00	10% of cost	267.00	—	26
3—Motors and air blowers #2-3-4, $2,359.00	10% of cost	234.00	—	23
	Total	$22,999.00	—	$22,99

	Weight				
18 C. P. Air compressors 8—4½ x 8	72,000#				
36 Dayton Dowd Cent. Pumps 8 x 10	52,200#				
Miscellaneous Items	18,000#				
9—4½ x 2¾" x 4½ Duplex Steam Pumps	6,750#				
9—5¼ x 4¾ x 5" Duplex Steam Pumps	8,100#				
	157,050# 78.53T	@ 9.38/T	$ 737.00	$ 738.00†	$*
			$23,736.00	$ 738.00	$22,99

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†Note:

$2.00/T to demolish;
$3.00/T to load and haul
$4.40/T freight

$9.40/T Total

Note: *—Red figure.

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Errata Page No. 29

N.G.P.L.

1006-h Piping

	Total Weight	Salvage Value	Cost of Reclaim	Net Salvage
Main Engine, Basement, Manifold Yard Piping 3-6 unit Sta. 6-5 unit Sta. 12" and under to Jan. 1, 1938	3,252 Tons	$65,040.00	$48,780.00	$16,260.00
1-1-38 to June 1, 1939 68,859#	34.4 Tons	688.00	516.00	172.00
Total as of 6-1-39	3,286.4 Tons	$65,728.00 @ $20/Ton	$49,296.00 @ $15/Ton	$16,432.00 @ $5/Ton
Miscellaneous Piping all Sta. 919,499#	459.7 Tons	$ 9,194.00	$ 6,896.00	$ 2,298.00
Water Lines to wells 470,588#	235.3 Tons	4,706.00	3,530.00	1,176.00
Total added after 6-1-39	695.0 Tons	$13,900.00	$10,426.00	$ 3,474.00

All station yard piping 12" and smaller, includes valves and fittings.

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Errata Page No. 30

N.G.Pl.

1006-I—Electrical Material (Exclusive of Motors)

		Weight	Total Salvage	Cost to Reclaim	Net Salvage
	Electrical Materials as of 6-1-39 All Stations				
	Copper Wire				
2025′	400,000 C.M. 1.24# 1 ft.	2,511			
70′	No. 0000-3 cond. 1.9215# 1 ft.	134.5			
3060′	No. 0-3 cond. .9585# 1 ft.	2,933			
360′	No. 0-DBRC .3195# 1 ft.	115			
250′	No. 1-3 cond. .7599# 1 ft.	190			
2295′	No. 2-2 cond. .4018# 1 ft.	922			
4230′	No. 2-3 cond. .6027# 1 ft.	2,549			
2430′	No. 2-DBRC .2009# 1 ft.	488			
—	No. 2- — —	5,094			
2380′	No. 4-3 cond. .3792# 1 ft.	902			
—	No. 4-TBWP —	1,570			
3735′	No. 6-2 cond. .1592# 1 ft.	595			
—	No. 6- — —	.558			
25′	No. 6-4 cond. .3184# 1 ft.	8			
7620′	No. 8- — .04998# 1 ft.	381			
542′	No. 8-3 cond. .14994# 1 ft.	81			
53730′	No. 8-2 cond. .09996# 1 ft.	5,370			
—	No. 8- — —	6,472			
3600′	No. 10-DBRC .03143# 1 ft.	113			
2340′	No. 10-3 cond. .09429# 1 ft.	221			
—	No. 10 — —	945			
11565′	No. 10-2 cond. .06286# 1 ft.	727			
2250′	No. 12-2 cond. .03954# 1 ft.	89			
630′	No. 12-3 cond. .05931# 1 ft.	37			
64555′	No. 14-DBRC .01243# 1 ft.	802			
1800′	No. 14-3 cond. .03729# 1 ft.	67			
1530′	No. 14-2 cond. .02486# 1 ft.	38			
2925′	No. 16-3 cond. .02346# 1 ft.	69			
—	Ground Connections	360			
	Total Copper Wire	34,341.5# 17.2T	2,580.00 @ $150/Ton	$764.00 @ $44.40/Ton	$1,816.00 @ $105.60/T

Transformers @ -5%	Orig. Cost			
9—25 K.V.A.	$1,510.02	$ 75.50	—	$ 75
18—250 Watt	256.50	12.82	—	12
9—7½ K.V.A.	678.42	33.92	—	33
2—Transformer Banks	1,700.00	85.00	—	85
2—Transformers	254.92	12.75	—	12
2—15 K.V.A. Moloney	276.82	13.84	—	13
2—500 Watt	39.97	2.00	—	2
Carried Forward	$4,716.65	$ 235.83	—	$ 235

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N.G.P.Co.

1006-I—Electrical Material (Continued)

	Weight Lbs.	Cost	Total Salvage	Cost to Reclaim	Net Salvag
Transformers—continued					
Carried Forward		$4,716.65	$ 235.83	—	$ 235.8
9—2 K.V.A.		1,701.00	85.05	—	85.0
1—7½ K.V.A.		95.75	4.79	—	4.7
6—10 K.V.A.		678.00	33.90	—	33.9
2—15 K.V.A.		286.00	14.30	—	14.3
7—Small		146.00	7.30	—	7.3
1—25 K.V.A.		202.00	10.10	—	10.1
4—50 K.V.A.		1,319.00	65.95	—	65.9
Total Transformers		$9,144.40	$ 455.72	$ —	$ 455.7
Salvage Value of Copper Wire		$ —	2,580.00	764.00	1,816.0
Total Electrical Materials as of 6-1-39		$ —	$3,035.72	$764.00	$2,271.7
Electrical Materials Added After 6-1-39					
Copper Wire					
225′—400,000 C.M. 1.24 #/ft.	279.00#				
130′ No. 0-3 cond. .9585 #/ft.	125.00#				
80′ No. 2-3 cond. .6027 #/ft.	48.00#				
80′ No. 2-2 cond. .4018 #/ft	32.00#				
205′ No. 4-3 cond. .3792 #/ft.	78.00#				
25′ No. 6-2 cond. .1592 #/ft.	4.00#				
80′ No. 8-1 cond. .04998 #/ft.	4.00#				
30′ No. 8-3 cond. .1494 #/ft.	4.00#				
22820′ No. 8-2 cond. .09996 #/ft.	2,281.00#				
35′ No. 10-3 cond. .09429 #/ft.	3.00#				
70′ No. 12-3 cond. .05931 #/ft.	4.00#				
200′ No. 14-3 cond. .03729 #/ft.	~~7.00#~~				
Total Copper Wire	2,869.00#		$ 215.18	$ 63.69	$ 151.4
Transformers					
14—Transformers		$280.00	$ 14.00	—	$ 14.00
2—Transformer Banks		1,700,00	85.00	—	85.00
1—Transformer		100.00	5.00	—	5.00
2—Transformers		300.00	15.00	—	15.00
		$2,380.00	$ 119.00	$ —	$ 119.00
Total Electrical Materials			$ 334.18	$ 63.69	$ 270.4

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NGPCo

1014—Laboratory Equipment

	Original Cost	Net Salvage
Supercompressibility Apparatus, Special Gas Measuring Device	$ 635.00	
Hyvac Pump	25.64	
#110 Centrifugal Pump	81.70	
Manifold Mercury Container	198.65	
#19 Chainomatic Balance w/weights	186.50	
Elevating Flask Mechanism	26.75	
Mercury Transfer Receptacle	24.00	
Recording Thermometer Complete	105.00	
Recording Thermometer	566.11	
Junkers Calorimeter	295.00	
Spec. dust proof metal cabinet	331.28	
Thomas Recording Calorimeter	2,015.33	
Sulphur-Ammonia test Apparatus	146.15	
Acme recording Gravitometer	331.69	
#2315-A Tycos Mico-Baragraph	156.00	
#9 Chainomatic balance w/weights	289.28	
#112 Round Telechron Clock	15.69	
Water Distillate Apparatus	90.00	
Gas Meter Test Bottle 1/10 cu. ft.	90.00	
Stop watch	10.00	
Freas Electric Oven	135.00	
#16 Std. Observatory barometer w/mah.	152.66	
#110 Telechrone Clock	14.13	
Model 11M Recd. Pressure Gauge	53.56	
Hyvac Pump	80.00	
500# Test Gauge	18.25	
50" Std. Monometer	19.68	
Acme Gravity Balance	326.20	
100" Mercury Chamber	14.85	
Dead weight Meter Tester	441.26	
Gas Sample Tank for Supe- Comp. Test	93.06	
Dew Point Instrument	82.14	
5-gal. Compressed gas cylinder	31.88	
Total cost Laboratory Equipment as of 6-1-39	$7,062.24	$1,412.45
Total Cost Laboratory Equipment added after 6-1-39		

N.G.P.L.

1016—Furniture & Fixtures

	Total Investment	Total Salvage	Cost to Reclaim	Net Salvage
June 1, 1939 Furniture & Fixtures				
Chicago Office & Field Offices	$58,282.00 @ 20%	$11,656.00		$11,656.00
Law Library	11,389.00	271.00*		271.00
Salvage as of 6-1-39	$69,671.00	$11,927.00		$11,927.00
Furniture & Fixtures added after 6-1-39				
Investment after 6-1-39 to end of project	$3,133.00 @ 20%	$ 627.00		$ 627.00
To Law Library	9,600.00	229.00*		229.00
	$12,733.00	$ 856.00		$ 856.00

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* These figures based on receiving $500.00 for entire law library.

Exhibit No. 124.

Errata Page #71

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TNGCO
1007-e—Miscellaneous Pumps, Motors, Clark Engines
(Gasoline Plant)

Description	As of June 1, 1939	Salvage Rate	Total Salvage	Cost of Reclaim	Net Salvage
1—300 HP 60-Cycle motor w/compen. & Breaker	2,045.01	10% of Cost	$ 205.00	$ —	$ 205.00
1—125 HP 60-Cycle motor w/compen. & Breaker	1,067.35	"	107.00	—	107.00
1—10 HP 60-Cycle motor w/compen. & Breaker	177.29	"	18.00	—	18.00
2—3"-6 stage Fig. 3360 Cent. Pump	8,850#	$ 9.38/ton	42.00	54.00	R 12.00
1—3"-1 stage Fig. 3480 Cent. Pump	625#	"	3.00	4.00	R 1.00
1—Dean Hill H4H 3 nozzle Horiz. turbine	4,450#	"	21.00	27.00	R 6.00
3—8"x7"x18" Dean Bros. Horiz. Pumps	9,900#	"	46.00	60.00	R 14.00
2—14"x7"x18" Dean Bros. Horiz. Pumps	7,400#	"	35.00	45.00	R 10.00
2—Clark Eng. #2 Comp. S. B. 6"x20"	15,930.00	5% of Cost	797.00	—	797.00
3—Clark Eng. #3 Comp. S 10"x20"	24,327.00	"	1,216.00	—	1,216.00
1—Clark Eng. #6 Comp. S 10"x12"	8,109.00	"	405.00	—	405.00
1—Type 4C 1-½ KW Turb. Generator	1-½ Kw	$ 5.00 Kw	8.00	—	8.00
2—8"x5"x12" Dean Bros. Horiz. Duplex Pump	5,248#	$ 9.38/ton	25.00	32.00	R 7.00
2—7"x6"x10" Dean Bros. Horiz. Duplex Pump	2,312#	"	11.00	14.00	R 3.00
2—6"x4"x6" Dean Bros. Horiz. Duplex Pump	3,156#	"	15.00	19.00	R 4.00
2—Goulds 10" Cent. Pumps Fig. 3065	5,600#	"	26.00	34.00	R 8.00
1—121 Type S3 Moore Turbine	3,000#	"	14.00	18.00	R 4.00
1—Fig. 3480—2-½" Cent. Iron Pump	625#	"	3.00	4.00	R 1.00
1—12"x6"x12" Dean Bros Horiz. Pump	4,750#	"	22.00	29.00	R 7.00
1—6"x6"x12" Dean Bros. Horiz. Pump	1,519#	"	7.00	9.00	R 2.00
1—8-½"x12" Westinghouse Steam Air Compressor	350#	"	2.00	2.00	—
Salvage as of 6-1-39			$ 3,028.00	$ 351.00	$ 2,677.00

Demolition and Hauling	$ 5.00	ton on items above salvaged as scrap.
Freight	7.20	"
Cost of Reclaim	$12.20	"
Total Salvage	$ 9.38	"
Net Salvage	R $ 2.82	

NOTE: R denotes red figure.

2155 F. C. Hamilton
Consulting Engineer
Sixty Wall Tower
New York, N. Y.

August 15, 1939.

Mr. F. C. Brown, Vice President and General Manager
Natural Gas Pipeline Company of America
Chicago, Illinois

Dear Sir:

In accordance with your request, I submit a valuation of the property of Natural Gas Pipeline Company of America and its associate, Texoma Natural Gas Company. This valuation has been made on the basis of the cost to reproduce the property of the two companies as of June 1, 1939.

The valuation includes all physical property owned and used by the companies, with the exception of Gas Leaseholds, which item of property we were instructed to exclude from our consideration. The values which we have found are entirely physical, no allowance having been made for any item of an intangible nature.

As a preliminary step in making this valuation, a careful and complete detailed inventory was made of the entire property. Access was had to all map records, plans, detailed drawings, specifications, purchase commitments, well logs, job orders, and other detailed information in the files of the companies and permanently maintained by them. This data was checked against actual quantities in the field and was consistently found to be in close conformity with the property as it actually existed. The few differences found were easily reconciled and we are certain that the property as indicated in the detailed portion of this report accurately reflects the property as it physically existed on the date of valuation. Construction work in progress has been excluded from the inventory and the valuation therefore reflects only the property which had been fully completed and placed in service prior to June 1, 1939 and the cost of which was reflected by closed job orders on that date.

During the course of our work, we made no attempt to check titles to property, but accepted representations made by employees of the company as constituting proof of ownership. This applies particularly to such items of property as fee land and rights of way. Our engineers have not attempted to place values on the various parcels of land owned in fee, but have employed reliable local realtors to value these parcels. We have incorporated in the valuation the amounts which these realtors have reported to us as fairly representing the value of fee lands.

In the case of Rights of Way, we made a careful analysis and inventory of all easement and damage contracts, together with a detailed analysis of the cost of acquisition. We have then adjusted these costs to reflect conditions existing on June 1, 1939. To assist us in this work, we employed the services of an experienced rights of way agent who spent several weeks traveling over the route of the pipelines, interviewing land-owners, realtors, county agricultural agents, and other parties having a knowledge of existing values. The unit prices which we have used with respect to rights of way have been predicated to a considerable extent on data obtained from this actual field study.

2156 Unit prices have been compiled and applied to the assembled inventory which reflect prices of materials and labor rates prevailing in the immediate territory as of the valuation date. In computing these unit prices, we have been guided by the manner in which the project was originally constructed, and have considered that in the reproduction of the property the same general plan of procedure probably would be followed. This contemplates that about the same length of time would be necessary for the design and construction, that the same general type and number of construction contracts would be let, and we have assumed as a matter of course that the most modern and economical methods of construction would be employed. It is further contemplated that the same type of materials would be used as were used in the original construction of the system.

Prices of materials and equipment were secured from actual quotations by dealers and manufacturers of these identical items. Requests for quotations specified the required quantities so that the prices used would reflect any savings due to quantity purchases. Labor rates were obtained from contractors and builders operating in the immediate territory and were predicated on wage levels as of June 1, 1939, with due consideration given to prevailing union wage scales. Freight rates were obtained from railroad traffic bureaus and insurance and tax rates predicated on existing local conditions.

Due to the great variance of labor rates and material prices at different points of the system, it has been necessary to compile individual unit prices for each compressor station and for each state traversed by the pipeline system. Through extensive analysis, average unit prices could have been evolved which would apply to the system as a whole, but the application of such prices to a particular portion of the system would have produced distorted results. The method which has been followed produces greater accuracy and gives a true value of each individual portion of the system.

In valuing the gas wells, the assumption has been made that a drilling program would be inaugurated coincident with beginning of construction of the main pipeline system, and that the program followed would provide for all of the wells being drilled between this time and the time of completion of the main pipeline system. This drilling program thus contemplates that a minimum amount of drilling tools and equipment would be employed and that the first wells drilled in a particular area would provide fuel for the drilling of subsequent wells.

It will be noted that in arriving at the Present Value of the different items of property, a deduction for depreciation has been made from the Reproduction Cost New. This depreciation deduction was determined by Mr. P. McDonald Biddison, Consulting Engineer, Dallas, Texas, who was employed by the companies to make a study of existing depreciation of property and report upon this specific item. We have taken the findings of Mr. Biddison and have deducted from the Reproduction Cost New the amounts determined by him as representing existing depreciation of property. As a consequence, the amounts shown as Present Value are a composite of our determinations of Reproduction Cost New and Mr. Biddison's determination of existing property depreciation.

The ensuing pages of the report show in detail the amounts included for General Overheads, both of a structural and corporate nature. In arriving at the amounts so included, we have been guided by the actual experience of the companies during the construction period. A care-

ful analysis of all overhead construction expenditures
2157 was made and this analysis adjusted to reflect conditions prevailing as of the date of valuation, formed the basis of our calculations.

Organization Expenses have been calculated with due regard to present existing laws, and costs incurred by virtue of such laws. Taxes during Construction have been computed on the basis of present assessments and rates with the necessary assumption that in the reproduction of the property the duration of the construction period would closely approximate that of the actual construction period. Interest during Construction has been calculated and predicated on the assumption that funds would be currently available as needed throughout the construction period and at an annual rate of interest sufficient to attract capital to investment in the enterprise.

An allowance for Cost of Financing would usually be included in a valuation of this type. Our decision to omit this item is due to the fact that none of the outstanding securities of the companies has ever been offered for sale to the public. Construction funds in total for the project were provided by participants in the enterprise and each participant has received securities of the companies in proportion to the amount of cash so provided.

The amount included for Working Capital has been computed from the operating reports of the companies as of the date of valuation. It includes cash and/or equivalent working capital necessary in the ordinary conduct of the business, together with gas currently in the lines and necessary materials and supplies on hand. The amount so calculated is believed to be the minimum amount with which the companies can successfully operate.

As previously stated, this valuation includes no item of an intangible nature. We have been advised that the important item of Going Concern Value has been made the subject of study and will be dealt with in a separate report.

In conclusion, we wish to express our appreciation of the courteous and helpful cooperation given our engineers by all employees of the companies.

Yours very truly,
F. C. Hamilton.
F. C. Hamilton.

FCH/W

Exhibit 129

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

PERSONNEL DATA - KEY MEN IN CHICAGO OFFICE

						Chro
Name	Present Position	Age	Education	Time with Company (Years)	Experience in Present Line (Years)	Position
E. V. Kesinger	General Superintendent	43	Electrical Engineer	9	21	Junior Engineer Asst. to Construction Engineer Construction & Petroleum Engine Chief Engineer in Charge of Con General Superintendent
S. E. Campbell	Secretary & Assistant Treasurer	47	Mechanical Engineer	9	23	Junior Engineer Station Superintendent Sergeant in Charge of Gun Repai Draftsman on Refinery Chief Clerk in Engineering Dept. Construction Engineer Assistant Purchasing Agent Assistant Chief Engineer Superintendent ot Operations Secretary & Assistant Treasurer
G. M. Davidson	Chief Engineer and Supt. of Operations	45	Mechanical Engineer	7½	19½	First Lieutenant Office Engineer Plant Superintendent Superintendent of Gaso.Plant Co General Supt. of Gasoline Dept. Chief Engineer Chief Engineer & Supt.of Operat
R. G. Strong	Supt. of Pipelines	45	Mechanical Engineer	9	19	Machinist Apprentice Machine Shop Foreman Mach. mate, ensign, eng. office Mechanical drafting & machine Machine Shop Superintendent Supt. of Const. & Inspector of Pipelines Construction Superintendent Design & Testing Engr.-Chicago Project Construction Superintendent Superintendent of Pipelines
W. H. Davidson	Supt. of Compressor Stations	36	Civil Engineer	8	15	Junior Engineer Construction Engineer District Supt. in Pipeline Dept. Supt. of Compressor Stations

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me th pany ars)	Experience in Present Line (Years)	Chronological Experience Position	 Employer.	 Length of Time
	21	Junior Engineer	Empire Companies	1 Year
			U. S. Army	1 Year
		Asst. to Construction Engineer	Empire Companies	2 Years
		Construction & Petroleum Engineer	" "	9 Years
		Chief Engineer in Charge of Const.	Continental Construction Corp.	1 Year
		General Superintendent	Natural Gas Pipeline Co.	8 Years
	23	Junior Engineer	Empire Companies	1/2 Year
		Station Superintendent	" "	1/2 Year
		Sergeant in Charge of Gun Repair	U. S. Army	1-2/3 Yrs.
		Draftsman on Refinery	Empire Companies	1/4 Year
		Chief Clerk in Engineering Dept.	" "	8 Years
		Construction Engineer	" "	2 Years
		Assistant Purchasing Agent	" "	1 Year
		Assistant Chief Engineer	Continental Construction Corp.	1-1/4 Yrs.
		Superintendent of Operations	Natural Gas Pipeline Co.	2-1/2 Yrs.
		Secretary & Assistant Treasurer	" " " "	5-1/4 Yrs.
	19½	First Lieutenant	U. S. Army	2 Years
		Office Engineer	Empire Oil & Refining Co.	2 Years
		Plant Superintendent	" " " " "	2 Years
		Superintendent of Gaso. Plant Const.	" " " " "	3 Years
		General Supt. of Gasoline Dept.	" " " " "	5 Years
		Chief Engineer	Natural Gas Pipeline Co.	2-1/2 Yrs
		Chief Engineer & Supt. of Operations	" " " "	5 Years
	19	Machinist Apprentice	Westinghouse Air Brake	5 Years
		Machine Shop Foreman	Aetna Chemical Company	1/3 Year
		Mach. mate, ensign, eng. officer	U. S. Navy	2 Years
		Mechanical drafting & machine shop	Empire Gas & Fuel Company	1 Year
		Machine Shop Superintendent	" " " " "	5 Years
		Supt. of Const. & Inspector of Pipelines	Empire Companies	2 Years
		Construction Superintendent	Texas-Empire Pipeline Co.	1 Year
		Design & Testing Engr.-Chicago Project	Empire Companies	1 Year
		Construction Superintendent	Continental Construction Corp.	1 Year
		Superintendent of Pipelines	Natural Gas Pipeline Co.	8 Years
8	15	Junior Engineer	Empire Companies	1 Year
		Construction Engineer	" "	6 Years
		District Supt. in Pipeline Dept.	Natural Gas Pipeline Co.	3 Years
		Supt. of Compressor Stations	" " " "	5 Years

PERSONNEL DATA - KEY MEN IN CHICAGO OFFICE
(Continued)

2160

						Chronol
Name	Present Position	Age	Education	Time with Company (Years)	Experience in Present Line (Years)	Position
W. T. Bulla	Supt. of Telephone and Pressure	44	Telephone Engineer	9	28	Clerk, Tel. Oper.,Div.Clerk,Tester,S Wire Chief & Asst.Supt. Tel. & Tel. Supt. of Telephone and Telegraph Supt. Construction of Telephone Syst Chicago Project Supt. Telephone & Pressure Depts.
J. J. Hedrick	General Counsel	40	Lawyer	9	21½	Stenographer in Land Department Stenographer in Legal Department Attorney General Counsel
C. B. Randall	Tax Attorney	43	Lawyer	8	18	Chief Clerk & Special Assistant Attorney General Asst. Supreme Court Reporter General practise of law Attorney for Tax Commission Charge of Tax & Insurance Dept.
Henry O. Loebell	Consultant on Marketing	53	Combustion Engineer	9	35	Research Engineer Industrial Engineer Industrial Engineer Vice President & General Manager
F. K. Macdonald	Assistant Treasurer Charge of Accounting	43	Chemical Engineer & Accountant	9	20	Junior Engineer Oil Gauger Labor Gang Foremah Oil Pipeline Field Clerk General Office Clerk Special Engr. in Federal Tax Dept. Oil Production & Pipeline Clerk Oil Pipeline Field Superintendent Office Engineer-East Chicago Refinery Asst.Treasurer, Office Mgr., Charge Accounting
N. D. Holman	Tax & Insurance Agent	46	Business Administration	9	21½	Valuation Engineer Asst.Chief Valuation Engineer Superintendent of Gas Rates Superintendent of Market Survey Supt.of Plant Ledger & Budget Tax & Insurance Agent
C. W. Fischer	Asst. Secretary	50	Electrical Engineer & Accountant	9	21	Engineer & Draftsman Draftsman on Motor Design Draftsman on Substations Accountant & Asst. Secretary Accountant Accountant Accountant & Asst. Secretary

e h any rs)	Experience in Present Line (Years)	Chronological Experience		
		Position	Employer	Length of Time
	28	Clerk, Tel. Oper.,Div.Clerk,Tester,Sup.	Southwestern Bell Telephone Co.	6 Years
		Wire Chief & Asst.Supt. Tel. & Tel.	Empire Companies	11-1/2 Yrs.
		Supt. of Telephone and Telegraph	" "	1-1/2 Yrs.
		Supt. Construction of Telephone System, Chicago Project	Continental Construction Corp.	1 Year
		Supt. Telephone & Pressure Depts.	Natural Gas Pipeline Co.	8 Years
9	21½	Stenographer in Land Department	Empire Companies	1/2 Year
		Stenographer in Legal Department	" "	4 Years
		Attorney	" "	9 Years
		General Counsel	Continental Construction Corp. & Natural Gas Pipeline Co.	8 Years
8	18	Chief Clerk & Special Assistant Attorney General	State of Kansas	1-1/2 Yrs.
		Asst. Supreme Court Reporter	" " "	3/4 Years
		General practice of law	Dean & Colmery	4 Years
		Attorney for Tax Commission	State of Kansas	4 Years
		Charge of Tax & Insurance Dept.	Natural Gas Pipeline Co.	8 Years
9	35	Research Engineer	Doherty Gas & Electric Co.	5 Years
		Industrial Engineer	Spokane Gas & Fuel Co.	3 Years
		Industrial Engineer	Henry L. Doherty & Co.	5 Years
		Vice President & General Manager	Combustion Utilities Co.	22 Years
9	20		U. S. Army	1 Year
		Junior Engineer	Empire Companies	1-1/2 Yrs.
		Oil Gauger	" "	1 Year
		Labor Gang Foreman	" "	1 Year
		Oil Pipeline Field Clerk	" "	1 Year
		General Office Clerk	" "	1 Year
		Special Engr. in Federal Tax Dept.	" "	1 Year
		Oil Production & Pipeline Clerk	" "	2 Years
		Oil Pipeline Field Superintendent	" "	1-1/4 Yrs.
		Office Engineer-East Chicago Refinery	" "	1-1/4 Yrs.
		Asst.Treasurer, Office Mgr. Charge of Accounting	Natural Gas Pipeline Co.	9 Years
9	21½	Valuation Engineer	Empire Companies	1/2 Year
			U. S. Navy	3/4 Year
		Asst.Chief Valuation Engineer	Empire Companies	4 Years
		Superintendent of Gas Rates	" "	7 Years
		Superintendent of Market Survey	Natural Gas Pipeline Co.	1-1/3 Yrs.
		Supt.of Plant Ledger & Budget	" " " "	2 Years
		Tax & Insurance Agent	" " " "	5-2/3 Yrs.
9	21	Engineer & Draftsman	Illinois Bell Telephone Co.	1 Year
		Draftsman on Motor Design	Mutual Electric Co.	1 Year
		Draftsman on Substations	Commonwealth Edison Co.	3 Years
		Accountant & Asst. Secretary	Atlas Chemical Co.	10 Years
		Accountant	Northwestern Natural Gas Co.	2 Years
		Accountant	Natural Gas Pipeline Co.	2-1/2 Yrs.
		Accountant & Asst. Secretary	" " " "	6-1/2 Yrs.

PERSONNEL DATA - KEY MEN IN CHICAGO OFFICE
(Continued)

Name	Present Position	Age	Education	Time with Company (Years)	Experience in Present Line (Years)	Chronolo
						Position
C. E. Holmes	Special Engineer	37	Civil Engineer	9	15	Field Engineer
						Engineer on Special Problems
						Engineer on Design of Chicago Project
						Engr. on Rates & Special Problems
						Engr. on Marketing & Special Problems
R. M. Bussard	Special Engineer	39	Mechanical Engineer and Accountant	9	16	Junior Engineer
						Gas Engineer
						Construction Engineer
						Gas Engineer
						Gas Engineer
						Engineer on Market Surveys
						Engineer on Special Problems
A. S. McKenzie	Supt. of Gas Accounting & Budget Depts.	42	Accountant	7½	17	Bookkeeper & Teller
						Bookkeeper
						Bookkeeper
						Chief Clerk, Gas Accounting Dept.
						Supt. Gas Accounting
						Supt. Gas Accounting & Budget Dept.
M. C. Madsen	Construction Engineer	46	Mechanical Engineer	8		Draftsman on Gold Dredge Design
						Draftsman on Oil Refinery Design
						Draftsman on Oil Refinery Design
						Draftsman on Oil Refinery Design
						Draftsman on Shipbuilding
						Chief Draftsman
						Engineer in Charge Field Construction
						Chief Draftsman & Supt. of Compressor Station Construction
						Supt. of Compressor Stations
						Leave of Absence -
						Engr. in Charge of Design & Const.
W. R. Caldwell	Auditor	33	Accountant	8	13½	Bookkeeper
						Payroll Clerk on Construction
						Payroll Clerk on Construction
						Cost Clerk
						Cost Clerk, Job Order Clerk, Traffic Ag
						Asst. to Chief Clerk in Engr. Dept.
						Auditor of Disbursements on Branch Line Construction
						Assistant to Chief Auditor
						Assistant Chief Auditor
						Chief Auditor
G. P. Garver	Attorney	33	Lawyer	8	12	Attorney
						Attorney

Chronological Experience

Position	Employer	Length of Time
Field Engineer	Empire Companies	1/2 Year
Engineer on Special Problems	" "	4-1/2 Years
Engineer on Design of Chicago Project	" "	1 Year
Engr. on Rates & Special Problems	Natural Gas Pipeline Co.	5-1/2 Years
Engr. on Marketing & Special Problems	" " " "	3-1/2 Years
Junior Engineer	Empire Companies	2 Years
Gas Engineer	Henry L. Doherty & Co.	3 Years
Construction Engineer	Missouri-Kansas Pipeline Co.	1/2 Year
Gas Engineer	Henry L. Doherty & Co.	1/2 Year
Gas Engineer	Colorado-Wyoming Gas Co.	1 Year
Engineer on Market Surveys	Natural Gas Pipeline Co.	1-1/2 Years
Engineer on Special Problems	" " " "	7-1/2 Years
Bookkeeper & Teller	Calcasieu National Bank	3-1/2 Years
Bookkeeper	Henry Rose Merc. & Mfg. Co.	1 Year
Bookkeeper	1st National Bank-Shreveport	1/2 Year
Chief Clerk, Gas Accounting Dept.	Arkansas Natural Gas Co.	9 Years
Supt. Gas Accounting	Natural Gas Pipeline Co.	3 Years
Supt. Gas Accounting & Budget Dept.	" " " "	4-1/2 Years
Draftsman on Gold Dredge Design	Yuba Construction Company	
Draftsman on Oil Refinery Design	Associated Oil Company	
Draftsman on Oil Refinery Design	Shell Company of California	
Draftsman on Oil Refinery Design	Roxana Petroleum Corp.	
Draftsman on Shipbuilding	Standifer Construction Co.	
Chief Draftsman	Empire Companies	6 Years
Engineer in Charge Field Construction	" "	5 Years
Chief Draftsman & Supt. of Compressor Station Construction	Continental Construction Corp.	1 Year
Supt. of Compressor Stations	Natural Gas Pipeline Co.	3 Years
Leave of Absence - Ill Health		1 Year
Engr. in Charge of Design & Const.	Natural Gas Pipeline Co.	4 Years
Bookkeeper	Peerless Oil & Refining Co.	1 Year
Payroll Clerk on Construction	Empire Companies	1 Year
Payroll Clerk on Construction	Combustion Utilities Co.	1/3 Year
Cost Clerk	Empire Companies	2/3 Year
Cost Clerk, Job Order Clerk, Traffic Agt.	Empire Oil & Refining Co.	2-1/2 Years
Asst. to Chief Clerk in Engr. Dept.	Natural Gas Pipeline Co.	2-1/3 Years
Auditor of Disbursements on Branch Line Construction	" " " "	1/2 Year
Assistant to Chief Auditor	" " " "	2/3 Year
Assistant Chief Auditor	" " " "	1 Year
Chief Auditor	" " " "	3-1/2 Years
Attorney	Charles M. Miller	4 Years
Attorney	Natural Gas Pipeline Co.	8 Years

PERSONNEL DATA
KEY FIELD MEN IN PIPELINE AND TELEPHONE DEPARTMENTS

						Chr
Name	Present Position	Age	Education	Time with Company (years)	Experience in Present Line (Years)	Position
Earl Rush	Supt. of Meters and Regulators	52	Mechanical Engineer	8	26½	Draftsman & Mechanical Engineer Testing, computing, lab. work Experimental work, gas pressure & Exp. & Mfg. work on Pressure & Fl Controls & Exp. work on Orifice Coefficients with U.S.B.of S.& Gas Measurement Work Supt. of Meters & Regulators
H. E. Smith	Division Supt.	49	Civil Engineer	8	22	Draftsman Chainman, rodman, transitman Civil Engineer Engineer Civil Engineer Chief Draftsman & Asst.Chief Civil Engineer Construction Engineer District Supt. of Pipelines Division Superintendent
E. D. Warren	Division Supt.	42	Civil Engineer	8	18½	Civil Engineer Resident Engr. Pipeline & Ref. C Resident Engineer Division Superintendent
L. D. Williams	Division Supt.	50	Civil Engineer	8	25	Engineer Construction Engineer Supervisor of Construction Refinery Engineer Ranching Special Engineer Assistant Rate Engineer Mill Inspector of Pipe Inspector & Tester on Constructi Division Superintendent Division Superintendent
Fred McKee	Wire Chief	38	Telephone Engineer	8	22½	Messenger in Telegraph Office Telegraph Operator & Station Age Relay Tel. Oper. & Division Wire Broker, Tel. Oper. & Branch Mana Division Wire Chief & General Of Telegraph Construction Assistant Wire Chief Wire Chief

Chronological Experience

Position	Employer	Length of Time
Draftsman & Mechanical Engineer	Iola Portland Cement Co,	3 Years
Testing, computing, lab. work	Santa Fe Railway Co.	4 Years
Experimental work, gas pressure & flow	Empire Companies	5 Years
Exp. & Mfg. work on Pressure & Flow Controls & Exp. work on Orifice Coefficients with U.S.B.of S.& A.G.A.	Doherty Research Co.	5 Years
Gas Measurement Work	Empire Companies	1-1/2 Yrs.
Supt. of Meters & Regulators	Natural Gas Pipeline Co.	8 Years
Draftsman	Omaha Structural Steel Co.	1/3 Year
Chainman, rodman, transitman	A. T. & S. F. Railway Co.	4 Years
Civil Engineer	Empire Companies	1 Year
Engineer	U. S. Army	1/2 Year
Civil Engineer	Empire Companies	1-1/2 Yrs.
Chief Draftsman & Asst.Chief Civil Engineer	" "	6 Years
Construction Engineer	" "	2 Years
District Supt. of Pipelines	Cities Service Gas Co.	3 Years
Division Superintendent	Natural Gas Pipeline Co.	8 Years
Civil Engineer	Ventura Cons. Oil Fields Co.	1-1/2 Yrs.
Resident Engr. Pipeline & Ref. Const.	Empire Companies.	7-1/2 Yrs.
Resident Engineer	Continental Construction Corp.	1-1/2 Yrs.
Division Superintendent	Natural Gas Pipeline Co.	8 Years
Engineer	Various engr. & const. cos.	5 Years
Construction Engineer	Empire Companies	2-1/2 Yrs.
Supervisor of Construction	Cities Service Co. in Mexico	1-1/4 Yrs.
Refinery Engineer	Pierce Oil Company	3/4 Year
Ranching	None	2 Years
Special Engineer	Empire Companies	1-1/2 Yrs.
Assistant Rate Engineer	Cities Service Gas Co.	1-1/2 Yrs.
Mill Inspector of Pipe	" " " "	1/4 Year
Inspector & Tester on Construction	" " " "	3/4 Year
Division Superintendent	" " " "	3-1/2 Yrs.
Division Superintendent	Texoma Natural Gas Company	8 Years
Messenger in Telegraph Office	C. B. & Q. Railroad Co.	1-1/2 Yrs.
Telegraph Operator & Station Agent	" "	4-1/2 Yrs.
Relay Tel. Oper. & Division Wire Chief	" "	3-1/2 Yrs.
Broker, Tel. Oper. & Branch Manager	Jerpe-Detroit Comm. Co.	1-1/2 Yrs.
Division Wire Chief & General Office	C. B. & Q. Railroad Co.	3 Years
Telegraph Construction	" "	1/2 Year
Assistant Wire Chief	Natural Gas Pipeline Co.	2 Years
Wire Chief	" " " "	6 Years

PERSONNEL DAT

KEY FIELD MEN IN THE COMPRESSOR STATION

Name	Present Position	Age	Education	Time with Company (Years)	Experience in Present Line (Years)	Position
Ronald M. Hendry	Supt. of Compressor Station #10	37	Mining Engineer	8-3/4	9	Machinist Apprentice Oiler on Steamship Shift Boss in Electro Zinc Inspector on Construction Main Engineer Station #1 Supt. of Compressor Station Inspector on New Engines Supt. of Compressor Station
Harry R. Rohwedder	Supt. of Compressor Station #9	35	Civil Engineer	8-1/2	12	Junior Engineer Resident Engineer Resident Eng. Compressor Auxiliary Engineer Station Main Engineer Station #1 Supt. of Compressor Station Supt. of Compressor Station
Frank F. Graham	Supt. of Compressor Station #8	39	Mechanical Engineer	7-3/4	23	Mach. & Drill Press Dept. Garage Mechanic Assembly Department & Fiel Garage Mechanic Field Erecting Engineer Auxiliary Engineer Station Main Engineer Station #8 Supt. of Compressor Stati
D. B. Sprow	Supt. of Compressor Station #7	36	Electrical Engineer	9	15	Plant Instal., Testing & Installation Engineer Draftsman & Design Engine Draftsman & Design Engine Auxiliary Engineer Statio Main Engineer Station #1 Supt. of Comp. Stations
E. C. Marsh	Supt. of Compressor Station #6	47	Mechanical Engineer	8	27	Valuation Engineer Oiler, fireman, engr. & Pressure Dispatcher Clerk in Compressor Stati Supt. of Dilworth Statio Supervising Test Crew Supt. of Compressor Stati Supt. of Compressor Stati

erience Present Line ears)	Chronological Experience		
	Position	Employer	Length of Time
9	Machinist Apprentice	Todd Dry Dock & Const. Co.	3 Years
	Oiler on Steamship	SS Pres. Grant & SS Maikiki	1/2 Year
	Shift Boss in Electro Zinc Ref.	Sullivan Mining Company	2 Years
	Inspector on Construction Work	Continental Construction Corp.	1 Year
	Main Engineer Station #1	Texoma Natural Gas Company	3 Years
	Supt. of Compressor Station #2	Natural Gas Pipeline Company	1 Year
	Inspector on New Engines	" " " "	1/4 Year
	Supt. of Compressor Station #10	" " " "	3-1/2 Yrs.
12	Junior Engineer	Empire Companies	2 Years
	Resident Engineer	" "	1-1/2 Yrs.
	Resident Eng. Compressor Sta. #3	Continental Construction Corp.	1 Year
	Auxiliary Engineer Station #1	Texoma Natural Gas Company	2 Years
	Main Engineer Station #1	" " " "	1/2 Year
	Supt. of Compressor Station #4	Natural Gas Pipeline Co.	1 Year
	Supt. of Compressor Station #9	" " " "	4 Years
23	Mach. & Drill Press Dept. Foreman	Bessemer Gas Engine Co.	2 Years
	Garage Mechanic	Grove City Garage	2-1/2 Yrs.
	Assembly Department & Field Erect.Eng.	Bessemer Gas Engine Co.	4 Yrs.
	Garage Mechanic	Tanner Brothers Garage	1-1/2 Yrs.
	Field Erecting Engineer	Bessemer Gas Engine Co.	5 Years
	Auxiliary Engineer Station #4	Natural Gas Pipeline Co.	2 Years
	Main Engineer Station #2	" " " "	1/4 Year
	Supt. of Compressor Station #8	" " " "	5-1/2 Yrs.
15	Plant Instal., Testing & Operating	Kansas City, Kansas	5 Years
	Installation Engineer	Western Electric Company	1 Year
	Draftsman & Design Engineer	Continental Construction Corp.	1 Year
	Draftsman & Design Engineer	Natural Gas Pipeline Co.	1 Year
	Auxiliary Engineer Station #10	" " " "	2 Years
	Main Engineer Station #10	" " " "	3/4 Year
	Supt. of Comp. Stations #3 & #7	" " " "	4-1/2 Yrs.
27	Valuation Engineer	Barnsdall Oil Company	3/4 Years
	Oiler, fireman, engr. & relief supt.	Wichita Natural Gas Co.	4 Years
	Pressure Dispatcher	Empire Companies	1/2 Year
	Clerk in Compressor Station Dept.	" "	8 Years
	Supt. of Dilworth Station	" "	6 Years
	Supervising Test Crew	Continental Construction Corp.	1/2 Year
	Supt. of Compressor Station #4	Natural Gas Pipeline Co.	2-1/2 Yrs.
	Supt. of Compressor Station #6	" " " "	5 Years

PERSONNEL DATA
KEY FIELD MEN IN THE COMPRESSOR STATION AND GASOLINE PLANT DEPARTMENTS
(Continued)

				Time with Company (Years)	Experience in Present Line (Years)	Chronolog
Name	Present Position	Age	Education			Position
H. C. Taintor	Supt. of Compressor Station #5	40	Mechanical Engineer	7-2/3	17	Assistant in Test Dept. Dynamometer Car Engineer Sales Engineer Salesman Testing Department Engineer Engineer Main Engineer Compressor Station #5 Supt. of Compressor Station #5
C. C. Jolley	Supt. of Compressor Station #4	38	Civil Engineer	7-1/4	13	Rodman & Transitman Instrumentman Inspector on Construction Dist.Const.Engr. & Asst.Prod.Supt. Office Engineer Construction Engineer Pipeline Maintenance Foreman Pipeline District Foreman Supt. of Compressor Station #4
J. G. Barnhart	Supt. of Compressor Station #3	34	Mechanical Engineer	9	11	Junior Engineer Engineer on Special Studies Engineer on Special Studies Operating Engineer Main Engineer Inspector on New Units Asst.Supt.Gasoline Plant & Sta. #1 Supt. of Compressor Station #3
W. E. Warner	Supt. of Compressor Station #2	36	Mechanical Engineer	7-1/2	15	Draftsman Experimental Engineer Service & Erection Engineer Main Engineer Repair Engineer Supt. of Compressor Station #2
R. T. Powers	Gen. Supt. Gasoline Plant & Station #1	42	Mechanical Engineer	9	20	Junior Engineer Chief Clerk of Auto Service Dept. Engineer in Gasoline Division Engineer in Refinery Division Supervision of Compressor Station & Gasoline Plant Design Supt. Gasoline Plant & Comp.Sta.#1

xperience n Present Line (Years)	Chronological Experience		
	Position	Employer	Length of Time
17	Assistant in Test Dept.	A. T. & S. F. Railway Co.	3 Years
	Dynamometer Car Engineer	K. C. Southern	3 Years
	Sales Engineer	Worthington Pump & Machinery	2-1/2 Yrs.
	Salesman	Bublitz Machinery Co.	1/2 Year
	Testing Department Engineer	Cooper-Bessemer	1 Year
	Engineer	Natural Gas Pipeline Co.	2 Years
	Main Engineer Compressor Station #5	" " " "	1/3 Year
	Supt. of Compressor Station #5	" " " "	5-1/3 Yrs.
13	Rodman & Transitman	Union Pacific Railway	1/2 Year
	Instrumentman	U.S.Bureau of Public Roads	1/2 Year
	Inspector on Construction	Colorado Portland Cement Co.	1/2 Year
	Dist.Const.Engr. & Asst.Prod.Supt.	Continental Oil Co.	3-1/2 Yrs.
	Office Engineer	Portland Cement Assn.	1-1/3 Yrs.
	Construction Engineer	Great Lakes Pipeline Co.	3/4 Year
	Pipeline Maintenance Foreman	Natural Gas Pipeline Co.	1-1/4 Yrs.
	Pipeline District Foreman	" " " "	2 Years
	Supt. of Compressor Station #4	" " " "	4 Years
11	Junior Engineer	Empire Companies	2 Years
	Engineer on Special Studies	Continental Construction Corp.	1-1/3 Yrs.
	Engineer on Special Studies	Natural Gas Pipeline Co.	2 Years
	Operating Engineer	Texoma Natural Gas Company	2 Years
	Main Engineer	" " " "	1-1/3 Yrs.
	Inspector on New Units	" " " "	1/3 Year
	Asst.Supt.Gasoline Plant & Sta. #1	" " " "	2 Years
	Supt. of Compressor Station #3	Natural Gas Pipeline Co.	Recently Assigned
15	Draftsman	Cooper-Bessemer Corp.	1 Year
	Experimental Engineer	" " "	1 Year
	Service & Erection Engineer	" " "	1 Year
	Main Engineer	Texoma Natural Gas Co.	2-1/2 Yrs.
	Repair Engineer	" " " "	1-1/2 Yrs.
	Supt. of Compressor Station #2	Natural Gas Pipeline Co.	3-1/2 Yrs.
20	Junior Engineer	Empire Companies	1-1/2 Yrs.
	Chief Clerk of Auto Service Dept.	" "	2-1/2 Yrs.
	Engineer in Gasoline Division	" "	6 Years
	Engineer in Refinery Division	" "	1 Year
	Supervision of Compressor Station & Gasoline Plant Design	Continental Construction Corp.	1 Year
	Supt. Gasoline Plant & Comp.Sta.#1	Texoma Natural Gas Company	8 Years

PERSONNEL DATA
KEY FIELD MEN IN THE COMPRESSOR STATION AND GASOLINE PLANT DEPARTMENTS
(Continued)

2165

						Chronolo
Name	Present Position	Age	Education	Time with Company (Years)	Experience in Present Line (Years)	Position
G. W. Gibbs	Supt. of Gasoline Plant	39	Petroleum Engineer	7½	18	Timekeeper & Mach. Apprentice Pumper, loader, treater. yard foreman Tool Dresser Pipe fitter, foreman, treater & stillman Const. Foreman, stillman, tester & asst. supt. Chief Chemist Asst. Supt. & Supt. of Operations Superintendent Laborer Stillman Tester Foreman of Gasoline Plant Supt. of Gasoline Plant
E. G. Hammerschmidt	Chief Chemist	40	Chemical Engineer	7½	16½	Gasoline Plant Tester Asst. Supt. Gasoline Plant Chemist Research Chemist Chief Chemist

Experience in Present Line (Years)	Chronological Experience		
	Position	Employer	Length of Time
18	Timekeeper & Mach. Apprentice	A. T. & S. F. Railway Co.	2 Years
	Pumper, loader, treater, yard foreman	Peerless Oil & Refining Co.	2-1/2 Yrs.
	Tool Dresser	Franklin Drilling Co.	2 Years
	Pipe fitter, foreman, treater & stillman	Continental Oil Company	1 Year
	Const. Foreman, stillman, tester & asst. supt.	Marland Refining Co.	2 Years
	Chief Chemist	Pampa Refining Co.	3/4 Year
	Asst. Supt. & Supt. of Operations	Natural Gasoline Corp.	1/3 Year
	Superintendent	Seaboard Gasoline & Refining Co.	1-1/2 Yrs.
	Laborer	Stearns Rogers Co.	1/4 Year
	Stillman	Texoma Natural Gas Company	2-1/4 Yrs.
	Tester	" " " "	3/4 Years
	Foreman of Gasoline Plant	" " " "	2 Years
	Supt. of Gasoline Plant	" " " "	2-1/2 Yrs.
16½	Gasoline Plant Tester	Empire Companies	3 Years
	Asst. Supt. Gasoline Plant	" "	1/2 Year
	Chemist	" "	1 Year
	Research Chemist	" "	4-1/2 Yrs.
	Chief Chemist	Texoma Natural Gas Co.	7-1/2 Yrs.

Exhibit 130

NATURAL GAS PIPELINE COMPANY OF AMERICA

And

TEXOMA NATURAL GAS COMPANY

SUMMARY OF COST OF ATTACHING BUSINESS

Page #1

Description	1932	1933	1934	1935	Total
	OX	OX	OX	OX	OX
1 - Cost of Soliciting Business (New Business Department Expense)	$ 86,105.00	$ 219,149.00	$ 889,060.00	$ 373,477.00 (1)	$ 1,567,791.00
2 - Cost of Providing Facilities in Advance of Attached Business					
Total Fixed Charges Paid					
Interest	$3,666,350.00	$3,625,079.00	$3,598,329.00	$3,474,732.00	$14,364,490.00
Ad Valorem Taxes	301,776.00	301,689.00	270,558.00	289,193.00	1,163,156.00
Depreciation	386,529.00 (2)	386,529.00 (2)	386,529.00 (2)	386,529.00 (2)	1,546,116.00
Total	$4,354,655.00	$4,313,237.00	$4,255,416.00	$4,150,454.00	$17,073,762.00
Portion of Capacity Provided in Advance of Attached Business (Percent)	51.98	56.75	21.42	3.63	-
Fixed Charges on That Portion of the Capacity Provided in Advance of Attached Business					
Interest	$1,905,769.00	$2,057,232.00	$ 770,762.00	$ 126,133.00	$ 4,859,896.00
Ad Valorem Taxes	156,863.00	171,174.00	57,954.00	10,498.00	396,489.00
Depreciation	200,918.00	219,355.00	82,795.00	14,031.00	517,099.00
Total	$2,263,550.00	$2,447,761.00	$ 911,511.00	$ 150,662.00	$ 5,773,484.00
3 - Cost of Operating Facilities Provided in Advance of Attached Business					
Expenses Not Affected by Volume of Gas Handled	$1,072,759.00	$ 835,903.00	$ 770,616.00	$ 819,759.00	$ 3,499,037.00
Portion of Capacity Provided in Advance of Attached Business (Percent)	51.98	56.75	21.42	3.63	-
Expense of Operating Facilities Provided in Advance of Attached Business	557,620.00	474,375.00	165,066.00	29,757.00	1,226,818.00
GRAND TOTAL COST OF ATTACHING BUSINESS	$2,907,275.00	$3,141,285.00	$1,965,637.00	$ 553,896.00	$ 8,568,093.00

What?

NOTES - (1) Includes $65,471.00 paid in 1936 but contracted for in 1934 and 1935. — when you K for oil in 1935 & pay for in 3 to what yr do you chge it?

(2) Viewed depreciation as of 6-1-39 has been testified to as being $2,866,758.00 which would mean $386,529.00 per year.

Name	Present Position	Age	Education	Time with Company (Years)	Experience in Present Line (Years)	Chronological Experience		
						Position	Employer	Length of Time
J. G. Dickinson	General Supt. of Gas Production	44	Electrical Engineer	9	22	Junior Engineer	Toledo Railway & Light Co.	2/3 Year
						Second Lieutenant	U. S. Army	1 Year
						Junior Engineer	Empire Companies	2 Years
						Engineer	" "	2 Years
						District Supt. of Oil Production	" "	7 Years
						General Supt. of Gas Production	Texoma Natural Gas Company	9 Years
C. J. Peterson	Chief Geologist	54	Geologist	9	29	Assistant Surveyor	Tonopah Mining Company	2 Years
						Geologist	New York & Bermudez Co.	1 Year
						Examiner of Mines	Tonopah Mining Company	3 Years
						Petroleum Geologist	Empire Gas & Fuel Company	1 Year
						Petroleum Geologist	Pomeroy & Hamilton	4 Years
						Consulting Geologist	C. L. Severy	2 Years
						Petroleum Geologist	Empire Gas & Fuel Co.	3 Years
						Geol. in Charge of Rocky Mountain Area	" " " " "	1 Year
						Geol. in Charge of Gas Exploration	" " " " "	3 Years
						Chief Geologist	Texoma Natural Gas Company	9 Years
C. I. Galloup	Production Supt.	48	Mechanical Engineer	9	32	Tool Dresser	Featherland & Shurman	2 Years
						Driller	" " "	1 Year
						Field Foreman, Pipeline Construction and Production	Portland Gas & Pipeline Co.	2 Years
						Pipeline Construction Supt.	Ardesons & Ossenbeck	1 Year
						Dist. Foreman Pipeline Const. & Prod.	Empire Companies	11 Years
						Dist. Foreman, Oil Production, Dev.	" "	6 Years
						Production Superintendent	Texoma Natural Gas Company	9 Years
C. C. Kuhne	Supt. of Land & Lease Department	39	Chemical Engineer	8	20	Junior Engineer	Empire Companies	1-1/2 Yrs.
						Foreman of Oil Dehydration Plant	" "	1/2 Year
						Head Roustabout	" "	1 Year
						Tool Dresser	" "	1-1/2 Yrs.
						Pressure Still Operator	White Eagle Oil & Ref. Co.	2/3 Year
						Chemist on Corrosion Study	Empire Companies	4-1/2 Yrs.
						Production Engineer	" "	2 Years
						Production Engineer	Texoma Natural Gas Company	4-1/2 Yrs.
						Supt. of Land & Lease Department	" " " "	3-1/2 Yrs.
W. F. Martin	Chief Accountant	46	Accountant	8½	20	Laborer - Air brakes	Gulf & Ship Island Railroad	4 Years
						Stenographer & Clerk	District Attorney - Gulfport	1 Year
						Quotation Stenographer	Great Southern Lumber Co.	1 Year
						Stenographer & Clerk	Enochs Bros. (Lumber Mfgrs)	1 Year
							U. S. Army	2-1/4 Yrs.
						Clerk in Office of Port Director	City of Houston	1/3 Year
						Asst. Construction Paymaster	Humble Oil & Refining Co.	1/3 Year
						Special Auditor	Empire Companies	1 Year
						Job Order Clerk	" "	4 Years
							Leave of Absence	1 Year
						Job Order Clerk	Empire Companies	1-1/3 Yrs.
						Chief Field Clerk	" "	1-1/3 Yrs.
						Chief Accountant	Texoma Natural Gas Co.	8-1/2 Yrs.
W. F. Brainerd	Geologist	43	Geologist	8½	16	Geologist	Empire Companies	13-1/2 Yrs.
						Geologist	Texoma Natural Gas Company	8-1/2 Yrs.

NATURAL GAS PIPELINE COMPANY OF AMERICA

TEXOMA NATURAL GAS COMPANY

ESTIMATED LAG IN THE ATTACHMENT OF BUSINESS

Year	Annual Sales (M.C.F.)	Annual Capacity with Full Continuous Load (M.C.F.)	Capacity Factor (Sales / Capacity = Per-cent)	Percent Capacity Factor of Proved Capacity in 1936, 1937 and 1938 (Percent)
1936	69,615,337	76,650,000(A)		
1937	74,476,893	76,650,000		
1938	68,759,039	76,860,000		
Proved Capacity 3-Year Average =	70,950,423	76,720,000	92.48%	100.00%
1935	56,926,369	63,875,000(B)	89.12%	96.37%
1934	46,416,991	63,875,000	72.67	78.58
1933	25,548,760	63,875,000	40.00	43.25
1932	28,445,679	64,050,000	44.41	48.02

NOTE: (A) At 210,000,000 Cu.Ft. daily

(B) At 175,000,000 Cu.Ft. daily

Annual Capacity with Full Continuous Load (M.C.F.)	Capacity Factor (Sales / Capacity = Per-cent)	Percent Capacity Factor of Proved Capacity in 1936, 1937 and 1938 (Percent)	Lag in Load as Compared with Proved Capacity (Percent)
76,650,000(A)			
76,650,000			
76,860,000			
76,720,000	92.48%	100.00%	0.00%
63,875,000(B)	89.12%	96.37%	3.63%
63,875,000	72.67	78.58	21.42
63,875,000	40.00	43.25	56.75
64,050,000	44.41	48.02	51.98

(A) At 210,000,000 Cu.Ft. daily

(B) At 175,000,000 Cu.Ft. daily

Page No.	Description	1932	1933	1934	1935
1	Gas Purchased	$ 378,366.00	$ 384,039.00	$ 643,974.00	$ 839,119.00
2	Royalties on Gas Produced	84,106.00	71,788.00	130,283.00	189,108.00
3	Gasoline Plant Expense	84,381.00	119,150.00	147,774.00	215,262.00
4	Gathering Line Expense	55,048.00	45,527.00	40,068.00	62,269.00
5	Compressor Station	183,264.00	175,783.00	506,572.00	745,223.00
6	Sub-total	$ 785,165.00	$ 796,287.00	$1,468,671.00	$2,050,981.00
7	Less Gas Used in Operation	48,669.00	49,604.00	149,586.00	269,786.00
8	Total Costs Varying with Volume of Gas Sold	$ 736,496.00	$ 746,683.00	$1,319,085.00	$1,781,195.00
9	Production Cost (Other than Royalties and Taxes)	$ 184,647.00	$ 161,296.00	$ 141,909.00	$ 139,466.00
10	Pipeline Expense (Main Line and Meter)	338,622.00	188,553.00	159,087.00	205,026.00
11	Telephone Expense	60,218.00	58,211.00	61,620.00	60,572.00
12	General and Adminstrative (Exclusive of Taxes)	489,272.00	427,843.00	408,000.00	414,695.00
13	Total Costs Not Varying with Volume	$1,072,759.00	$ 835,903.00	$ 770,616.00	$ 819,759.00
14	Ad Valorem Taxes	$ 301,776.00	$ 301,629.00	$ 270,558.00	$ 289,193.00
15	Other Taxes	17,144.00	64,763.00	65,021.00	379,636.00
16	New Business Expense	86,105.00	219,149.00	889,060.00	308,006.00
17	Interest Paid	3,666,350.00	3,625,079.00	3,598,329.00	3,474,732.00
18	Total Expense Before Depreciation	$5,880,630.00	$5,793,206.00	$6,912,669.00	$7,052,521.00

DATA ON GAS SALES

Years	Annual Sales-MCF
1932	28,445,679
1933	25,548,760
1934	46,416,991
1935	56,926,369
1936	69,615,337
1937	74,476,893
1938	68,759,039

Line No.		CLASS A-1		CLASS A-2		CLASS A-3		CLASS B-1	
		Acres	Value	Acres	Value	Acres	Value	Acres	Value
1	**Moore County**								
2	Developed Leases	30,931.86	$3,866,482.50	37,511,20	$3,752,919.50	2,880.00	$216,000.00	1,200.00	$ 60,000.00
3	Undeveloped Leases	-	-	-	-	-	-	1,600.00	80,000.00
4	Total								
5	**Carson County**								
6	Developed Leases	24,195.00	3,033,375.00	15,102.70	1,510,220.00	720.00	54,000.00	2,596.50	129,852.00
7	Undeveloped Leases	-	-	160.00	16,000.00	-	-	160.00	8,000.00
8	Total								
9	**Gray County**								
10	Developed Leases	-	-	1,760.00	176,000.00	800.00	60,000.00	1,020.00	51,000.00
11	Undeveloped Leases	-	-	-	-	-	-	-	-
12	Total								
13	**Gray County**								
14	**Lefors Area**								
15	Developed Leases	-	-	-	-	-	-	-	-
16	Undeveloped Leases	-	-	-	-	-	-	-	-
17	Total								
18	**Hutchinson County**								
19	Developed Leases	-	-	-	-	1,663.30	124,747.50	-	-
20	Undeveloped Leases	-	-	-	-	160.00	12,000.00	-	-
21	Total								
22	**Wheeler County**								
23	Developed Leases	-	-	-	-	-	-	-	-
24	Undeveloped Leases	-	-	-	-	-	-	-	-
25	Total								
26	GRAND TOTAL	55,126.86	$6,899,857.50	54,533.90	$5,455,139.50	6,223.30	$466,747.50	6,576.50	$328,852.00

RECAPITULATION

		Acres	Value
Class	A-1	55,126.86	$ 6,899,857.50
"	A-2	54,533.90	5,455,139,50
"	A-3	6,223.30	466,747.50
"	B-1	6,576.50	328,852.00
"	B-2	3,932.00	108,640,00
"	B-3	767.90	14,397.50
"	C	10,118.10	14,918.10
Sour Gas		2,722.35	-
		140,000.91	$ 13,288,552.10

CLASS B-2		CLASS B-3		CLASS C				
Acres	Value	Acres	Value	Acres	Value	Sour Acres	Total Acres By Counties	Total Value By Counties
-	-	-	-	-	-	-	72,523.06	$ 7,895,402.00
2,092.00	$ 48,640.00	-	-	-	-	242.35	3,934.35	128,640.00
							76,457.41	$ 8,024,042.00
440.00	13,800.00	-	-	-	-	-	43,054.20	$ 4,741,247.00
120.00	3,000.00	-	-	320.00	$ 3,200.00	2,480.00	3,240.00	30,200.00
							46,294.20	$ 4,771,447.00
640.00	20,800.00	767.90	$ 14,397.50	400.00	2,000.00	-	5,387.90	$ 324,197.50
-	-	-	-	-	-	-	-	-
							5,387.90	$ 324,197.50
-	-	-	-	9,318.10	9,318.10	-	9,318.10	$ 9,318.10
-	-	-	-	-		-	-	-
							9,318.10	$ 9,318.10
-	-	-	-	-	-	-	1,663.30	$ 124,747.50
-	-	-	-	-	-	-	160.00	12,000.00
							1,823.30	$ 136,747.50
640.00	22,400.00	-	-	80.00	400.00	-	720.00	$ 22,800.00
-	-	-	-	-	-	-	-	-
							720.00	$ 22,800.00
3,932.00	$ 108,640.00	767.90	$ 14,397.50	10,118.10	$ 14,918.10	2,722.35	140,000.91	$ 13,288,552.10

CLASSIFICATION

A-1	$125.00 per acre
A-2	100.00 " "
A-3	75.00 " "
B-1	50.00 " "
B-2	$35.00--$25.00--$20.00 per acre
B-3	$15.00--$10.00 " "
C	$10.00 per acre or less

Exhibit 132

QUOTATIONS AND YIELDS
of
UNITED STATES OF AMERICA TREASURY NOTES AND BONDS
AT CLOSE OF MARKET ON AUGUST 15, 1939

Coupon Rate - %	Maturity Date	Optional Call Date	Quotations		Yield - %		Amount Of Issue Outstanding (Millions)
			Bid	Offered	to Call	to Maturity	$
			UNITED STATES TREASURY NOTES				
1-3/8	9/15/39	-	100- 2/32	-	-	-	-
1-3/8	12/15/39	-	101-10/32	101-12/32	-	(100.450=0.00)	526
1-5/8	3/15/40	-	101-20/32	101-22/32	-	(100.940=0.00)	1378
1-1/2	6/15/40	-	101-21/32	101-23/32	-	(101.241=0.00)	738
1-1/2	12/15/40	-	102- 1/32	102- 3/32	-	(101.991=0.00)	737
1-1/2	3/15/41	-	102-10/32	102-12/32	-	0.00	677
1-3/8	6/15/41	-	102-13/32	102-15/32	-	0.02	504
1-1/4	12/15/41	-	102-22/32	102-24/32	-	0.07	204
1-3/4	3/15/42	-	103-31/32	104- 1/32	-	0.18	426
2	9/15/42	-	105-12/32	105-14/32	-	0.23	342
1-3/4	12/15/42	-	104-27/32	104-29/32	-	0.27	232
1-1/8	6/15/43	-	102-18/32	102-20/32	-	0.43	629
1-1/8	12/15/43	-	102-21/32	102-23/32	-	0.48	421
3/4	6/15/44	-	100-22/32	100-24/32	-	0.59	417
			UNITED STATES TREASURY BONDS				
3-3/8	6/15/43	6/15/40	103- 3/32	103- 5/32	(102.793=0.00)	2.46	353
3-3/8	3/15/43	3/15/41	105- 9/32	105-11/32	(105.325=0.00)	1.80	545
3-1/4	8/ 1/41	-	106- 1/32	106- 3/32	-	0.13	834
3-3/8	6/15/47	6/15/43	110-18/32	110-20/32	0.56	1.93	454
3-1/4	10/15/45	10/15/43	110-12/32	110-14/32	0.70	1.48	1401
3-1/4	4/15/46	4/15/44	110-26/32	110-28/32	0.86	1.53	1519
4	12/15/54	12/15/44	115-17/32	115-21/32	0.98	2.73	1037
2-3/4	9/15/47	9/15/45	109-12/32	109-14/32	1.13	1.50	1214
2-1/2	12/15/45	-	108-18/32	108-21/32	-	1.08	541
3-3/4	3/15/56	3/15/46	115-13/32	115-17/32	1.28	2.60	489
3	6/15/48	6/15/46	111- 4/32	111- 7/32	1.27	1.65	1036
3-1/8	6/15/49	6/15/46	111-30/32	112-	1.28	1.80	819
4-1/4	10/15/52	10/15/47	121-10/32	121-13/32	1.46	2.34	759
2	12/15/47	-	105-16/32	105-18/32	-	1.29	701
2-3/4	3/15/51	3/15/48	109-12/32	109-14/32	1.56	1.80	1223
2-1/2	9/15/48	-	108-16/32	108-18/32	-	1.48	451
3-1/8	12/15/52	12/15/49	113- 6/32	113- 8/32	1.72	1.97	491
2-1/2	12/15/53	12/15/49	106-17/32	106-19/32	1.80	1.94	1786
2-1/2	9/15/52	9/15/50	106-19/32	106-21/32	1.84	1.90	1186
2-3/4	6/15/54	6/15/51	108-22/32	108-24/32	1.92	2.05	1627
3	9/15/55	9/15/51	112- 5/32	112- 6/32	1.86	2.00	755
2-7/8	3/15/60	3/15/55	109-14/32	109-16/32	2.17	2.29	2611
2-3/4	9/15/59	9/15/56	108- 3/32	108- 5/32	2.21	2.22	982
2-3/4	6/15/63	6/15/58	107-21/32	107-23/32	2.24	2.32	918
2-3/4	12/15/65	12/15/60	107-20/32	107-22/32	2.29	2.33	1486

Exhibit 133

AVERAGE YIELD OBTAINABLE
from
INVESTMENTS IN UNITED STATES GOVERNMENT NOTES AND BONDS

Year Funds Invested	Coupon Rate - %	Maturity Date	Optional Call Date	Asked Price 8/15/39	Yield - % to Call	Yield - % to Maturity	Indicated Yield Obtainable %
1st	2-3/4	6/15/54	6/15/51	108-24/32	1.92	2.05	2.05
2nd	2-1/2	12/15/53	12/15/49	106-19/32	1.80	1.94	1.95
3rd	2-1/2	9/15/52	9/15/50	106-21/32	1.84	1.90	1.85
4th	2-3/4	3/15/51	3/15/48	109-14/32	1.56	1.80	1.75
5th	3-1/8	6/15/49	6/15/46	112	1.28	1.80	1.70
6th	3-1/8	6/15/49	6/15/46	112	1.28	1.80	1.55
7th	2-1/2	9/15/48	-	108-18/32	-	1.48	1.50
8th	2	12/15/47	-	105-18/32	-	1.29	1.30
9th	2-1/2	12/15/45	-	108-21/32	-	1.08	1.20
10th	2-1/2	12/15/45	-	108-21/32	-	1.08	1.10
11th	3/4	6/15/44	-	100-24/32	-	0.59	.60
12th	1-1/8	12/15/43	-	102-22/32	-	0.48	.50
13th	1-3/4	12/15/42	-	104-29/32	-	0.27	.27
14th	1-1/4	12/15/41	-	102-24/32	-	0.07	.07
15th	-	-	-	-	-	0.00	0.00

Average Yield 1.52

Less Cost of Administration .17

Net Average Yield to Investor 1.35

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EXHIBIT 134.

Amarillo, Texas
August 24, 1939

Mr. J. G. Dickinson
Office

Explanation of Method Used in Determining Reserves As of August 1, 1931, On Acreage Owned by Texoma Natural Gas Company January 1, 1939.

Dear Mr. Dickinson:

In calculating the reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939, but as of August 1, 1931, I used the same method used in determining reserves for Texoma's leases as of January 1, 1939, as described on Pages 3 and 4 of Exhibit No. 43, and divided the acreage into the same approximately 506 tracts mentioned in that exhibit. The total reserve for Texoma's acreage was then determined by adding up the reserves figured for all these tracts. In this manner was determined the total original recoverable reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939. At the time that these original recoverable reserves were figured, there was also determined the amount of gas which would remain in the reservoir at the assumed well head abandonment pressures designated and with a 90% recovery factor applied.

In figuring the recoverable reserves underlying the acreage owned by Texoma Natural Gas Company on January 1, 1939, as of August 1, 1931, at the assumed well head abandonment pressures designated, the actual absolute reservoir rock pressure was determined as of August 1, 1931, and the proportion of this absolute rock pressure to the original 471 pound rock pressure, applied to the original reserves underlying each tract. Then the reserves determined for all the tracts were totalled and from this amount was subtracted the amount of gas which would be left in the reservoir at the designated abandonment pressures with a 90% recovery factor. This process resulted in the amounts noted below at the varous designated well head abandonment pressures and it will be noted that this reserve at an assumed well head abandonment pressure of 0# gauge was 2,505,680,723 MCF.

In determining the rock pressures of each of the approximately 506 tracts used, for August 1, 1931, the following method was used. The writer has in his possession rock pressure records of wells drilled prior to August 1, 1931, which give rock pressures prior to and shortly after August 1, 1931. From these records, the rock pressures as of August 1, 1931 were computed. These rock pressures were plotted on the writer's 1932 rock pressure map and showed at each well used the difference between the rock pressures as of 1932 and August 1, 1931. Information on enough wells was available so that enough control was obtained to determine what differences occurred between the 1932 rock pressures and the 1931 rock pressures, in the different areas.

Each tract was plotted on the map and the rock pressure of its center determined. When the tracts did not occur between wells with 1931 rock Pressures, and would therefore not be directly scaled, the differences noted in
2175 that area between 1931 and 1932 rock pressures were
applied to the 1932 rock pressure contours to determine the 1931 rock pressure.

For this work, the writer used rock pressure records of wells which had been acquired and drilled by Texoma Natural Gas Company at that time, and wells drilled prior to August 1, 1931, by Canadian River Gas Company and Panhandle Eastern Pipe Line Company in Moore and Hutchinson Counties, Cities Service Gas Company in Carson and Gray Counties, and the Lone Star Gas Company in Wheeler County.

The following tabulation shows the results obtained:

Texoma Natural Gas Company Reserves—August 1, 1931
Leases Owned Jan. 1, 1939—Pressure Base 16.4#—90%
Recovery Factor Used

Abandonment Pressure Pounds Gauge At Well Head	Reserves M. C. F.
0#	2,505,680,723
25#	2,349,536,607
50#	2,187,387,385
75#	2,025,240,991
100#	1,869,096,876
125#	1,708,947,653

Very truly yours,
(Signed. C. J. Peterson)
C. J. Peterson,
Chief Geologist.

CJP:BEP
cc-Mr. E. V. Kesinger (2)
Judge S. A. L. Morgan
Mr. J. J. Hedrick

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EXHIBIT 136.

Natural Gas Pipeline Company of America and Texamo Natural Gas Company

Index of Statements

Page No.

Combined Statements

Condensed Statement of Profit and Loss 1
Statements of Gross Operating Revenue and Operation, Maintenance, and General Expenses .. 2
Surplus Account 3

Natural Gas Pipeline Company of America

Statement of Profit and Loss 4
Statements of Gross Operating Revenue—Operation, Maintenance, and General Expense—Gas Account 5
Statements of Gas Sales in M. C. F. and Revenue 6
Statements of Other Operating Income and Non-Operating Income 7
Statements of Gas Purchased and Gas Used by Company 8
Surplus Account 9

Texoma Natural Gas Company

Statement of Profit and Loss 10
Statements of Gross Operating Revenue and Operation, Maintenance, and General Expenses .. 11
Statement of Gas Sales in M. C. F. and Revenue . 12
Statements of Gas Account and Gasoline Account 13
Statements of Other Operating Income and Non-Operating Income 14
Surplus Account 15

NATURAL GAS PIPELINE COMPANY OF AMERICA and TEXOMA NATURAL GAS COMPANY

STATEMENT OF COMBINED PROFIT AND LOSS

Line Number		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)
1	Gross Operating Revenue	$5,879,863.89	$6,274,671.61	$9,507,410.58	$12,062,798.72	$14,566,842.76	$15,552,607.5
2	Operation, Maintenance, & General Expense	2,214,269.20	2,168,127.50	3,314,340.91	3,577,788.42	4,259,781.91	4,789,540.2
3	Net Earnings from Operations	$3,665,594.69	$4,106,544.11	$6,193,069.67	$ 8,485,010.30	$10,307,060.85	$10,763,067.3
4	Non-Operating Income	7,630.25	9,434.86	35,083.25	47,266.82	36,074.03	33,194.4
5	Net Earnings before Other Charges	$3,673,224.94	$4,115,978.97	$6,228,152.92	$ 8,532,277.12	$10,343,134.88	$10,796,261.7
6	Other Charges						
7	Interest	$3,727,815.35	$3,794,229.77	$3,707,658.64	$ 3,536,519.20	$ 3,258,095.53	$ 3,061,183.8
8	Bond Discount & Expense Amortized	259,651.59	258,214.09	257,891.19	258,078.89	258,078.89	255,250.9
9	Depreciation	1,473,566.76	1,483,723.34	1,502,397.16	1,547,568.32	1,599,792.29	2,034,754.0
10	Depletion	109,916.86	98,507.67	178,792.07	220,199.45	267,676.71	320,526.9
11	Retirements	5,147.34*	2,378,034.03	397,322.00	801,893.49	1,339,824.21	576,828.7
12	Total Other Charges	$5,565,803.22	$8,012,708.90	$6,044,061.06	$ 6,364,259.35	$ 6,723,467.63	$ 6,248,544.6
13	Net Profit	$1,892,578.28*	$3,896,729.93*	$ 184,091.86	$ 2,168,017.77	$ 3,619,667.25	$ 4,547,717.1

* Red

Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
,062,798.72	$14,566,842.76	$15,552,607.50	$14,441,349.76	$78,285,544.82
,577,788.42	4,259,781.91	4,789,540.20	4,556,604.48	24,880,452.62
,485,010.30	$10,307,060.85	$10,763,067.30	$ 9,884,745.28	$53,405,092.20
47,266.82	36,074.03	33,194.46	85,916.91	194,600.58
,532,277.12	$10,343,134.88	$10,796,261.76	$ 9,910,662.19	$53,599,692.78
,536,519.20	$ 3,258,095.53	$ 3,061,183.86	$ 2,908,527.63	$23,994,029.98
258,078.89	258,078.89	255,250.96	255,250.96	1,802,416.57
,547,568.32	1,599,792.29	2,034,754.08	1,978,408.31	11,620,210.26
220,199.45	267,676.71	320,526.96	261,658.04	1,457,277.76
801,893.49	1,339,824.21	576,828.75	992,567.28	6,481,322.42
,364,259.35	$ 6,723,467.63	$ 6,248,544.61	$ 6,396,412.22	$45,355,256.99
,168,017.77	$ 3,619,667.25	$ 4,547,717.15	$ 3,514,249.97	$ 8,244,435.79

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)
1.	**Gross Operating Revenue**					
2.	Gas Sales	$5,658,891.95	$5,993,921.28	$9,123,449.96	$11,440,493.23	$13,745,968.25
3.	Gasoline Sales	195,675.01	260,256.08	361,915.86	596,042.00	792,017.15
4.	Other Operating Income	25,296.93	20,494.25	22,044.76	26,263.49	28,857.36
5.	Gross Operating Revenue	$5,879,863.89	$6,274,671.61	$9,507,410.58	$12,062,798.72	$14,566,842.76
6.	**Operation, Maintenance & General Expenses**					
7.	Purchased Gas	$ 378,365.84	$ 384,039.32	$ 643,973.84	$ 839,119.01	$ 1,075,485.64
8.	Production	268,753.35	233,083.50	272,191.92	328,573.54	381,992.98
9.	Pipeline	393,669.64	234,080.38	199,155.11	267,294.94	408,358.78
10.	Compressor	183,263.62	175,782.98	506,572.20	745,223.12	1,037,087.07
11.	Gasoline and Refrigerating	84,380.97	119,149.91	147,774.18	215,261.69	282,524.52
12.	Telephone	60,217.92	58,210.53	61,620.36	60,571.72	59,723.22
13.	Taxes	318,910.10	366,392.25	335,579.01	658,828.84	947,250.58
14.	Regulatory	- -	- -	- -	- -	- -
15.	General	489,271.54	427,842.94	407,999.92	414,695.18	384,038.69
16.	New Business	86,104.76	219,149.32	889,060.43	308,006.18	81,422.91
17.	Total	$2,262,937.74	$2,217,731.13	$3,463,926.97	$ 3,847,574.22	$ 4,657,884.39
18.	Less: Gas Used by Company	48,668.54	49,603.63	149,586.06	269,785.80	398,102.48
19.	Net Operation, Maintenance & General Expenses	$2,214,269.20	$2,168,127.50	$3,314,340.91	$ 3,577,788.42	$ 4,259,781.91

* Red

Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
$13,745,968.25	$14,652,643.90	$13,791,843.48	$74,407,212.05
792,017.15	893,807.30	665,055.95	3,764,769.35
28,857.36	6,156.30	15,549.67*	113,563.42
$14,566,842.76	$15,552,607.50	$14,441,349.76	$78,285,544.82
$ 1,075,485.64	$ 1,130,277.82	$ 1,061,359.13	$ 5,512,620.60
381,992.98	374,873.35	359,049.68	2,228,518.32
408,358.78	325,058.73	394,545.28	2,222,162.86
1,037,087.07	1,219,850.97	998,916.57	4,866,696.53
282,524.52	308,614.77	244,125.15	1,401,831.19
59,723.22	63,990.24	65,884.80	430,218.79
947,250.58	1,306,681.47	1,123,170.19	5,068,812.44
- -	41,467.63	190,788.47	232,256.10
384,038.69	438,228.21	469,775.71	3,031,852.19
81,422.91	16,115.48	17,788.18	1,617,647.26
$ 4,657,884.39	$5,225,158.67	$4,935,403.16	$26,610,616.28
398,102.48	435,618.47	378,798.68	1,730,163.66
$ 4,259,781.91	$4,789,540.20	$4,556,604.48	$24,880,452.62

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY

COMBINED SURPLUS

2180

	Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Ye
1. Profit & Loss	$1,892,578.28*	$3,896,729.93*	$ 184,091.86	$2,168,017.77	$3,619,667.25	$4,547,717.15	$3,51
2. Less: Dividends	--	--	--	--	2,775,000.00	4,125,000.00	2,25
3. Net Balance	$1,892,578.28*	$3,896,729.93*	$ 184,091.86	$2,168,017.77	$ 844,667.25	$ 422,717.15	$1,2
4. Other Charges to Surplus							
5. Corporate Expense	$ --	$ --	$ --	$ 5,979.02	$ --	$ --	$
6. Bond Expense applicable to 1931	--	--	--	--	--	28,210.35	
7. Total Other Charges to Surplus	$ --	$ --	$ --	$ 5,979.02	$ --	$ 28,210.35	$
8. Balance from First of Year	--	1,892,578.28*	5,789,308.21*	5,605,216.35*	3,443,177.60*	2,598,510.35*	2,20
9. Surplus (Deficit) at End of Year	$1,892,578.28*	$5,789,308.21*	$5,605,216.35*	$3,443,177.60*	$2,598,510.35*	$2,204,003.55*	$ 93

* Red

Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
$1,892,578.28*	$3,896,729.93*	$ 184,091.86	$2,168,017.77	$3,619,667.25	$4,547,717.15	$3,514,249.97	$8,244,435.79
--	--	--	--	2,775,000.00	4,125,000.00	2,250,000.00	9,150,000.00
$1,892,578.28*	$3,896,729.93*	$ 184,091.86	$2,168,017.77	$ 844,667.25	$ 422,717.15	$1,264,249.97	$ 905,564.21*
$ --	$ --	$ --	$ 5,979.02	$ --	$ --	$ --	$ 5,979.02
--	--	--	--	--	28,210.35	--	28,210.35
$ --	$ --	$ --	$ 5,979.02	$ --	$ 28,210.35	$ --	$ 34,189.37
--	1,892,578.28*	5,789,308.21*	5,605,216.35*	3,443,177.60*	2,598,510.35*	2,204,003.55*	--
$1,892,578.28*	$5,789,308.21*	$5,605,216.35*	$3,443,177.60*	$2,598,510.35*	$2,204,003.55*	$ 939,753.58*	$ 939,753.58*

NATURAL GAS PIPELINE COMPANY OF AMERICA

CONDENSED STATEMENT OF PROFIT AND LOSS

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 19 (6)
1.	Gross Operating Revenue	$5,666,329.58	$5,997,564.05	$9,133,135.13	$11,452,371.93	$13,753,485.00	$14,583,716
2.	Operation, Maintenance & General Expenses	3,515,295.24	3,454,014.32	5,557,332.72	6,017,222.61	7,152,505.70	6,863,912
3.	Net Earnings from Operations	$2,151,034.34	$2,543,549.73	$3,575,802.41	$ 5,435,149.32	$ 6,600,979.30	$ 7,719,803
4.	Non-Operating Income	1,505,004.21	1,533,690.80	1,568,136.84	1,530,614.59	1,462,149.71	1,363,481
5.	Net Earnings before Other Charges	$3,656,038.55	$4,077,240.53	$5,143,939.25	$ 6,965,763.91	$ 8,063,129.01	$ 9,083,285
6.	Other Charges						
7.	Interest	$3,712,798.54	$3,780,632.77	$3,717,859.32	$ 3,552,980.49	$ 3,288,694.53	$ 3,099,518
8.	Bond Discount & Expense Amortized	258,410.18	256,972.68	256,685.19	256,876.85	256,876.85	254,876
9.	Depreciation	1,132,150.32	1,137,593.73	1,141,474.58	1,152,413.53	1,162,667.23	1,578,104
10.	Retirements	6,075.51*	2,793.26	11,271.94	21,478.07	16,221.47	29,402
11.	Total Other Charges	$5,097,283.53	$5,177,992.44	$5,127,291.03	$ 4,983,748.94	$ 4,724,460.08	$ 4,961,901
12.	Net Profit	$1,441,244.98*	$1,100,751.91*	$ 16,648.22	$ 1,982,014.97	$ 3,338,668.93	$ 4,121,383

* Red

Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
$5,997,564.05	$9,133,135.13	$11,452,371.93	$13,753,485.00	$14,583,716.11	$13,755,850.88	$74,342,452.68
3,454,014.32	5,557,332,72	6,017,222.61	7,152,505.70	6,863,912.86	7,156,568.82	39,716,852.27
$2,543,549.73	$3,575,802.41	$ 5,435,149.32	$ 6,600,979.30	$ 7,719,803.25	$ 6,599,282.06	$34,625,600.41
1,533,690.80	1,568,136.84	1,530,614.59	1,462,149.71	1,363,481.84	1,274,391.43	10,237,469.42
$4,077,240.53	$5,143,939.25	$ 6,965,763.91	$ 8,063,129.01	$ 9,083,285.09	$7,873,673.49	$44,863,069.83
$3,780,632.77	$3,717,869.32	$ 3,552,980.49	$ 3,288,694.53	$ 3,099,518.66	$ 2,923,446.94	$24,075,930.95
256,972.68	256,685.19	256,876.85	256,876.85	254,876.76	254,876.76	1,795,575.27
1,137,593.73	1,141,474.58	1,152,413.53	1,162,667.23	1,578,104.41	1,512,424.97	8,816,828.77
2,793.26	11,271.94	21,478.07	16,221.47	29,402.31	2,408.01	77,499.55
$5,177,992.44	$5,127,291.03	$ 4,983,748.94	$ 4,724,460.08	$ 4,961,901.84	$ 4,693,156.68	$34,765,834.54
$1,100,751.91*	$ 16,648.22	$ 1,982,014.97	$ 3,338,668.93	$ 4,121,383.25	$ 3,180,516.81	$10,097,235.29

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NATURAL GAS PIPELINE COMPANY OF AMERICA

GROSS OPERATING REVENUE - OPERATION & MAINTENANCE EXPENSE - GAS ACCOUNT

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
1.	Gross Operating Revenue.								
2.	Gas Sales								
3.	Chicago District Pipeline Company	$5,609,274.40	$5,736,842.95	$8,305,978.17	$10,485,556.53	$12,562,288.15	$13,215,053.13	$12,338,805.99	$68,853,799.3
4.	Other Distribution Centers	40,479.49	103,825.19	582,176.54	886,406.10	1,054,777.39	1,202,562.70	1,277,641.09	5,147,868.5
5.	Industrial Consumers & Pipelines	- -	143,559.08	227,890.14	61,096.09	115,451.47	159,201.59	152,987.33	860,185.7
6.	Total Sales	$5,649,753.89	$5,984,227.22	$9,116,044.85	$11,433,058.72	$13,732,517.01	$14,576,817.42	$13,769,434.41	$74,261,853.5
7.	Other Operating Income	16,575.69	13,336.83	17,090.28	19,313.21	20,967.99	6,898.69	13,583.53*	80,599.1
8.	Gross Operating Revenue	$5,666,329.58	$5,997,564.05	$9,133,135.13	$11,452,371.93	$13,753,485.00	$1[illegible],583,716.11	$13,755,850.88	$74,342,452.6
9.	Operation, Maintenance, & General Expenses								
10.	Purchased Gas	$2,392,730.72	$2,310,615.03	$3,637,646.01	$ 4,237,947.31	$ 5,119,964.02	$ 4,451,282.05	$ 4,785,474.10	$26,935,667.2
11.	Pipeline	316,752.61	179,012.02	150,011.05	189,797.81	319,016.16	244,045.79	311,312.12	1,709,947.5
12.	Compressor	133,465.84	131,379.10	415,390.89	573,609.47	773,059.23	902,449.53	740,484.32	3,669,838.3
13.	Telephone	55,200.15	53,763.84	57,195.54	55,664.78	55,092.86	59,286.38	61,180.35	397,383.9
14.	Taxes	225,649.43	273,625.99	218,300.01	532,128.58	796,658.50	1,130,600.94	955,138.22	4,132,101.6
15.	Regulatory	- -	- -	- -	- -	- -	41,467.63	190,788.47	232,256.1
16.	General	331,880.34	316,102.55	297,072.39	292,125.05	277,387.44	329,663.86	351,582.85	2,195,814.4
17.	New Business	86,104.76	219,149.32	889,060.43	308,006.18	81,422.91	16,115.48	17,788.18	1,617,647.2
18.	Total	$3,541,791.85	$3,483,647.85	$5,664,676.32	$ 6,189,279.18	$ 7,422,601.12	$ 7,174,911.66	$ 7,413,748.61	$40,890,656.5
19.	Less: Gas Used by Company	26,496.61	29,633.53	107,343.60	172,056.57	270,095.42	310,998.80	257,179.79	1,173,804.3
20.	Net Operation, Maintenance, & General Expenses	$3,515,295.24	$3,454,014.32	$5,557,332.72	$ 6,017,222.61	$ 7,152,505.70	$ 6,863,912.86	$ 7,156,568.82	$39,716,852.
21.	Gas Account - M.C.F.								
22.	Gas Purchased from Texoma Natural Gas Co. & Colorado Interstate Gas Co. - 16.4# Basis	25,474,804	23,296,984	42,843,927	52,946,053	65,753,706	70,696,911	64,921,831	345,936,2
23.	Total Gas to Account For - 14.65# Basis	28,517,770	26,079,807	47,963,874	59,270,459	73,607,988	79,141,933	72,676,997	387,258,8
24.	Gas Sales								
25.	Chicago District Pipeline Company	28,225,013	23,661,939	40,153,292	49,980,090	62,008,191	66,700,446	60,457,831	331,188,
26.	Other Distribution Centers	220,666	481,179	3,993,244	6,418,357	6,903,692	6,852,431	7,447,944	32,317,5
27.	Industrial Consumers & Pipelines	- -	1,405,642	2,270,455	527,922	703,454	924,016	853,264	6,684,7
28.	Total Gas Sales (Billed Volume)	28,445,679	25,548,760	46,416,991	56,926,369	69,615,337	74,476,893	68,759,039	370,189,0
29.	Less: B.T.U. Correction	273,178	257,669	540,183	659,335	376,660	435,500	281,659	2,824,1
30.	Total Gas Sales (Metered Volume)	28,172,501	25,291,091	45,876,808	56,267,034	69,238,677	74,041,393	68,477,380	367,364,8
31.	Gas Used by Company	378,523	422,910	1,533,480	2,457,951	3,858,506	4,442,840	3,673,997	16,768,2
32.	Change in Line Peck	40,665*	125,834	63,559	35,368	20,495*	12,918	21,670*	154,8
33.	Gas Lost and Unaccounted For	7,180	239,972	490,027	510,106	531,300	644,782	547,290	2,970,6
34.	Testing	231	- -	- -	- -	- -	- -	- -	2
35.	Total Gas Accounted For	28,517,770	26,079,807	47,963,874	59,270,459	73,607,988	79,141,933	72,676,997	387,258,8

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NATURAL GAS PIPELINE COMPANY OF AMERICA

GAS SALES IN M.C.F. AND REVENUE

	Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year (7
1. Sales in M.C.F. (Billed Volumes)							
2. Chicago District Pipeline Company							
3. Firm Sales	19,871,999	20,306,026	26,598,145	38,872,582	42,495,483	42,683,947	41,946
4. Interruptible Supply	8,353,014	2,936,571	10,072,358	7,556,968	8,412,989	7,154,746	6,339
5. Excess Gas Contract	--	286,001	1,011,146	--	25,593	--	
6. Glass Contract	--	32,815	1,339,092	1,471,410	1,700,504	2,595,370	2,124
7. Calcining Contract	--	--	--	--	236,371	400,229	249
8. Steel Mill Contracts	--	100,526	1,132,551	2,079,130	8,854,766	9,208,561	5,797
9. Tin Plate Contract	--	--	--	--	115,263	1,264,397	930
10. Industrial Processing Contract	--	--	--	--	167,222	3,036,259	2,571
11. Standard Oil Contract	--	--	--	--	--	356,937	497
12. Total Sales to Chicago Dist. Pipeline Co.	28,225,013	23,661,939	40,153,292	49,980,090	62,008,191	66,700,446	60,457
13. Total All Other Gas Sales	220,666	1,886,821	6,263,699	6,946,279	7,607,146	7,776,447	8,301
14. Total Gas Sales in M.C.F.	28,445,679	25,548,760	46,416,991	56,926,369	69,615,337	74,476,893	68,759
15. Revenue							
16. Chicago District Pipeline Company							
17. Commodity Charge							
18. Firm Sales	$1,192,319.94	$ 1,218,765.52	$1,595,888.70	$ 2,332,354.92	$ 2,549,728.98	$ 2,561,036.82	$ 2,516
19. Interruptible Supply	810,242.37	306,442.23	1,057,597.57	793,481.68	883,363.88	751,248.36	665
20. Excess Gas Contract	--	121,550.44	429,737.07	--	8,957.55	--	
21. Glass Contract	--	5,343.28	170,322.97	183,926.28	212,563.04	415,259.20	339
22. Calcining Contract	--	--	--	--	30,728.23	52,029.77	3
23. Steel Mill Contracts	--	13,088.64	136,652.58	243,226.40	1,283,941.10	1,335,241.39	845
24. Tin Plate Contract	--	--	--	--	12,102.62	132,761.72	9
25. Industrial Processing Contract	--	--	--	--	20,902.75	379,532.41	321
26. Standard Oil Contract	--	--	--	--	--	27,943.46	3
27. Total Commodity Charge	$2,002,562.31	$ 1,665,190.11	$3,390,198.89	$ 3,552,989.28	$ 5,002,288.15	$ 5,655,053.13	$ 4,86
28. Total Demand Charge	3,606,712.09	4,071,652.84	4,915,779.28	6,932,567.25	7,560,000.00	7,560,000.00	7,48
29. Total Revenue from Chicago Dist. Pipeline	$5,609,274.40	$ 5,736,842.95	$8,305,978.17	$10,485,556.53	$12,562,288.15	$13,215,053.13	$12,33
30. Other Gas Customers							
31. Commodity Charge	$ 23,404.43	$ 185,338.22	$ 635,325.90	$ 711,007.92	$ 826,489.80	$ 910,887.51	$ 92
32. Demand Charge	17,075.06	62,046.05	174,740.78	236,494.27	343,739.06	450,876.78	50
33. Total Revenue from Other Gas Customers	$ 40,479.49	$ 247,384.27	$ 810,066.68	$ 947,502.19	$ 1,170,228.86	$ 1,361,764.29	$ 1,43
34. Total Gas Revenues	$5,649,753.89	$5,984,227.22	$9,116,044.85	$11,433,058.72	$13,732,517.01	$14,576,817.42	$13,76

	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
	20,306,026	26,598,145	38,872,582	42,495,483	42,683,947	41,946,982	232,775,164
	2,936,571	10,072,358	7,556,968	8,412,989	7,154,746	6,339,368	50,826,014
	286,001	1,011,146	--	25,593	--	--	1,322,740
	32,815	1,339,092	1,471,410	1,700,504	2,595,370	2,124,288	9,263,479
	--	--	--	236,371	400,229	249,540	886,140
	100,526	1,132,551	2,079,130	8,854,766	9,208,561	5,797,462	27,172,996
	--	--	--	115,263	1,264,397	930,960	2,310,620
	--	--	--	167,222	3,036,259	2,571,251	5,774,732
	--	--	--	--	356,937	497,980	854,917
	23,661,939	40,153,292	49,980,090	62,008,191	66,700,446	60,457,831	331,186,802
	1,886,821	6,263,699	6,946,279	7,607,146	7,776,447	8,301,208	39,002,266
	25,548,760	46,416,991	56,926,369	69,615,337	74,476,893	68,759,039	370,189,068
.94	$ 1,218,765.52	$1,595,888.70	$ 2,332,354.92	$ 2,549,728.98	$ 2,561,036.82	$ 2,516,818.92	$13,966,913.80
.37	306,442.23	1,057,597.57	793,481.68	883,363.88	751,248.36	665,633.67	5,268,009.76
	121,550.44	429,737.07	--	8,957.55	--	--	560,245.06
	5,343.28	170,322.97	183,926.28	212,563.04	415,259.20	339,886.08	1,327,300.85
	--	--	--	30,728.23	52,029.77	32,440.20	115,198.20
	13,088.64	136,652.58	243,226.40	1,283,941.10	1,335,241.39	845,624.54	3,857,774.65
	--	--	--	12,102.62	132,761.72	97,750.83	242,615.17
	--	--	--	20,902.75	379,532.41	321,406.40	721,841.56
	--	--	--	--	27,943.46	37,386.35	65,329.81
.31	$ 1,665,190.11	$3,390,198.89	$ 3,552,989.28	$ 5,002,288.15	$ 5,655,053.13	$ 4,856,946.99	$26,125,228.86
.09	4,071,652.84	4,915,779.28	6,932,567.25	7,560,000.00	7,560,000.00	7,481,859.00	42,128,570.46
.40	$ 5,736,842.95	$8,305,978.17	$10,485,556.53	$12,562,288.15	$13,215,053.13	$12,338,805.99	$68,253,799.32
.43	$ 185,338.22	$ 635,325.90	$ 711,007.92	$ 826,489.80	$ 910,887.51	$ 927,688.92	$ 4,220,142.70
.06	62,046.05	174,740.78	236,494.27	343,739.06	450,876.78	502,939.50	1,787,911.50
.49	$ 247,384.27	$ 810,066.68	$ 947,502.19	$ 1,170,228.86	$ 1,361,764.29	$ 1,430,628.42	$ 6,008,054.20
.89	$5,984,227.22	$9,116,044.85	$11,433,058.72	$13,732,517.01	$14,576,817.42	$13,769,434.41	$74,261,853.52

NATURAL GAS PIPELINE COMPANY OF AMERICA

DETAILS OF OTHER OPERATING INCOME & NON-OPERATING INCOME

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)
1.	Other Operating Income					
2.	Leased Facilities	$ 34.00	$ 41.80	$ 55.38	$ 116.70	$ 118.50
3.	Sale of Stock Material	- -	- -	- -	- -	- -
4.	Miscellaneous	- -	- -	- -	- -	2,000.00
5.	House Rents	16,541.69	13,295.03	17,034.90	19,196.51	18,849.49
6.	Total Other Operating Income	$ 16,575.69	$ 13,336.83	$ 17,090.28	$ 19,313.21	$ 20,967.99
7.	Non-Operating Income					
8.	Interest Earned	$1,503,554.88	$1,532,137.93	$1,566,281.88	$1,528,908.32	$1,459,623.19
9.	Miscellaneous	207.82	738.15	402.36	344.18	2,526.52
10.	Purchase Discount	1,241.51	814.72	1,452.60	1,362.09	- -
11.	Total Non-Operating Income	$1,505,004.21	$1,533,690.80	$1,568,136.84	$1,530,614.59	$1,462,149.71

* Red

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Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
$ 34.00	$ 41.80	$ 55.38	$ 116.70	$ 118.50	$ 118.50	$ - -	$ 484.88
- -	- -	- -	- -	- -	33.75	2,243.71*	2,209.96*
- -	- -	- -	- -	2,000.00	- -	- -	2,000.00
16,541.69	13,295.03	17,034.90	19,196.51	18,849.49	6,746.44	11,339.82*	80,324.24
$ 16,575.69	$ 13,336.83	$ 17,090.28	$ 19,313.21	$ 20,967.99	$ 6,898.69	$ 13,583.53*	$ 80,599.16
$1,503,554.88	$1,532,137.93	$1,566,281.88	$1,528,908.32	$1,459,623.19	$1,363,232.92	$1,274,347.59	$10,228,086.71
207.82	738.15	402.36	344.18	2,526.52	248.92	43.84	4,511.79
1,241.51	814.72	1,452.60	1,362.09	- -	- -	- -	4,870.92
$1,505,004.21	$1,533,690.80	$1,568,136.84	$1,530,614.59	$1,462,149.71	$1,363,481.84	$1,274,391.43	$10,237,469.42

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NATURAL GAS PIPELINE COMPANY OF AMERICA

DETAILS OF GAS PURCHASED & GAS USED BY COMPANY

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		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Ye
1.	**GAS PURCHASED**							
2.	M.C.F. - 16.4# Basis							
3.	Texoma Natural Gas Company	19,328,268	17,360,388	31,865,440	39,360,284	48,795,294	52,742,027	
4.	Colorado Interstate Gas Company							
5.	Gross Delivery	6,271,977	6,057,750	11,204,579	13,862,916	17,304,503	18,321,309	
6.	Less: Gasoline Extraction	125,441	121,154	224,092	277,147	346,091	366,425	
7.	Net Delivery	6,146,536	5,936,596	10,980,487	13,585,769	16,958,412	17,954,884	
8.	Interruptible Supply Gas	1,765,637	1,036,337	3,989,571	3,764,984	5,580,160	6,328,203	
9.	Firm Gas	4,380,899	4,900,259	6,990,916	9,820,785	11,378,252	11,626,681	
10.	Total Colorado Interstate Gas Company	6,146,536	5,936,596	10,980,487	13,585,769	16,958,412	17,954,884	
11.	Total Gas Purchased in M. C. F.	25,474,804	23,296,984	42,845,927	52,946,053	65,753,706	70,696,911	
12.	Amount							
13.	Texoma Natural Gas Company	$1,924,610.23	$1,845,215.28	$2,855,269.86	$3,221,187.89	$3,812,718.15	$3,103,981.72	$3,5
14.	Colorado Interstate Gas Company							
15.	Interruptible Supply Gas	$ 307,740.36	$ 343,562.39	$ 489,364.13	$ 687,454.95	$ 796,477.64	$ 813,867.67	$ 7
16.	Firm Gas	70,625.48	40,476.93	154,609.71	151,664.06	279,008.00	316,410.15	2
17.	Transportation Charge	89,762.65	81,360.43	138,402.31	177,640.41	231,760.23	217,022.51	2
18.	Total Colorado Interstate Gas Company	$ 468,128.49	$ 465,399.75	$ 782,376.15	$1,016,759.42	$1,307,245.87	$1,347,300.33	$1,2
19.	Total Gas Purchased	$2,392,738.72	$2,310,615.03	$3,637,646.01	$4,237,947.31	$5,119,964.02	$4,451,282.05	$4,7
20.	**GAS USED BY COMPANY**							
21.	M.C.F. - 14.65# Basis	378,523	422,910	1,533,400	2,457,951	3,858,506	4,442,840	
22.	Amount	$ 26,496.61	$ 29,633.53	$ 107,343.60	$ 172,056.57	$ 270,095.48	$ 310,993.80	$ 25

Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
19,328,268	17,360,388	31,865,440	39,360,284	48,795,294	52,742,027	48,263,244	257,714,945
6,271,977	6,057,750	11,204,579	13,862,916	17,304,503	18,321,309	16,998,560	90,021,594
125,441	121,154	224,092	277,147	346,091	366,425	339,973	1,800,323
6,146,536	5,936,596	10,980,487	13,585,769	16,958,412	17,954,884	16,658,587	88,221,271
1,765,637	1,036,337	3,989,571	3,764,984	5,580,160	6,328,203	5,237,098	27,701,990
4,380,899	4,900,259	6,990,916	9,820,785	11,378,252	11,626,681	11,421,489	60,519,281
6,146,536	5,936,596	10,980,487	13,585,769	16,958,412	17,954,884	16,658,587	88,221,271
25,474,804	23,296,984	42,845,927	52,946,053	65,753,706	70,696,911	64,921,831	345,936,216
$1,924,610.23	$1,845,215.28	$2,855,269.86	$3,221,187.89	$3,812,718.15	$3,103,981.72	$3,510,632.99	$20,273,616.12
$ 307,740.36	$ 343,562.39	$ 489,364.13	$ 687,454.95	$ 796,477.64	$ 813,867.67	$ 799,504.23	$4,237,971.37
70,625.48	40,476.93	154,609.71	151,664.06	279,008.00	316,410.15	261,854.90	1,274,649.23
89,762.65	81,360.43	138,402.31	177,640.41	231,760.23	217,022.51	213,481.98	1,149,430.52
$ 468,128.49	$ 465,399.75	$ 782,376.15	$1,016,759.42	$1,307,245.87	$1,347,300.33	$1,274,841.11	$6,662,051.12
$2,392,738.72	$2,310,615.03	$3,637,646.01	$4,237,947.31	$5,119,964.02	$4,451,282.05	$4,785,474.10	$26,935,667.24
378,523	422,910	1,533,400	2,457,951	3,858,506	4,442,840	3,673,997	16,768,207
$ 26,496.61	$ 29,633.53	$ 107,343.60	$ 172,056.57	$ 270,095.42	$ 310,998.80	$ 257,179.79	$1,173,804.32

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NATURAL GAS PIPELINE COMPANY OF AMERICA

SURPLUS ACCOUNT

	Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year
1. Profit and Loss	$1,441,244.90*	$1,100,751.91*	$ 16,648.22	$1,982,014.97	$3,338,668.93	$4,121,383.25	$3,10
2. Less Dividends	-	-	-	-	2,775,000.00	4,125,000.00	2,25
3. Net Balance	$1,441,244.90*	$1,100,751.91*	$ 16,648.22	$1,982,014.97	$ 563,668.93	$ 3,616.75*	$ 93
4. Other Charges to Surplus							
5. Corporate Expense				$ 5,979.02			
6. Gas Purchased and Bond Expenses							
7. applicable to 1931						28,210.35	
8. Total Other Charges to Surplus	-	-	-	$ 5,979.02	-	$ 28,210.35	
9. Balance from First of Year	-	1,441,244.90*	2,541,996.09*	2,525,348.67*	549,312.72*	14,356.21	17,
10. Surplus (Deficit*) at End of Year	$1,441,244.90*	$2,541,996.09*	$2,525,348.67*	$ 549,312.72*	$ 14,356.21	$ 17,470.89*	$ 913

* Red

Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
$1,441,244.98*	$1,100,751.91*	$ 16,648.22	$1,982,014.97	$3,338,668.93	$4,121,383.25	$3,180,516.81	$10,097,235.29
	-	-	-	2,775,000.00	4,125,000.00	2,250,000.00	9,150,000.00
$1,441,244.98*	$1,100,751.91*	$ 16,648.22	$1,982,014.97	$ 563,668.93	$ 3,616.75*	$ 930,516.81	$ 947,235.29
			$ 5,979.02				$ 5,979.02
					28,210.35		28,210.35
-	-	-	$ 5,979.02	-	$ 28,210.35	-	$ 34,189.37
-	1,441,244.98*	2,541,996.89*	2,525,348.67*	549,312.72*	14,356.21	17,470.89*	-
$1,441,244.98*	$2,541,996.89*	$2,525,348.67*	$ 549,312.72*	$ 14,356.21	$ 17,470.89*	$ 913,045.92	$ 913,045.92

TEXOMA NATURAL GAS COMPANY

CONDENSED STATEMENT OF PROFIT AND LOSS

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)
1	Gross Operating Revenue	$2,227,907.19	$2,203,683.27	$3,367,947.62	$4,009,255.09	$4,857,836.14	$4,289,895.62
2	Operation, Maintenance, & Gen. Expense	713,346.84	640,688.89	750,680.36	959,394.11	1,151,754.59	1,246,631.57
3	Net Earnings from Operations	$1,514,560.35	$1,562,994.38	$2,617,267.26	$3,049,860.98	$3,706,081.55	$3,043,264.05
4.	Non-Operating Income	54,018.96	10,250.12	10,383.39	16,610.47	32,283.67	39,688.76
5	Net Earnings Before Other Charges	$1,568,579.31	$1,573,244.50	$2,627,650.65	$3,066,471.45	$ 3,738,365.22	$3,082,952.81
6	**Other Charges**						
7	Interest	$1,566,409.73	$1,548,103.06	$1,533,236.30	$1,483,496.95	$1,427,760.35	$1,331,641.64
8	Bond Expense	1,241.41	1,241.41	1,206.00	1,202.04	1,202.04	374.20
9	Depreciation	341,416.44	346,129.61	360,922.58	398,154.79	437,125.06	456,649.67
10.	Depletion	109,916.86	98,807.67	178,722.07	239,199.45	267,676.71	320,526.96
11	Retirements	928.17	2,375,240.77	386,080.06	760,415.42	1,323,602.74	547,426.44
12	Total Other Charges	$2,019,912.61	$4,369,222.52	$2,460,207.01	$2,882,468.65	$3,457,366.90	$2,656,618.91
13	Net Profit	$ 451,330.30*	$2,795,978.02*	$ 167,443.64	$ 184,002.80	$ 280,998.32	$ 426,333.90

* Red

Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
$4,857,836.14	$4,289,695.62	$4,409,613.85	$25,366,138.78
1,151,754.59	1,246,431.57	1,124,150.63	6,586,646.99
$3,706,081.55	$3,043,264.05	$3,285,463.22	$18,779,491.79
32,283.67	39,688.76	16,029.09	179,264.46
$ 3,738,365.22	$3,082,952.81	$3,301,492.31	$18,958,756.25
$1,427,760.35	$1,331,641.64	$1,249,584.30	$10,140,232.33
1,202.04	374.20	374.20	6,841.30
437,125.06	456,649.67	465,983.34	2,803,381.49
267,676.71	320,526.96	261,658.04	1,457,277.76
1,323,602.74	547,426.44	990,159.27	6,403,822.87
$3,457,366.90	$2,656,618.91	$2,967,759.15	$20,811,555.75
$ 280,998.32	$ 426,333.90	$ 333,733.16	$ 1,852,799.50*

TEXOMA NATURAL GAS COMPANY

GROSS OPERATING REVENUE—OPERATION, MAINTENANCE, & GENERAL EXPENSE

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)
1	**Gross Operating Revenue**						
2	Gas Sales	$1,933,748.29	$ 1,854,909.34	$2,862,674.97	$3,228,622.40	$3,826,169.39	$3,179,808.20
3	Gasoline Sales	195,675.01	260,256.08	361,915.86	596,042.00	792,017.15	893,807.30
4	Other Operating Income	98,483.89	88,517.85	143,356.79	184,590.69	239,649.60	216,280.12
5	Gross Operating Revenue	$2,227,907.19	$2,203,683.27	$3,367,947.62	$4,009,255.09	$4,857,836.14	$4,289,895.62
6	**Operation, Maintenance, & General Expenses**						
7	Production	$ 268,753.35	$ 233,083.50	$ 272,191.92	$ 328,573.54	$ 381,992.98	$ 374,873.35
8	Pipeline	76,917.03	55,060.36	49,144.06	77,497.13	89,342.62	81,012.94
9	Compressor	49,797.78	44,403.88	91,181.31	171,613.65	264,027.84	317,401.44
10	Gasoline and Refrigerating	84,380.97	119,149.91	147,774.18	215,261.69	282,524.52	308,614.77
11	(Including Payments to Canadian River Gas Company)						
12	Telephone	5,017.77	4,446.69	4,424.82	4,906.94	4,630.36	4,703.86
13	Taxes	93,260.67	92,766.26	117,279.00	136,700.26	150,592.08	176,080.53
14	General	157,391.20	111,740.39	110,927.53	122,570.13	106,651.25	108,564.35
15	Total	$ 735,518.77	$ 660,650.99	$ 792,922.82	$1,057,123.34	$1,279,761.65	$1,371,251.24
16	Less: Gas Used by Company	22,171.93	19,970.10	42,242.46	97,729.23	128,007.06	124,619.67
17	Net Operation, Maintenance, & Gen. Exp.	$ 713,346.84	$ 640,680.89	$ 750,680.36	$ 959,394.11	$1,151,754.59	$1,246,631.57

Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
$3,826,169.39	$3,179,808.20	$3,533,042.06	$20,418,974.65
792,017.15	893,807.30	665,055.95	3,764,769.35
239,649.60	216,280.12	211,515.84	1,182,394.78
$4,857,836.14	$4,289,895.62	$4,409,613.85	$25,366,138.78
$ 381,992.98	$ 374,873.35	$ 369,049.68	$ 2,228,513.32
89,342.62	81,012.94	83,233.16	512,215.30
264,027.84	317,401.44	258,432.25	1,196,858.15
282,524.52	308,614.77	244,125.15	1,401,831.19
4,630.36	4,703.86	4,704.45	32,834.09
150,592.08	176,080.53	168,031.97	934,710.77
106,651.25	108,564.35	118,192.86	836,037.71
$1,279,761.65	$1,371,251.24	$1,245,769.52	$7,143,006.33
128,007.06	124,619.67	121,618.89	556,359.34
$1,151,754.59	$1,246,631.57	$1,124,150.63	$ 6,586,645.99

TEXOMA NATURAL GAS COMPANY

GAS SALES IN M.C.F. AND REVENUE

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)
1	**Sales in M.C.F.**						
2	**Pipeline Sales**						
3	Natural Gas Pipeline Co. of America	19,328,268	17,360,388	31,865,440	39,360,284	48,795,294	52,742,027
4	**Field Sales**						
5	Lone Star Gas Company	394,038	433,979	324,772	293,145	303,302	365,966
6	Texas Pipeline Company	35,881	21,441	11,046	5,996	-	-
7	Coltexo Corporation	-	-	-	-	-	7,581,137
8	Miscellaneous	-	1,680	14,944	33,525	47,592	19,620
9	Total Field Sales	429,919	457,100	350,762	332,666	350,894	7,966,723
10	Total Gas Sales in M.C.F.	19,758,187	17,817,488	32,216,202	39,692,950	49,146,188	60,708,750
11	**Revenue**						
12	**Pipeline Sales**						
13	Natural Gas Pipeline Company of America	$1,924,610.23	$1,845,215.28	$2,855,269.86	$3,221,187.89	$3,812,718.15	$3,103,981.72
14	**Field Sales**						
15	Lone Star Gas Company	$ 7,880.76	$ 8,640.48	$ 6,495.44	$ 5,862.90	$ 10,456.88	$ 14,638.64
16	Texas Pipeline Company	1,233.30	780.58	386.64	239.84	-	-
17	Coltexo Corporation	-	-	-	-	-	60,403.04
18	Miscellaneous	24.00	273.00	523.03	1,331.77	2,994.36	784.80
19	Total Field Sales	$ 9,138.06	$ 9,694.06	$ 7,405.11	$ 7,434.51	$ 13,451.24	$ 75,826.48
20	Total Revenue from Gas Sales	$1,933,748.29	$1,854,909.34	$2,862,674.97	$3,228,622.40	$3,826,169.39	$3,179,808.20

Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
48,795,294	52,742,027	48,263,244	257,714,945
303,302	365,966	401,798	2,517,000
-	-	-	74,364
-	7,581,137	370,693	7,951,830
47,592	19,620	26,573	143,934
350,894	7,966,723	799,064	10,687,128
49,146,188	60,708,750	49,062,308	268,402,073
$3,812,718.15	$3,103,981.72	$3,510,632.99	$20,273,616.12
$ 10,456.88	$ 14,638.64	$ 16,071.92	$ 70,047.02
-	-	-	2,640.36
-	60,403.04	5,274.23	65,677.27
2,994.36	784.80	1,062.92	6,993.88
$ 13,451.24	$ 75,826.48	$ 22,409.07	$ 145,358.53
$3,826,169.39	$3,179,808.20	$3,533,042.06	$20,418,974.65

TEXOMA NATURAL GAS COMPANY

GAS ACCOUNTS AND GASOLINE ACCOUNT

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)
1	Gas Account - MCF - 16.4# Pressure Base						
2	Gas Produced	20,122,564	18,139,156	33,119,200	40,915,860	51,017,401	62,252,650
3	Correction for Deviation	572,769	437,218	830,031	983,178	1,258,002	1,376,666
4	Gas Purchased from Canadian River Gas Company	6,271,977	6,057,750	11,206,998	13,862,916	17,304,503	18,321,309
5	Gas Received for Exchange	607,889	745,888	1,316,304	965,375	672,867	589,055
6	Total	27,575,199	25,380,012	46,472,533	56,727,329	70,252,773	82,539,680
7	Pipeline Sales	19,328,268	17,360,388	31,865,440	39,360,284	48,795,294	52,742,027
8	Field Sales	429,919	457,100	350,762	332,666	350,894	7,966,723
9	Gas Transported for Canadian River Gas Company	6,146,536	5,936,596	10,980,487	13,585,769	16,958,412	17,954,884
10	Gas Delivered for Exchange	452,989	757,745	1,318,401	962,600	673,533	584,809
11	Free Gas	29,470	30,640	25,217	22,400	5,714	12,359
12	Gas Used by Company	613,621	540,258	1,032,740	1,443,807	1,880,511	1,825,470
13	Gas Lost in Process	308,461	243,410	632,061	1,075,100	1,309,503	1,444,121
14	Change in Line Pack	8,214*	1,288*	3,296*	24,026	466	5,324
15	Gas Lost and Unaccounted For	274,149	55,163	244,254	79,323*	278,446	3,963
16	Repressuring Tests	-	-	26,467	-	-	-
17	Total	27,575,199	25,380,012	46,472,533	56,727,329	70,252,773	82,539,680
18	Gasoline Accounts - Gallons						
19	Storage First of Period	67,095	137,340	573,317	265,547	217,241	255,939
20	Net Production	10,335,153	8,075,386	14,420,109	17,889,037	22,216,896	25,495,306
21	Purchased (Naptha)	13,635	-	-	-	-	-
22	Blended	25,009	-	-	-	-	-
23	Total	10,440,892	8,212,726	14,993,426	18,154,584	22,434,137	25,751,245
24	Sales	9,629,783	7,381,065	14,370,142	17,577,163	21,472,941	24,864,500
25	Losses	648,760	258,344	357,737	360,180	705,257	505,258
26	Transfers to Blend	25,009	-	-	-	-	-
27	Storage at End of Period	137,340	573,317	265,547	217,241	255,939	381,487
	Total	10,440,892	8,212,726	14,993,426	18,154,584	22,434,137	25,751,245

* Red

Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
40,915,860	51,017,401	62,252,650	51,383,791	276,950,622
983,178	1,258,002	1,376,666	1,279,722	6,737,586
13,862,916	17,304,503	18,321,309	16,998,560	90,024,013
965,375	672,867	589,055	3,460,823	8,358,201
56,727,329	70,252,773	82,539,680	73,122,896	382,070,422
39,360,284	48,795,294	52,742,027	48,263,244	257,714,945
332,666	350,894	7,966,723	799,064	10,687,128
13,585,769	16,958,412	17,954,884	16,658,587	88,221,271
962,600	673,533	584,809	3,443,368	8,193,445
22,400	5,714	12,359	266	126,066
1,443,807	1,880,511	1,825,470	1,792,506	9,128,913
1,075,100	1,309,503	1,444,121	1,489,012	6,501,668
24,026	466	5,324	3,222*	13,796
79,323*	278,446	3,963	680,071	1,456,723
-	-	-		26,467
56,727,329	70,252,773	82,539,680	73,122,896	382,070,422
265,547	217,241	255,939	381,487	67,095
17,889,037	22,216,895	25,495,306	27,624,855	126,056,742
-	-	-	-	13,635
-	-	-	-	25,009
18,154,584	22,434,137	25,751,245	28,006,342	126,162,481
17,577,163	21,472,941	24,864,500	27,474,240	122,769,834
360,180	705,257	505,258	427,450	3,262,986
-	-	-	-	25,009
217,241	255,939	381,487	104,652	104,652
18,154,584	22,434,137	25,751,245	28,006,342	126,162,481

TEXOMA NATURAL GAS COMPANY

STATEMENT OF OTHER OPERATING INCOME & NON-OPERATING INCOME

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)
1	**Other Operating Income**						
2	Transportation of Gas for Canadian River						
3	Gas Company	$ 89,762.65	$ 81,360.43	$ 138,402.31	$ 177,640.41	$ 231,760.23	$ 217,022.
4	Sales of Materials	689.71*	419.62	1,773.24*	281.58*	608.79	639.
5	Miscellaneous	280.58	96.00	294.42	48.80	253.35	-
6	House Rents	9,130.37	6,641.80	6,433.30	7,183.06	7,027.23	1,382.
7	Total Other Operating Income	$ 98,483.89	$ 88,517.85	$ 143,356.79	$ 184,590.69	$ 239,649.60	$ 216,280.
8	**Non-Operating Income**						
9	Interest	$ 52,087.16	$ 9,188.91	$ 10,314.39	$ 16,461.29	$ 31,993.81	$ 39,431.
10	Miscellaneous	39.55	311.58	69.00	149.18	289.86	257.
11	Purchase Discounts	1,892.25	749.63	-	-	-	-
12	Total Non-Operating Income	$ 54,018.96	$ 10,250.12	$ 10,383.39	$ 16,610.47	$ 32,283.67	$ 39,688.

*Red

2

INCOME

Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
$ 81,360.43	$ 138,402.31	$ 177,640.41	$ 231,760.23	$ 217,022.51	$ 213,481.98	$ 1,149,430.52
419.62	1,773.24*	281.58*	608.79	639.82	85.53*	1,161.83*
96.00	294.42	48.80	253.35	-	210.00	1,183.15
6,641.80	6,433.30	7,183.06	7,027.23	1,382.21*	2,090.61*	32,942.94
$ 88,517.85	$ 143,356.79	$ 184,590.69	$ 239,649.60	$ 216,280.12	$ 211,515.84	$ 1,182,394.78
$ 9,188.91	$ 10,314.39	$ 16,461.29	$ 31,993.81	$ 39,431.49	$ 16,029.09	$ 175,506.14
311.58	69.00	149.18	289.86	257.27	-	1,116.44
749.63	-	-	-	-	-	2,641.88
$ 10,250.12	$ 10,383.39	$ 16,610.47	$ 32,283.67	$ 39,688.76	$ 16,029.09	$ 179,264.46

TEXOMA NATURAL GAS COMPANY

SURPLUS ACCOUNT

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)
1	Profit and Loss	$451,333.30*	$2,795,978.02*	$ 167,443.64	$ 186,002.80	$ 280,998.32	$ 426,333.90	$ 333,733.16
2	Less Dividends	--	--	--	--	--	--	--
3	Net Balance	$451,333.30*	$2,795,978.02*	$ 167,443.64	$ 186,002.80	$ 280,998.32	$ 426,333.90	$ 333,733.16
4	Balance from First of Year	--	451,333.30*	3,247,311.32*	3,079,867.68*	2,893,864.88*	2,612,866.56*	2,186,532.6
5	Surplus (Deficit) at End of Year	$451,333.30*	$3,247,311.32*	$3,079,867.68*	$2,893,864.88*	$2,612,866.56*	$2,186,532.68*	$1,852,799.50

*Red

Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
$ 167,443.64	$ 186,002.80	$ 280,998.32	$ 426,333.90	$ 333,733.16	$1,852,799.50*
--	--	--	--	--	--
$ 167,443.64	$ 186,002.80	$ 280,998.32	$ 426,333.90	$ 333,733.16	$1,852,799.50*
3,247,311.32*	3,079,867.68*	2,893,864.88*	2,612,866.56*	2,186,532.66*	--
$3,079,867.68*	$2,893,864.88*	$2,612,866.56*	$2,186,532.66*	$1,852,799.50*	$ --

EXHIBIT 137.

Natural Gas Pipeline Company of America and Texoma Natural Gas Company

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Combined Statements

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Natural Gas Pipeline Company of America

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Texoma Natural Gas Company

Balance Sheets 5
Statements of Plant and Equipment 6

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY

COMBINED BALANCE SHEETS

		Dec. 31, 1931 (1)	Dec. 31, 1932 (2)	Dec. 31, 1933 (3)	Dec. 31, 1934 (4)	Dec. 31, 1935 (5)	Dec. 31, 1936 (6)	Dec. 31, 1937 (7)	Dec. 31, 1938 (8)
1	ASSETS								
2	Capital Assets								
3	Plant and Equipment	$61,113,958.22	$61,565,622.17	$59,615,636.74	$59,412,092.06	$59,796,268.14	$59,017,763.62	$59,409,650.89	$59,180,148.74
4	Construction Work in Progress	--	239,107.75	16,536.51	121,462.59	232,799.11	511,985.14	27,172.42	17,693.95
5	Total Capital Assets	$61,113,958.22	$61,804,729.92	$59,632,173.25	$59,533,554.65	$60,029,067.25	$59,529,748.76	$59,436,823.31	$59,197,842.69
6	Current Assets								
7	Cash	$ 224,717.43	$ 793,231.06	$ 467,321.18	$ 107,779.71	$ 212,241.20	$ 122,708.90	$ 144,327.35	$ 163,961.78
8	Gas Accounts Receivable	476,207.90	506,425.91	803,480.25	1,006,246.98	1,615,241.22	1,225,264.69	1,232,848.76	1,242,877.57
9	Gasoline Accounts Receivable	5,495.00	6,267.48	31,517.91	28,045.70	36,752.84	45,445.04	30,339.31	51,567.37
10	Miscellaneous Accounts Receivable	15,827.90	20,775.81	52,056.08	7,612.68	10,636.67	8,412.00	4,254.42	5,581.87
11	Notes Receivable	--	--	--	--	--	28,000.00	26,470.65	25,697.11
12	Material and Supplies	333,325.19	413,641.44	407,225.46	392,554.07	219,037.72	241,930.26	329,159.45	390,748.60
13	Gas in Lines	27,905.70	27,905.70	27,905.70	27,905.70	27,905.70	27,905.70	27,905.70	27,905.70
14	Interest Receivable	1,465.49	589.53	--	24,377.34	25,762.95	28,176.77	777.81	108.50
15	Prepaid Expenses	39,100.50	87,968.42	75,893.93	112,187.15	78,005.45	68,233.69	75,568.74	75,767.10
16	Lateral Line Advances	--	38,407.10	346,834.38	493,349.79	509,560.81	516,695.30	509,236.83	--
17	Total Current Assets	$ 1,124,045.11	$ 1,895,212.45	$ 2,212,234.89	$ 2,200,059.12	$ 2,735,145.56	$ 2,310,772.35	$ 2,380,889.02	$ 1,984,215.60
18	Bond Discount and Expense	$ 3,810,005.08	$ 3,608,323.50	$ 3,344,053.43	$ 3,086,239.20	$ 2,828,160.31	$ 2,570,081.42	$ 2,286,620.11	$ 2,031,369.15
19	Total Assets	$66,048,008.41	$67,308,265.87	$65,188,461.57	$64,819,852.97	$65,592,374.12	$64,410,602.53	$64,104,332.44	$63,213,427.44
20	LIABILITIES AND CAPITAL								
21	Capital Stock	$ 3,500,000.00	$ 3,500,000.00	$ 3,500,000.00	$ 3,500,000.00	$ 3,500,000.00	$ 3,500,000.00	$ 3,500,000.00	$ 3,500,000.00
22	Bonds Outstanding	$59,999,000.00	$59,999,000.00	$60,999,000.00	$58,999,000.00	$56,499,000.00	$52,599,000.00	$50,300,000.00	$46,500,000.00
23	Current Liabilities								
24	Wages and Salaries Payable	$ 24,268.31	$ 15,331.20	$ 16,942.35	$ 23,118.75	$ 26,718.84	$ 32,773.77	$ 31,248.06	$ 32,645.61
25	Gas Accounts Payable	--	35,380.33	54,735.11	72,202.69	99,727.97	103,330.38	97,070.98	95,996.20
26	Royalties Payable	4,874.29	6,987.02	12,227.44	16,983.55	22,060.54	25,430.47	27,180.98	27,662.92
27	Accounts Payable	228,809.19	41,499.79	236,479.43	219,599.33	249,748.54	308,662.77	123,421.57	96,032.85
28	Notes Payable	2,000,000.00	3,599,940.00	2,599,940.00	2,355,769.17	1,414,970.00	1,200,000.00	525,000.00	300,000.00
29	Taxes Accrued	99,389.95	187,418.91	206,418.40	206,796.34	526,948.49	822,206.82	1,120,408.25	926,701.61
30	Interest Payable	191,666.67	232,298.95	212,098.96	207,481.17	145,396.60	131,500.00	125,750.00	116,250.00
31	Coltexo Agreement	--	--	--	23,709.98	43,915.78	53,160.86	--	--
32	Total Current Liabilities	$ 2,549,008.41	$ 4,118,856.20	$ 3,339,741.69	$ 3,125,660.98	$ 2,529,486.16	$ 2,677,065.13	$ 2,050,079.84	$ 1,595,289.19
33	Reserves								
34	Reserve for Depreciation	$ --	$ 1,473,071.09	$ 2,951,588.88	$ 4,440,199.36	$ 5,956,403.67	$ 7,510,007.94	$ 9,476,968.19	$11,405,037.74
35	Reserve for Depletion	--	109,916.86	187,439.21	360,208.98	550,661.89	723,039.81	981,287.96	1,152,854.09
36	Total Reserves	$ --	$ 1,582,987.95	$ 3,139,028.09	$ 4,800,408.34	$ 6,507,065.56	$ 8,233,047.75	$10,458,256.15	$12,557,891.83
37	Surplus (Deficit)	$ --	$ 1,892,578.28*	$ 5,789,308.21*	$ 5,605,216.35*	$ 3,443,177.60*	$ 2,598,510.35*	$ 2,204,003.55*	$ 939,753.58*
38	Total Liabilities and Capital	$66,048,008.41	$67,308,265.87	$65,188,461.57	$64,819,852.97	$65,592,374.12	$64,410,602.53	$64,104,332.44	$63,213,427.44
	"Invested Capital" as in Ex 150 Return after income Tax Rod 07				57,000,000 3,9 7%	56,500,000 5,7 9.9%	53,500,000 6,8 13%	51,600,000 36 12½%	50,937, 6,4 12½%

NATURAL GAS PIPELINE COMPANY OF AMERICA & TEXOMA NATURAL GAS COMPANY

2196

STATEMENT OF COMBINED PLANT AND EQUIPMENT

		Dec. 31, 1931 (1)	Dec. 31, 1932 (2)	Dec. 31, 1933 (3)	Dec. 31, 1934 (4)	Dec. 31, 1935 (5)	Dec. 31, 1936 (6)	Dec. 31, 1937 (7)	Dec. 31, 1938 (8)
1	Lands in Fee	$ 95,512.04	$ 97,616.61	$ 97,987.86	$ 98,163.45	$ 98,163.45	$ 98,163.45	$ 105,429.47	$ 105,169.47
2	Leaseholds	15,816,420.15	15,847,395.13	13,499,010.93	13,107,446.04	12,315,009.34	10,939,113.98	10,368,916.98	9,367,363.86
3	Rights of Way	1,391,202.79	1,429,104.92	1,590,263.23	1,600,338.25	1,600,304.39	1,596,290.55	1,605,200.36	1,611,717.43
4	Gas Wells	1,965,618.77	2,185,931.19	2,259,341.06	2,261,093.13	2,593,074.16	2,797,746.03	3,011,787.47	3,185,974.36
5	Gathering Lines	2,919,934.79	2,965,067.37	2,991,305.52	3,003,304.78	3,229,873.69	3,305,734.71	3,376,652.73	3,418,137.29
6	Main Lines	29,180,294.20	29,175,317.61	29,148,257.70	29,150,375.68	29,200,254.00	29,360,409.18	29,641,102.10	29,398,570.36
7	Compressor Station	7,834,966.87	7,895,306.27	7,919,881.76	8,025,331.49	8,450,412.04	8,539,097.17	8,952,998.20	9,136,043.86
8	Gasoline & Refrigerating Plant	751,294.00	754,483.27	778,101.11	814,335.39	849,916.73	863,794.93	884,716.44	880,833.22
9	Telephone System	790,288.65	786,710.38	786,759.80	737,542.65	788,006.37	784,932.02	788,897.56	794,131.96
10	Meters and Regulators	42,165.90	51,634.82	52,839.89	57,150.91	60,437.42	64,018.64	68,715.76	71,176.06
11	Other Main Line Structures	99,535.00	121,482.35	124,155.46	125,777.65	128,040.03	135,831.78	145,744.79	154,049.57
12	Branch Lines to Distributors	29,895.35	31,153.30	137,539.07	148,305.94	151,140.62	151,186.17	160,861.20	161,226.06
13	Drilling and Cleanout Tools	--	--	--	--	94,974.14	84,061.52	52,995.47	50,359.52
14	Tools	44,696.98	50,220.87	56,866.21	56,090.25	57,846.15	62,067.39	61,232.45	104,056.74
15	General Laboratory Equipment	15,051.13	16,151.40	16,685.72	16,750.49	16,750.49	16,750.49	16,750.49	17,175.52
16	Automotive & Transportation Equipt.	54,336.33	71,558.61	67,737.17	69,967.64	70,800.57	74,795.54	75,041.09	107,875.25
17	Furniture and Fixtures	74,740.09	78,411.02	81,827.33	82,121.40	83,187.55	85,772.41	90,611.41	93,489.59
18	Booster Station	--	--	--	--	--	--	--	6,796.70
19	Preliminary Operations	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92
20	Total	$61,113,958.22	$61,565,622.17	$59,615,636.74	$59,412,092.06	$59,796,268.14	$59,017,763.62	$59,409,650.89	$59,180,148.74
21	Construction Work in Progress	--	239,107.75	16,536.51	121,462.59	232,799.11	511,985.14	27,172.42	17,693.95
22	Total Plant and Equipment	$61,113,958.22	$61,804,729.92	$59,632,173.25	$59,533,554.65	$60,029,067.25	$59,529,748.76	$59,436,823.31	$59,197,842.69
	Depr + Depl Reserve		1,582,957	3,139,038	4,910,409	6,507,065	8,233,047	10,458,256	12,557,891
	Net (Excl Const Wk in Prog)		60,000,000	56,500,000	54,600,000	53,300,000	50,800,000	48,950,000	46,630,000
	Ave Return of 4,935,000 (P[illegible] Exhibit [illegible] 1+2) = % Return		8%	8.55%	8.85%	9.05%	9.5%	9.9%	10.83%

59,180,148.74
9,367,363.86
49,812,784.88

59,197,842
975
10,172,842

NATURAL GAS PIPELINE COMPANY OF AMERICA

BALANCE SHEETS

	ASSETS	Dec. 31, 1931 (1)	Dec. 31, 1932 (2)	Dec. 31, 1933 (3)	Dec. 31, 1934 (4)	Dec. 31, 1935 (5)	Dec. 31, 1936 (6)	Dec. 31, 1937 (7)	Dec. 31, 193 (8)
1	Capital Assets								
2	Plant and Equipment	$35,434,374.64	$35,570,006.74	$35,844,018.33	$35,975,419.92	$36,158,108.25	$36,447,969.59	$37,119,110.68	$37,587,837.2
3	Securities Owned	25,000,000.00	25,000,000.00	25,450,000.00	24,700,000.00	23,750,000.00	22,600,000.00	21,250,000.00	19,650,000.0
4	Construction Work in Progress	--	166,629.22	15,282.81	35,553.97	194,281.26	487,644.06	4,039.89	590.3
5	Total Capital Assets	$60,434,374.64	$60,736,635.96	$61,309,301.14	$60,710,973.89	$60,102,389.51	$59,535,613.65	$58,373,150.57	$57,238,427.6
6	Current Assets								
7	Cash	$ 195,476.19	$ 754,235.01	$ 352,596.89	$ 37,436.59	$ 25,537.35	$ 57,905.00	$ 110,083.87	$ 98,768.1
8	Gas Accounts Receivable	476,038.20	506,046.95	803,198.32	1,005,479.70	1,615,326.86	1,225,264.69	1,232,848.76	1,242,869.2
9	Miscellaneous Accounts Receivable	12,283.47	17,690.21	19,096.98	2,943.29	2,434.89	2,878.66	1,940.03	3,038.0
10	Notes Receivable	--	--	--	303,624.98	320,134.13	--	--	--
11	Materials and Supplies	89,578.80	158,943.66	150,641.66	162,732.11	128,111.70	144,815.18	180,221.69	219,303.1
12	Gas in Lines	24,238.38	24,238.38	24,238.38	24,238.38	24,238.38	24,238.38	24,238.38	24,238.3
13	Interest Receivable	63,965.49	63,089.53	63,624.98	86,127.34	85,137.95	83,475.93	751.34	--
14	Prepaid Expenses	11,100.50	34,143.14	34,301.26	58,163.26	34,901.33	33,452.28	41,253.02	47,026.3
15	Texoma Natural Gas Company	--	--	620,702.85	141,015.11	346,133.37	--	6,080.36	64,558.8
16	Lateral Line Advances	--	38,407.10	346,834.38	493,349.79	509,560.81	516,695.30	509,236.83	--
17	Total Current Assets	$ 872,681.03	$ 1,596,793.98	$ 2,415,235.70	$ 2,315,110.55	$ 3,091,516.77	$ 2,088,725.42	$ 2,106,654.28	$ 1,699,802.0
18	Bond Discount & Expense Unamortized	$ 3,797,505.08	$ 3,591,451.85	$ 3,328,500.15	$ 3,071,814.96	$ 2,814,938.11	$ 2,558,061.25	$ 2,283,267.83	$ 2,028,391.0
19	TOTAL ASSETS	$65,104,560.75	$65,924,881.79	$67,053,036.99	$66,097,899.40	$66,008,844.39	$64,182,400.33	$62,763,072.68	$60,966,620.7
	LIABILITIES AND CAPITAL								
20	Capital Stock	$ 3,000,000.00	$ 3,000,000.00	$ 3,000,000.00	$ 3,000,000.00	$ 3,000,000.00	$ 3,000,000.00	$ 3,000,000.00	$ 3,000,000.0
21	Bonds Outstanding	$59,999,000.00	$59,999,000.00	$60,999,000.00	$58,999,000.00	$56,499,000.00	$52,599,000.00	$50,300,000.00	$46,500,000.0
22	Current Liabilities								
23	Wages & Salaries Payable	$ 17,446.88	$ 10,687.40	$ 11,845.61	$ 16,787.45	$ 18,216.48	$ 24,351.81	$ 21,210.13	$ 22,870.1
24	Gas Accounts Payable	13,709.15	75,046.09	145,936.50	345,744.10	389,108.53	423,277.53	500,213.27	506,674.3
25	Accounts Payable	163,764.30	30,211.06	186,444.40	146,403.26	101,432.99	213,874.38	47,439.77	43,661.9
26	Notes Payable	--	2,599,940.00	2,599,940.00	2,355,769.17	1,414,970.00	1,200,000.00	525,000.00	300,000.0
27	Taxes Accrued	71,425.45	151,452.71	174,102.35	153,698.39	456,142.69	735,428.81	1,045,430.26	862,062.2
28	Interest Payable	154,540.60	267,399.14	212,998.96	207,481.17	145,396.60	131,500.00	125,750.00	116,250.0
29	Texoma Natural Gas Company	1,684,674.37	100,735.72	--	--	--	163,053.82	--	--
30	Total Current Liabilities	$ 2,105,560.75	$ 3,235,472.12	$ 3,331,267.82	$ 3,225,883.54	$ 2,525,267.29	$ 2,891,486.35	$ 2,265,043.43	$ 1,851,518.7
31	Reserve for Depreciation	$ --	$ 1,131,654.65	$ 2,264,766.06	$ 3,398,364.53	$ 4,533,889.82	$ 5,677,557.77	$ 7,215,500.14	$ 8,702,056.1
32	Surplus (Deficit)	$ --	$ 1,441,244.98*	$ 2,541,996.89*	$ 2,525,348.67*	$ 549,312.72*	$ 14,356.21	$ 17,470.89*	$ 913,045.9
	TOTAL LIABILITIES & CAPITAL	$65,104,560.75	$65,924,881.79	$67,053,036.99	$66,097,899.40	$66,008,844.39	$64,182,400.33	$62,763,072.68	$60,966,620.7

*Red

NATURAL GAS PIPELINE COMPANY OF AMERICA

STATEMENT OF PLANT AND EQUIPMENT

		Dec. 31, 1931 (1)	Dec. 31, 1932 (2)	Dec. 31, 1933 (3)	Dec. 31, 1934 (4)	Dec. 31, 1935 (5)	Dec. 31, 1936 (6)	Dec. 31, 19 (7)
1	Lands in Fee	$ 87,246.84	$ 89,351.41	$ 89,722.66	$ 89,944.81	$ 89,944.81	$ 89,944.81	$ 97,210.
2	Rights of Way	1,261,823.53	1,299,231.27	1,459,392.97	1,472,413.32	1,472,727.72	1,467,340.78	1,476,106.
3	Main Lines	26,926,455.67	26,935,351.55	26,908,259.43	26,910,586.17	86,960,464.57	27,132,219.90	27,412,912.
4	Compressor Station	6,249,642.90	6,307,366.84	6,331,398.51	6,431,179.28	6,553,405.19	6,663,043.16	7,009,601.
5	Telephone System	655,707.20	654,404.32	654,453.34	655,236.59	655,231.48	655,264.16	657,878.
6	Meters and Regulators	28,620.14	32,617.45	33,152.17	36,015.57	36,656.08	38,012.42	40,992.
7	Other Main Line Structures	50,294.05	66,452.33	67,393.59	68,663.36	68,782.07	70,113.58	77,936.
8	Branch Lines to Distributors	29,895.35	31,153.38	137,539.07	148,305.94	151,140.62	151,186.17	160,861.
9	Tools	39,409.27	36,762.36	40,446.44	40,024.91	43,997.21	50,353.90	49,963.
10	Laboratory Equipment	9,299.65	9,305.50	9,839.82	9,733.85	9,733.85	9,733.85	9,733.
11	Automotive & Transportation Equipt.	33,844.37	43,194.19	44,170.57	45,182.79	47,052.35	49,594.11	50,901.
12	Furniture and Fixtures	54,138.75	56,819.22	60,252.84	60,136.41	60,975.38	63,165.83	67,014.
13	Preliminary Operations	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.
14	Total	$35,434,374.64	$35,570,006.74	$35,844,018.33	$35,975,419.92	$36,158,108.25	$36,447,969.59	$37,119,110.
15	Construction Work in Progress	--	166,629.22	15,282.81	35,553.97	194,281.26	487,644.06	4,039.
16	Total Plant and Equipment	$35,434,374.64	$35,736,635.96	$35,859,301.14	$36,010,973.89	$36,352,389.51	$36,935,613.65	$37,123,150.

ec. 31, 1932 (2)	Dec. 31, 1933 (3)	Dec. 31, 1934 (4)	Dec. 31, 1935 (5)	Dec. 31, 1936 (6)	Dec. 31, 1937 (7)	Dec. 31, 1938 (8)
89,351.41	$ 89,722.66	$ 89,944.81	$ 89,944.81	$ 89,944.81	$ 97,210.83	$ 96,950.83
1,299,231.27	1,459,392.97	1,472,413.32	1,472,727.72	1,467,340.78	1,476,106.71	1,481,841.22
,935,351.55	26,908,259.43	26,910,586.17	26,960,464.57	27,132,219.90	27,412,912.82	27,671,219.52
,307,366.84	6,331,398.51	6,431,179.28	6,553,405.19	6,663,043.16	7,009,601.22	7,133,536.33
654,404.32	654,453.34	655,236.59	655,231.48	655,264.16	657,878.53	663,112.93
32,617.45	33,152.17	36,015.57	36,656.08	38,012.42	40,992.47	40,981.62
66,452.33	67,393.59	68,663.36	68,782.07	70,113.58	77,936.15	83,564.71
31,153.38	137,539.07	148,305.94	151,140.62	151,186.17	160,861.20	161,226.06
36,762.36	40,446.44	40,024.91	43,997.21	50,353.90	49,963.66	87,658.06
9,305.50	9,839.82	9,733.85	9,733.85	9,733.85	9,733.85	9,815.99
43,194.19	44,170.57	45,182.79	47,052.35	49,594.11	50,901.66	80,261.94
56,819.22	60,252.84	60,136.41	60,975.38	63,165.83	67,014.66	69,671.08
7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92
,570,006.74	$35,844,018.33	$35,975,419.92	$36,158,108.25	$36,447,969.59	$37,119,110.68	$37,587,837.21
166,629.22	15,282.81	35,553.97	194,281.26	487,644.06	4,039.89	590.39
,736,635.96	$35,859,301.14	$36,010,973.89	$36,352,389.51	$36,935,613.65	$37,123,150.57	$37,588,427.60

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TEXOMA NATURAL GAS COMPANY

BALANCE SHEETS

		Dec. 31, 1931 (1)	Dec. 31, 1932 (2)	Dec. 31, 1933 (3)	Dec. 31, 1934 (4)	Dec. 31, 1935 (5)	Dec. 31, 1936 (6)	Dec. 31, 1937 (7)	Dec. 31, 1938 (8)
1	ASSETS								
2	Capital Assets								
3	Plant and Investment	$25,679,583.58	$25,995,615.43	$23,771,618.41	$23,436,672.14	$23,638,159.89	$22,569,794.03	$22,290,540.21	$21,592,311.53
4	Construction Work in Progress	--	72,478.53	1,253.70	85,908.62	38,517.85	24,341.08	23,132.53	17,103.56
5	Total Capital Assets	$25,679,583.58	$26,068,093.96	$23,772,872.11	$23,522,580.76	$23,676,677.74	$22,594,135.11	$22,313,672.74	$21,609,415.09
6	Current Assets								
7	Cash	$ 29,241.24	$ 38,996.05	$ 114,724.29	$ 70,343.12	$ 186,703.85	$ 64,603.90	$ 34,243.48	$ 65,193.68
8	Gas Accounts Receivable	13,878.85	33,218.35	84,158.52	260,586.02	274,205.10	300,986.85	380,522.81	388,906.72
9	Gasoline Accounts Receivable	5,495.00	6,267.48	31,517.91	28,045.70	36,752.84	45,445.04	30,339.31	51,567.37
10	Miscellaneous Accounts Receivable	3,544.43	9,911.97	40,283.90	4,669.39	8,203.78	5,535.34	2,314.39	2,543.80
11	Notes Receivable	--	--	--	--	--	22,000.00	26,470.65	25,697.11
12	Material and Supplies	243,746.39	254,697.78	256,583.80	229,821.96	90,926.02	97,115.08	148,937.76	171,445.49
13	Gas in Lines	3,667.32	3,667.32	3,667.32	3,667.32	3,667.32	3,667.32	3,667.32	3,667.32
14	Interest Receivable	4,540.60	55,933.52	—	--	--	1,200.84	26.47	108.50
15	Prepaid Expenses	28,000.00	53,825.28	41,592.67	54,023.89	43,104.12	34,781.41	34,315.72	28,740.76
16	Natural Gas Pipeline Co. of America	1,684,674.37	100,735.72	—	—	--	163,053.82	--	--
17	Total Current Assets	$ 2,016,788.20	$ 557,253.47	$ 572,528.41	$ 651,157.40	$ 643,563.03	$ 742,587.60	$ 660,837.91	$ 737,870.75
18	Bond Discount & Expense Unamortized	$ 12,500.00	$ 16,871.65	$ 15,553.28	$ 14,424.24	$ 13,222.20	$ 12,020.16	$ 3,352.28	$ 2,978.08
19	TOTAL ASSETS	$27,708,871.78	$26,642,219.08	$24,360,953.80	$24,188,162.40	$24,333,462.97	$23,348,742.87	$22,977,862.93	$22,350,263.92
20	LIABILITIES AND CAPITAL								
21	Capital Stock	$ 500,000.00	$ 500,000.00	$ 500,000.00	$ 500,000.00	$ 500,000.00	$ 500,000.00	$ 500,000.00	$ 500,000.00
22	Bonds Outstanding	$25,000,000.00	$25,000,000.00	$25,450,000.00	$24,700,000.00	$23,750,000.00	$22,600,000.00	$21,250,000.00	$19,650,000.00
23	Current Liabilities								
24	Wages and Salaries Payable	$ 6,821.43	$ 4,643.80	$ 5,096.74	$ 6,331.30	$ 8,501.76	$ 8,421.96	$ 10,037.93	$ 9,775.43
25	Royalties Payable	4,874.29	6,987.02	12,227.44	16,983.55	22,060.54	25,450.47	27,180.98	27,662.92
26	Accounts Payable	65,044.89	11,288.73	50,035.03	59,473.40	133,225.73	75,828.09	53,362.32	30,591.12
27	Notes Payable	2,000,000.00	1,000,000.00	--	303,624.98	320,134.13	--	--	--
28	Taxes Accrued	27,964.50	35,966.20	32,316.05	53,097.95	70,805.80	86,778.07	74,977.99	64,639.38
29	Interest Payable	104,166.67	83,333.33	63,624.98	61,750.00	59,375.00	56,500.00	—	—
30	Natural Gas Pipeline Co. of America	--	—	320,702.85	141,015.11	346,133.37	--	6,080.36	64,558.87
31	Coltexo Corporation	--	--	--	23,709.98	43,915.78	53,180.86	--	--
32	Total Current Liabilities	$ 2,208,871.78	$ 1,142,219.08	$ 784,003.09	$ 665,986.27	$ 1,004,152.11	$ 306,119.45	$ 171,639.58	$ 197,227.72
33	Reserves								
34	Depreciation	$ --	$ 341,416.44	$ 686,822.82	$ 1,041,834.85	$ 1,422,513.85	$ 1,832,450.17	$ 2,261,468.05	$ 2,702,981.61
35	Depletion	--	109,916.86	187,439.21	360,208.96	550,661.89	723,039.81	981,287.96	1,152,854.09
36	Total Reserves	$ --	$ 451,333.30	$ 874,262.03	$ 1,402,043.81	$ 1,973,175.74	$ 2,555,489.98	$ 3,242,756.01	$ 3,855,835.70
37	Surplus (Deficit)	$ --	$ 451,333.30*	$ 3,247,311.32*	$ 3,079,867.68*	$ 2,893,864.88*	$ 2,612,866.56*	$ 2,186,532.66*	$ 1,852,799.50*
38	TOTAL LIABILITIES & CAPITAL	$27,708,871.78	$26,642,219.08	$24,360,953.80	$24,188,162.40	$24,333,462.97	$23,348,742.87	$22,977,862.93	$22,350,263.92

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TEXOMA NATURAL GAS COMPANY

STATEMENT OF PLANT AND EQUIPMENT

		Dec. 31, 1931 (1)	Dec. 31, 1932 (2)	Dec. 31, 1933 (3)	Dec. 31, 1934 (4)	Dec. 31, 1935 (5)	Dec. 31, 1936 (6)	Dec. 3 (
1	Lands in Fee	$ 8,265.20	$ 8,265.20	$ 8,265.20	$ 8,218.64	$ 8,218.64	$ 8,218.64	$ 8
2	Leaseholds	15,816,428.15	15,847,395.18	13,499,010.93	13,107,446.04	12,315,009.34	10,939,113.92	10,362
3	Rights of Way	129,379.26	129,953.65	130,870.26	127,924.93	127,656.67	128,949.77	129
4	Gas Wells	1,965,618.77	2,185,931.19	2,259,341.06	2,261,093.13	2,593,074.16	2,797,746.03	3,011
5	Gathering Lines	2,919,934.79	2,965,067.37	2,991,365.52	3,003,304.78	3,289,673.69	3,305,734.71	3,376
6	Main Lines	2,253,838.53	2,239,966.06	2,239,998.27	2,239,789.51	2,239,789.51	2,228,189.28	2,228
7	Compressor Station	1,585,323.97	1,587,939.43	1,588,483.25	1,594,152.21	1,897,006.85	1,926,054.01	1,943
8	Gasoline and Refrigerating Plant	751,294.00	754,483.27	778,101.11	814,335.39	849,916.73	863,794.93	884
9	Telephone System	134,581.66	132,306.06	132,306.46	132,306.06	132,774.89	129,668.66	131
10	Meters and Regulators	13,545.76	19,017.37	19,687.72	21,135.34	23,781.34	26,006.22	27
11	Other Main Line Structures	49,240.95	55,030.02	56,761.87	57,114.29	59,257.96	65,718.20	67
12	Drilling and Cleanout Tools	--	--	--	--	94,974.14	84,061.52	52
13	Tools	5,287.71	13,458.51	15,419.77	16,065.34	13,848.94	11,713.49	11
14	Laboratory Equipment	5,751.53	6,845.90	6,845.90	7,016.64	7,016.64	7,016.64	7
15	Automotive & Transportation Equipt.	20,491.96	28,364.42	23,566.60	24,784.85	23,748.22	25,201.43	24
16	Furniture and Fixtures	20,601.34	21,591.80	21,574.49	21,984.99	22,212.17	22,606.56	23
17	Booster Stations	--	--	--	--	--	--	-
18	Total	$25,679,583.58	$25,995,615.43	$23,771,618.41	$23,436,672.14	$23,638,159.89	$22,569,794.03	$22,290
19	Construction Work in Progress	--	72,478.53	1,253.70	85,908.62	38,517.85	24,341.08	23
20	Total Plant and Equipment	$25,679,583.58	$26,068,093.96	$23,772,872.11	$23,522,580.76	$23,676,677.74	$22,594,135.11	$22,313

Dec. 31, 1932	Dec. 31, 1933	Dec. 31, 1934	Dec. 31, 1935	Dec. 31, 1936	Dec. 31, 1937	Dec. 31, 1938
(2)	(3)	(4)	(5)	(6)	(7)	(8)
$ 8,265.20	$ 8,265.20	$ 8,218.64	$ 8,218.64	$ 8,218.64	$ 8,218.64	$ 8,218.64
15,847,395.18	13,499,010.93	13,107,446.04	12,315,009.34	10,939,113.92	10,362,916.98	9,367,363.86
129,953.65	130,870.26	127,924.93	127,656.67	128,949.77	129,093.65	129,876.21
2,185,931.19	2,259,341.06	2,261,093.13	2,593,074.16	2,797,746.03	3,011,787.47	3,185,974.36
2,965,067.37	2,991,385.58	3,003,304.78	3,229,873.69	3,305,734.71	3,376,652.73	3,418,137.29
2,239,966.06	2,239,998.27	2,239,789.51	2,239,789.51	2,228,189.28	2,228,189.28	2,227,350.84
1,587,939.43	1,588,483.25	1,594,152.21	1,897,006.85	1,926,054.01	1,943,396.98	2,002,512.53
754,483.27	778,101.11	814,335.39	849,916.75	863,794.93	884,716.44	888,833.22
132,306.06	132,306.46	132,306.06	132,774.89	129,668.66	131,019.03	131,019.03
19,017.37	19,687.72	21,135.34	23,781.34	26,006.22	27,723.29	30,194.44
55,030.02	56,761.87	57,114.29	59,257.96	65,718.20	67,808.64	70,484.86
--	--	--	94,974.14	84,061.52	52,995.47	50,359.52
13,458.51	15,419.77	16,065.34	13,848.94	11,713.49	11,268.79	16,398.68
6,845.90	6,845.90	7,016.54	7,016.64	7,016.64	7,016.64	7,359.53
28,364.42	23,566.60	24,784.85	23,748.22	25,201.43	24,139.43	27,613.51
21,591.80	21,574.49	21,984.99	22,212.17	22,606.58	23,596.75	23,813.51
--	--	--	--	--	--	6,796.70
$25,995,615.43	$23,771,618.41	$23.436,672.14	$23,638,159.89	$22,569,794.03	$22,290,540.21	$21,592,311.53
72,478.53	1,253.70	85,908.62	38,517.85	24,341.08	23,132.53	17,103.56
$26,068,093.96	$23,772,872.11	$23,522,580.76	$23,676,677.74	$22,594,135.11	$22,313,672.74	$21,609,415.09

Natural Gas Pipeline Company of America and Texoma Natural Gas Company

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NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

STATEMENT OF COMBINED OPERATING REVENUE AND EXPENSES

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 19 (7)
1	**Operating Revenue**							
2	**Gas Sales**							
3	Firm Sales (Including Demand Charges)	$ 4,824,248.26	$ 5,493,804.18	$ 7,201,816.74	$ 9,619,764.92	$10,689,822.11	$10,863,829.31	$10,787,177
4	Interruptible Sales	825,505.63	490,423.04	1,914,228.11	1,813,293.80	3,042,694.90	3,712,988.11	2,982,256
5	Texoma Field Sales	9,138.06	9,694.06	7,405.11	7,434.51	13,451.24	75,826.48	22,409
6	Total Gas Sales	$ 5,658,891.95	$ 5,993,921.28	$ 9,123,449.96	$11,440,493.23	$13,745,968.25	$14,652,643.90	$13,791,843
7	Gasoline Sales	195,675.01	260,256.08	361,915.86	596,042.00	792,017.15	893,807.30	665,055
8	Other Operating Income	25,296.93	20,494.25	22,044.76	26,263.49	28,857.36	6,156.30	15,549
9	Gross Operating Income	$ 5,879,863.89	$ 6,274,671.61	$ 9,507,410.58	$12,062,798.72	$14,566,842.76	$15,552,607.50	$14,441,349
10	**Expenses**							
11	**Operation and General Expenses**							
12	Purchased Gas	$ 378,365.64	$ 384,039.32	$ 643,973.84	$ 839,119.01	$ 1,075,485.64	$ 1,130,277.82	$ 1,061,359
13	Production	265,779.35	223,497.13	270,978.95	324,127.37	376,350.23	371,614.97	360,187
14	Pipeline	155,659.79	122,020.13	124,518.81	125,132.75	143,453.84	144,133.22	155,584
15	Compressor Station	182,826.47	164,623.36	429,787.92	606,952.21	785,877.91	879,214.16	793,690
16	Gasoline and Refrigerating	79,366.12	116,166.31	140,949.27	206,798.55	262,829.31	286,614.48	228,868
17	Telephone	40,171.76	39,828.29	38,650.08	40,399.67	41,388.22	42,334.89	42,289
18	Taxes	318,910.10	366,392.25	335,579.01	668,828.84	947,250.50	1,306,681.47	1,123,170
19	Regulatory	-	-	-	-	-	41,467.63	190,788
20	General	489,271.54	427,842.94	407,999.92	414,695.18	384,038.69	438,228.21	469,775
21	New Business	86,104.76	219,149.32	889,060.43	308,006.18	81,422.81	16,115.48	17,788
22	Total Operation and General Expenses	$ 1,976,455.73	$ 2,063,559.05	$ 3,281,498.23	$ 3,534,059.76	$ 4,098,097.33	$ 4,656,682.33	$ 4,443,412
23	**Maintenance Expenses**							
24	Production	$ 2,707.90	$ 1,431.65	$ 1,192.26	$ 4,444.67	$ 5,594.75	$ 3,236.37	$ 3,970
25	Pipeline	238,009.85	111,531.72	74,523.93	134,564.12	259,670.87	173,686.36	235,346
26	Compressor Station	20,437.15	11,129.02	76,784.28	137,844.58	250,249.72	339,452.33	204,106
27	Gasoline and Refrigerating	5,014.85	2,983.60	6,884.91	8,404.72	19,091.78	21,906.31	15,181
28	Telephone	20,046.16	18,382.24	22,970.28	19,870.55	18,209.75	21,621.44	23,595
29	Total Maintenance Expenses	$ 286,215.91	$ 145,458.23	$ 182,295.66	$ 305,128.64	$ 552,816.87	$ 559,902.81	$ 482,201
30	**Total Cost of Retirements**	$ 266.10	$ 8,713.85	$ 133.08	$ 8,385.82	$ 6,970.19	$ 8,573.53	$ 9,739
31	**Total Expenses**	$ 2,262,937.74	$ 2,217,731.13	$ 3,463,926.97	$ 3,847,574.22	$ 4,657,884.39	$ 5,225,158.67	$ 4,935,403
32	Less Gas Used by Company	48,668.54	49,603.63	149,586.06	269,785.80	398,102.48	435,618.47	378,798
33	Net Operation, Maintenance, Retirements, and General Expenses	$ 2,214,269.20	$ 2,168,127.50	$ 3,314,340.91	$ 3,577,788.42	$ 4,259,781.91	$ 4,789,540.20	$ 4,556,604
34	Net Earnings from Operation before Amortization and Other Charges	$ 3,665,594.69	$ 4,106,544.11	$ 6,193,069.67	$ 8,485,010.30	$10,307,060.85	$10,763,067.30	$ 9,884,745
35	Accumulated Net Earnings from Operation before Amortization and Other Charges	$ 3,665,594.69	$ 7,772,138.80	$13,965,208.47	$22,450,218.77	$32,757,279.62	$43,520,346.92	$53,405,092
36	Annual Average of Net Earnings from Operation before Amortization and Other Charges	$ 3,665,594.69	$ 3,886,069.40	$ 4,655,069.49	$ 5,612,554.69	$ 6,551,455.92	$ 7,253,391.15	$ 7,629,298

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	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
6	$ 5,493,804.18	$ 7,201,816.74	$ 9,619,764.92	$10,689,822.11	$10,863,829.31	$10,787,177.99	$59,480,465.51
3	490,423.04	1,914,228.11	1,813,293.80	3,042,694.90	3,712,988.11	2,982,256.42	14,781,390.01
6	9,694.06	7,405.11	7,434.51	13,451.24	75,826.48	22,409.07	145,358.53
5	$ 5,993,921.28	$ 9,123,449.96	$11,440,493.23	$13,745,968.25	$14,652,643.90	$13,791,843.48	$74,407,212.05
1	260,256.08	361,915.86	596,042.00	792,017.15	893,807.30	665,055.95	3,764,769.35
3	20,494.25	22,044.76	26,263.49	28,857.36	6,156.30	15,549.67*	113,563.42
9	$ 6,274,671.61	$ 9,507,410.58	$12,062,798.72	$14,566,842.76	$15,552,607.50	$14,441,349.76	$78,285,544.32
4	$ 384,039.32	$ 643,973.84	$ 839,119.01	$ 1,075,485.64	$ 1,130,277.82	$ 1,061,359.13	$ 5,512,680.60
5	223,497.13	270,978.95	324,127.37	376,350.23	371,614.97	360,187.98	2,192,535.98
9	122,020.13	124,518.81	125,132.75	143,453.84	144,133.22	155,584.68	970,505.22
7	164,623.36	429,787.92	606,952.21	785,877.91	879,214.16	793,600.31	3,822,088.34
2	116,166.31	140,949.27	206,798.55	262,829.31	286,614.48	228,868.25	1,321,592.29
6	39,828.29	38,650.08	40,399.67	41,388.22	42,334.89	42,289.31	285,062.22
0	366,392.25	335,579.01	663,828.84	947,250.58	1,306,681.47	1,123,170.19	5,066,812.44
	-	-	-	-	41,467.63	190,788.47	232,256.10
4	427,842.94	407,999.92	414,695.18	384,038.69	438,228.21	469,775.71	3,031,852.19
6	219,149.32	889,060.43	308,006.18	81,422.91	16,115.48	17,788.18	1,617,647.26
3	$ 2,063,559.05	$ 3,281,498.23	$ 3,534,059.76	$ 4,098,097.33	$ 4,656,682.33	$ 4,443,418.21	$24,053,764.64
0	$ 1,431.65	$ 1,192.26	$ 4,444.67	$ 5,594.75	$ 3,236.37	$ 3,970.91	$ 22,578.51
5	111,531.72	74,523.93	134,564.12	259,670.87	173,686.36	235,346.38	1,227,333.23
5	11,129.02	76,784.28	137,844.58	250,249.72	339,452.35	204,106.55	1,040,003.63
5	2,983.60	6,824.91	8,404.72	19,091.78	21,906.31	15,181.83	79,408.00
6	18,382.24	22,970.28	19,870.55	18,209.75	21,621.44	23,595.49	144,695.91
1	$ 145,458.23	$ 182,295.66	$ 305,128.64	$ 552,816.87	$ 559,902.81	$ 482,201.16	$ 2,514,019.28
0	$ 8,713.85	$ 133.08	$ 8,385.82	$ 6,970.19	$ 8,573.53	$ 9,739.79	$ 42,832.36
4	$ 2,217,731.13	$ 3,463,926.97	$ 3,847,574.22	$ 4,657,884.39	$ 5,225,150.67	$ 4,935,403.16	$26,610,616.28
4	49,603.63	149,586.06	269,705.80	398,102.48	435,610.47	378,798.68	1,730,163.66
0	$ 2,168,127.50	$ 3,314,340.91	$ 3,577,780.42	$ 4,259,781.91	$ 4,789,540.20	$ 4,556,604.48	$24,880,452.62
9	$ 4,106,544.11	$ 6,193,069.67	$ 8,405,010.30	$10,307,060.85	$10,763,067.30	$ 9,804,745.28	$53,405,092.20
9	$ 7,772,138.30	$13,965,208.47	$22,450,218.77	$32,757,279.62	$43,520,346.92	$53,405,092.20	$53,405,092.20
9	$ 3,386,069.40	$ 4,655,069.49	$ 5,612,554.69	$ 6,551,455.92	$ 7,253,391.15	$ 7,629,298.88	$ 7,629,298.88

2204

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY
SCHEDULE OF COMBINED PLANT AND EQUIPMENT
AND
ACCUMULATED EXPENDITURES FOR LEASEHOLDS

		Dec. 31 1931 (1)	Dec. 31 1948 (2)	Dec. 31 1933 (3)	Dec. 31 1934 (4)	Dec. 31 1935 (5)	Dec. 31 1936 (6)	Dec. 31 1937 (7)	
	Plant and Equipment Exclusive of Leaseholds								
1	Lands in Fee	$ 95,512.04	$ 97,616.61	$ 97,9[illegible]6	$ 98,163.45	$ 98,163.45	$ 98,163.45	$ 105,429.47	$
2	Rights of Way	1,391,202.79	1,429,184.92	1,590,263.23	1,600,338.25	1,600,304.39	1,596,290.55	1,605,200.36	
3	Gas Wells	1,965,618.77	2,185,931.19	2,259,341.06	2,261,093.13	2,593,074.16	2,797,746.03	3,011,787.47	
4	Gathering Lines	2,919,934.79	2,965,067.37	2,991,385.52	3,003,304.78	3,229,873.69	3,305,734.71	3,376,652.73	
5	Main Lines	29,180,294.80	29,175,317.61	29,148,257.90	29,150,375.68	29,200,254.08	29,368,409.18	29,641,102.10	2
6	Compressor Station	7,834,966.87	7,895,306.27	7,919,881.76	8,025,331.49	8,450,412.04	8,589,097.17	8,952,998.20	
7	Gasoline & Refrigerating Plants	751,294.00	754,483.27	778,101.11	814,335.39	849,916.73	863,794.93	884,716.44	
8	Telephone System	790,288.86	786,710.38	786,759.30	787,542.65	788,006.37	784,932.82	788,897.56	
9	Meters and Regulators	42,165.90	51,634.82	52,839.09	57,150.91	60,437.42	64,018.64	68,715.76	
10	Other Main Line Structures	99,535.00	121,482.35	124,155.46	125,777.65	130,040.03	135,831.78	145,744.79	
11	Branch Lines to Distributors	29,095.35	31,153.38	137,539.07	148,305.94	151,140.62	151,106.17	160,861.20	
12	Drilling and Cleanout Tools	-	-	-	-	94,974.14	84,061.52	52,995.47	
13	Tools	44,696.90	50,220.07	55,866.21	56,090.25	57,046.15	62,067.39	61,232.45	
14	Laboratory Equipment.	15,051.18	16,151.40	16,685.72	16,750.49	16,750.49	16,750.49	16,750.49	
15	Automotive Equipment	54,336.33	71,558.61	67,737.17	69,967.64	70,800.57	74,795.54	75,041.09	
16	Furniture and Fixtures	74,740.09	78,411.02	81,827.33	82,121.40	83,187.55	85,772.41	90,611.41	
17	Booster Station	-	-	-	-	-	-	-	
18	Preliminary Operations	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	
19	Construction Work in Progress.	-	239,107.75	16,536.51	121,462.59	232,799.11	511,985.14	27,172.42	
20	Total Plant and Equipment exclusive of Leaseholds	$45,297,530.07	$45,957,334.74	$46,133,162.32	$46,426,108.61	$47,714,057.91	$48,590,634.84	$49,073,906.33	$4
21	Accumulated Expenditures for Leaseholds	15,816,426.15	15,847,395.18	15,863,168.52	15,859,130.08	15,863,551.98	15,893,462.08	15,893,513.08	1
22	Total	$61,113,956.22	$61,804,729.92	$61,996,330.84	$62,285,238.69	$63,577,609.89	$64,484,096.92	$64,967,419.41	26

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Dec. 31 1948 (2)	Dec. 31 1933 (3)	Dec. 31 1934 (4)	Dec. 31 1935 (5)	Dec. 31 1936 (6)	Dec. 31 1937 (7)	Dec. 31 1938 (8)
$ 97,616.61	$ 97,987.86	$ 98,163.45	$ 98,163.45	$ 98,163.45	$ 105,429.47	$ 105,169.47
1,429,184.92	1,590,263.23	1,600,338.25	1,600,304.39	1,596,290.55	1,605,200.36	1,611,717.43
2,185,931.19	2,259,341.06	2,261,093.13	2,593,074.16	2,797,746.03	3,011,787.47	3,185,974.36
2,965,067.37	2,991,385.52	3,003,304.78	3,229,873.69	3,305,754.71	3,376,652.73	3,418,137.29
29,175,317.61	29,148,257.90	29,150,375.68	29,200,254.08	29,360,409.18	29,641,102.10	29,898,570.36
7,895,306.27	7,919,881.76	8,025,331.49	8,450,412.04	8,509,097.17	8,952,998.20	9,136,048.86
754,483.27	778,101.11	814,335.39	849,916.73	863,794.93	884,716.44	888,833.22
786,710.38	786,759.80	787,542.65	788,006.37	784,932.82	788,897.56	794,131.96
51,634.88	52,839.89	57,150.91	60,437.42	64,018.64	68,715.76	71,176.06
121,482.35	124,155.46	125,777.65	128,040.03	135,831.78	145,744.79	154,049.57
31,153.38	137,539.07	148,305.94	151,140.62	151,106.17	160,861.20	161,226.06
-	-	-	94,974.14	84,061.52	52,995.47	80,359.52
50,220.87	55,866.21	56,090.25	57,046.15	62,067.39	61,232.45	104,056.74
16,151.40	16,685.72	16,750.49	16,750.49	16,750.49	16,750.49	17,175.52
71,558.61	67,737.17	69,967.64	70,800.57	74,795.54	75,041.09	107,875.25
78,411.02	81,827.33	82,121.40	83,187.55	85,772.41	90,611.41	93,489.59
-	-	-	-	-	-	6,796.70
7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92
239,107.75	16,536.61	121,462.59	232,799.11	511,985.14	27,172.42	17,693.95
$45,957,334.74	$46,133,162.32	$46,426,108.61	$47,714,057.91	$48,590,634.84	$49,073,906.33	$49,830,478.83
15,847,395.18	15,863,168.52	15,859,130.08	15,863,551.98	15,893,462.08	15,893,513.08	15,893,513.08
$61,804,729.92	$61,996,330.84	$62,285,238.69	$63,577,609.89	$64,484,096.92	$64,967,419.41	$65,723,991.91
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NATURAL GAS PIPELINE COMPANY OF AMERICA

STATEMENT OF OPERATING REVENUE AND EXPENSES

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year
1	**Operating Revenue**						
2	Gas Sales						
3	Firm Sales (Including Demand Charges)	$4,824,248.26	$5,493,804.18	$7,201,816.74	$ 9,619,764.92	$10,689,822.11	$10,863,
4	Interruptible Sales	825,505.63	490,423.04	1,914,228.11	1,813,293.80	3,042,694.90	3,712,
5	Total Gas Sales	$5,649,753.89	$5,984,227.22	$9,116,044.85	$11,433,058.72	$13,732,517.01	$14,576,
6	Other Operating Income	16,575.69	13,336.83	17,090.28	19,313.21	20,967.99	6,
7	Gross Operating Revenue	$5,666,329.58	$5,997,564.05	$9,133,135.13	$11,452,371.93	$13,753,485.00	$14,583,
8	**Expenses**						
9	**Operation and General Expenses**						
10	Purchased Gas	$2,392,738.72	$2,310,615.03	$3,637,646.01	$ 4,237,947.31	$ 5,119,964.02	$ 4,451,
11	Pipeline	117,129.64	87,212.91	91,141.69	89,754.79	95,877.40	97,
12	Compressor	120,842.27	123,358.10	351,957.29	467,836.29	590,028.76	682,
13	Telephone	38,825.49	38,440.48	37,572.69	39,082.50	39,561.66	40,
14	Taxes	225,649.43	273,625.99	218,300.01	532,128.58	796,658.50	1,130,
15	Regulatory	-	-	-	-	-	41,
16	General	331,880.34	316,102.56	297,072.39	292,125.05	277,387.44	329,
17	New Business	86,104.76	219,149.32	889,060.43	308,006.18	81,422.91	16,
18	Total Operation and General Expenses	$3,313,170.65	$3,368,504.38	$5.522,750.51	$ 5,966,880.70	$7,000,900.69	$6,789,
19	**Maintenance Expenses**						
20	Pipeline	$ 199,622.97	$ 91,270.58	$ 58,756.99	$ 95,333.97	$ 218,841.66	$ 139,
21	Compressor	12,623.57	8,021.00	63,433.60	105,530.11	182,547.92	218,
22	Telephone	16,374.66	15,323.36	19,622.85	16,582.28	15,531.20	18,
23	Total Maintenance Expenses	$ 228,621.20	$ 114.614.94	$ 141,813.44	$ 217,446.36	$ 416,920.78	$ 376,
24	**Total Cost of Retirements**	$ -	$ 528.53	$ 112.37	$ 4,952.12	$ 4,779.65	$ 8,
25	**Total Expenses**	$3,541,791.85	$3,483,647.85	$5,664,676.32	$ 6,189,279.18	$ 7,422,601.18	$ 7,174,
26	Less Gas Used by Company	26,496.61	29,633.53	107,343.60	172,056.57	270,095.42	310,
27	Net Operation, Maintenance, Retirements, and General Expenses	$3,515,295.24	$3,454,014.32	$5,557,332.72	$ 6,017,222.61	$ 7,152,505.70	$ 6,863,
28	Net Earnings from Operation before Amorization and Other Charges	$2,151,034.34	$2,543,549.73	$3,575,802.41	$ 5,435,149.32	$ 6,600,979.30	$ 7,719,
29	Accumulated Net Earnings from Operation before Amortization and Other Charges	$2,151,034.34	$4,694,584.07	$8,270,386.48	$13,705,535.80	$20,306,515.10	$28,026,
30	Annual Average of Net Earnings from Operation before Amortization and Other Charges	$2,151,034.34	$2,347,292.03	$2,756,795.49	$ 3,426,383.95	$ 4,061,303.02	$ 4,671,

Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
$4,824,248.26	$5,493,804.18	$7,201,816.74	$ 9,619,764.92	$10,689,822.11	$10,863,829.31	$10,787,177.99	$59,480,463.51
825,505.63	490,423.04	1,914,228.11	1,813,293.80	3,042,694.90	3,712,988.11	2,982,256.42	14,781,390.01
$5,649,753.89	$5,984,227.22	$9,116,044.85	$11,433,058.72	$13,732,517.01	$14,576,817.42	$13,769,434.41	$74,261,853.52
16,575.69	13,336.83	17,090.28	19,313.21	20,967.99	6,898.69	13,583.53*	80,599.16
$5,666,329.58	$5,997,564.05	$9,133,135.13	$11,452,371.93	$13,753,485.00	$14,583,716.11	$13,755,850.88	$74,342,452.68
$2,392,738.72	$2,310,615.03	$3,637,646.01	$ 4,237,947.31	$ 5,119,964.02	$ 4,451,282.05	$4,785,474.10	$26,935,667.24
117,129.64	87,212.91	91,141.69	89,754.79	95,877.40	97,483.05	103,343.34	681,942.82
120,842.27	123,358.10	351,957.29	467,836.29	590,028.76	682,502.58	606,485.91	2,943,011.20
38,825.49	38,440.48	37,572.69	39,082.50	39,561.66	40,883.94	40,916.67	275,283.43
225,649.43	273,625.99	218,300.01	532,128.58	796,658.50	1,130,600.94	955,138.22	4,132,101.67
-	-	-	-	-	41,467.63	190,788.47	232,256.10
331,880.34	316,102.55	297,072.39	292,125.05	277,387.44	329,663.86	351,582.85	2,195,814.48
86,104.76	219,149.32	889,060.43	308,006.18	81,422.91	16,115.48	17,788.18	1,617,647.26
$3,313,170.65	$3,368,504.38	$5.522,750.51	$ 5,966,880,70	$7,000,900.69	$6,789,999.53	$ 7,051,517.74	$39,013,724.20
$ 199,622.97	$ 91,270.58	$ 58,756.99	$ 95,333.97	$ 218,841.66	$ 139,624.01	$ 207,954.99	$ 1,011,405.17
12,623.57	8,021.00	63,433.60	105,530.11	182,547.92	218,806.36	132,900.60	723,863.16
16,374.66	15,323.36	19,622.85	16,582.28	15,531.20	18,402.44	20,263.68	122,100.47
$ 228,621.20	$ 114.614.94	$ 141,813.44	$ 217,446.36	$ 416,920.78	$ 376,832.81	$ 361,119.27	$ 1,857,368.80
$ -	$ 528.53	$ 112.37	$ 4,952.12	$ 4,779.65	$ 8,079.32	$ 1,111.60	$ 19,563.59
$3,541,791.85	$3,483,647.85	$5,664,676.32	$ 6,189,279.18	$ 7,422,601.12	$ 7,174,911.66	$ 7,413,748.61	$40,890,656.59
26,496.61	29,633.53	107,343.60	172,056.57	270,095.42	310,998.80	257,179.79	1,173,804.32
$3,515,295.24	$3,454,014.32	$5,557,332.72	$ 6,017,222.61	$ 7,152,505.70	$ 6,863,912.86	$ 7,156,568.82	$39,716,852.27
$2,151,034.34	$2,543,549.73	$3,575,802.41	$ 5,435,149.32	$ 6,600,979.30	$ 7,719,803.25	$ 6,599,282.06	$34,625,600.41
$2,151,034.34	$4,694,584.07	$8,270,386.48	$13,705,535.80	$20,306,515.10	$28,026,318.35	$34,625,600.41	$34,625,600.41
$2,151,034.34	$2,347,292.03	$2,756,795.49	$ 3,426,383.95	$ 4,061,303.02	$ 4,671,053.06	$ 4,946,514.34	$ 4,946,514.34

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NATURAL GAS PIPELINE COMPANY OF AMERICA

STATEMENT OF PLANT AND EQUIPMENT

	Dec. 31, 1931 (1)	Dec. 31, 1932 (2)	Dec. 31, 1933 (3)	Dec. 31, 1934 (4)	Dec. 31, 1935 (5)	Dec. 31, 1936 (6)	Dec 1
1. Lands in Fee	$ 87,246.84	$ 89,351.41	$ 89,722.66	$ 89,944.81	$ 89,944.81	$ 89,944.81	$ 9
2. Rights of Way	1,261,823.53	1,299,231.27	1,459,392.97	1,472,413.32	1,472,727.72	1,467,340.78	1,47
3. Main Lines	26,926,455.67	26,935,351.55	26,908,259.43	26,910,586.17	26,960,464.57	27,132,219.90	27,41
4. Compressor Station	6,249,642.90	6,307,366.84	6,331,398.51	6,431,179.28	6,553,405.19	6,663,043.16	7,00
5. Telephone System	655,707.20	654,404.32	654,453.34	655,236.59	655,231.48	655,264.16	65
6. Meters and Regulators	28,620.14	32,617.45	33,152.17	36,015.57	36,656.08	38,012.42	4
7. Other Main Line Structures	50,294.05	66,452.33	67,393.59	68,663.36	68,782.07	70,113.58	7
8. Branch Lines to Distributors	29,895.35	31,153.38	137,539.07	148,305.94	151,140.62	151,186.17	16
9. Tools	39,409.27	36,762.36	40,446.44	40,024.91	43,997.21	50,353.90	4
10. Laboratory Equipment	9,299.65	9,305.50	9,839.82	9,733.85	9,733.85	9,733.85	
11. Automotive & Transportation Equipment	33,844.37	43,194.19	44,170.57	45,182.79	47,052.35	49,594.11	5
12. Furniture and Fixtures	54,138.75	56,319.22	60,252.84	60,136.41	60,975.38	63,165.83	6
13. Preliminary Operations	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	
14. Construction Work in Progress	--	166,629.22	15,282.81	35,553.97	194,281.26	487,644.06	
15. Total	$35,434,374.64	$35,736,635.96	$35,859,301.14	$36,010,973.89	$36,352,389.51	$36,935,613.65	$37,12

Dec. 31, 1932 (2)	Dec. 31, 1933 (3)	Dec. 31, 1934 (4)	Dec. 31, 1935 (5)	Dec. 31, 1936 (6)	Dec. 31, 1937 (7)	Dec. 31, 1938 (8)
$ 89,351.41	$ 89,722.66	$ 89,944.81	$ 89,944.81	$ 89,944.81	$ 97,210.83	$ 96,950.83
1,299,231.27	1,459,392.97	1,472,413.32	1,472,727.72	1,467,340.78	1,476,106.71	1,481,841.22
26,935,351.55	26,908,259.43	26,910,586.17	26,960,464.57	27,132,219.90	27,412,912.82	27,671,219.52
6,307,366.84	6,331,398.51	6,431,179.28	6,553,405.19	6,663,043.16	7,009,601.22	7,133,536.33
654,404.32	654,453.34	655,236.59	655,231.48	655,264.16	657,878.53	663,112.95
32,617.45	33,152.17	36,015.57	36,656.08	38,012.42	40,992.47	40,981.62
66,452.33	67,393.59	68,663.36	68,782.07	70,113.58	77,936.15	83,564.71
31,153.38	137,539.07	148,305.94	151,140.62	151,186.17	160,861.20	161,226.06
36,762.36	40,446.44	40,024.91	43,997.21	50,353.90	49,963.66	87,658.06
9,305.50	9,839.82	9,733.85	9,733.85	9,733.85	9,733.85	9,815.99
43,194.19	44,170.57	45,182.79	47,052.35	49,594.11	50,901.66	80,261.94
56,819.22	60,252.84	60,136.41	60,975.38	63,165.85	67,014.66	69,671.08
7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92	7,996.92
166,629.22	15,282.81	35,553.97	194,281.26	487,644.06	4,039.89	590.39
$35,736,635.96	$35,859,301.14	$36,010,973.89	$36,352,389.51	$36,935,613.65	$37,123,150.57	$37,588,427.60

TEXOMA NATURAL GAS COMPANY

STATEMENT OF OPERATING REVENUE AND EXPENSES

		Year 1932 (1)	Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)
1	**Operating Revenue**						
2	Gas Sales						
3	Firm Gas Sales to Natural Gas Pipeline						
4	Company of America	$ 1,924,610.23	$ 1,845,215.28	$ 2,855,269.86	$ 3,221,187.89	$ 3,812,718.15	$ 3,103,981.7
5	Field Sales	9,138.06	9,694.06	7,405.11	7,434.51	13,451.24	75,826.4
6	Total Gas Sales	$ 1,933,748.29	$ 1,854,909.34	$ 2,862,674.97	$ 3,228,622.40	$ 3,826,169.39	$ 3,179,808.2
7	Gasoline Sales	195,675.01	260,256.08	361,915.86	596,042.00	792,017.15	893,807.3
8	Other Operating Income	98,483.89	88,517.85	143,356.79	184,590.69	239,649.60	216,280.1
9	Gross Operating Revenue	$ 2,227,907.19	$ 2,203,683.27	$ 3,367,947.62	$ 4,009,255.09	$ 4,857,836.14	$ 4,289,895.6
10	**Expenses**						
11	**Operation and General Expenses**						
12	Production	$ 265,779.35	$ 223,497.13	$ 270,978.95	$ 324,127.37	$ 376,350.23	$ 371,614.9
13	Pipeline	38,530.15	34,807.22	33,377.12	35,377.96	47,576.44	46,650.1
14	Compressor	41,984.20	41,265.26	77,830.63	139,115.92	195,849.15	196,711.5
15	Gasoline and Refrigerating	79,366.12	116,166.31	140,949.27	206,798.55	262,829.31	286,614.4
16	Telephone	1,346.27	1,387.81	1,077.39	1,317.17	1,826.56	1,450.9
17	Taxes	93,260.67	92,766.26	117,279.00	136,700.26	150,592.08	176,080.5
18	General	157,391.20	111,740.39	110,927.53	122,570.13	106,651.25	108,564.3
19	Total Operation and General Expenses	$ 677,657.96	$ 621,630.38	$ 752,419.89	$ 966,007.36	$ 1,141,675.02	$ 1,187,687.0
20	**Maintenance Expenses**						
21	Production	$ 2,707.90	$ 1,431.65	$ 1,192.26	$ 4,444.67	$ 5,594.75	$ 3,236.3
22	Pipeline	38,386.88	20,261.14	15,766.94	39,230.15	40,829.21	34,062.3
23	Compressor	7,813.58	3,108.02	13,350.68	32,314.47	67,701.80	120,645.9
24	Gasoline & Refrigerating	5,014.85	2,983.60	6,824.91	8,404.72	19,091.78	21,906.3
25	Telephone	3,671.50	3,058.88	3,347.43	3,288.27	2,678.55	3,219.0
26	Total Maintenance Expenses	$ 57,594.71	$ 30,843.29	$ 40,482.22	$ 87,682.28	$ 135,896.09	$ 183,070.0
27	**Total Cost of Retirement**	$ 266.10	$ 8,185.32	$ 20.71	$ 3,433.70	$ 2,190.54	$ 494.2
28	Total Expenses	$ 735,518.77	$ 660,658.99	$ 792,922.82	$ 1,057,123.34	$ 1,279,761.65	$ 1,371,251.2
29	Less Gas Used by Company	22,171.93	19,970.10	42,242.46	97,729.23	128,007.06	124,619.6
30	Net Operation, Maintenance, Retirement, and General Expenses	$ 713,346.84	$ 640,688.89	$ 750,680.36	$ 959,394.11	$ 1,151,754.59	$ 1,246,631.5
31	Net Earnings from Operation before Amortization and Other Charges	$ 1,514,560.35	$ 1,562,994.38	$ 2,617,267.26	$ 3,049,860.98	$ 3,706,081.55	$ 3,043,264.0
32	Accumulated Net Earnings from Operation before Amortization and Other Charges	$ 1,514,560.35	$ 3,077,554.73	$ 5,694,821.99	$ 8,744,682.97	$12,450,764.52	$15,494,023.5
33	Annual Average of Net Earnings from Operation before Amortization and Other Charges	$ 1,514,560.35	$ 1,538,777.36	$ 1,898,273.99	$ 2,186,170.74	$ 2,490,152.90	$ 2,582,338.0

Year 1933 (2)	Year 1934 (3)	Year 1935 (4)	Year 1936 (5)	Year 1937 (6)	Year 1938 (7)	Total Accumulated (8)
$ 1,845,215.28	$ 2,855,269.86	$ 3,221,187.89	$ 3,812,718.15	$ 3,103,981.72	$ 3,510,632.99	$20,273,616.12
9,694.06	7,405.11	7,434.51	13,451.24	75,826.48	22,409.07	145,358.53
$ 1,854,909.34	$ 2,862,674.97	$ 3,228,622.40	$ 3,826,169.39	$ 3,179,808.20	$ 3,533,042.06	$20,418,974.65
260,256.08	361,915.86	596,042.00	792,017.15	893,807.30	665,055.95	3,764,769.35
88,517.85	143,356.79	184,590.69	239,649.60	216,280.12	211,515.84	1,182,394.78
$ 2,203,683.27	$ 3,367,947.62	$ 4,009,255.09	$ 4,857,836.14	$ 4,289,895.62	$ 4,409,613.85	$25,366,138.78
$ 223,497.13	$ 270,978.95	$ 324,127.37	$ 376,350.23	$ 371,614.97	$ 360,187.98	$ 2,192,535.98
34,807.22	33,377.12	35,377.96	47,576.44	46,650.17	52,241.34	288,560.40
41,265.26	77,830.63	139,115.92	195,849.15	196,711.58	187,114.40	879,871.14
116,166.31	140,949.27	206,798.55	262,829.31	286,614.48	228,868.25 x	1,321,592.29
1,387.81	1,077.39	1,317.17	1,826.56	1,450.95	1,372.64 a+g	9,778.79
92,766.26	117,279.00	136,700.26	150,592.08	176,080.53	168,031.97 ✓	934,710.77
111,740.39	110,927.53	122,570.13	106,651.25	108,564.35	118,192.86 a+g	836,037.71
$ 621,630.38	$ 752,419.89	$ 966,007.36	$ 1,141,675.02	$ 1,187,687.03	$ 1,116,009.44	$ 6,463,087.08
$ 1,431.65	$ 1,192.26	$ 4,444.67	$ 5,594.75	$ 3,236.37	$ 3,970.91	$ 22,578.51
20,261.14	15,766.94	39,230.15	40,829.21	34,062.35	27,391.39	215,928.06
3,108.02	13,350.68	32,314.47	67,701.80	120,645.97	71,205.95	316,140.47
2,983.60	6,824.91	8,404.72	19,091.78	21,906.31	15,181.83 x	79,408.00
3,058.88	3,347.43	3,288.27	2,678.55	3,219.00	3,331.81 a+g	22,595.44
$ 30,843.29	$ 40,482.22	$ 87,682.28	$ 135,896.09	$ 183,070.00	$ 121,081.89	$ 656,650.48
$ 8,185.32	$ 20.71	$ 3,433.70	$ 2,190.54	$ 494.21	$ 8,678.19	$ 23,268.77
$ 660,658.99	$ 792,922.82	$ 1,057,123.34	$ 1,279,761.65	$ 1,371,251.24	$ 1,245,769.52	$ 7,143,006.33
19,970.10	42,242.46	97,729.23	128,007.06	124,619.67	121,618.89 ✓	556,359.34
$ 640,688.89	$ 750,680.36	$ 959,394.11	$ 1,151,754.59	$ 1,246,631.57	$ 1,124,150.63	$ 6,586,646.99
$ 1,562,994.38	$ 2,617,267.26	$ 3,049,860.98	$ 3,706,081.55	$ 3,043,264.05	$ 3,285,463.22	$18,779,491.79
$ 3,077,554.73	$ 5,694,821.99	$ 8,744,682.97	$12,450,764.52	$15,494,028.57	$18,779,491.79	$18,779,491.79
$ 1,538,777.36	$ 1,898,273.99	$ 2,186,170.74	$ 2,490,152.90	$ 2,582,338.09	$ 2,682,784.54	$ 2,682,784.54

TEXOMA NATURAL GAS COMPANY

SCHEDULES OF PLANT AND EQUIPMENT AND ACCUMULATED EXPENDITURES FOR LEASEHOLDS

	Dec. 31, 1931 (1)	Dec. 31, 1932 (2)	Dec. 31, 1933 (3)	Dec. 31, 1934 (4)	Dec. 31, 1935 (5)	Dec. 31, 1936 (6)	Dec. 3 193 (7)
Plant and Equipment Exclusive of Leaseholds							
1. Lands in Fee	$ 8,265.20	$ 8,265.20	$ 8,265.20	$ 8,218.64	$ 8,218.64	$ 8,218.64	$ 8,2
2. Right of Way	129,379.26	129,953.65	130,870.26	127,924.93	127,656.67	128,949.77	129,0
3. Gas Wells	1,965,618.77	2,185,931.19	2,259,341.06	2,261,093.13	2,593,074.16	2,797,746.03	3,011,7
4. Gathering Lines	2,919,934.79	2,965,067.37	2,991,385.52	3,003,304.78	3,229,873.69	3,305,734.71	3,376,6
5. Main Lines	2,253,838.53	2,239,966.06	2,239,998.27	2,239,789.51	2,239,789.51	2,228,189.28	2,228,1
6. Compressor Stations	1,585,323.97	1,587,939.43	1,588,483.25	1,594,152.21	1,897,006.85	1,926,054.01	1,943,3
7. Gasoline & Refrigerating Plant	751,294.00	754,483.27	778,101.11	814,335.39	849,916.73	863,794.93	884,7
8. Telephone System	134,581.66	132,306.06	132,306.46	132,306.06	132,774.89	129,668.66	131,0
9. Meters and Regulators	13,545.76	19,017.37	19,687.72	21,135.34	23,781.34	26,006.22	27,7
10. Other Main Line Structures	49,240.95	55,030.02	56,761.87	57,114.29	59,257.96	65,718.20	67,
11. Drilling and Clean-out Tools	--	--	--	--	94,974.14	84,061.52	52,9
12. Tools	5,287.71	13,458.51	15,419.77	16,065.34	13,848.94	11,713.49	11,
13. Laboratory Equipment	5,751.53	6,845.90	6,845.90	7,016.64	7,016.64	7,016.64	7,0
14. Automotive Equipment	20,491.96	28,364.42	23,566.60	24,784.85	23,748.22	25,201.43	24,1
15. Furniture and Fixtures	20,601.34	21,591.80	21,574.49	21,984.99	22,212.17	22,606.58	23,5
16. Booster Station	--	--	--	--	--	--	--
17. Construction Work in Progress	--	72,478.53	1,253.70	85,908.62	38,517.85	24,341.08	23,1
18. Total Plant & Equipment Exclusive							
19. of Leaseholds	$ 9,863,155.43	$10,220,698.78	$10,273,861.18	$10,415,134.72	$11,361,668.40	$11,655,021.19	$11,950,
20. **Accumulated Expenditures for Leaseholds**	15,816,428.15	15,847,395.18	15,863,168.52	15,859,130.08	15,863,551.98	15,893,462.08	15,893,
21. Total	$25,679,583.58	$26,068,093.96	$26,137,029.70	$26,274,264.80	$27,225,220.36	$27,548,483.27	$27,844,

Dec. 31, 1932 (2)	Dec. 31, 1933 (3)	Dec. 31, 1934 (4)	Dec. 31, 1935 (5)	Dec. 31, 1936 (6)	Dec. 31, 1937 (7)	Dec. 31, 1938 (8)
$ 8,265.20	$ 8,265.20	$ 8,218.64	$ 8,218.64	$ 8,218.64	$ 8,218.64	$ 8,218.64
129,953.65	130,870.26	127,924.93	127,656.67	128,949.77	129,093.65	129,876.21
2,185,931.19	2,259,341.06	2,261,093.13	2,593,074.16	2,797,746.03	3,011,787.47	3,185,974.36
2,965,067.37	2,991,385.52	3,003,304.78	3,229,873.69	3,305,734.71	3,376,652.73	3,418,137.29
2,239,966.06	2,239,998.27	2,239,789.51	2,239,789.51	2,228,189.28	2,228,189.28	2,227,350.84
1,587,939.43	1,588,483.25	1,594,152.21	1,897,006.85	1,926,054.01	1,943,396.98	2,002,512.53
754,483.27	778,101.11	814,335.39	849,916.73	863,794.93	884,716.44	888,833.22
132,306.06	132,306.46	132,306.06	132,774.69	129,668.66	131,019.03	131,019.03
19,017.37	19,687.72	21,135.34	23,781.34	26,006.22	27,723.29	30,194.44
55,030.02	56,761.87	57,114.29	59,257.96	65,718.20	67,808.64	70,484.86
--	--	--	94,974.14	84,061.52	52,995.47	50,359.52
13,458.51	15,419.77	16,065.34	13,848.94	11,713.49	11,268.79	16,398.68
6,845.90	6,845.90	7,016.64	7,016.64	7,016.64	7,016.64	7,359.53
28,364.42	23,565.60	24,784.85	23,748.22	25,201.43	24,139.43	27,613.31
21,591.80	21,574.49	21,984.99	22,212.17	22,606.58	23,596.75	23,818.51
--	--	--	--	--	--	6,796.70
72,478.53	1,253.70	85,908.62	38,517.85	24,341.08	23,132.53	17,103.56
$10,220,698.78	$10,273,861.18	$10,415,134.72	$11,361,668.40	$11,655,021.19	$11,950,755.76	$12,242,051.23
15,847,395.18	15,863,168.52	15,859,130.08	15,863,551.98	15,893,462.08	15,893,513.08	15,893,513.08
$26,068,093.96	$26,137,029.70	$26,274,264.80	$27,225,220.36	$27,548,483.27	$27,844,268.84	$28,135,564.31

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Texoma Natural Gas Company

Details of Leasehold Account

As at December 31, 1931.

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Acquisition of Acreage		
Cities Service Company, (Including Delmer Oil Co.)	$2,085,559.74	
Columbian Carbon Company	496,469.03	
Insull Son & Co. (Gulf Acreage)	5,307,965.86	
Phillips Petroleum Company	1,589,906.24	
Magnolia Petroleum Company	2,009,227.65	
Skelly Oil Company	1,264,907.76	
The Texas Company	2,171,033.31	
Other Acquisitions and Renewals	9,385.26	$14,934,454.85
Overheads		
Interest During Construction	$ 798,006.70	
Preliminary Expense	83,966.60	881,973.30
Total Expenditures to December 31, 1931		$15,816,428.15

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TEXOMA NATURAL GAS COMPANY

DETAILS OF EXPENDITURES FOR LEASEHOLDS

	December 31, 1931 (1)	Year 1932 (2)	Year 1933 (3)	Year 1934 (4)	Year 1935 (5)	Year 1936 (6)	Y 1
1. Expenditures During the Year	$ --	$ 30,967.03	$ 15,725.80	$ 10.00	$ 9,351.00	$ 3,734.23	$
2. Adjustment for Cost of Property							
3. Exchanged for Leasehold	--	--	--	--	--	92,175.87	
4. Bond Expense Charged to Account in							
5. 1933 but Reversed in 1934	--	--	47.54	47.54*	--	--	
6. Total	$ --	$ 30,967.03	$ 15,773.34	$ 37.54*	$ 9,351.00	$ 95,910.10	$
7. Less:							
8. Sale Price of Acreage Sold	$ --	$ --	$ --	$ 4,000.00	$ 4,430.00	$ --	$
9. Boot Received on Exchanges	--	--	--	--	500.00	66,000.00	
10. Total	$ --	$ --	$ --	$ 4,000.00	$ 4,930.00	$ 66,000.00	$
11. Net Additions for the Year	$ --	$ 30,967.03	$ 15,773.34	$ 4,037.54*	$ 4,421.00	$ 29,910.10	$
12. Balance from First of Year	--	15,816,428.15	15,847,395.18	15,863,168.52	15,859,130.98	15,863,551.98	15,89
13. Total at End of Year	$15,816,428.15	$15,847,395.18	$15,863,168.52	$15,859,130.98	$15,863,551.98	$15,893,462.08	$15,89

* Red

31,	Year 1932 (2)	Year 1933 (3)	Year 1934 (4)	Year 1935 (5)	Year 1936 (6)	Year 1937 (7)	Year 1938 (8)
	$ 30,967.03	$ 15,725.80	$ 10.00	$ 9,351.00	$ 3,734.25	$ 51.00	$ --
	--	--	--	--	92,175.87	--	--
	--	47.54	47.54*	--	--	--	--
	$ 30,967.03	$ 15,773.34	$ 37.54*	$ 9,351.00	$ 95,910.10	$ 51.00	$ --
	$ --	$ --	$ 4,000.00	$ 4,430.00	$ --	$ --	$ --
	--	--	--	500.00	66,000.00	--	--
	$ --	$ --	$ 4,000.00	$ 4,930.00	$ 66,000.00	$ --	$ --
	$ 30,967.03	$ 15,773.34	$ 4,037.54*	$ 4,421.00	$ 29,910.10	$ 51.00	$ --
	15,816,428.15	15,847,395.16	15,863,168.52	15,859,130.98	15,863,551.98	15,893,462.08	15,893,513.08
5	$15,847,395.18	$15,863,168.52	$15,859,130.98	$15,863,551.98	$15,893,462.08	$15,893,513.08	$15,893,513.08

Exhibit 140

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY
(COMBINED)

EARNINGS STATEMENT COVERING ENTIRE LIFE OF PROJECT

Line No.		Total 1932-1938 Inclusive	Total 1939-1954 Inclusive	Total 1932-1954 Inclusive	Average 1932-1954 Inclusive
	Revenue				
1	From Domestic Sales	$59,480,464	$164,835,603	$224,316,067	$ 9,752,872
2	From Industrial Sales	14,781,390	46,190,085	60,971,475	2,650,934
3	From Texoma Field Sales	145,358	256,591	401,949	17,476
4	Total Gas Sales	$74,407,212	$211,282,279	$285,689,491	$12,421,282
5	From Gasoline Sales	3,764,769	8,974,017	12,738,786	553,860
6	From Other Operating Income	113,563	193,531	307,094	13,352
7	Total Revenue	$78,285,544	$220,449,827	$298,735,3[illegible]	$12,988,494
	Operation, Maintenance and Retirement Expense				
8	Operation Expense	$24,053,765	$ 80,994,386	$105,048,151	$ 4,567,311
9	Company Used Gas (Deduct)	1,730,164	6,272,871	8,003,035	347,958
10	Maintenance Expenses	2,514,019	13,785,303	16,299,322	708,666
11	Expense of Retiring Property	42,832	109,449	152,281	6,621
12	Maintenance Contingencies (10%)	-	1,389,473	1,389,473	60,412
13	Net Operation, Maintenance and Retirement Expense	$24,880,452	$ 90,005,740	$114,886,192	$ 4,995,052
14	Revenue Remaining for Amortization and Return	$53,405,092	$130,444,087	$183,849,179	$ 7,993,442
15	Capital Expenditure Excluding Cost of Gas Reserves	$50,305,248	$ 11,900,174	$ 62,205,422	$ -
16	Replacement Contingencies (10%)	-	256,406	256,406	-
17	Cost of Gas Reserves	15,893,513	2,800	15,896,313	-
18	Working Capital	975,000	-	975,000	-
19	Total Capital Expenditure and Working Capital	$67,173,761	$ 12,159,380	$ 79,333,141	$71,777,589
20	**Liquidating Salvage Value of**				
21	(a) Capital Expenditures	-	-	457,452	-
22	(b) Warehouse Stocks	-	-	24,314	-
23	(c) Working Capital Cash	-	-	567,366	-
24	Total Liquidating Salvage Value	-	-	$ 1,049,132	-
25	Total Capital Expenditure and Working Capital less Total Liquidating Salvage Value (Total Amortization)	-	-	$ 78,284,009	÷ 3403652
26	Revenue Remaining for Return	-	-	105,565,170	$ 4,589,790
27	Average Rate of Return	-	-	-	6.39%

EXHIBIT 141.

Natural Gas Pipeline Company of America and Texoma Natural Gas Company (Combined)

Earnings Statement Based on Book Cost as of January 1, 1939

Line Number		As of Jan. 1, 1939	Total 1939-1954	Average 1939-1954
	Revenue			
1	From Domestic Sales	$ —	$164,835,603	$10,302,225
2	From Industrial Sales	—	46,190,085	2,886,880
3	From Texoma Field Sales	—	256,591	16,037
4	Total Gas Sales	—	$211,282,279	$13,205,142
5	From Gasoline Sales	—	8,974,017	560,876
6	From Other Operating Income	—	193,531	12,096
7	Total Revenue	—	$220,449,827	$13,778,114
	Operation and Maintenance			
8	Operation Expenses	—	$ 80,994,386	$ 5,062,149
9	Company Used Gas (deduct)	—	6,272,871	392,054
10	Maintenance Expense	—	13,785,303	861,581
11	Maintenance Contingencies (10%)	—	1,378,533	86,158
12	Net Operation Maintenance	—	$ 89,885,351	$ 5,617,834
13	Revenue Remaining for Replacements, Amortization and Return	—	$130,564,476	$ 8,160,280
	Reserve for Replacements			
14	Capital Expenditure for Replacements	—	$ 3,105,244	$ 194,078
15	Cost of Retiring Capital Replaced	—	109,449	6,841
16	Salvage Value of Retirements (deduct)	—	541,253	33,828
17	Replacement Contingencies (10%)	—	267,346	16,709
18	Total of Reserve for Replacements	—	$ 2,940,786	$ 183,800
19	Capital Expenditures per Books, excluding Gas Reserves	$49,830,479		
20	Viewed Depreciation (deduct)	2,485,079		
21	Cost of Gas Reserves less Depletion to January 1, 1939	12,402,884		
22	Cost of Additional Property	—	$ 9,338,983	—
23	Going Concern Value	8,500,000	—	—
24	Working Capital	975,000	—	—
25	Total	$69,223,284	$ 78,562,267	—
26	Total Rate Base	—	—	$75,305,459
27	Liquidation Salvage Value of			
28	(a) Capital Expenditures	—	$ 457,452	—
29	(b) Warehouse Stocks	—	24,314	—
30	(c) Working Capital Cash	—	567,306	—
31	Total Liquidating Salvage Value	—	$ 1,049,132	—
32	Total To Be Amortized	—	$ 77,513,135	—
33	Amortization Allowance	—	$ 69,960,256	$ 4,372,516
34	Revenue Remaining for Return	—	$ 57,063,434	$ 3,603,964
35	Rate of Return			4.79%

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY
(Combined)

EARNINGS STATEMENT COVERING ENTIRE LIFE OF PROJECT

Line No.		Total 1932-1938 Inclusive	1939	1940	1941	1942
	Revenue					
1	From Domestic Sales	$59,480,464	$10,717,297	$10,717,297	$10,717,297	$10,717,297
2	From Industrial Sales	14,781,390	3,308,959	3,308,959	3,308,959	3,308,959
3	From Texoma Field Sales	145,358	21,657	21,983	20,653	19,320
4	Total Gas Sales	74,407,212	14,047,913	14,048,239	14,046,909	14,045,576
5	From Gasoline Sales	3,764,769	661,317	625,611	600,550	601,942
6	From Other Operating Income	113,563	8,088	10,235	13,281	15,512
7	Total Revenue	78,285,544	14.717,318	14,684,085	14,660,740	14,663,030
	Operation, Maintenance & Retirement Expense					
8	Operation Expenses	24,053,765	4,655,448	4,842,606	4,785,052	4,999,748
9	Company Used Gas (Deduct)	1,730,164	386,150	408,380	409,991	411,823
10	Maintenance Expenses	2,514,019	568,317	615,133	787,036	694,785
11	Expense of Retiring Property	42,832	8,692	8,168	17,688	18,226
12	Maintenance Contingencies (10%)	-	80,701	62,330	80,472	71,301
13	Net Operation, Maintenance & Retirement Expense	24,880,452	4,927,008	5,119,857	5,260,257	5,372,237
14	Revenue Remaining for Amortization and Return	53,405,092	9,790,310	9,564,228	9,400,483	9,290,793
15	Capital Expenditures Excluding Cost of Gas Reserves	50,305,248	909,456	1,299,715	1,261,214	1,348,641
16	Replacement Contingencies (10%)	-	5,570	22,744	33,516	20,124
17	Cost of Gas Reserves	15,893,513	2,800	-	-	-
18	Working Capital	975,000	-	-	-	-
19	Total Capital Expenditures & Working Capital	67,173,761	68,091,587 567 966 67 324,371	69,414,046	70,708,776	72,077,541

1942	1943	1944	1945	1946	1947	1948	1949	1950	1951
$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717.297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,29
3,308,959	3.308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,95
19,320	19,320	19,320	18,480	17,640	16,800	15,960	15,120	14,280	13,44
14,045,576	14,045,576	14,045,576	14,044,736	14,043,896	14,043,056	14,042,216	14,041,376	14,040,536	14,039,69
601,942	601,558	601,573	600,781	601,542	601,317	600,572	600,683	600,939	600,98
15,512	13,514	11,845	9,919	14,647	10,269	11,631	8,768	14,338	10,29
14,663,030	14,660,648	14,658,994	14,655,436	14,660,085	14,654,642	14,654,419	14,650,827	14,655,813	14,650,98
4,999,748	5,096,837	5,163,248	5,323,553	5,444,732	5,670,835	5,717,032	5,768,934	5,775,578	5,798,69
411,823	415,361	416,608	416,525	424,985	434,430	439,626	444,478	449,853	456,72
694,785	783,255	795,888	807,417	911,163	996,202	989,745	1,043,869	1,044,092	1,062,48
18,226	13,416	8,994	14,446	5,846	2,257	1,796	634	836	1,17
71,301	79,667	80,288	82,186	91,701	99,846	99,154	104,450	104,493	106,36
5,372,237	5,557,814	5,629,816	5,811,077	6,028,457	6,334,710	6,368,101	6,473,409	6,475,146	6,511,99
9,290,793	9,102,834	9,029,178	8,844,359	8,631,628	8,319,932	8,286,318	8,177.418	8,180,667	8,138,99
1,348,641	906,361	814,123	1,018,947	1,138,146	850,356	692,192	521,517	530,139	410,22
20,124	28,571	24,560	54,973	30,378	12,090	12,904	6,306	6,549	7,16
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
72,077,541	73,012,473	73,851,156	74,899,076	76,067,600	76,930,046	77,635,222	78,163,045	78,699,733	79,117,11

1949	1950	1951	1952	1953	1954	Total 1932-1954 Inclusive	Average 1932-1954 Inclusive
$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,160,423	$ 4,633,082	$224,316,067	$ 9,752,872
3,308,959	3,308,959	3,308,959	2,854,626	318,992	-	60,971,475	2,650,934
15,120	14,280	13,440	11,844	7,434	3,340	401,949	17,476
14,041,376	14,040,536	14,039,696	13,583,767	10,486,849	4,636,362	285,689,491	12,421,282
600,683	600,939	600,988	567,463	355,597	151,584	12,738,786	553,860
8,768	14,338	10,298	10,894	11,439	18,853	307,094	13,352
14,650,827	14,655,813	14,650,982	14,162,124	10,853,885	4,806,799	298,735,371	12,988,494
5,768,934	5,775,578	5,798,691	5,668,024	4,084,025	2,200,043	105,046,151	4,567,311
444,478	449,853	456,729	442,197	216,832	88,909	8,003,035	347,958
1,043,869	1,044,092	1,062,485	990,876	873,991	793,049	16,299,322	708,666
634	836	1,177	4,967	1,042	1,264	152,281	6,621
104,450	104,493	106,366	99,584	87,503	79,431	1,389,473	60,412
6,473,409	6,475,146	6,511,990	6,321,254	4,829,729	2,984,878	114,886,192	4,995,052
8,177,418	8,180,667	8,138,992	7,840,870	6,024,156	1,821,921	183,849,179	7,993,442
521,517	530,139	410,220	144,914	54,807	5,426	-	-
6,306	6,549	7,165	6,738	3,595	543	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
78,163,045	78,699,733	79,117,118	79,268,770	79,327,172	79,333,141	79,333,141	71,777,589

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NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY
(Combined)

Earnings Statement Based on Book Cost as of Jan. 1, 1939

Line No.

Revenue

1 From Domestic Sales
2 From Industrial Sales
3 From Texoma Field Sales
4 Total Gas Sales
5 From Gasoline Sales
6 From Other Operating Income
7 Total Revenue

Operation and Maintenance

8 Operation Expenses
9 Company Used Gas (deduct)
10 Maintenance Expense
11 Maintenance Contingencies (10%)
12 Net Operation and Maintenance
13 Revenue Remaining for Replacements, Amortization and Return

Reserve for Replacements

14 Capital Expenditure for Replacements
15 Cost of Retiring Capital Replaced
16 Salvage Value of Retirements (deduct)
17 Replacement Contingencies (10%)
18 Total of Reserve for Replacements
19 Capital Expenditures per Books, excluding Gas Reserves
20 Viewed Depreciation (deduct)
21 Cost of Gas Reserves less Depletion to January 1, 1939
22 Cost of Additional Property
23 Going Concern Value
24 Working Capital
25 Total [redacted]
26 Total Rate Base

As of Jan.1,1939	1939	1940	1941	
$ -	$10,717,297	$10,717,297	$10,717,297	$
-	3,308,959	3,308,959	3,308,959	
-	21,657	21,983	20,653	
-	14,047,913	14,048,239	14,046,909	
-	661,317	625,611	600,550	
-	8,088	10,235	13,281	
-	14,717,318	14,684,085	14,660,740	
-	4,655,448	4,842,606	4,785,052	
-	396,150	408,380	409,991	
-	598,317	615,133	787,036	
-	59,832	61,513	78,704	
-	4,917,447	5,110,872	5,240,801	
-	9,799,871	9,573,213	9,419,939	
-	106,530	249,924	389,053	
-	8,692	8,168	17,688	
-	50,832	22,479	53,903	
-	6,439	23,561	35,284	
-	70,829	259,174	388,122	
49,830,479				
2,485,079				
12,402,884				
-	856,558	1,072,270	926,064	
8,500,000				
975,000				
69,223,284	70,079,842	71,152,112	72,078,176	7
-	75,305,459	75,305,459	75,305,459	7

1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	
$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,
3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,
20,653	19,320	19,320	19,320	18,480	17,640	16,800	15,960	15,120	14,280	
14,046,909	14,045,576	14,045,576	14,045,576	14,044,736	14,043,896	14,043,056	14,042,216	14,041,376	14,040,536	14,
600,550	601,942	601,558	601,573	600,731	601,542	601,317	600,572	600,683	600,939	
13,281	15,512	13,514	11,845	9,919	14,647	10,269	11,631	8,768	14,338	
14,660,740	14,663,030	14,660,648	14,658,994	14,655,436	14,660,085	14,654,642	14,654,419	14,650,827	14,655,813	14,
4,785,052	4,999,748	5,096,837	5,163,248	5,323,553	5,444,732	5,670,835	5,717,032	5,768,934	5,775,578	5,
409,991	411,823	415,361	416,602	416,525	424,985	434,430	439,626	444,478	449,853	
787,036	694,785	783,255	793,888	807,417	911,163	996,202	989,745	1,043,869	1,044,092	1,
78,704	69,479	78,326	79,389	80,742	91,116	99,620	98,975	104,387	104,409	
5,240,801	5,352,189	5,543,057	5,619,923	5,795,187	6,022,026	6,332,227	6,366,126	6,472,712	6,474,226	6,
9,419,939	9,310,841	9,117,591	9,039,071	8,860,249	8,638,059	8,322,415	8,288,293	8,178,115	8,181,587	8,
389,053	242,976	317,879	264,952	380,794	333,410	144,261	154,689	84,763	89,465	
17,688	18,226	13,416	8,994	14,446	5,846	2,257	1,796	634	836	
53,903	41,742	32,178	19,360	31,073	29,630	23,359	24,858	21,707	23,970	
35,284	21,946	29,912	25,459	36,417	30,963	12,315	13,163	6,369	6,633	
388,122	241,406	329,029	280,045	400,584	340,589	135,475	144,790	70,059	72,964	
926,064	1,147,407	620,660	568,531	663,226	834,366	729,454	562,361	458,461	464,644	
72,078,176	73,225,583	73,846,243	74,414,774	75,078,000	75,912,366	76,641,820	77,204,181	77,662,642	78,187,286	78,
75,305,459	75,305,459	75,305,459	75,305,459	75,305,459	75,305,459	75,305,459	75,305,459	75,305,459	75,305,459	75,

1949	1950	1951	1952	1953	1954	Total 1939-1954	Average 1939-1954
$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,160,423	$ 4,633,022	$164,835,603	$10,302,225
3,308,959	3,308,959	3,308,959	2,854,626	318,992	-	46,190,085	2,886,880
15,120	14,200	13,440	11,844	7,434	3,340	256,591	16,037
14,041,376	14,040,536	14,039,696	13,583,767	10,486,849	4,636,362	211,282,279	13,205,142
600,683	600,939	600,988	567,463	355,597	151,584	8,974,017	560,876
8,768	14,338	10,298	10,894	11,439	18,853	193,531	12,096
14,650,827	14,655,813	14,650,982	14,162,124	10,853,885	4,806,799	220,449,827	13,778,114
5,768,934	5,775,578	5,798,691	5,668,024	4,084,025	2,200,043	80,994,336	5,062,149
444,478	449,853	456,729	442,197	216,832	88,909	6,272,871	392,054
1,043,869	1,044,092	1,062,485	990,876	873,991	793,049	13,785,303	861,581
104,387	104,409	106,249	99,088	87,399	79,305	1,378,533	86,158
6,472,712	6,474,226	6,510,696	6,315,791	4,828,583	2,983,488	89,885,351	5,617,834
8,178,115	8,181,587	8,140,286	7,846,333	6,025,302	1,823,311	130,564,476	8,160,280
84,763	89,465	92,890	191,438	55,840	6,380	3,105,844	194,078
634	836	1,177	4,967	1,042	1,264	109,449	6,841
21,707	23,970	21,250	124,067	19,891	954	541,253	33,828
6,369	6,633	7,282	7,234	3,699	669	267,346	16,709
70,059	72,964	80,099	79,572	40,690	7,359	2,940,786	183,800
458,461	464,644	338,580	77,543	18,858		9,338,903	-
77,662,642	78,127,286	78,465,866	78,543,409	78,562,267	78,562,267	78,562,267	-
75,305,459	75,305,459	75,305,459	75,305,459	75,305,459	75,305,459		75,305,459

EXHIBIT 142.

Natural Gas Pipeline Company of America and Texoma Natural Gas Company
(Combined)

Earnings Statement Based on Reproduction Cost New Less Existing Depreciation as of June 1, 1939

Line Number		As of June 1, 1939	Total 6-1-39 to 12-31-54 Inclusive	Average Yearly 6-1-39 to 12-31-54 Inclusive
	Revenue			
1	From Domestic Sales	$	$160,370,063	$10,291,127
2	From Industrial Sales		44,811,352	2,875,595
3	From Texoma Field Sales		247,567	15,887
4	Total Gas Sales		$205,428,982	$13,182,609
5	From Gasoline Sales		8,698,468	558,190
6	From Other Operating Income		190,161	12,203
7	Total Revenue		$214,317,611	$13,753,002
	Operation and Maintenance			
8	Operation Expense		$ 79,054,616	$ 5,073,023
9	Company Used Gas (deduct)		6,107,808	391,945
10	Maintenance Expense		13,536,004	868,620
11	Maintenance Contingencies (10%)		1,353,603	86,862
12	Net Operation and Maintenance		$ 87,836,415	$ 5,636,560
13	Revenue Remaining for Replacement, Amortization Return		$126,481,196	$ 8,116,442
	Reserve for Replacements			
14	Capital Expenditure for Replacements		$ 3,086,671	$ 198,075
15	Cost of Retiring Capital Replaced		109,063	6,999
16	Salvage Value of Retirement (deduct)		531,642	34,116
17	Replacement Contingencies (10%)		266,411	17,096
18	Total of Reserve for Replacements		$ 2,930,503	$ 188,054
19	Reproduction Cost New Excluding Gas Reserves	$56,302,250	$ —	$ —
20	Viewed Depreciation (deduct)	2,866,758	—	—
21	Value of Gas Reserves	13,288,552	—	—
22	Cost of Additional Property	—	9,145,083	—
23	Going Concern Value	8,500,000	—	—
24	Working Capital	975,000	—	—
25	Total	$76,199,044	$ 85,344,127	$ —
26	Total Rate Base			$82,245,330
27	Liquidating Salvage Value of			
28	(a) Capital Expenditure	—	$ 457,452	—
29	(b) Warehouse Stocks	—	24,314	—
30	(c) Working Capital Cash	—	567,363	—
31	Total Liquidating Salvage Value	$ —	$ 1,049,132	$ —
32	Total to be Amortized		$ 84,294,995	
33	Amortization Allowance		$ 76,302,249	$ 4,896,401
34	Revenue Remaining for Return		$ 47,248,444	$ 3,031,987
35	Rate of Return			3.69%

EARNINGS STATEMENT BASED ON REPRODUCTION COST NEW LESS EXISTING DEPRECIATION AS OF JUNE 1, 1939

Line No.	
	Revenue
1	From Domestic Sales
2	From Industrial Sales
3	From Texoma Field Sales
4	Total Gas Sales
5	From Gasoline Sales
6	From Other Operating Income
7	Total Revenue
	Operation and Maintenance
8	Operation Expenses
9	Company Used Gas (Deduct)
10	Maintenance Expense
11	Maintenance Contingencies (10%)
12	Net Operation and Maintenance
13	Revenue Remaining for Replacements, Amortization and Retur
	Reserve for Replacements
14	Capital Expenditure for Replacements
15	Cost of Retiring Capital Replaced
16	Salvage Value of Retirements (Deduct)
17	Replacement Contingencies (10%)
18	Total of Reserve for Replacements
19	Reproduction Cost New, Excluding Gas Reserves
20	Viewed Depreciation (Deduct)
21	Value of Gas Reserves
22	Cost of Additional Property
23	Going Concern Value
24	Working Capital
25	Total [redacted]
26	Total Rate Base

As of June 1, '39	June 1 to December 31, 1939 Average Monthly Basis	1940	1941	1942
$	$ 6,251,757	$10,717,297	$10,717,297	$10,717,297
	1,930,226	3,308,959	3,308,959	3,308,959
	12,633	21,983	20,653	19,320
	8,194,616	14,048,239	14,046,909	14,045,576
	385,768	625,611	600,550	601,942
	4,718	10,235	13,281	15,512
	8,585,102	14,684,085	14,660,740	14,663,030
	2,715,678	4,842,606	4,785,052	4,999,748
	231,087	408,380	409,991	411,823
	349,018	615,133	787,036	694,785
	34,902	61,513	78,704	69,479
	2,868,511	5,110,872	5,240,801	5,352,189
	5,716,591	9,573,213	9,419,939	9,310,841
	87,957	249,924	389,053	242,976
	8,306	8,168	17,688	18,226
	41,221	22,479	53,903	41,742
	5,504	23,561	35,284	21,946
	60,546	259,174	388.122	241,406
56,302,250				
2,866,758				
13,288,552				
-	662,658	1,072,270	926,064	1,147,407
8,500,000	-	-	-	-
975,000	-	-	-	-
$76,199,044	$76,861,702	$77,933,972	$78,860,036	$80,007,443
-	$82,245,330	$82,245,330	$82,245,330	$82,245,330

1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951
$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,717,297
3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959	3,308,959
20,653	19,320	19,320	19,320	18,480	17,640	16,800	15,960	15,120	14,280	13,440
14,046,909	14,045,576	14,045,576	14,045,576	14,044,736	14,043,896	14,043,056	14,042,216	14,041,376	14,040,536	14,039,696
600,550	601,942	601,558	601,573	600,781	601,542	601,317	600,572	600,683	600,939	600,988
13,281	15,512	13,514	11,845	9,919	14,647	10,269	11,631	8,768	14,338	10,298
14,660,740	14,663,030	14,660,648	14,658,994	14,655,436	14,660,085	14,654,642	14,654,419	14,650,827	14,655,813	14,650,982
4,785,052	4,999,748	5,096,837	5,163,248	5,323,553	5,444,732	5,670,835	5,717,032	5,768,934	5,775,578	5,798,691
409,991	411,823	415,361	416,602	416,525	424,985	434,430	439,626	444,478	449,853	456,729
787,036	694,785	783,255	793,888	807,417	911,163	996,202	989,745	1,043,869	1,044,092	1,062,485
78,704	69,479	78,326	79,389	80,742	91,116	99,620	98,975	104,387	104,409	106,249
5,240,801	5,352,189	5,543,057	5,619,923	5,795,187	6,022,026	6,332,227	6,366,126	6,472,712	6,474,226	6,510,696
9,419,939	9,310,841	9,117,591	9,039,071	8,860,249	8,638,059	8,322,415	8,288,293	8,178,115	8,191,587	8,140,286
389,053	242,976	317,879	264,952	380,794	333,410	144,261	154,689	84,763	89,465	92,890
17,688	18,226	13,416	8,994	14,446	5,846	2,257	1,796	634	836	1,177
53,903	41,742	32,178	19,360	31,073	29,630	23,359	24,853	21,707	23,970	21,250
35,284	21,946	29,912	25,459	36,417	30,963	12,316	13,163	6,369	6,633	7,282
388.122	241,406	329,029	280,045	400,584	340,589	135,475	144,790	70,059	72,964	80,099
926,064	1,147,407	620,660	568,531	663,226	834,366	729,454	562,361	458,461	464,644	338,580
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
$78,860,036	$80,007,443	$80,628,103	$81,196,634	$81,859,860	$82,694,226	$83,423,680	$83,986,041	$84,444.502	$84.909,146	$85,247,726
$82,245,330	$82,245,330	$82,245,330	$82,245,330	$82,245,330	$82,245,330	$82,245,330	$82,245,330	$82,245,330	$82,245.330	$82,245,330

1949	1950	1951	1952	1953	1954
$10,717,297	$10,717,297	$10,717,297	$10,717,297	$10,160,423	$ 4,633,0
3,308,959	3,308,959	3,308,959	2,854,626	318,992	-
15,120	14,280	13,440	11,844	7,434	3,3
14,041,376	14,040,536	14,039,696	13,583,767	10,486,849	4,636,3
600,683	600,939	600,988	567,463	355,597	151,5
8,768	14,338	10,298	10,894	11,439	18,3
14,650,827	14,655,813	14,650,982	14,162,124	10,853,885	4,806,7
5,768,934	5,775,578	5,798,691	5,668,024	4,084,025	2,200,0
444,478	449,853	456,729	442,197	216,832	88,9
1,043,869	1,044,092	1,062,485	990,876	873,991	793,0
104,387	104,409	106,249	99,038	87,399	79,3
6,472,712	6,474,226	6,510,696	6,315,791	4,828,583	2,983,4
8,178,115	8,181,587	8,140,286	7,846,333	6,025,302	1,323,31
84,763	89,465	92,890	191,433	55,840	6,33
634	836	1,177	4,967	1,042	1,26
21,707	23,970	21,250	124,067	19,391	95
6,369	6,633	7,282	7,234	3,699	66
70,059	72.964	80,099	79,572	40,690	7,35
458,461	464,644	338,580	77,543	18,858	-
-	-	-	-	-	-
-	-	-	-	-	-
$84,444.502	$84,909,146	$85,247,726	$85,325,269	$85,344,127	$85,344,12
$82,245,330	$82,245.330	$82,245,330	$82,245,330	$82,245,330	$82,245.33

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VOLUME VII.

TRANSCRIPT OF RECORD

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1941

No. 265

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, PETITIONERS

vs.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY

No. 268

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, PETITIONERS

vs.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT

Petitions for certiorari filed July 12, 1941, July 14, 1941

Certiorari granted October 13, 1941

IN THE

United States Circuit Court of Appeals
For the Seventh Circuit

No. 7454

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND TEXOMA NATURAL GAS COMPANY,
Petitioners,

vs.

FEDERAL POWER COMMISSION AND ILLINOIS
COMMERCE COMMISSION,
Respondents.

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EXHIBIT NO. 168.

Poor's
Public Utility Volume
1939
Federal Power Commission
Library

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NATURAL GAS—CUSTOMER CLASSIFICATION

	SALES (billion cu. ft.)				REVENUE ($thous.)			
	†Domestic	Commercial	‡Industrial	§Total	†Domestic	Commercial	‡Industrial	§Total
	335.418	58.641	585.271	991.036	223.464	32.579	117.857	376.250
	347.979	61.702	569.993	990.066	237.483	33.994	112.171	385.857
	340.501	68.793	489.217	908.270	227.739	37.899	89.276	366.216
	320.641	77.100	427.151	834.010	228.063	38.986	74.134	342.651
	300.296	73.781	479.629	862.268	213.496	37.165	77.148	329.889
	303.321	79.153	582.387	976.141	213.619	38.376	90.123	347.067
	330.733	88.115	632.073	1,053.906	225.415	42.314	106.593	376.388
	359.853	98.709	764.820	1,215.920	237.210	46.463	126.[illegible]	412.444
	380.294	103.306	836.166	1,316.190	248.069	48.613	148.294	443.219
	349.285	99.845	736.313	1,200.607	244.329	47.574	125.108	419.474
Change 1929-38	+4.1	+70.3	+25.8	+21.1	+9.3	+46.0	+6.1	+11.5

† Including House Heating. ‡ Including Elec. Gen. § Including Miscellaneous.

urce: American Gas Association.

vidual company, and depends on the character f the territory and the competitive position of ther fuels such as coal, oil and electricity.

NATURAL GAS INDUSTRY

mpetitive sition:

vorable

Persistent growth has been the outstanding characteristic of the natural gas industry. The 1929-32 depression proved to be only a temporary check, and new output reds have been established in each year since 1934. en disregarding probable gains in business acity, the outlook would favor continued growth. e reasons are: 1) Vast new sources of supply h long-lived reserves have been developed in Southwest and in California within the last ade, allaying fears as to the industry's life. Extensive new pipe line transportation systems e been built to carry this gas to the large ulation centers, notably those of the Middle t and Great Lakes regions. This has opened new markets for future exploitation. Natural gas is clean and has a higher heat than manufactured gas. Moreover, it can successfully mixed with manufactured gas. most localities, natural gas is cheaper so that can compete successfully with coal and oil as strial fuel. Even in the heart of coal and oil ducing regions, natural gas is being sought on rice basis. Moreover, as costs and prices geny advance with industrial recovery, or infla-, the cost of natural gas should be among the t affected. 5) Large gas utility companies aldy operating in industrial centers have found it rable to take over the distribution of natural which has generally made it unnecessary to licate sales and administration facilities. Furrmore, privately owned utilities have been able rotect themselves against the threat of munil competition by securing contracts for the ivery of natural gas.

However, implications as to aggregate profit ins are not so clearly defined. As the result accelerated oil well drilling during the past w years, many natural gas wells have been rought into production by corporations not in the gas business. This product has forced competitive rate reductions in producing areas, particularly as regards industrial rates. More important has been increasing agitation for lower domestic rates, again more noticeable near producing areas. This is an unfavorable development since the domestic demand, carrying the higher rates, is relatively inelastic. Finally, the production of natural gas is basically an extractive industry. Consequently, unit costs tend to rise as individual fields mature.

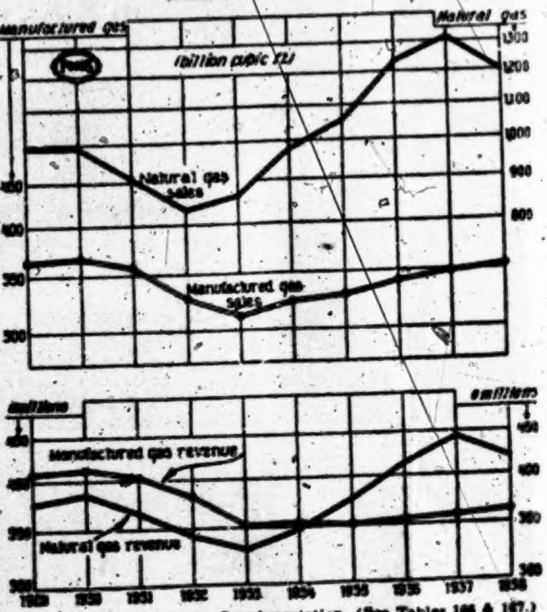
Although new industrial uses are constantly being developed for natural gas—a recent example is in the manufacture of explosives—earnings still depend largely upon domestic demand. As this represents house heating to a fair degree, sales and earnings vary with temperature conditions.

Increasing Regulation:

Outlined

Following passage of the Natural Gas Act in June, 1938, closer supervision is outlined for this division of the utility industry. The legislation places natural gas companies engaged in interstate commerce under the jurisdiction of the Federal Power Commission. Only

Chart III—COMPARISON OF NATURAL GAS SALES AND REVENUE WITH MANUFACTURED GAS SALES AND REVENUE



Source of data: American Gas Association. (See Tables 166 & 167.)

Exhibit No. 168.

Table V
Indexes of Retail Prices of Gas

(1923-25—100)

Average per Quarter	Manufactured Gas		Natural Gas		Mixed Gas		Combined Index	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
1923	100.1	100.3	97.6	94.9	101.9	101.9	100.0	100.0
1924	100.0	99.9	98.8	100.2	99.2	99.2	99.8	99.8
1925	100.0	99.8	104.1	105.2	98.9	98.9	100.2	100.2
1926	99.6	99.5	107.1	108.1	101.0	101.0	100.2	99.8
1927	99.6	99.1	99.3	108.0	101.0	101.0	100.0	99.4
1928	99.2	98.5	111.8	108.1	101.0	101.0	99.4	98.1
1929	99.6	97.6	119.3	108.4	100.3	100.3	99.5	96.2
1930	100.3	96.9	119.2	108.3	93.3	98.8	99.3	94.2
1931	100.0	95.3	119.2	108.3	93.3	98.8	98.7	92.6
1932	99.6	93.6	119.2	108.3	98.6	98.0	97.8	90.4
1933	99.1	92.1	118.9	108.1	97.9	94.8	97.2	88.8
1934	99.4	92.1	117.8	107.0	98.2	92.8	97.3	88.3
1935	100.1	92.2	114.4	104.1	98.3	92.6	97.5	88.0
1936	99.9	90.2	113.2	101.8	98.1	92.1	96.8	86.1
1937	99.9	85.2	112.5	101.1	98.3	92.4	86.5	83.5
1938	100.6	87.7	112.4	100.8	107.8	96.0	98.6	84.2
1937								
Mar	99.8	89.9	112.8	101.2	98.2	92.2	96.4	85.0
Jun	99.8	85.3	112.7	101.1	98.3	92.3	96.5	82.1
Sep	100.0	85.2	112.7	101.1	98.4	92.5	96.6	82.1
Dec	100.0	89.4	112.7	101.1	98.4	92.4	96.6	84.7
1938								
Mar	100.2	89.5	112.7	101.1	107.8	96.0	98.4	85.4
Jun	100.7	85.8	112.3	100.6	107.8	96.0	98.7	83.0
Sep	100.7	85.8	112.3	100.7	107.8	96.0	98.7	83.0
Dec	100.7	90.0	112.3	100.7	107.6	95.8	98.6	85.6

(a) Based on consumption of 10.6 therms. (b) Based on consumption of 30.6 therms. (See Note).

Note: In order to put the prices upon a comparable basis it was necessary to convert the normal consumption requirements used for computing monthly bills into an equivalent heating value expressed in therms. Average residential requirements per month for each of four combinations of service are as follows—Range, 10.6; range and manual type water heater, 19.6; range and automatic storage or instantaneous type water heater, 30.6; range, automatic storage or instantaneous type water heater and refrigerator, 40.6. Indexes for the 2 services (10.6 and 30.6 therms) are based on data from the following number of cities: Manufactured Gas, 40 cities in Mar., 1923, decreasing to 25 cities by June, 1936; Natural Gas, Mar., 1923, 7 cities, increasing to 18 cities by June, 1936; Mixed Gas, Mar., 1923, 3 cities, June, 1936, 7 cities. The Combined Index is based on 50 cities throughout.

Source: U. S. Bureau of Labor Statistics.

Table VI
Manufactured Gas—Sales and Revenue

(Per Cent of Each Class of Service to Total)

	Domestic		House Heating		*All Other	
	Sales	Revenue	Sales	Revenue	Sales	Revenue
1929	70.1	76.8	3.7	2.8	26.2	20.4
1930	70.0	76.5	4.8	3.5	25.2	20.0
1931	70.6	77.0	5.3	3.8	24.1	19.2
1932	73.0	79.1	5.8	3.8	21.2	17.1
1933	71.4	78.7	6.4	4.0	22.2	17.3
1934	66.8	76.9	8.7	5.3	24.5	17.8
1935	62.6	75.1	10.6	6.4	26.8	18.5
1936	58.0	72.5	12.1	7.3	29.9	20.2
1937	55.7	71.4	13.1	7.9	31.2	20.7
1938	55.8	71.6	13.5	8.5	30.7	19.9

*Includes Industrial and Commercial.

Source: Computed by Poor's from data reported by the American Gas Association.

Table VII
Consumption of Fuel For Production of Electrical Energy

	Fuel Used					
	Coal (Thous. Short Tons)	Oil (Thous. †Bbls.)	Gas (Million Cu. Feet)	*Total (Thous. Short Tons)	Energy Generated By Fuels (Mill. K.W.H.)	Fuel Used Per KWH Generated (lbs.)
1920	42,938	10,466	21,861	46,154	27,228	3.39
1921	31,575	12,046	23,716	34,916	25,864	2.70
1922	34,171	13,224	27,181	37,770	30,216	2.50
1923	38,966	14,681	31,486	43,306	36,088	2.40
1924	37,563	16,643	48,465	42,687	38,806	2.20
1925	40,217	10,264	46,526	45,431	43,268	2.10
1926	41,329	9,430	53,694	46,107	47,289	1.95
1927	41,887	6,784	62,922	46,001	50,001	1.84
1928	41,390	7,154	77,426	46,471	52,808	1.76
1929	44,394	10,185	112,621	52,639	62,295	1.69
1930	42,910	9,263	120,297	50,636	62,513	1.62
1931	38,714	8,129	139,274	47,113	60,791	1.55
1932	30,296	7,967	107,840	36,698	48,931	1.50
1933	30,575	9,953	102,726	37,151	50,546	1.47
1934	33,561	10,391	127,892	41,832	56,914	1.47
1935	34,164	11,378	125,239	43,198	59,176	1.46
1936	42,025	14,119	156,080	51,987	72,188	1.44
1937	44,766	14,143	171,268	55,142	76,883	1.43
1938	40,212	13,077	170,688	50,574	71,525	1.41

*Putting all fuel on "coal equivalent" basis (output by use of wood not included). †Of 42 gals.

Source: U. S. Geological Survey and Federal Power Commission.

Table VIII
Domestic Gas Service

	†Number of Customers (thous.)	Average Annual Use (MCF)	Average Annual Bill	*Average Rate Per MCF
Manufactured & ‡Mixed Gas (excl. house heating)				
1929	9,217	27.6	$34.08	$1.234
1930	9,232	27.8	34.18	1.229
1931	9,138	27.6	33,92	1.231
1932	8,730	27.4	34.58	1.262
1933	8,664	25.6	32.00	1.249
1934	8,792	24.5	31.02	1.266
1935	8,910	23.1	29.60	1.282
1936	8,924	22.2	28.84	1.299
1937	9,220	21.1	27.67	1.312
1938	9,254	21.3	28.01	1.314
Manufactured & Mixed Gas (house heating)				
1929	42	324.1	$274.68	$0.848
1930	52	338.4	279.88	0.827
1931	57	335.7	270.09	0.804
1932	59	321.8	247.66	0.770
1933	79	253.6	178.57	0.704
1934	115	245.0	163.72	0.668
1935	131	267.4	172.66	0.646
1936	171	240.1	152.53	0.635
1937	202	225.9	141.30	0.625
1938	227	211.4	136.88	0.647
Natural Gas (incl. house heating)				
1929	5,540	60.5	$40.34	$0.667
1930	5,840	59.6	40.66	0.683
1931	5,777	59.0	41.15	0.698
1932	5,671	56.5	40.20	0.711
1933	5,716	52.5	37.37	0.711
1934	5,911	51.3	36.12	0.719
1935	6,104	52.5	36.95	0.704
1936	6,292	54.0	37.71	0.698
1937	6,512	55.3	38.09	0.699
1938	6,655	52.5	36.72	0.699

†At end of year. ‡Mixed gas is a mixture of manufactured and natural gas.

*Computed from Average Annual Use and Average Annual Bill and does not show the actual trend of rates. For a correct picture of the changes in retail prices, see Table V.

Source: Computed by Poor's from data reported by the American Gas Association.

Table IX
Natural Gas—Sales and Revenue
(Percentage of Each Class of Service to Total)

	†Domestic		Commercial		‡Industrial	
	Sales	Rev.	Sales	Rev.	Sales	Rev.
1929	33.9	59.4	5.9	8.7	59.1	31.3
1930	35.2	61.6	6.2	8.8	57.5	29.1
1931	37.5	64.9	7.6	11.0	53.9	24.4
1932	38.4	66.6	9.2	11.4	51.2	21.6
1933	34.8	64.7	8.5	11.3	55.6	23.4
1934	30.7	61.5	8.0	11.1	58.9	26.8
1935	30.4	59.9	8.4	11.2	60.0	28.3
1936	27.9	57.5	8.0	11.3	62.9	30.7
1937	27.4	56.0	7.9	11.0	63.5	33.5
1938	29.1	58.3	8.3	11.3	61.4	29.7

†Including House Heating. ‡Including Elec. Gen.

Source: Computed by Poor's from data reported by the American Gas Association.

2502 EXHIBIT NO. 169.

Moody's Manual of Investments American and Foreign

Public Utility Securities

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Liabilities:	1936	1935	1934	1933	1932	1931	1930	1929
Capital stock	$841,740	$845,959	$855,271	$849,345	$869,328	$842,313	$827,361	$797,412
Long term debt	792,600	786,885	789,926	793,631	800,582	768,414	678,063	612,178
Current liabilities	45,670	87,457	86,663	79,987	100,044	112,123	134,191	172,379
Accrued liabilities	99,684	97,149	98,480	95,014	89,598	84,324	109,085	94,408
Retirement reserve	201,686	202,378	197,424	185,173	174,090	155,455	137,079	142,455
Other reserves	55,628	64,459	55,612	54,568	62,208	86,135	68,426	68,910
Miscellaneous unadjusted credits	6,900	3,000	2,939	5,548	4,410	6,097	2,444	4,214
Surplus	231,613	227,297	229,864	248,516	240,941	290,732	268,049	215,369
Total liabilities	$2,306,231	$2,307,681	$2,317,179	$2,311,772	$2,321,201	$2,316,693	$2,221,700	$2,107,325

*Companies formerly distributing manufactured gas but which were distributing natural gas at the beginning of 1937 have been excluded from the above tabulation for all eight years. The data shown above for 1929 to 1936 are therefore not comparable with data of the manufactured gas industry previously issued for those years.

II. THE NATURAL GAS INDUSTRY

While the natural gas industry had its beginning over a century ago, its importance and development came much later than the manufactured gas industry, and in fact the growth since 1921 has been far greater than in any other period. In these recent years investment attention has been drawn to the industry as a branch of the public utility field of increasing importance, and this interest was especially apparent from 1929 to 1931, during which period there was much new construction and extension of long distance natural gas pipe lines throughout the country.

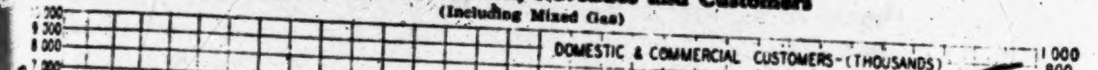
Growth of the Industry

Natural gas was first used and developed extensively in what are known as the Appalachian fields, located in western New York and Pennsylvania, eastern Ohio, West Virginia and northern Kentucky. With the rapid development in the oil industry, gas fields were discovered in connection with oil drilling. At first this gas was considered a by-product of relatively small value but its importance has since been well recognized and wastage of gas is being curtailed by state legislation. The new fields to develop in connection with the oil industry were the Monroe and Richland fields in Louisiana, the Amarillo field in Texas, the Hugoton field in Kansas, the Oklahoma fields and the Kettleman Hills, Button Willow and Ventura fields in California. With the discovery of immense resources of natural gas, the fear that exhaustion of supply would prohibit the extensive development of the industry has passed and today it is estimated by geologists that the country's supply is sufficient for many years to come.

In following the growth of the industry, statistical information is not as complete as in the case of manufactured gas. However, the following figures representing a compilation of reports of the U. S. Bureau of Mines, reflect the annual growth since 1906.

Natural Gas Production, Revenues and Customers

(Including Mixed Gas)



	*Production (M cu. ft.)	Gross Revenues in Dollars	Domestic & Commercial Customers	Gasoline Recovery—in Gal.
1937	2,447,620,000	$528,686,000	9,028,000	2,039,100,000
1936	2,167,802,000	476,916,000	8,674,000	1,796,340
1935	1,916,595,000	429,317,000	8,004,000	1,651,986,000
1934	1,770,721,000	395,290,594	7,566,000	1,535,360,000
1933	1,555,474,000	368,119,000	7,232,000	1,420,000,000
1932	1,555,990,000	384,123,000	7,037,000	1,523,800,000
1931	1,686,436,000	392,156,000	6,961,000	1,831,918,000
1930	1,943,421,000	415,519,000	5,448,000	2,210,494,000
1929	1,917,693,000	413,153,000	5,098,000	2,233,688,000
1928	1,568,129,000	363,726,000	4,344,000	1,814,034,000
1927	1,445,428,000	317,930,000	3,984,000	1,641,144,000
1926	1,312,853,000	300,168,000	3,731,000	1,363,090,000
1925	1,188,439,000	265,271,000	3,506,000	1,127,470,000
1924	1,141,482,000	253,830,000	3,443,000	933,861,000
1923	1,008,135,000	239,966,000	3,234,000	816,226,000
1922	762,546,000	221,536,000	3,014,600	505,832,000
1921	662,052,000	174,617,000	2,651,904	449,934,000

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A Nation-Wide Survey of Public Utility Progress

	*Production (M cu. ft.)	Gross Revenues in Dollars	Domestic & Commercial Customers	Gasoline Recovery—in Gal.
1920	798,210,000	196,194,000	2,635,968	384,744,000
1919	745,916,000	160,888,000	2,525,849	351,535,000
1918	721,001,000	153,553,560	2,525,124	282,535,000
1917	795,110,000	142,089,334	2,449,895	217,884,000
1916	753,170,000	120,227,468	2,380,772	103,493,000
1915	628,578,842	101,312,381	2,213,439	65,365,000
1914	591,866,733	94,115,524	2,090,985	42,653,000
1913	581,898,239	87,846,677	1,934,071	24,061,000
1912	562,203,452	84,563,957	1,637,493	12,081,000
1911	512,993,021	74,621,534	1,512,224	7,427,000
1910	509,155,309	70,756,158	1,345,989	†
1909	480,706,174	63,206,941	1,240,697	†
1908	402,140,730	54,640,374	1,177,973	†
1907	404,441,254	52,222,399	1,068,186	†
1906	338,842,562	46,873,932	884,018	†

*Includes only gas marketed, does not cover gas blown into the air or otherwise naccounted for. †Figures not available.

Production has expanded faster than the number of customers, reflecting the gradual extension of supply to large industrial users. The gain in customers in 1931, 1932 and 1933 was due chiefly to a gain in the number of consumers using natural gas mixed with manufactured gas. The companies reporting to the American Gas Association showed a 10% drop in gas sales and a 5% drop in revenues in 1938 in reflection of economic recession and generally warmer winter weather.

The amount of gasoline recovered through treating natural gas expanded prior to the depression, as a result of more efficient technique and the increase in gas produced for consumption in the oil fields. It is interesting, however, to note that in contrast to production from "dry gas" wells, the amount of gas available from oil wells depends on the crude oil requirements of oil companies. The value of the oil output of these wells is, of course, far greater than that of natural gas and consequently the gas supply available for distribution fluctuates widely due to variations in oil production and the drilling of new wells. Since 1929 the amount of natural gas treated for the recovery of natural gasoline has several times exceeded the total marketed production due to the fact that natural gas was allowed to escape into the air for want of a market after being treated.

Exhibit No. 169.

*Trend of Natural Gas Production by States.

(Millions of cubic feet)

	Arkansas	California	Illinois	Indiana	Kansas	Kentucky	Louisiana	Montana	New York	Ohio
1906	†	153	410	7,861	69,323	789	‡1,039	......	2,548	45,486
1907	†	230	1,155	6,624	76,707	1,303	‡1,288	......	3,288	52,041
1908	†	479	4,979	5,256	80,740	1,430	‡1,752	......	3,843	47,442
1909	†	2,324	8,473	6,159	75,074	2,097	‡4,365	......	4,696	58,223
1910	†	2,764	6,723	5,760	59,380	1,357	‡8,110	......	6,010	48,232
1911	†	6,390	6,762	4,365	38,800	1,275	§9,786	......	5,240	49,450
1912	†	9,355	5,603	3,618	28,068	1,951	§14,493	......	8,626	56,210
1913	†	11,035	4,767	2,921	22,884	1,821	§26.653	......	8,515	50,612
1914	†	17,829	3,548	2,580	22,628	1,422	§26,775	......	8,935	68,270
1915	¶992	21,891	2,690	2,261	27,046	1,667	25,540	6	7,977	79,510
1916	2,388	31,643	3,534	1,715	31,710	2,107	32,081	213	8,036	69,888
1917	5,610	49,427	4,439	1,712	24,439	2,802	31,287	334	8,372	68,917
1918	5,295	39,719	4,473	1,667	27,825	3,022	36,094	177	8,461	61,261
1919	5,587	55,607	3,825	1,407	16,150	2,057	47,062	858	8,124	63,153
1920	9,027	66,041	3,013	1,779	21,158	3,345	58,274	818	8,419	58,938
1921	4,260	75,942	2,646	1,066	15,717	4,820	58,004	336	6,583	47,412
1922	9,700	84,580	3,383	947	20,289	5,872	70,267	486	6,947	51,481
1923	24,215	131,434	4,049	880	30,913	11,953	112,031	1,470	6,497	53,812
1924	36,616	189,692	4,072	998	25,580	12,875	160,945	1,071	6,196	47,396
1925	41,878	187,789	4,165	1,168	26,917	10,770	152,620	1,496	6,210	43,285
1926	43,566	204,915	3,808	901	38,095	10,410	157,423	2,283	7,027	47,863
1927	30,450	212,364	3,741	1,124	42,646	10,206	186,961	4,253	5,908	51,381
1928	20,235	246,215	3,051	1,290	45,644	15,383	227,821	6,277	7,224	56,341
1929	19,928	342,214	2,983	1,012	38,469	27,588	261,138	9,659	8,387	57,936
1930	18,585	334,789	2,890	1,217	37,630	28,023	278,341	10,060	9,624	63,394
1931	13,300	305,930	2,130	1,337	38,742	27,870	224,155	10,949	7,868	56,326
1932	10,235	263,484	1,769	1,349	40,690	29,005	201,561	13,295	8,813	51,466
1933	8,288	259,799	1,631	1,544	41,596	31,380	197,826	14,391	6,865	47,929
1934	7,024	268,122	1,868	1,802	46,909	33,124	225,713	14,971	6,278	50,330
1935	6,167	284,109	1,448	1,777	57,125	39,738	249,450	19,870	8,288	49,592
1936	8,500	320,406	865	2,241	69,178	43,903	290,151	23,003	12,431	46,994
1937	9,690	329,769	1,040	1,551	83,890	55,719	315,301	24,765	21,325	42,783

	Oklahoma	Pennsylvania	Texas	West Virginia	Wyoming	Others	Total	Value at Points of Consumption Total (Thousands of Dollars)	Value at Points of Consumption Aver. per M cu. ft. (cents)
1906	3,520	138,161	‡	119,400	†	203	388,843	46,874	12.1
1907	4,867	135,516	‡	122,687	†	916	406,622	54,222	13.3
1908	11,925	130,476	‡	112,181	†	1,638	402,141	54,640	13.6
1909	28,037	127,697	‡	166,435	†	2,126	480,706	63,207	13.1
1910	50,430	126,867	‡	190,706	†	2,816	509,155	70,756	13.9
1911	67,276	108,869	5,503	206,891	†	2,386	512,993	74,622	14.5
1912	73,799	112,150	7,470	239,007	†	1,853	562,203	84,564	15.0
1913	75,018	118,860	12,160	245,454	†	1,198	581,898	87,847	15.1
1914	78,167	110,745	13,434	236,489	†	1,045	591,867	94,116	15.9
1915	87,517	113,692	13,324	244,004	†	462	628,579	101,312	16.1
1916	123,517	130,484	15,810	299,319	†	725	753,170	120,227	16.0
1917	137,384	133,397	17,047	308,617	†	1,326	795,110	142,089	17.9
1918	124,317	123,813	13,440	265,161	4,339	1,937	721,001	153,554	21.3
1919	163,649	113,489	24,710	234,095	6,014	129	745,916	160,888	21.6
1920	154,467	125,787	37,063	239,719	10,312	50	798,210	196,194	24.6
1921	124,058	86,144	44,504	174,921	15,608	31	662,052	174,617	26.4
1922	140,631	101,276	47,945	195,288	23,427	27	762,546	221,535	29.1
1923	203,082	112,562	74,535	203,867	35,523	153	1,006,976	240,001	23.8
1924	214,452	105,863	107,247	182,285	46,036	197	1,141,521	253,856	22.2
1925	249,285	101,632	134,872	180,345	45,539	650	1,188,571	265,271	22.3
1926	286,421	107,089	175,392	180,223	46,567	1,536	1,313,019	300,168	22.9
1927	326,864	105,709	254,063	162,375	43,582	3,801	1,445,428	317,930	22.0
1928	320,861	99,466	301,990	163,018	47,490	5,833	1,568,139	363,726	23.2
1929	357,893	101,951	464,928	167,333	44,648	11,626	1,917,693	413,276	21.6
1930	348,116	88,706	517,880	144,180	43,219	16,767	1,943,421	416,090	21.4
1931	263,685	74,797	464,580	124,797	39,770	30,200	1,686,436	392,816	23.3
1932	255,497	61,611	456,832	100,540	28,938	30,915	1,555,990	384,632	24.7
1933	245,759	63,579	475,691	100,653	25,830	32,713	1,555,474	368,540	23.7
1934	254,457	86,283	602,976	109,161	23,148	**38,555	1,770,721	394,871	22.3
1935	274,313	94,464	642,366	115,772	26,643	**45,473	1,916,595	429,317	22.4
1936	280,481	110,362	734,561	138,076	29,322	**34,161	2,167,802	476,916	22.0
1937	336,260	115,928	854,561	149,084	31,023	**74,931	2,447,620	528,686	21.6

* Includes only gas consumed.
† Included under "Others."
‡ Alabama and Texas included with Louisiana.
§ Includes Alabama.
¶ Includes gas piped from Oklahoma and consumed in Arkansas.
** Includes New Mexico: 1937, 46,337; 1936, 33,928; 1935, 27,931; 1934, 24,075.

2505 The above table shows the growth of the various gas fields over the past 30 years. The tremendous change that has taken place in the output of the various states is shown by the fact that in 1906 Pennsylvania and West Virginia accounted for approximately 65% of the total United States production, whereas in 1937 they accounted for only 11% of the total. The States of California, Lousiana, Oklahoma and Texas, which together produced only a little over 1% of the total in 1906, now account for approximately 75% of all gas produced in the United States. By 1920 the southeastern fields and the California fields had already assumed considerable importance, accounting for approximately 40% of the total production in that year. The greatest increase in any state has been in Texas, which in 1920 produced only 37,000,000 cubic feet and in 1937 over 850,000,000. A substantial part of the increase in these fields is due the opening up of new wells, but part is also due to the utilization of gas which was previously blown off in the air and wasted. Some idea of the extent of this waste can be gained from the fact that from 1920 to 1932 it has been estimated that approximately 35% of the total natural gas production in California was wasted. In the last few years, however, regulation has reduced wastage.

Exhibit No. 169.

A Nation-Wide Survey of Public Utility Progress

Classification of Natural Gas Sales
(Millions of cubic feet)

	Domestic	Commercial	Petroleum Refineries	Electric Public Utility Power Plants	Miscellaneous Industrial	Total Misc. Industrial, Petroleum Refineries, and Electric P. U. Power Plants	Field Use	Carbon Black Manufacture	Total Industrial†
1937	489,234		113,005	170,567	637,830	921,402	691,320	341,085	1,953,807
1936	454,969		93,183	156,080	554,397	803,660	618,468	283,421	1,705,549
1935	413,685		80,175	125,239	468,799	674,213	580,414	241,589	1,496,216
1934	379,497		79,965	127,896	393,155	601,016	554,542	229,933	1,385,491
1933	283,197	85,577	66,333	102,601	334,451	503,385	494,459	186,781	1,184,625
1932	298,520	87,367	67,467	107,239	296,127	470,833	529,378	168,237	1,168,448
1931	294,406	86,491	75,548	138,343	322,700	536,591	571,365	195,396	1,303,352
1930	295,700	80,707	98,842	120,290	356,315	575,447	723,165	266,625	1,565,237
1929	359,853		103,729	112,707	374,972	591,408	705,083	261,107	1,557,598
1928	320,877		114,950	77,326	305,991	498,267	573,698	175,137	1,247,102
1927	296,036		123,395	62,919	269,352	455,666	549,455	144,087	1,149,208
1926	289,175		121,449	53,207	240,513	415,169	478,188	130,321	1,023,678
1925	272,146		87,843	46,521	218,040	352,404	423,524	140,366	916,293
1924	285,482		†	48,443	*285,000	306,443	393,437	156,514	856,330
1923	276,967		†	31,000	*247,000	278,000	343,076	109,096	729,917
1922	254,413		†	27,000	*229,000	256,000	198,000	54,000	508,133
1921	248,334		†	24,000	*157,000	181,000	182,000	51,000	413,718
1920	286,001		†	25,000	*244,000	269,000	202,000	41,000	512,209
1919	255,743		†	21,000	*249,000	270,000	170,000	50,000	490,173

†Included in miscellaneous industrial.

*Includes petroleum refineries.

The foregoing table shows the trend of total consumption and the consumption by groups over the past eighteen years. From 1920 to 1929 the proportion of gas taken by industrial consumers was constantly increasing, rising from 62.5% of the total in 1921 to 81.0% in 1929. With the decline in business activity, industrial consumption was curtailed, while domestic consumption, because of the extension of pipe lines to large centers of population in 1929, 1930 and 1931, continued to increase. The combination of these two factors caused a drop in the percentage of gas taken by the industrial consumer from 81.0% in 1929 to 75.6% in 1934 but with the revival of general business activity this percentage rose to 80% in 1937 and it is expected that the long-term trend of an increasing proportion of the product being absorbed by industrial consumers will continue.

Sources of Natural Gas Revenues*

	Domestic	Commercial	Domestic & Commercial	**Miscellaneous Industrial	Field Use	Carbon Black	Total Industrial	Total
1937	$330,722		$330,722	$161,298	$32,363	$4,294	$197,955	$528,677
1936	305,284		305,284	138,051	28,397	3,681	170,129	475,413
1935	283,417		283,417	113,736	27,225	3,787	144,748	428,165
1934	260,335		260,335	101,569	28,356	4,016	133,941	394,276
1933	$209,665	$42,576	252,241	83,166	28,851	3,821	115,838	368,079
1932	223,377	44,000	267,377	81,268	32,585	2,893	116,746	384,123
1931	208,262	41,347	249,488	98,030	40,469	4,048	142,547	392,816
1930	200,615	38,558	239,173	111,226	59,118	6,002	176,346	415,519
1929	......	......	223,172	116,521	68,352	5,108	189,981	413,276
1928	......	......	198,808	102,146	58,356	4,321	164,823	363,726
1927	......	......	180,018	94,809	38,912	4,064	137,785	317,930
1926	......	......	168,810	......	36,650	......	131,185	300,168
1925	......	......	152,494	......	......	......	112,690	265,271
1924	......	......	154,075	......	......	......	99,755	253,830
1923	......	......	142,317	......	......	......	97,678	239,966

* 000's omitted. ** Includes electric public utility power plants and petroleum refineries.

The preceding table shows the amount of revenues contributed by each class of consumer. From 1923 to 1929 the proportion of revenues contributed by industrial users showed a steady gain, rising from 40.7% in 1923 to 46.0% in 1929. From 1929 to 1932, inclusive, the decline in industrial revenues was more drastic than the decline in sales, and in 1932 revenues from this source amounted to only 30.4% of the total. As in the case of industrial sales, a pick-up in the proportion of revenues contributed by industrial consumers to 37.5% of the total occurred in 1936. Revenues from gas used in the field amounted to 6.0% of the total, and that used in the carbon black industry to 0.8%. It is apparent that while these two industries are important from the viewpoint of the consumption of gas taking nearly 42% of the total, they contribute an insignificant amount, 6.8% of total revenues.

Revenues per Thousand Cubic Feet, in Cents

	Domestic	Com-mercial	Domestic & Com-mercial	**Miscel. Industrial	Field Use	Carbon Black	Total Industrial	Total for All Sources
1937	....	....	67.6	17.5	4.7	1.3	10.1	21.6
1936	....	....	67.1	17.2	4.6	1.3	10.0	22.0
1935	....	....	68.5	16.8	4.7	1.6	9.7	22.4
1934	....	....	68.6	16.8	5.1	1.7	9.7	22.3
1933	74.0	49.8	68.4	16.5	5.9	2.0	9.8	23.7
1932	74.8	50.4	69.3	17.3	6.2	1.7	10.0	24.7
1931	70.7	47.8	65.5	18.3	7.1	2.3	10.9	23.3
1930	67.8	47.8	63.5	19.3	8.2	2.0	11.3	21.4
1929	....	....	62.0	19.7	9.7	1.9	12.2	21.5
1928	....	....	62.0	20.3	10.2	2.5	13.2	23.2
1927	....	....	60.8	20.4	7.1	2.8	12.0	22.0
1926	....	....	58.4	....	7.7	....	12.8	22.9
1925	....	....	56.0	....	....	....	12.3	22.3
1924	....	....	54.0	....	....	....	11.6	22.2
1923	....	....	51.4	....	....	....	13.4	23.8

* Includes electric public utility power plants and petroleum refineries.

This table, derived from the two previous ones, shows the price paid per unit for gas used by the various consuming groups. It brings out the tremendous difference in the price paid for gas by the different consumers. In fact, the price paid for gas to manufacture carbon black and for field use is so low that sales in these categories should be eliminated in measuring the progress of the industry. The price per unit of gas sold to domestic and commercial consumers has in recent years tended to rise because a growing proportion is sold at points more distant from production centers than formerly. Revenues per unit of gas sold to miscellaneous industrial consumers, on the other hand, has been generally downward since 1927 because of the larger proportion of gas sold in the lower priced part of the group. The price per unit of gas sold for field use has also been declining. In this group the price per unit is dependent on many factors, such as the price of fuel gas, available supply of natural gas, and the demand for fuel for drilling and pumping purposes. The price per unit of gas sold to the carbon black manufacturer has been irregular, varying with the demand for carbon black and the available supply of gas for which there is no demand by the other consuming industries. The average price of gas sold for all sources was downward until 1930 because of the increasing proportion of the product taken by the groups paying low prices and also the decrease in the price paid by those consumers. Since 1932 it has again declined.

2506 Domestic Consumption

The trend of domestic and commercial consumption combined has been steadily upward for the past decade, increasing 51% from 1919 to 1932, declining 4.5% in 1933, increasing 2.9% in 1934, 9.1% in 1935, 9.0% in 1936 and 7.5% in 1937. The gain in sales and revenues continued through most of the depression as a result of the extension of pipe lines to densely populated areas which were previously served only by manufactured gas. The most notable examples were the Detroit line which connects the city of Detroit with the Texas, Panhandle and the Hugoton, Kanses fields and the Chicago line, which pipes gas from the "Panhandle" in Texas to the city of Chicago. In the latter case the gas is then mixed with the manufactured product and distributed throughout the entire city. While we have no figures indicating the experience of domestic sales, exclusive of business gained because of the extension of pipe lines, figures from individual companies and individual states indicate declines in both sales and revenues were experienced during the depression. Per capita consumption by domestic and commercial users has dropped quite steadily as the number supplied with mixed gas has increased.

Mainly as a result of an increase in the proportion of gas consumed in areas at some distance from the points of production, the price per unit of gas sold to domestic and commercial consumers has risen over the long term. Obviously, the cost per unit of gas in Chicago is greater than at the point of production in Texas. Since we expect a continuation of the growth of long distance pipe lines and of consumption at points far removed from the production centers, we look for a continued rise in the average price per thousand feet of gas sold for domestic and commercial purposes, which, however, is more than offset by the increase in heating value resulting. The average price per 1,000 cubic feet paid by domestic and commercial consumers varies widely, depending largely on the distance from the producing field. For example, in 1937 average domestic and commercial prices (combined), ranged from about $1.18 per 1,000 cubic feet in Illinois and Michigan to 36 cents in West Virginia. (See "Summary of Natural Gas Statistics" below.)

Miscellaneous Industrial Consumption

Consumption in this category increased more rapidly than domestic consumption from 1925 to 1929, but fell off sharply in 1931 and 1932, increasing the five following years to far above the previous peak. The principal consumers in this group are the steel, glass, brick and cement industries. In the first three named, the product, because of its cleanliness and the ease with which the temperature may be controlled, has a special value. In the cement industry, however, the only question that arises as to the desirability of the fuel is the cost per heat unit.

Petroleum Refineries: Consumption of natural gas at petroleum refineries declined steadily until 1934, as many refiners found it cheaper to utilize fuels made at their plant (fuel oil, refinery gas, and coke) than to buy natural gas from outside companies. Since 1934, however, this trend changed as the price of fuel rose.

Electric Public Utility Power Plants: The quantity of natural gas used in electric public utility power plants increased rapidly through 1931, more so than in any other industry. This has followed from the extension of lines making available a fuel often cheaper than coal or oil and, while the trend was interrupted in 1932 and 1933, it was resumed in 1934 with the revival of electric consumption, sales reaching a new high in 1937.

Field Uses: This category includes gas used for drilling, pumping, and other field purposes, in connection with the production of oil and gas. The use of gas for this purpose has constituted the largest item in consumption since natural gas statistics were first compiled. This widespread use of gas in the field is chiefly the result of its accessibility. The consumption of gas for this purpose has increased approximately 300% since 1919. The increase is a reflection of the discovery of new gas fields. However, the decline since 1929 is a result, not only of the decline in general business activity, but even to a greater extent of the fact that the east Texas oil fields, which now produce a large portion of the total oil, have an abnormally low gas-oil ratio. Had the east Texas fields been normal as regards gas production, many wells drilled with fuel oil would have been drilled with gas and the national total for field purposes would have shown a much smaller decline.

Carbon Black: The use of natural gas as the raw material for the manufacture of carbon black, which had increased rapidly up to 1930, slumped sharply in the two subsequent years. This substantial decrease resulted primarily from voluntary restrictions placed on production by the carbon black producers. As can be seen from the above table, the price paid for gas for this purpose is extremely low, and represents the utilization of gas which otherwise might have gone to waste. The carbon black industry moves toward the center of greatest production, where the fuel is cheapest, and about 20% of the total carbon black is produced in Louisiana and nearly all the rest in Texas, as a result of the expansion of the natural gas industry in those states. As conditions in the carbon black industry have shown improvement since 1933, consumption rose to a new high in 1937.

Natural Gas Sales—Monthly
(Millions of Cubic Feet)

	Domestic Sales (Including House Heating)						Total Sales					
	1939	1938	1937	1936	1935	1934	1939	1938	1937	1936	1935	1934
January	49,177	46,503	46,697	45,201	40,679	38,562	129,397	122,093	128,263	121,957	105,611	95,154
February	51,291	45,497	47,758	51,899	40,136	38,381	134,515	120,462	134,025	134,140	104,549	97,689
March	46,791	40,988	41,900	40,427	35,658	38,078	127,377	113,637	126,633	112,235	97,005	96,714
April	36,509	34,323	39,216	32,973	29,838	30,336	113,379	105,608	124,723	104,605	89,036	86,185
May	......	25,693	26,249	24,524	25,712	22,139	....	91,720	104,242	91,191	82,343	74,778
June	......	19,648	18,694	17,448	19,988	16,756	....	82,497	94,494	83,684	73,630	68,831
July	......	16,270	15,589	14,220	14,711	13,308	....	79,488	91,777	81,469	67,893	63,859
August	......	14,510	14,549	13,155	13,080	12,461	....	80,697	94,201	84,053	71,080	64,736
September	......	15,671	15,686	13,876	14,775	14,366	....	85,624	94,959	87,130	74,905	68,051
October	......	19,683	21,145	18,960	19,380	17,754	....	94,403	102,651	94,267	84,574	73,803
November	......	29,457	30,780	30,157	27,919	24,982	....	109,128	110,724	111,496	99,130	85,892
December	......	43,333	45,802	40,633	37,929	35,326	....	128,012	129,341	124,418	112,730	99,249
Total	......	351,576	364,064	343,473	319,806	302,449	....	1,213,369	1,336,034	1,230,645	1,062,486	974,941

Revenue from Sales of Natural Gas
(Thousands of Dollars)

	Domestic Revenues (Including House Heating)						Total Revenues					
	1939	1938	1937	1936	1935	1934	1939	1938	1937	1936	1935	1934
January	32,140	30,656	30,091	29,717	26,922	25,871	50,279	47,670	47,846	46,182	41,050	38,196
February	32,619	29,687	30,532	32,490	25,982	24,980	51,197	46,470	48,995	50,144	40,114	37,712
March	30,218	27,027	27,161	26,257	23,675	24,598	47,978	42,832	45,234	41,395	37,043	37,332
April	24,845	23,243	25,300	22,347	20,472	20,396	41,034	38,006	42,667	36,979	33,072	31,945
May	......	18,577	18,706	17,465	18,097	16,003	....	31,874	34,159	30,499	29,664	26,385
June	......	15,131	14,543	13,508	14,939	13,010	....	27,069	28,733	25,836	25,507	22,931
July	......	12,878	12,429	11,588	11,893	10,994	....	24,986	26,440	23,855	22,061	20,237
August	......	11,875	11,797	10,996	10,953	10,442	....	24,003	26,329	23,731	21,724	19,823
September	......	12,269	12,171	11,446	11,960	11,631	....	25,144	26,738	24,680	23,147	21,308
October	......	14,849	15,475	14,337	14,536	13,477	....	28,929	31,012	28,642	27,005	23,795
November	......	20,250	20,757	20,499	19,441	17,531	....	36,086	36,911	36,814	33,559	29,182
December	......	27,726	28,949	26,328	25,108	23,303	....	45,448	46,673	43,954	40,601	36,503
Total	......	244,168	247,812	236,979	223,978	212,235	....	418,517	441,738	412,711	374,546	345,348

These tables, taken from the American Gas Association reports, are not comparable to data taken from the Bureau of Mines reports. The industrial figures shown by the latter organization include gas sold for field purposes and for the manufacture of carbon black while the Association excludes gas sold for such purposes. The Bureau of Mines also includes companies supplying mixed gas while the A. G. A. excludes them.

2507 Domestic sales show a wide seasonal variation, usually reaching their peak in January and dropping until August, in which month average sales are but a fraction of those of January. Because of the negligible variation in industrial sales and their preponderance in the total the latter shows only a samll change from month to month. Domestic revenues vary less than domestic sales, this difference being due, for the most part, to the prevalence of a fixed minimum monthly charge and a rate schedule based on progressively lower rates with increased consumption.

Trend of Consumption of Natural Gas by States
Domestic and Commercial Consumption
(Thousands of cubic feet)

	Arkansas	California	Colorado	Illinois	Kansas	Kentucky	Louisiana	Missouri	Montana
1926........	7,824,000	20,960,000	78,800	203,000	10,133,000	12,404,000	4,413,000	5,288,000	1,383,000
1927........	6,419,000	35,309,000	179,000	164,000	10,435,000	11,448,000	4,071,000	5,359,000	1,775,000
1928........	6,785,000	37,702,000	629,000	52,000	12,008,000	10,753,000	6,127,000	6,129,000	2,346,000
1929........	7,535,000	43,499,000	2,731,000	94,000	15,539,000	11,505,000	7,917,000	7,224,000	3,033,000
1930........	8,338,000	47,519,000	5,141,000	115,000	17,320,000	10,674,000	8,574,000	9,158,000	3,635,000
1931........	7,623,000	50,094,000	4,226,000	3,631,000	19,402,000	10,786,000	9,690,000	9,736,000	3,804,000
1932........	6,963,000	60,926,000	5,383,000	16,113,000	20,275,000	10,135,000	9,406,000	11,684,000	5,352,000
1933........	6,544,000	64,753,000	4,793,000	17,272,000	18,481,000	9,528,000	8,733,000	11,937,000	6,073,000
1934........	6,770,000	58,618,000	4,296,000	19,628,000	18,414,000	9,500,000	9,876,000	12,109,000	5,991,000
1935........	7,387,000	69,059,000	4,999,000	20,810,000	19,937,000	9,472,000	11,013,000	12,996,000	7,564,000
1936........	8,483,000	69,258,000	5,601,000	22,468,000	22,665,000	10,410,000	13,080,000	13,962,000	8,600,000
1937........	8,855,000	81,709,000	6,485,000	22,863,000	24,528,000	10,366,000	12,561,000	15,013,000	9,438,000

	Nebraska	New York	Ohio	Oklahoma	Pennsylvania	Tennessee	Texas	W. Virginia
1926................	....	16,909,000	87,672,000	17,617,000	56,148,000	5,500	18,045,000	25,700,000
1927................	....	15,036,000	83,654,000	22,298,000	51,794,000	9,000	20,517,000	23,406,000
1928................	....	16,391,000	88,511,000	23,185,000	52,971,000	....	27,284,000	25,407,000
1929................	....	16,531,000	88,169,000	31,263,000	53,255,000	1,311,000	38,830,000	24,921,000
1930................	180,000	16,915,000	90,879,000	28,206,000	51,974,000	2,246,000	41,058,000	23,824,000
1931................	1,163,000	15,437,000	80,202,000	26,273,000	48,385,000	2,748,000	42,937,000	22,210,000
1932................	2,605,000	15,122,000	69,698,000	20,478,000	43,491,000	3,116,000	39,728,000	20,055,000
1933................	3,107,000	15,311,000	62,043,000	22,623,000	38,893,000	2,927,000	34,357,000	19,367,000
1934................	3,459,000	15,899,000	64,048,000	23,138,000	40,695,000	3,088,000	36,213,000	20,747,000
1935................	4,915,000	16,151,000	65,707,000	25,136,000	40,056,000	3,353,000	38,916,000	20,716,000
1936................	5,810,000	17,060,000	69,852,000	27,734,000	43,891,000	3,930,000	43,987,000	23,271,000
1937................	6,192,000	17,299,000	68,250,000	28,801,000	43,807,000	4,159,000	46,307,000	23,036,000

Industrial Consumption

	Arkansas	California	Colorado	Illinois	Kansas	Kentucky	Louisiana	Missouri	Montana
1926	44,806,000	183,955,000	425,000	3,605,000	51,009,000	5,722,000	144,473,000	531,000	1,912,000
1927	34,497,000	177,055,000	1,365,000	3,877,000	56,183,000	5,246,000	166,239,000	1,225,000	3,680,000
1928	30,978,000	208,513,000	5,718,000	2,999,000	60,663,000	5,094,000	182,628,000	3,637,000	4,919,000
1929	32,223,000	298,715,000	11,631,000	3,045,000	59,937,000	7,943,000	192,860,000	7,854,000	6,299,000
1930	29,893,000	287,270,000	11,501,000	9,487,000	58,315,000	5,292,000	175,522,000	16,964,000	4,430,000
1931	24,655,000	251,201,000	11,500,000	10,919,000	46,207,000	4,747,000	122,296,000	14,527,000	4,555,000
1932	18,367,000	202,558,000	11,026,000	13,319,000	36,690,000	3,563,000	103,809,000	13,626,000	5,748,000
1933	16,231,000	195,046,000	11,099,000	16,069,000	38,551,000	3,694,000	107,067,000	15,646,500	6,149,000
1934	18,205,000	209,495,000	12,153,000	24,456,000	47,185,000	4,606,000	127,537,000	17,683,000	6,453,000
1935	19,089,000	215,050,000	12,234,000	36,509,000	52,869,000	[illegible]	140,921,000	20,046,000	9,268,000
1936	22,503,000	251,148,000	14,112,000	50,048,000	59,360,000	7,749,000	153,405,000	26,162,000	11,294,000
1937	26,219,000	248,060,000	14,331,000	55,787,000	72,294,000	7,788,000	161,592,000	31,885,000	12,156,000

	Nebraska	New York	Ohio	Oklahoma	Pennsylvania	Tennessee	Texas	W. Virginia
1926	....	955,000	28,047,000	227,376,000	69,688,000	6,000	169,296,000	47,084,000
1927	....	1,138,000	28,949,000	264,187,000	70,188,000	....	249,427,000	42,794,000
1928	....	1,527,000	33,973,000	262,148,000	63,179,000	....	291,434,000	41,865,000
1929	....	1,661,000	38,462,000	298,032,000	69,653,000	....	426,696,000	48,935,000
1930	918,000	2,076,000	34,937,000	392,654,000	56,244,000	4,084,000	485,102,000	39,058,000
1931	3,654,000	1,519,000	27,258,000	222,676,000	44,244,000	5,088,000	404,695,000	32,905,000
1932	6,056,000	1,602,000	24,716,000	221,263,000	33,444,000	4,875,000	374,916,000	26,226,000
1933	7,186,000	4,601,000	30,719,000	219,871,000	34,734,000	4,567,000	378,071,000	27,566,000
1934	9,330,000	15,300,000	30,950,000	226,583,000	46,779,000	4,442,000	464,834,000	31,606,000
1935	9,395,000	19,554,000	40,189,000	233,462,000	51,545,000	4,974,000	486,781,000	33,047,000
1936	10,970,000	23,578,000	51,529,000	232,386,000	66,304,000	6,126,000	556,483,000	34,707,000
1937	11,071,000	32,781,000	56,883,000	280,803,000	75,694,000	7,983,000	659,813,000	42,359,000

Exhibit No. 169.

Trend of Natural Gas Revenues by States
Domestic and Commercial Revenues

	Arkansas	California	Colorado	Illinois	Kansas	Kentucky	Louisiana	Missouri	Montana
1926........	3,532,000	15,731,000	68,000	142,000	6,905,000	5,258,000	1,669,000	4,843,000	589,000
1927........	2,900,000	30,125,000	105,000	116,000	6,893,000	4,917,000	1,482,000	4,841,000	763,000
1928........	3,281,000	32,987,000	697,000	46,000	7,876,000	4,874,000	2,777,000	5,074,000	1,010,000
1929........	3,661,000	37,785,000	2,524,000	79,000	9,391,000	5,238,000	4,275,000	6,176,000	1,290,000
1930........	4,029,000	41,317,000	3,905,000	118,000	10,283,000	5,131,000	5,061,000	7,205,000	1,558,000
1931........	3,884,000	50,094,000	4,226,000	4,569,000	11,145,000	5,460,000	5,565,000	7,615,000	1,706,000
1932........	3,559,000	53,675,000	4,321,000	27,030,000	11,234,000	5,125,000	5,613,000	9,476,000	2,387,000
1933........	3,320,000	55,575,000	3,961,000	22,892,000	10,080,000	4,823,000	5,210,000	9,783,000	2,492,000
1934........	3,405,000	51,082,000	3,665,000	24,931,000	9,723,000	5,102,000	5,876,000	10,147,000	2,467,000
1935........	3,649,000	59,253,000	3,979,000	26,387,000	10,487,000	5,285,000	6,410,000	10,851,000	3,101,000
1936........	4,080,000	57,346,000	4,324,000	27,119,000	11,718,000	5,642,000	7,534,000	11,309,000	3,397,000
1937........	4,224,000	64,468,000	4,824,000	27,070,000	12,411,000	5,629,000	7,612,000	12,025,000	3,737,000

	Nebraska	New York	Ohio	Oklahoma	Pennsylvania	Tennessee	Texas	W. Virginia
1926................	....	11,004,000	53,970,000	8,840,000	33,912,000	1,300	11,986,000	8,166,000
1927................	....	10,087,000	52,038,000	10,532,000	31,389,000	2,200	14,019,000	7,673,000
1928................	....	11,221,000	55,540,000	11,811,000	32,409,000	....	18,305,000	8,394,000
1929................	....	11,130,000	56,271,000	13,929,000	32,707,000	1,280,000	24,878,000	8,624,000
1930................	172,000	11,548,000	57,884,000	13,759,000	31,889,000	1,722,000	27,145,000	8,799,000
1931................	1,037,000	10,703,000	50,581,000	12,475,000	29,855,000	1,911,000	27,906,000	8,203,000
1932................	2,050,000	10,841,000	43,267,000	10,580,000	27,373,000	2,042,000	26,430,000	7,337,000
1933................	2,341,000	11,656,000	38,079,000	9,426,000	23,979,000	1,981,000	23,497,000	7,058,000
1934................	2,457,000	12,273,000	38,365,000	9,673,000	24,727,000	2,064,000	24,625,000	7,622,000
1935................	3,667,000	13,308,000	39,030,000	10,506,000	24,474,000	2,267,000	26,152,000	7,499,000
1936................	4,212,000	13,682,000	41,352,000	11,676,000	26,598,000	2,555,000	28,811,000	8,424,000
1937................	4,421,000	14,133,000	40,131,000	12,068,000	26,416,000	2,724,000	30,100,000	8,224,000

Industrial Revenues

	Arkansas	California	Colorado	Illinois	Kansas	Kentucky	Louisiana	Missouri	Montana
1926	3,495,000	20,694,000	57,000	721,000	7,476,000	861,000	5,243,000	154,000	61,000
1927	2,851,000	20,821,000	172,000	648,000	7,105,000	691,000	7,858,000	424,000	155,000
1928	3,366,000	23,708,000	1,150,000	314,000	9,135,000	1,594,000	10,359,000	828,000	514,000
1929	3,926,000	31,187,000	2,015,000	329,000	9,416,000	1,803,000	11,152,000	1,559,000	717,000
1930	3,253,000	27,754,000	1,540,000	1,558,000	9,226,000	1,460,000	11,169,000	3,120,040	676,000
1931	2,661,000	26,251,000	2,087,000	2,015,000	7,147,000	1,233,000	8,754,000	2,848,000	741,000
1932	1,989,000	19,497,000	1,915,000	3,529,000	5,234,000	942,000	7,158,000	2,492,000	972,000
1933	1,660,000	18,905,000	1,500,000	3,921,000	4,971,000	990,000	7,280,000	2,708,000	954,000
1934	2,210,000	21,601,000	1,621,000	6,001,000	5,703,000	1,247,000	8,927,000	3,080,000	967,000
1935	2,361,000	22,256,000	1,682,000	7,027,000	6,279,000	1,618,000	9,990,000	3,679,000	1,306,000
1936	2,498,000	25,046,000	2,188,000	9,211,000	7,191,000	2,026,000	11,486,000	4,817,000	1,531,000
1937	2,960,000	26,601,000	2,207,090	11,088,000	8,175,000	1,930,000	13,660,000	5,523,000	1,598,000

2508	Nebraska	New York	Ohio	Oklahoma	Pennsylvania	Tennessee	Texas	W. Virginia
1926	....	439,000	12,012,000	24,411,000	22,812,000	600	18,821,000	10,171,000
1927	....	427,000	12,220,000	22,971,000	23,084,000	....	26,122,000	9,409,000
1928	....	746,000	14,755,000	27,034,000	21,979,000	....	35,965,000	10,237,000
1929	....	929,000	16,110,000	29,676,000	24,193,000	901,700	40,696,000	11,398,000
1930	178,000	1,128,000	14,661,000	21,796,000	19,871,000	944,000	43,542,000	9,929,000
1931	746,000	857,000	10,837,000	13,688,000	14,504,000	899,000	31,420,000	8,334,000
1932	1,044,000	785,000	9,328,000	11,502,000	10,578,000	821,000	23,896,000	6,612,000
1933	1,249,000	1,534,000	10,607,000	10,921,000	10,203,000	807,000	22,556,000	6,646,000
1934	1,565,000	3,031,000	10,581,000	10,921,000	12,901,000	924,000	23,678,000	7,603,000
1935	1,626,000	3,892,000	12,934,000	9,766,000	14,073,000	1,116,000	23,634,000	7,456,000
1936	1,878,000	4,656,000	16,454,000	9,665,000	18,154,000	1,389,000	25,378,000	7,805,000
1937	1,947,000	6,166,000	18,459,000	11,299,000	21,112,000	1,608,000	29,644,000	9,072,000

The above tabulations of the Bureau of Mines show the trend of natural gas consumption by states over the past eight years. The figures include sales of mixed gas and consequently reflect the full effect of the extension of the long distance pipe lines. It should be noted in connection with this table that industrial sales in Texas and Louisiana include large quantities of gas sold for carbon black manufacture at prices as low as 1.6 cents per 1,000 cubic feet and for field purposes in Texas and Oklahoma at prices as low as 3.1 cents as compared with the average price of 10 cents for all gas sold for industrial purposes in 1937. Accordingly, total industrial sales are not a good index of the prosperity of the industry in the various states. Revenues from miscellaneous industrial sales, which reflect the growth of the consumption of the higher priced industrial gas, and domestic sales and revenues afford the best measurement of the essential development of the industry. California and Texas, which are two of the four largest consuming states, showed a tremendous expansion in domestic revenues during the period, Pennsylvania a decline and in Illinois, which is now the fourth largest domestic revenue producing state, domestic sales and revenues made practically their entire gains since 1930, mixed gas being introduced in and around Chicago in Oct., 1931. The greatest gains in recent years in industrial revenues occurred in Illinois, New York, Nebraska, Missouri, Montana and Tennessee.

Summary of Natural Gas Statistics, 1937

	Production			Consumption										
				Domestic and commercial			Industrial							
							Field (drilling, pumping, etc.)		Manufacture of carbon black		Fuel at petroleum refineries, electric public-utility power plants, and other industrial consumption			
State	Millions of cu. ft.	Average value at wells per M cu. ft. (cts.)	Average value at points of consumption per M cu. ft. (cts.)	Thousands of consumers	Millions of cu. ft.	Average value at points of consumption per M cu. ft. (cents)	Millions of cu. ft.	Value at points of consumption (thousands of dollars)	Millions of cu. ft.	Value at points of consumption (thousands of dollars)	Petroleum refineries	Electric public utility power plants	Other industrial	Value at points of consumption (thousands) of dollars)*
Alabama	....	....	....	29	1,877	88.9	....	....	....	....	....	....	14,716	$2,495
Arkansas	9,690	6.6	20.5	75	8,855	47.7	6,577	$501	....	.....	3,391	2,695	13,556	2,459
California	329,769	6.6	27.6	1,573	81,709	78.9	140,743	9,229	....	.....	32,619	15,554	59,144	17,732
Colorado	3,186	3.3	21.1	101	6,485	74.4	372	17	....	.....	2	425	13,532	2,190
Georgia	....	....	....	83	5,587	74.1	....	....	....	.....	....	3,596	4,710	1,408
Illinois	1,040	8.1	51.3	1,231	22,863	118.4	1,275	101	....	.....	101	3,733	50,678	10,987
Indiana	1,551	14.6	64.2	121	2,160	101.8	152	17	....	.....	354	7,864	13,021	4,606
Iowa	....	....	....	118	5,118	90.3	....	....	....	.....	....	4,733	11,503	2,634
Kansas	83,890	4.2	36.2	221	24,528	50.6	21,762	1,634	†	†	5,588	16,357	†28,587	†6,541
Kentucky	55,719	12.2	41.1	176	10,366	54.3	1,220	158	....	.....	....	....	6,568	1,772
Louisiana	315,301	3.4	17.1	177	12,561	60.6	32,022	1,987	39,406	$1,040	10,460	25,564	54,140	10,633
Michigan	9,080	9.6	62.1	536	16,034	117.2	1,072	104	....	.....	2	....	7,004	3,694
Minnesota	....	....	....	143	4,984	97.6	....	....	....	.....	....	1,337	6,790	1,561
Mississippi	13,348	4.3	22.8	42	4,614	52.4	....	....	....	.....	....	1,410	7,368	1,132
Missouri	444	8.6	50.9	396	15,013	80.1	409	70	....	.....	....	8,306	23,170	5,453
Montana	24,765	3.7	26.9	39	9,438	39.6	1,501	98	....	.....	580	691	9,384	1,500
Nebraska	....	....	....	119	6,192	71.4	....	....	....	.....	....	2,819	8,252	1,947
New Mexico	46,337	1.5	16.6	20	2,343	58.1	16,414	378	....	.....	104	3,436	5,759	1,348
New York	21,325	16.0	58.1	428	17,299	81.7	268	23	....	.....	2,155	4,114	26,244	6,143
Ohio	42,783	16.0	46.7	1,268	68,250	58.8	2,569	443	....	.....	20	3,738	50,556	18,016
Oklahoma	336,260	2.1	9.9	255	28,801	41.9	228,598	6,656	†	†	10,288	9,853	†32,064	†4,643
Pennsylvania	115,928	17.4	36.1	707	43,807	60.3	6,026	1,360	....	.....	1,960	3,113	64,595	19,752
South Dakota	10	10.0	30.0	16	2,306	58.2	....	....	....	.....	....	968	2,245	550
Tennessee	17	5.9	35.3	45	4,159	65.5	....	....	....	.....	2	4,880	4,312	1,608
Texas	854,561	2.3	15.5	631	46,307	65.0	211,612	7,261	291,199	3,032	40,247	42,845	73,910	19,351
West Virginia	149,084	12.9	39.3	193	23,036	35.7	12,162	2,083	....	.....	686	62	29,449	6,989
Wyoming	31,023	3.2	16.1	23	4,706	37.5	6,515	241	†	†	4,442	429	†5,556	†798
Other	2,509	3.6	22.8	262	9,836	74.5	51	2	10,480	222	4	2,045	21,562	3,938
Total 1937	2,447,620	5.1	21.6	9,028	489,234	67.6	691,320	$32,363	341,085	$4,294	113,005	170,567	637,830	$161,298
Total 1936	2,167,802	5.5	22.0	8,674	454,969	67.1	618,468	28,397	283,421	3,681	93,183	156,080	554,397	138,051

*Includes value of gas ued at petroleum refineries and public-utility power plants. †Gas used in manufacture or carbond black included under "Other" for United States total under "Other industrial" for State total to avoid revealing figures of individual operators.

Interstate Transportation of Natural Gas

The total quantity of natural gas transported across the State borders in 1937 was 19% above 1936 and 45% above 1935 and aggregated 687,480,000,000 cubic feet, which was equivalent to about 28% of the total production compared with 24% in 1935. The principal interstate movements were from Texas, Louisiana and West Virginia, exporting approximately 203 billion, 153 billion, and 103 billion cubic feet, respectively. Louisiana shipped most of its gas to Texas, Arkansas and Illinois. Texas exported the most to Illinois, Kansas, Colorado, Missouri, Iowa, Oklahoma and Indiana, while West Virginia shipped the largest portions to Ohio and to Pennsylvania. The shipment of gas from the other states was not so large, but Kansas, Pennsylvania, Kentucky and Oklahoma exported between 41,000,000 and 45,000,000 M cubic feet each.

Consumption of Natural Gas Used with Manufactured Gas in the United States in 1936, by States

State	Domestic Consumers	Domestic M cubic feet	Commercial Consumers	Commercial M cubic feet	Industrial (M cubic feet)	Total M cubic feet	Total Value at points of consumption
California	4,950	162,000	320	48,000	46,000	256,000	$216,000
District of Columbia	137,810	2,458,000	6,480	281,000	365,000	3,104,000	2,289,000
Illinois	993,930	15,253,000	57,160	3,474,000	5,400,000	24,127,000	24,138,000
Indiana	28,770	349,000	1,270	75,000	30,000	454,000	523,000
Iowa	55,400	1,306,000	4,130	301,000	1,044,000	2,651,000	1,863,000
Kentucky	69,720	2,736,000	7,180	756,000	805,000	4,297,000	2,250,000
Maryland	13,670	237,000	280	6,000	9,000	252,000	231,000
Michigan	426,310	3,211,000	16,200	431,000	1,286,000	4,928,000	6,144,000
Minnesota	113,620	2,383,000	5,340	223,000	415,000	3,021,000	3,563,000
Missouri	216,020	2,446,000	11,180	316,000	315,000	3,077,000	3,154,000
Nebraska	53,150	934,000	330	47,000	116,000	1,097,000	713,000
New York	269,930	8,223,000	23,020	1,831,000	986,000	11,040,000	8,755,000
Ohio	156,030	2,256,000	15,110	730,000	611,000	3,597,000	2,214,000
Pennsylvania	49,170	1,177,000	4,280	267,000	102,000	1,546,000	1,214,000
Virginia	11,680	83,000	250	6,000	2,000	91,000	100,000
Total, 1936	2,600,160	43,214,000	152,530	8,792,000	11,532,000	63,538,000	57,367,000

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	Domestic Consumers	Domestic M cubic feet	Commercial Consumers	Commercial M cubic feet	Industrial (M cubic feet)	Total M cubic feet	Total Value of points of consumption
1935[*]	2,218,830	38,496,000	137,930	6,986,000	8,587,000	54,069,000	49,791,000
1934	2,012,530	35,587,000	134,220	6,345,000	7,038,000	48,970,000	45,446,000
1933	1,904,890	31,475,000	132,850	6,093,000	5,291,000	42,759,000	40,382,000
1932	1,853,170	33,489,000	129,620	6,556,000	14,340,000	54,385,000	48,933,000
1931	1,755,030	21,285,000	129,530	4,310,000	3,333,000	28,929,000	21,358,000
1930	450,140	18,068,000	50,580	3,472,000	2,358,000	23,898,000	4,881,000

[*] Revised figures.

The above table of the Bureau of Mines reflects the extension of natural gas pipe lines to cities and towns previously served with manufactured gas alone. The large increase in sales and revenues between 1930 and 1932 is due to the fact that the figures for 1930 and 1931 reflect sales for only part of the year, as natural gas was used in many cases for the first time in those years. Thus these figures do not represent the trend but, rather, the first phase of the utilization of the mixed product. Reflecting the sale of mixed gas in the city of Chicago since the latter part of 1931, the State of Illinois supplied by far the greatest amount of revenue from this source, revenues amounting to approximately 42% of the total in this country, while revenues from this source in New York constituted an additional 15%.

Development of Natural Gas Transmission

During the early years of the natural gas industry, the product was used only locally in the general territory adjacent to the fields of production. However, with the growing realization of its uses, and the discovery of large reserves, an extension of the area of distribution was undertaken by the construction of pipe lines similar to those used in the oil industry. There has been a steady expansion in pipe line mileage since the beginning of the industry. It was only in 1927, however, with the development of electric welding and other improved methods of constructing pipe lines that the construction of long, large-diameter, natural gas lines was begun. Construction of these lines increased through 1928, 1929 and 1930, but declined in 1931 and almost entirely stopped from 1932 to 1936. This decrease in new construction was due chiefly to the fact that the major projects holding most promise of success were completed or well under way before 1931.

No complete survey of natural gas pipe lines, covering mileage and sizes, has been made. However, the Federal Trade Commission estimated that as of June 30, 1932 there were approximately 52,000 miles of natural gas trunk lines in the country as compared with about 40,000 miles in 1929. Since 1932 few important lines have been built, the principal being from Douglas to Tucson and Phoenix, Ariz., from Rockville, Ind. to Detroit, Mich. and the additional capacity provided for these lines. In June, 1932, the natural gas lines were operated in all but 13 states (the six

New England states, Del., N. C., S. C., Wisc., Nev., Idaho and Oregon). Texas leads in mileage. Other states with extensive systems are Ohio, Oklahoma, Kansas, Louisiana, Mississippi, Pennsylvania, West Virginia, Arkansas, Kentucky, New York, Wyoming and California. The major pipe line systems consist of those running from the "Panhandle," Texas, to (a) Chicago, Ill., (b) to Omaha, Des Moines, and Minneapolis (c) to Detroit and (d) to Denver. There are other important lines between the Monroe-Richland District and (a) Atlanta, Birmingham and Montgomery, and other cities in the south, (b) St. Louis (Mo.) and (c) New Orleans, La.; the lines from the Kettleman Hills Field to San Francisco and Los Angeles in the far west, the line from Kentucky to Baltimore and Philadelphia via Washington, D. C., in the east, and the line from the Cut Banks Field in Montana to Helena, Anaconda and Butte in the northwest. Other smaller systems consist of the lines from the Louisiana Field to Monterey, Mexico, one from New Mexico to El Paso, Texas and to Bisbee, Douglas and Phoenix, Ariz., and from Wyoming to Salt Lake City and Ogden, Utah.

The extension of these trunk lines into areas which previously were not supplied with gas, and the sale of the fuel at wholesale to the companies formerly distributing manufactured gas in the cities en route is similar to the developments followed by the electric power and light industry in recent years. These developments necessitating physical connections and tie-ins encourage the consolidation of natural gas properties into larger and larger units. The phase of development consisting of the building of large trunk lines, although probably not yet completed, appears to have reached its peak. However, the expansion and extension of small lines from these trunk lines to large and small communities is still in an early stage of development. Conditions existing during the depression were not propitious to such developments, but with the lifting of the depression new developments along this line have been carried on. This phase of the industry is still quite young. In building long distance lines many problems arise, including the type of line construction, cost of the right of way, pressure of gas coming from the well and existing soil through which the pipe must pass, consequently construction costs vary widely, other factors include climatic conditions along the route, the maintenance cost of the lines and, most important of all, the possible market and the rate at which the gas can be sold there.

Regulation of Interstate Transmission

On June 21, 1938 Congress enacted legislation providing for regulation by the Federal Power Commission of interstate transportation and sale of natural gas for resale for ultimate public consumption. The principal features of the Act are summarized as follows:

1. The production and gathering of natural gas, local distribution and direct pipeline sales for industrial use are not subject to the Act.

2. Exports to and imports from foreign countries must be approved by the Commission.

3. Rates must be filed with the Commission and changes approved by the Commission, which may initiate hearings and suspend the effectiveness of rate changes for five months; the Commission may not suspend effectiveness of rate changes affecting sales for resale to industrial customers.

4. The Commission may determine the reasonableness of rates on its own motion or on complaint and may fix rates by its orders, except that it may not initiate rate increases; it may also determine costs where it has no authority to fix rates, either on its own motion or at the request of a regulatory commission.

5. The Commission may determine the actual legitimate cost and depreciation therein of physical property and may require the filing of physical inventories, the original cost thereof, and the cost of all additions and retirements.

6. The Commission may direct extension or improvement of facilities and the extension of service to local distributors adjacent to its facilities if the Commission finds no undue burden will be placed upon the company thereby. The Commission may not compel the above extensions, etc., if they would impair the company's ability to render adequate service.

No abandonments of property subject to the Commission may be made without permission based on either depletion of the gas supply or public convenience or necessity.

Certificates of convenience and necessity shall be obtained before a gas line may be extended to a market in which natural gas is already being served by another company. Policy in granting certificates of convenience and necessity should seek service at "lowest possible reasonable" rates.

7. The Commission may prescribe accounts, records, cost accounting procedure, etc., except that the company shall not be relieved from requirements of state law.

8. The Commission may require depreciation accruals at rates it prescribes.

9. The Commission may require reports, subpoena witnesses, etc., of operating companies, and may examine their records and those of companies directly and indirectly controlling them insofar as the latter's records relate to transactions with controlled operating companies.

Legal Investments

Public Utility bonds legal for savings bank investments in various States are tabulated in the blue insert. The bonds are arranged alphabetically with the legal status given for the States of California, Connecticut, Maine, Massachusetts, New Hampshire, New York and New Jersey. An additional feature following this tabulation are lists of public utility securities eligible for fiduciaries in New Jersey and Pennsylvania.

Expanding Markets for Gas Industry Make Investments Sound

The gas industry today faces the future in a sounder and stronger position than at any time during the past decade, Percy S. Young declared in an address on "Investment Attributes of Gas Utility Securities," presented May 15 in San Francisco at the Executive Conference of the American Gas Association. Mr. Young is chairman of the Executive Committee of the Public Service Corporation of New Jersey and a past president of the Association.

After stating the many favorable characteristics of gas industry securities, Mr. Young cited the expanding market for gas. He summarized the principal segments of the gas market as follows:

(1) Cooking.—The modern gas range is a remarkable achievement. It is more efficient, excels and out performs any of its competitors. Public acceptance has been immediate and enthusiastic. The modern gas range has placed gas in a preeminent position in household economy. During the year 1938 over one million new gas ranges were sold.

(2) Water Heating.—This field offers one of the greatest opportunities for the expansion of a highly desirable load. Lower initial costs and substantial improvements in efficiencies have met customer requirements and public acceptance has followed. Sales of 740,000 water heaters in 1938 exceeded previous years' sales while the sales of many non-gas using major home appliances showed marked decreases.

(3) Refrigeration.—Gas refrigerators continued their extraordinary public acceptance and relative sales results were better than other types of automatic refrigerators during 1938.

(4) House Heating.—Faced with keen competition gas house heating has made outstanding gains. Manufactured gas sales for residential house heating increased every year throughout the depression, and in 1938 were almost four times the 1929 sales. Gas house heating entrenches the three other services of cooking, water heating, and refrigeration.

(5) Air Conditioning.—The market for air conditioning is rapidly growing. Air conditioning equipment can be used to good advantage wherever people live, work, or play. The application of gas-operated absorption type direct dehumidification equipment as applied to the air conditioning field is making excellent progress. Air conditioning has been termed the nation's next great business. It carries a great opportunity for the gas industry.

(6) Commercial and Industrial Use.—The future of commercial and industrial gas sales is decidedly bright. The steadily increasing demand and acceptance of gas in this field over the past nine years, when, despite adverse business conditions, sales increased almost 30 per cent, indicates the commanding position attained by the industry.

2511

EXHIBIT NO. 171.

The Investment Attributes of Gas Utility Securities

By Percy S. Young
Public Service Corporation of New Jersey, Newark, N. J.

The soundness of the gas industry from the long term point of view is unquestioned. It is one of the three large public utility industries using the public streets for the service of the public. The approximate investment in plant and equipment of these industries as of January 1, 1938, was: electric, light and power—$13,000,000,000; telephone (Bell Companies)—$4,400,000,000 and gas—$4,400,000,000. From 1929 to 1937 there was invested approximately $2,000,000,000; $300,000,000; and $400,000,000 in the electric light and power, telephone, and gas industries, respectively. While operating income decreased for all three industries during this period, it is significant that this decline was in face of a substantially smaller amount of new invested capital on the part of the gas industry. During the 10-year period from 1929 to 1938, which except for the first year broadly covers a period of depression, it is found that each of these industries has shown remarkable stability. Revenues were as shown in Table No. 1.

From 1929 to 1933, the low point of the depression in revenues of only 19½ per cent for the telephone industry, while the decline for the electric light and power industry and the gas industry was only 9½ per cent and 13 per cent, respectively.

Investment Characteristics

Investment in plant and equipment by the gas industry is in property of long life accompanied by low rates of depreciation. It does not suffer the substantial plant losses which often accompany revoluationary technological changes in many other industries but can benefit from the technical improvements now being developed for more efficient production. Its raw materials are not subject to wide price fluctuations and its by-products are bringing an increasingly larger return because of a widening demand. The amount of labor employed is small in relation to total expenditures for production and distribution. It is relatively free from political attack and direct governmental competition. The prospects for obtaining a balanced load with greater diversity are improving and should result in a greater utilization of plant. Its rates are generally competitive and are subject to adjustment upward without appreciable loss of business under the present system of state regulation should economic changes require such revision. Because of its stability, lower ratios of earnings to fixed charges can be maintained without detracting unduly from the investment appeal of its senior securities.

Mr. Young, who is chairman of the executive committee, Public Service Corporation of New Jersey, Newark, N. J., presented the paper, "Investment Attributes of Gas Utility Securities," before the Executive Conference of the American Gas Association, Fairmont Hotel, San Francisco, Calif., May 15, 1939. Excepts from this paper are published herewith.—Editor.

Investor Experience

The author is indebted to Dean John T. Madden and Dr. Herbert B. Dorau of New York University for statistical material recently prepared under their direction dealing with the experience of investors in public utility securities during recent years. This analysis necessitated a study of the following factors: (1) the changing market value of the securities; (2) the extent to which interest and dividends were paid; (3) receiverships.

They point out that usually there is a tendency to understate or overstate the investor's relative status at specific times by ignoring the interest and dividend record and by measuring it only in terms of the market value of the securities which he holds. The maintenance of interest and dividend payments over an extended period should be given at least as much weight as the record of market price. Furthermore, the record of receiverships among divisions of the industry and a comparison with other industries is valuable in testing the experience of investors in a selected industry.

The experience of investors in gas utility securities has been exceptionally favorable. The record indicates unquestionably and that they have been underrated, and that they compare quite favorably with the record of straight electric and combination electric and gas company securities.

Market Value Changes

The survey of the amounts invested in public utility bonds and preferred stocks of both holding and operating companies by types of service and a comparison of relative profits and losses, as measured from issue prices, illustrate how the holders of securities of each type of service fared on selected dates over an extended period including one of the worst deflations on record.

The distribution of public utility bonds in terms of type of service is shown in Table No. 2.

Although a large proportion of the total invested of over six billion dollars is represented by issues of straight electric and electric and gas companies, it does not detract from the value of comparison and an examination of relative profits or losses as measured from issued prices is interesting. (Table No. 3.)

As of December 31, 1933, the date at which the maximum loss was recorded, the bonds of straight electric companies were selling 29.9 per cent below issue price; the issues of gas and electric companies 21.9 per cent and gas companies 24.3 per cent. On December 31, 1936, the bonds of straight electric, gas and electric, and gas companies had all advanced above issue price and were 1.3, 2.0, and 2.2 per cent, respectively, above their issue prices. The issues of gas companies declined slightly more rapidly in the earlier years of the depression than straight electric and combination electric and gas issues. Except for the issues of combination electric and gas companies, they did not, however, decline nearly so far at the end of 1933 as the other issues. Furthermore, their recovery from this point on was more rapid than any of the other issues.

The analysis of the market experience of public utility bonds from 1929 to 1937 as compared with that for other groups of bonds indicates that the record of electric and gas operating company bonds was distinctly better and further that the record of utility holding company bonds was relatively better than the other groups of bonds.

2512 **Table No. 1. Revenues from Sales to Customers (1929–1938)**
(Millions of Dollars)

Year	Electric Light and Power	Gas	Telephone (Bell Companies) (Local and Toll Service Revenues)
1929	$1,938	$785	$1,045
1930	1,990	797	1,076
1931	1,975	768	1,049
1932	1,813	723	933
1933	1,754	682	841
1934	1,831	701	850
1935	1,911	727	899
1936	2,044	767	971
1937	2,180	800	1,024
1938 (Estimated)	2,172	786	1,024

Table No. 2. Distribution of Cost to Investor of Public Utility Operating and Holding Company Bonds by Types of Service (Dec. 31, 1936)

	Number of Companies	Number of Issues	Cost to Investor (Millions of Dollars)	Per Cent
Electric	129	342	$4,089.8	67.4
Gas	31	58	396.5	6.5
Gas and Electric	49	131	1,206.7	19.9
Electric and Traction	8	17	178.8	3.0
Gas, Electric and Traction	6	18	191.9	3.2
Total	223	566	$6,063.7	100.0

Table No. 3. Per Cent Profit or Loss on Public Utility Bonds by Type o Service for Selected Dates (1929–1936)

Date	Electric	Gas and Electric	Gas	Elec. and Traction	Gas. Elec. & Traction	Total
Sept. 20, 1929	− 2.2	+ 0.7	− 3.1	− 2.1	− 3.6	− 1.7
Dec. 31, 1930	− 1.2	− 2.1	− 4.5	− 2.3	− 2.5	− 1.7
Dec. 31, 1931	−16.2	−15.5	−21.7	−18.5	−21.4	−16.6
Dec. 31, 1932	−15.6	−12.4	−15.2	−22.1	−26.9	−15.3
March 1, 1933	−20.4	−16.4	−18.8	−26.0	−35.8	−20.0
Dec. 31, 1933	−29.9	−21.9	−24.3	−34.0	−43.5	−28.1
Dec. 31, 1934	−15.0	−10.2	− 9.4	−15.1	−29.7	−13.9
Dec. 31, 1935	− 2.3	+ 0.6	− 0.4	− 4.9	− 5.1	− 1.7
Dec. 31, 1936	+ 1.3	+ 2.0	+ 2.2	+ 0.5	+ 5.6	+ 1.6

An analysis of public utility operating and holding company preferred stocks by types of service showing the per cent profit or loss over the same period reveals that except for a sharper decline it follows the same general pattern as outlined above with respect to public utility bonds.

Dividend Record

A survey of interest paid on public utility operating and holding company bonds for the years 1930 to 1936 indicates that the record of interest payment has been very good and that the experience of gas utility companies within this group compared favorably with all other utility companies.

In a study of the income record of public utility preferred stocks, Jules Backman in the January, 1939, issue of Trusts and Estates arrives at the following conclusion: A comparison of the dividend experience of public utility gas and electric operating companies with that for other industries for the years 1933 and 1936 indicated that the record of dividend payments of electric and gas operating company preferred stocks was much more favorable than industries other than food and tobacco. These latter two industries reflected a high degree of stability in their dividend records and their record was about the same as that for public utility gas and electric operating companies.

A comprehensive analysis of receiverships for the years 1931 to 1936 has been compiled by Dean Madden and Dr. Dorau. This study shows that the receivership record with respect to electric, manufactured gas, and natural gas operating companies during the period under review was remarkable.

Manufactured gas operating company capitalization involved in receivership amounted to 2.4 per cent of the capitalization. That of electric operating companies amounted to 1.6 per cent of the fixed capital of the industry, while that of natural gas operating companies amounted to 6.4 per cent of the fixed capital of the industry. Involved in receiverships or defaults were 21.7 per cent of railroad capitalization despite the assistance of the Reconstruction Finance Corporation.

The data for foreign securities shows 38.5 per cent in default, real estate securities 61.7 per cent in default, and municipal securities five to 10 per cent in default. These, however, are not strictly comparable with the records for public utilities and railroads since the one deals with default while the other is concerned with receiverships. The comparison does, however, give a fairly good indication of the relative status of these types of securities as compared with securities of electric, manufactured gas, and natural gas companies.

The Industry's Future

The investment merit of the securities in any industry, obviously, is primarily dependent upon the status and future of that industry. The gas industry today faces the future in a sounder and stronger position than at any time during the past decade. During the past few years the industry has developed new vitality. While significant increases have been recorded during recent years in commercial, industrial, and house heating sales an even more important development occurred in the year 1938 during which residential sales, the base load of the industry, reversed their downward trend. For the first time since 1930 sales of manufactured gas for domestic purposes, which had suffered from adverse economic conditions, competing services and a change in customer usage, showed an upturn amounting to 1½ percent and this upturn has continued with increasing momentum during the current year.

Despite a general business decline the manufactured gas industry expanded and progressed during 1938. Over 17,100,000 customers were served by the entire gas industry during the year, the largest number ever supplied with gas, representing an increase of 180,000 over those served in 1937, a year of much higher business activity. Total manufactured gas revenues and sales increased over two per cent, while at the same time the revenues of
2513 many industries suffered declines ranging from 20 to 50 per cent.

The national advertising program, now in its third year, has been continued in harmony with an aggressive merchandising and sales promotional campaign. The results of this movement have demonstrated that the industry previously had not sufficiently publicized its development, the uses for gas, its superior efficiency, cleanliless, convenience, dependability and economy, and the tremendous strides recently made in the appliance field.

Gas for the four big domestic jobs—cooking, water heating, house heating, and refrigeration—offers the opportunity for one of the greatest advances in the history of the industry. The increasing public selection of gas as the fuel for the major household jobs is another indication of the preferred position of gas in the modern home.

The industry has recently completed a survey covering the utility characteristics of more than 104,000 one and two family homes constructed in 1938, this accounting for nearly 70 per cent of the entire number of one and two family homes built in the United States last year. For this group of more than 104,000 new and modern dwellings, of which 68,000 were located in the territory of natural gas companies, 88 per cent reported the use of gas for cooking, 74 per cent reported gas for water heating, 57 per cent used gas for house heating, while 12 per cent reported the installation of new gas refrigerators.

The amount and quality of research in all phases of the business is an outstanding achievement. Gas companies and manufacturers supplying the industry are engaged in extensive programs of development work. Revolutionary improvements have been made in ranges, water heaters, refrigerators, and other domestic appliances and further improvements are in prospect for the future. Commercial and industrial applications of gas are making notable progress. New developments in methods of producing higher B.t.u. manufactured gases, higher pressures, increased utilization of by-products, and improved efficiencies in gas production and distribution are on the horizon. Scientific investigation has not been confined to chemical and mechanical problems. Management is developing more effective rate structures, promotional activities, market analyses, cost analyses, and other aids.

The market for gas today is secure and the author is of the conviction that the field for gas in the home and industry will witness continued expansion. Let us examine briefly the principal segments of the gas market.

1. Cooking.—The modern gas range is more efficient, excels and out perform any of its competitors. During the year 1938 over one million new gas ranges were sold.

2. Water Heating.—Sales of 740,000 water heaters in 1938 exceeded previous years' sales while the sales of

many non gas using major home appliances showed marked decreases.

3. Refrigeration.—Gas refrigerators continued their extraordinary public acceptance and relative sales results were better than other types of automatic refrigerators during 1938.

4. House Heating.—Manufactured gas sales for residential house heating increased every year throughout the depression, and in 1938 were almost four times the 1929 sales.

5. Air Conditioning.—The application of gas-operated absorption type direct dehumidification equipment as applied to the air conditioning field is making excellent progress. Air conditioning has been termed the nation's next great business. It carries a great opportunity for the gas industry.

6. Commercial and Industrial Use.—The increasing demand for gas in this field over the past nine years has increased almost 30 per cent.

Conclusion

The high rank attained by investments of the securities of soundly financed and well managed electric companies and combination electric and gas companies is well merited. From the facts presented, this position should be shared by the securities of soundly financed and well managed companies distributing manufactured gas, mixed manufactured and natural gas, and natural gas companies having reserves adequate to meet requirements for a long period of years.

It has been shown that the gas business has a frontier still to be developed and that it is in a sound competitive position for all the uses in which fuel can be utilized for domestic, commercial, and industrial purposes. The industry looks upon past achievements as mere stepping stones to the broader fields of service which lie just ahead.

A Banker Analyses . . . Natural Gas Industry Investment Values

By Frank R. Denton
President, Mellon Securities Corp.,
Pittsburgh, Pa.

During the past twenty years, the development and growth in the use of natural gas has been enormous and with its increase of importance has come a material change in the attitude of the banking and investment community toward the industry.

High Credit Standing

Today your industry can borrow money at less cost than at any time in its history. In 1929 fifteen-year United States Government Bonds were selling to yield 3.4% while today fifteen-year Government Bonds yield 2.2%. This reduction of 1.2% presumably reflects the change in money rates for Government obligations are relatively risk free. During this same period the yield on bonds of some natural gas companies has been reduced twice as much as the yield on Government issues. In fact the yield on some of your industry's bonds is very comparable to that for Government issues if the tax free feature of Government bonds is considered.

The obligations of natural gas companies are today held in large blocks by insurance companies and other large investors in contrast to their small investment in the securities of your industry a few years ago. This record gives evidence of the improvement in the general credit rating of natural gas obligations. In order to understand these changes, it may be well to review the history of the industry as it appears to a banker.

The history of the natural gas business early in this century is primarily the development of larger gathering systems reaching more distance markets through larger and longer transmission lines. The story of the success of that development from a banking, investment and credit

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Part of address before annual convention, Natural Gas Section, American Gas Association, Tulsa, Okla., May 9-11, 1939.

viewpoint can be traced directly to the linking of widespread reserves including connections between companies, thus insuring dependability of supply for a known period of time.

In the past five years the natural gas industry has reached the highest credit standing in its history. Today, it can borrow money at less cost than ever before. Since 1929, Mr. Denton points out in the accompanying article, the yield on bonds of some natural gas companies has been reduced twice as much as the yield on Government issues.

These facts reflect a significant change in the attitude of bankers and investors toward the natural gas industry. What are the reasons for this change? Mr. Denton, a national banking authority, gives four principal factors together with a word of caution against over-expansion.

In the early 1920s, two things occurred which marked another era in the natural gas business, and which taken together greatly increased its national importance. The first of these was the discovery of vast new supplies of gas in the South and Southwest. Many of these important discoveries were made in the search for oil by our friends in the petroleum industry who from the beginning have been closely associated with your business. The second was the development of greater economy in long distance transmission of gas through better trenching and pipelaying methods, and material advances in the art of pipe manufacture. Your industry has been fortunate in having the cooperation of steel manufacturers, with their extensive research facilities and aggressive management, for they have provided you with the facilities for gas transportation which have made the recent expansion possible.

Even with large known reserves and practical methods of transmission, the industry was not yet especially popular with investors because it was still considered somewhat speculative and money for the new long distance pipe lines was mostly obtained through the credit backing of parent utility and oil companies. Many of the great new long distance pipe lines reached completion during the worst of the Depression and some met with considerable financial difficulties. In spite of all the difficulties; either financial or those connected with warm winters or poor business conditions, markets have been obtained, the industry has established itself and in the past five years has reached the highest credit standing in its history.

Such is perhaps the conception of the average banker or investor of the development of the natural gas business to the position is occupies today.

Confidence in Natural Gas

We may ask ourselves what are the principal reasons for the present high credit position of the natural gas industry and what it is that makes the banker and bond buyer so willing to advance funds to this industry. I believe the answer is that in the first place the banker, the bond buyer and the consumer are thoroughly convinced of the value of natural gas as a fuel. In the second place they are convinced that adequate gas reserves exist and are available to the companies, in which they are interested and they realize that long distance transmis-
2515 sion of gas from these reserves to the large markets
is practical. In the third place the industry has been realistic in its attitude with respect to methods of financing, and finally the industry has had competent management.

I am sure that I was not invited here to preach a sermon, but it is a good opportunity to say one or two things that mean much to the banker, and I believe also to the industry.

First, past success should not mean the abandonment of sound standards of financing. Some 30% of this country's railroad mileage has gone into receivership, perhaps in part because debt was regarded more or less as a permanent fixture and not as something to be paid over a reasonable period of time. The natural gas industry should profit by the experience of other industries and be willing to devote a reasonable portion of its earnings to the retirement of debt.

The other thing that I wish to mention is expansion. No one is more desirous of adequate development of a natural resource than a banker. On the other hand, speaking only as a layman who doesn't have a fraction of the knowledge of you gentlemen as to where gas can be found I doubt whether the Almighty made gas reserves inexhaustible, and I wish to leave with you my hope that the enthusiasm of the industry for rapid development of its markets will not outrun the development of known reserves and that new pipe lines will not be built beyond the capacity of the known and securely available supplies of gas, for the sake of the investor, the consumer and the banker, about whom I was invited to talk.

In conclusion, it is my opinion that the natural gas industry has a most promising outlook. There is every reason to believe that with the continuation of its capable management, it will be a source of satisfactory profit to its stockholders and a leading utility in the communities which it serves, for many years to come.

2516. EXHIBIT NO. 173.

Gas—May 1939 37

A Stock Broker Analyzes The Natural Gas Industry

By John Nickerson III

Partner, Winslow & Douglas, New York City

In selecting a security for a customer, the investment analyst tries to answer two questions about the industry represented by the security. The first is "Has this industry a proper degree of permanency or security?"

In any investment program, the element of permanency is very important. Suppose a client purchases a security and it goes down in price. If the industry holds its own, theoretically at least, the security will eventually come back to or even surpass the price paid for it.

The second question is almost a corollary of the first, "Has the industry the ability to expand profitably?"

While the proverb, "An industry is born but to die," is subject to a good many interpretations, it is a good one to keep in mind. If an industry year after year loses its customers and increases its expenses, watch out, for however attractive its securities may seem because of high yield or other reasons, it is giving statistical signs of disappearing from the economic horizon.

With these two questions in mind let us look at the natural gas business. But before plunging into present day trends, we must begin at the beginning.

A Speculative Beginning

As we all know the natural gas business had its start amid hectic and wild speculations. The millions of cubic feet wasted through ignorance, through the fond belief that there was no end to the magic supply must cause operators of natural gas properties to grieve even today.

The bible says, "The sins of the father are visited on the children to the third and fourth generation." It is the memory of such profligacy which haunt the minds of the investing public today. As one banker said to me, "What happens when the gas is all gone? You can's spit through a pipe line."

I bring this up for the reason that in my opinion when the natural gas industry wishes to raise equity money through the sale of common stock, it will have to convince the public (1) that it is making every effort to conserve the gas, (2) that new discoveries of gas are more than keeping up with the consumption of gas.

Ralph E. Davis, an engineer high in the regard of the oil and gas business, writes in an article which appeared in Gas (June 1938):

"Some three years ago, I had an occasion to estimate the known gas reserves of this country and at that time placed the figure at 62 trillion cu. ft. A similar survey just completed has given a figure of 66 trillion ft. Thus it is seen that new discoveries of natural gas have been in excess of current deliveries and that taken as a whole the gas reserve position of the industry is quite secure."

On the subject of "gas conservation," N. G. McGowen, president of the United Gas Public Service Corp., stated before the Natural Gas Convention held at New Orleans in 1938:

"Conservation of our natural gas reserves and conservation in the production, transmission and utilization of natural gas has been faced positively by your gas association and the gas companies themselves, and the gas industry can pride itself on accomplishments in this regard during the past 10 years. We have encouraged sound conservation policies and have advocated sound conservation laws with proper enforcement. Realizing the importance of proper utilization of gas produced with oil, we recently have been supporting actively studies designed to permit the proper use, in an orderly manner, of more of the gas produced with oil, heretofore blown to the air and wasted."

The present day methods of operating a natural gas company as a producing, transporting and distributing unit may be said to have started in the early 1920's. Up to this time natural gas operations were essentially local situations and performed by many small corporations. This decade saw the formation of such corporations as Cities Service Co., Lone Star Gas Corp., Oklahoma Natural Gas Co., Interstate Gas Co. and others. At the same time the then existing corporations such as Columbia Gas & Electric Corp., Pacific Gas & Electric Co., Pacific Lighting Corp., expanded tremendously. In the South the Moody-Seagraves interests were rapidly building up what was to become the United Public Service Co. system. Certain of the oil companies (particularly Standard Oil of New Jersey) developed such properties as the Peoples Natural Gas Co. and the Hope Natural Gas Co. The year 1929 arrived with the natural gas companies expanding as fast as they physically could.

The year 1930 came and went with the country still hopeful that conditions of prosperity would return; 1931 came and went with hope beginning to go. With 1932 came a dull fear called depression that engulfed the country like a tidal wave.

What happened to this comparatively new industry called natural gas? Did it have that investment element called "permanency"? During a period of unprecedented deflation plus extraordinary rate cuts, only three important companies constituting about four per cent of the gross of the entire industry were forced to the wall.

At the Bottom, a Rise

From an operating standpoint even during this period of depression, the answer to our second question is given. In 1929 total customers using natural gas were 5,848,000. In 1932, the low point of the depression, total customers had risen to 6,082,000, an increase of 234,000.

If this business can increase during a time of deflation, it should increase during a period of comparative prosperity. And so it proved.

From 1932 to 1937 the number of customers had risen to 7,006,000, an increase of 924,000 or 15 per cent. During

this same period, gross revenues went from $340,000,000
to $441,000,000, an increase of nearly 30 per cent. Net
income rose from $43,000,000 to $74,000,000, an in-
2517 crease of 72 per cent. These figures make pleasant
music to an investor's ear.

But looking for the most part into holding company reports is a story of a development of an industry within an industry which is as amazing as any development occurring in the 1920's, namely, the high pressure, long distance natural gas transmission company. These companies sell only at wholesale to other utilities or to large industrial companies.

It appears as if the first bonafide wholesale long distance natural gas transmission line was the formation of the Colorado Interstate Gas Co. in 1927. This was for the purpose of transporting gas from Clayton, N. M. to Denver, Colo., a distance of 350 miles. In pick succession came Mississippi River Fuel Gas Co. (Louisiana to St. Louis—450 miles); El Paso Natural Gas Co. (Texas to Phoenix, Ariz.—200 miles); Southern Natural Gas (Louisiana to Macon, Ga.—462 miles); Natural Gas Pipe Line of America (Oklahoma to Illinois—950 miles); Northern Natural Gas Co. (Oklahoma to Minneapolis, Minn.—960 miles); Panhandle Eastern Pipe Line Co. (Texas to border of Indiana—850 miles).

By 1933 these long distance pipe lines were in full operation with the exception of Panhandle which had not yet tied in with Detroit. In this year the total gross revenues of the five leading long distance pipe lines was approximately $25,000,000 with a net loss of over $3,000,000. In 1937, the total gross revenues had risen to $57,000,000 with a net profit of $17,000,000.

Holding Companies Did It

It is a commentary on the times that the holding company which is the political scapegoat of the day quietly and unobtrusively financed and built a whole new industry during the depression, a time when jobs and money to finance them were as nuggets of gold.

This same political force which is relentlessly pursuing "big business" and other reasons such as necessity for additional financing, due to inevitable extension programs, will eventually oblige the transmission companies to look to the investing public for the necessary financing. The common stock of El Paso Natural Gas Co. and Southern Natural Gas Corp. are available in the security markets. Indirectly, Colorado Interstate Gas Co. and Natural Gas Pipe Line Co. of America (the Chicago line) may be purchased by buying Mission Oil Co. stock. In the same way an interest in Panhandle Eastern Pipe Line Co. may be acquired through Missouri-Kansas Pipe Line stock.

The year 1938 was a second test of the natural gas companies. On top of a spectacularly warm winter, industrial consumption was far from normal due to the inert year of 1938. But again the natural gas companies acquitted themselves very creditably. In nine important producing and distributing companies the gross income for the year 1938 was off six per cent and net income off 27 per cent. These two percentage figures are exaggerated because one of the companies which is included in the above tabulation gets a good percentage of its gross from the oil business which was very adversely hit during the past year.

Efficient Management

Examining the annual reports of the important companies, one is impressed that without exception, expenses are being held in line with gross income.

A good example of efficient management may be found in the 1938 annual report of the Peoples Gas, Light & Coke Co., an important distributor of natural gas:

"Operating expenses exclusive of the item of taxes, were $911,010 less than in 1937. Decreased expenditures for gas purchased and produced, due to reduced sales, accounted for the principal reduction in operating expenses. Unaccounted for losses were less both in volume and percentage send-out, than in 1931, and this was also partly responsible for the decreased expenditures for gas."

Another encouraging sign is that the managements are taking advantage of the current money market to refund all fixed income obligations on a more favorable basis wherever possible. Note may be made also of the attempt of some of the companies to space their bond maturities so that the whole funded debt may not fall due in any one year and also to provide for debt retirement by adequate sinking funds.

An interesting statement appears in the Lone Star Gas 1938 annual report:

"During the current year conditions surrounding the security markets were more favorable than in past years, and your directors decided that the best interest of stockholders would be served by refinancing all outstanding bonds, bank loan notes and preferred stocks of your corporation and subsidiary companies, provided new securities could be issued on a basis favorable to the Lone Star group. * * * Negotiations with underwriters and bankers indicated that new securities could be issued on a basis that would reduce the annual carrying charges, and provide for uniform maturities over a period of years, thereby avoiding the requirement of providing for peak maturities in later year."

Best of all, the customers of the natural gas companies are increasing. In practically every company, the rate of increase runs from three to five per cent over 1937. This fact indicates that the industry is alive and growing. It seems safe to assume that if the companies can get business during hard times, they can get a lot more business in good times with attendant profits to those that invest in their securities.

On this subject the annual report of the Oklahoma Natural Gas Co. states:

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"Continuation of the construction of new homes is evidenced by the fact that the company has gained 5860 new customers during the year. * * * The addition of these new customers during the year and 16,182 during the past three years is a good indication of the stability and growth of the territory served."

A Look to the Future

Last, but not least, the annual reports of the different companies indicate that the managements realize the necessity of finding new supplies of gas and conserving those that they have. I quote from the 1938 annual report of the Pacific Lighting Co.:

"A deeper zone and extension were proved in the Kettleman North Dome field which is one of the most productive of the worlds known oil and gas supplies. Four new fields were discovered in the San Joaquin Valley, in one of which the discovery well was drilled to slightly over 15,000 ft.

bringing in the deepest zone in this area and opening up the possibility of new lower zones in existing valley fields. * * * It is estimated that of all gas produced in the state (California) in 1938, 90.3 per cent was delivered to pipe line systems serving gas customers, or utilized by oil and gas producing companies. This reflects an increase in unconserved gas due largely to the first flush production of new discoveries, and therefore may hoped to be temporary.''

No financial discussion, or in fact any treatise on any subject whether it be economic, social or political is complete without some pointed reference to the constant increase of taxes. I could give figures on the amount of gross and net consumed in taxes, but they have been
2518 read in a thousand places elsewhere.
If anyone, however, is curious enough to read an excellent analysis of the piercing, grinding, crunching, choking burden of taxes, which is bound to descend on this industry unless the present increase in taxes is stopped, I recommend he read the annual report of the Consolidated Edison Co. of New York. I am sure the company will send it to him on request.

To sum up, in my opinion the natural gas industry has given the lie to the oft-repeated statement that opportunity no longer knocks. It has answered in the affirmative the two questions which go through a stock broker's mind, namely, is the business permanent and is the business growing? From an investment point of view, ample yields are obtainable plus a large measure of possible appreciation for those investors who will study the securities of America's newest national industry, natural gas.

2519

EXHIBIT NO. 174.

The Gas Industry

Oldest Utility Gains New Vitality

With almost a century and a quarter of expansion and progress behind it, the gas industry in the United States has attained a new vitality in recent years and today occupies a strong position. In 1816, the first manufactured gas plant in this country was built in Baltimore, which then had a population of only about 56,000. Five years later, the first commercial natural gas well was drilled at Fredonia, N. Y., and natural gas was used there for lighting in 1824. Thus, both phases of the industry in the United States actually antedate the opening of the Erie Canal, while the electric lighting industry, beginning operations in 1882, is only about half as old as the gas industry.

During almost the first seventy years of its existence, the gas industry enjoyed practically unchallenged growth in the field of illumination. Then, in the early eighties, the electric light changed the character of competition in the lighting business from a struggle between two or more gas companies to one between industries. To meet the challenge offered by electricity, the gas companies first improved lighting equipment and service, and then set out to cultivate a new and previously untapped market, the use of gas for domestic cooking. So successful was this program that by the time electricity had seriously cut into the gas lighting load, the use of gas for domestic cooking, water heating and similar purposes had increased to such a degree that the trend of total gas sales continued to rise steadily. This capacity to adjust itself smoothly and effectively to changing conditions is still one of the salient characteristics of the gas industry, as has been demonstrated within the last ten years.

Group Effort Aids Sales

Shortly after the depression set in, according to the American Gas Association, leaders in the industry, noting that sales per domestic consumer were declining, determined upon a group effort to reverse this trend. Not only did the domestic business constitute more than 70 per cent of the industry's total sales, but, in the average company, from 80 to 85 per cent of the total investment had been made for the service of the domestic customer. From these figures the importance of this domestic business to the industry is evident. A study undertaken to discover the reasons for the decline in sales per domestic customer revealed that changes in the living habits of the American people had materially affected the use of gas in the home.

The study disclosed, for example, that while between 1910 and 1920 the number of American families increased by about 20 per cent, the number of restaurant keepers during the same period increased by more than 50 per cent, the volume of business of commercial laundries advanced by about 55 per cent, and the number of servants employed in homes and domestic establishments decreased by about 14 per cent.

2520 In addition, it was shown that from 1914 to 1925 the output of bread and other bakery products from commercial establishments rose more than 150 per cent, food prepared in commercial canning and preserving establishments nearly 180 per cent, and the preparation of foods in the so-called delicatessen category about 200 per cent.

In the field of building construction, it was found that whereas in 1921, 58 per cent of the families provided for in new buildings were to be housed in one-family dwellings, by 1927 this percentage had fallen to 38 per cent. During the same period, apartments or multi-family dwellings increased from 24 per cent of the total new construction to almost 50 per cent.

When these studies were made public in 1930, the gas industry was establishing new peaks in number of customers served, total sales, revenues and net income. Yet the leaders of the industry, as a result of the findings, decided on a program of action to anticipate and, as far as possible, turn to advantage the changes in the use of gas thus foreshadowed. In their program were reported aggressive merchandising and sales promotion activities, further study of the trends, and the formation of various committees for specific purposes.

Downward Trend Reversed

With the deepening of the depression, it became more apparent to the gas industry that it was being affected not only by the general economic conditions but also by the changes in public living habits affecting the use of gas in the home which continued, even after 1933, to exert a depressing influence. Consequently, merchandising and sales promotion activities were accelerated. In 1935, a national advertising campaign was inaugurated to bring forcibly to public attention "the numerous improvements that had been made in design and construction of gas appliances."

The establishment in 1924 of the American Gas Association Testing Laboratory, which tests more than 90 per cent of all makes of gas appliances sold in the United States and Canada, has made possible a steady and consistent increase by the laboratory in the basic national requirements for safety, durability and efficiency for its certification. Thus encouraged, improved performance of gas appliances has followed. Between 1927 and 1937, for instance, it is reported that the efficiency of the average gas range increased by some 15 per cent, and that of average gas water heaters rose by more than 30 per cent.

From 1929 through 1938, more than 11 million gas ranges were sold in this country, while sales of water heaters aggregated nearly six and one-half million, and gas refrigerator sales totaled 1,300,000. Last year alone, more than one million gas ranges were sold, and 740,000 new gas water heaters and approximately 185,000 new gas refrigerators were installed.

The progress achieved by the gas industry has been made against keen competition which has confronted it in practically all its fields of use. In most of the areas served by gas, the industry's advance has been accomplished despite the availability of coal, oil and electricity and of modern devices for their use. In brief, with the gas
2521 industry, as with other forms of private enterprise in the United States, competition has fostered progress.

Number of Customers Increases

Findings of a recently completed survey covering more than 104,000, or nearly 70 per cent, of the total number of one and two-family dwellings constructed in the United States last year show that use of gas for cooking was reported by 88 per cent, for water heating by 74 per cent, for house heating by 57 per cent, while 12 per cent reported the installation of new gas refrigerators.

A total of 17,135,000 customers, in 1938, an increase of 180,000 over the 1937 total, is the largest number ever served by manufactured and natural gas companies which supply towns and cities with a combined population of about 81,000,000. To provide service to these consumers, representing roughly three-fifths of all American households, requires a total investment in plants and equipment by the gas industry of almost $5,000,000,000.

According to preliminary estimates, revenues of the industry, including both natural and manufactured gas, amounted to about $786,576,000 in 1938, a decrease of 1.8 per cent from 1937. Sales of manufactured gas last year aggregated, it is estimated, $367,714,000, an increase of 2.2 per cent over 1937. Revenues of the natural gas companies totaled $418,862,000, a decrease of 5.1 per cent from the preceding year.

Total sales of manufactured gas for domestic uses, other than house heating, were reported at 198,331,000,000 cubic feet, a gain of 1.5 per cent for the year. House heating sales gained by about 10 per cent, even though mild temperatures prevailed throughout the year in most sections of the United States. Sales of natural gas for domestic uses, which, it is claimed, are substantially affected by weather conditions, decreased from 359,294,000,000 cubic feet in 1937 to 350,143,000,000 cubic feet in 1938, a loss of 2.5 per cent. Sales of manufactured gas for industrial and commercial purposes gained about 1.0 per cent, despite business stagnation, increasing from 107,433,000,000 cubic feet, in 1937, to 108,507,000,000 cubic feet, in 1938, but sales of natural gas for industrial and commercial purposes declined from 784,632,000,000 cubic feet, in 1937, to 680,910,000,000 cubic feet, in 1938, a loss of about 13 per cent.

Record Natural Gas Output

The total production of natural gas last year, including the amounts used in making carbon black and for field purposes[*] was estimated at the end of the year to constitute a new record output of more than two and one-half trillion cubic feet, approximately 2.0 per cent above the previous all-time peak reached in 1937. This was approximately six times the comparable figure for three decades earlier.

Known proven reserves of natural gas in this country are believed to amount to between 60 and 75 trillion cubic feet, or at the current rate of consumption to about
2522 25 to 30 years' supply. Authorities assert that continued exploration, improvement of drilling technique permitting penetration to greater depths and the search for petroleum are bound to uncover additional reserves of natural gas.

With more customers, greater total sales and larger revenues last year than in 1929, the natural gas industry has proved its vitality during the depression. The following table shows the progress of the industry in terms of number of customers, volume of sales, and revenues from sales during the period from 1929 through 1938.

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[*] More than a trillion cubic feet of natural gas are sold annually in nonutility sales for such purposes as the cracking of gasoline, field sales, etc., and for the production of carbon black.

Comparative Data on Customers, Sales and Revenue
For Natural Gas
1929-1938

Thousands of Gas Customers at End of Year

	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Domestic*	6,596	6,465	6,249	6,061	5,869	5,675	5,628	5,732	5,795	5,495
Commercial	510	501	485	465	444	430	427	416	358	331
Industrial	41	40	37	33	33	28	27	27	23	22
Total	7,147	7,006	6,771	6,559	6,346	6,133	6,082	6,175	6,176	5,848

Gas Sales to Consumers (Millions of Cubic Feet)

	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Domestic*	350,143	359,294	338,989	319,806	302,449	299,382	319,636	339,562	346,904	334,336
Commercial	99,459	102,654	96,316	87,728	78,831	73,479	70,774	68,355	61,236	58,141
Industrial	581,451	681,978	623,194	519,713	465,765	385,714	328,389	359,565	460,092	484,265
Electric Generation	172,500	170,567	156,080	125,239	127,896	102,601	107,875	139,328	120,290	112,707
Total Ind. & Elec. Generation	*753,951*	*852,545*	*779,274*	*644,952*	*593,661*	*488,315*	*436,264*	*498,893*	*580,382*	*596,972*
Total	1,203,553	1,314,493	1,214,579	1,052,486	974,941	861,176	832,674	906,810	988,522	989,449

Revenue from Sales to Consumers (Thousands of Dollars)

	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Domestic*	$244,063	$246,546	$235,771	$223,978	$212,235	$212,064	$226,488	$236,098	$235,877	$221,769
Commercial	47,381	48,152	46,070	41,945	38,046	36,838	38,637	37,483	33,573	32,112
Industrial & Elec. Gen.	127,418	146,534	128,766	108,623	95,067	79,222	75,586	90,605	114,374	120,201
Total	$418,862	$441,232	$410,607	$374,546	$345,348	$328,124	$340,711	$364,186	$383,824	$374,082

*Domestic includes House Heating.

Note:—These figures do not include natural gas used in field operations and in the manufacture of carbon black, or gas used by distributing companies in the conduct of their gas operations.

Companies selling mixed manufactured and natural gas are not included in these data.

1938 figures are preliminary estimates.

Source: American Gas Association.

Manufactured Gas Gains.

Since the low point of the depression in 1933, the use of manufactured gas, like that of natural gas, has steadily increased, each year showing a gain in the number of customers and in the output. In only one year, 1935, during that period, was there a decline in the total revenues from sales. Comparative data regarding number of customers, output and revenues from sales in the period from 1929 to 1938 are given in the following table.

These figures present statistical evidence of the progress made by the manufactured gas industry in recent years, particularly in house heating and in industrial and commercial uses, where the advances, it will be noted, have been both steady and marked.

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Comparative Data on Customers, Sales and Revenue For Manufactured Gas 1929-1938

Thousands of Gas Customers at End of Year

	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Domestic	9,289	9,276	9,063	8,957	8,837	8,708	8,776	9,186	9,280	9,264
House Heating	230	202	172	131	115	79	59	57	52	42
Industrial and Commercial	460	462	460	420	418	412	411	456	435	427
Miscellaneous	9	9	9	9	9	9	9	7	7	7
Total	9,988	9,949	9,704	9,517	9,379	9,208	9,255	9,706	9,774	9,740

Gas Sales to Consumers (Millions of Cubic Feet)

	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Domestic	198,331	195,400	198,199	206,636	216,507	223,110	240,495	253,068	257,582	255,841
House Heating	50,164	45,600	41,226	35,040	28,181	20,037	18,983	19,128	17,598	13,608
Industrial and Commercial	108,507	107,433	100,109	86,419	77,567	67,589	67,609	84,478	90,712	93,368
Miscellaneous	2,243	2,130	2,197	2,133	2,059	1,997	2,245	2,028	2,287	2,161
Total	359,245	350,563	341,731	330,228	324,314	312,733	329,332	358,702	368,179	364,978

Revenue from Sales to Consumers (Thousands of Dollars)

	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Domestic	$260,963	$256,853	$258,924	$265,379	$274,157	$279,285	$303,491	$311,850	$317,103	$315,703
House Heating	31,964	28,539	26,207	22,628	18,829	14,108	14,611	15,394	14,558	11,533
Industrial and Commercial	73,242	73,093	70,630	63,707	62,085	59,765	64,154	76,114	80,884	81,924
Miscellaneous	1,545	1,480	1,516	1,500	1,473	1,517	1,604	1,570	1,874	1,865
Total	$367,714	$359,965	$357,277	$353,214	$356,544	$354,675	$383,860	$404,928	$414,419	$411,025

1938—Preliminary Estimates.
Source: American Gas Association.

Manufactured gas is derived chiefly from coal and it is estimated that at present rates of use the United States has a coal reserve that will last more than 4,000 years. Even if coal were used to supply nearly all the nation's energy requirements, the United States is believed to have a sufficient supply for more than 2,000 years. The manufacturing gas industry, therefore, is not confronted with the problem of reserve supplies.

Development of Markets.

The most widespread use of gas, of course, is in supplying heat for cooking. Improvement in the gas range has been one of the chief factors in the growth in use of gas in this field. An important market for gas, both natural and manufactured, appears to be in the field of house heating and attention has been paid in recent years to this market.

The improvement of equipment, reduced rates in many areas, together with sales campaigns, have helped materially to increase the consumption of gas in house heating through central plant burners and other heaters. It is estimated that a total of 825,000 gas central house heating installations were connected to the lines of all United States gas companies in 1938. Approximately 1,400,000 dwellings, it is claimed, are heated by unit heaters, space heaters, floor furnaces and similar equipment. Thus, the total number of homes in this country heated by gas is estimated at more than 2,225,000.

2524 Domestic water heating also offers great opportunities for increased sales of gas and this market is likewise being cultivated through nation-wide promotional activities and widespread adoption of more favorable rates as well as through improvements in equipment.

Adoption of an all-gas home program, with a competition for architects and for builders, demonstrations, and similar features, has been helpful in expanding sales through stimulating a wider selection of gas and gas appliances in building construction planning and specifications.

A three-year $1,500,000 national cooperative advertising campaign, financed by more than seven hundred gas and gas and electric companies, is credited not only with helping greatly to increase sales of gas itself, but with improving both the quantity and quality of advertising by appliance manufacturers and by local companies and dealers. The success of this advertising program is attested by the announcement of a three-year extension of the campaign to July, 1942.

Outlook for the Industry

With more customers than it has served at any time in its history, with greater sales and revenues than it enjoyed in 1929, and with the continuation of sales and promotional activities which have proved effective, the gas industry seems to have reason to face the future with confidence. Its soundness has been tested during the depression and it has demonstrated its stability and its capacity for growth.

In a difficult period the industry has succeeded in expanding its market both in domestic and in industrial uses. Through improvement of appliances it has made its product more acceptable to consumers. Confronted with changing business conditions and habits of living, the industry has shown itself flexible enough to take advantage of these changes to improve its position in a highly competitive field.

The growth of the gas industry and its record in adverse times, therefore, indicate that with any upturn in business generally it may be expected to achieve even greater advances than those already made in its century and a quarter of orderly progress.

2525 EXHIBIT NO. 176.

The Fifth Big Job . . . Air Conditioning A Challenging Opportunity

By Charles R. Bellamy

Columbia Gas & Electric Corp., New York, N. Y. Chairman, Industrial and Commercial Air-Conditioning Committee.

A few years ago a great many people, including numerous industrial leaders, were expecting a new industry called summer air-conditioning to lead us right out of the depres-

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Abstract of paper presented at annual convention, Natural Gas Section, American Gas Association, Tulsa, Okla., May 8-11, 1939.

sion. But it has not done so, and probably will not, because air-conditioning costs real money. In return it offers more comfortable and healthful living conditions, thereby raising the standard of living, but, as we all know, living standards are closely related to income, and when incomes are low, improvements of this nature are regarded as luxuries.

Gas Position Improves

Instead of a phenomenal growth it has had a steady growth, from a gross business of $10,000,000 in 1931 to an annual business variously estimated from $65,000,000 to $90,000,000. In 1938 when general business declined more than 20% and plumbing and heating dropped 16% from the year before air-conditioning decreased only 11%. This is significant of the industry's position today, and it is indeed fortunate from our standpoint that the growth of air-conditioning has been rather slow but sure, because every year has seen a market improvement in the competitive position of gas equipment.

In speaking of the summer air-conditioning market it is advisable to distinguish between the actual present market and the potential market. The size of the first is based upon present cost of air-conditioning and present business conditions, while the second is dependent upon lower costs and improved business conditions.

An Analysis of the Market

First let us frankly survey the present market. Undoubtedly the most promising and largest outlet at this time is in the commercial field. The thousands of installations in department stores, restaurants, theaters, and other commercial establishments have yielded such good returns to their investors that competitors must either fall in line or lose out entirely. For this reason every store, shop, theater, hotel, hospital, school and church is at the present time a potential customer. Less than 25% of the large department stores now have air-conditioning, and only about 10% of the larger restaurants. There are therefore over 3,000 department stores that are excellent prospects, and close to 19,000 restaurants. In addition to this there are thousands of shops, theaters and hotels which, sooner or later, must install summer air-conditioning.

The second best outlet at this writing is probably the industrial field. Here the possibilities of summer air-conditioning are just beginning to be appreciated. True, industrial air-conditioning is relatively old, but generally speaking these older installations were in factories and plants where control of temperature and humidity were obviously imperative. Now, however, the benefits of such control are being demonstrated in all kinds of industries, and the success of these new applications indicates a universal need of air-conditioning by industry.

At the present moment the actual available domestic market is probably only a fraction of the potential market. As the public becomes air-condition conscious, that is, acquainted not only with the comfort but also with the actual benefits of temperature and humidity control, and as general business picks up and equipment costs are lowered, the size of this market will expand. In this connection it is well to remember that every commercial and industrial installation has an educational value, and it is altogether possible that the popular demand for home air-conditioning will be accelerated by the completely air-conditioned automobile that is ready for marketing.

Large Business Predicted

Altogether the existing market for summer air-conditioning is large, and with the equipment costs reduced and operating performance improved this industry should soon do a gross business of over $100,000,000 per year. One large chemical company recently completed a survey of the air-conditioning market and reached the conclusion that this business should for some time continue to double every three years. One writer estimates a yearly gross of $350,000,000 sometime within the next ten years.

Just what percentage of this total business will go to gas it is impossible to say, but it should be a substantial amount. On the assumption that air-conditioning with gas will cost about $300 per ton of refrigeration effect, an annual gross business by gas equipment manufacturers of $100,000,000 would mean roughly 333,000 tons of new installation. Thus annual sales might readily develop a yearly gas load of approximately 9,300,000 M cu. ft. This should mean something like $5,000,000 of new business to the gas industry per year. In fact, one of our leading utilities, after a most thorough study, has set 10,-
2526 000,000 M cu. ft. of gas as the annual new possible
business of summer air-conditioning in this country.

Ourusoff,* in his comprehensive analysis of the residential market, found that this business alone might add around $2,260,000 of gross revenue per year for many years. Figure out what the cumulative effect of such additions would mean to our industry, and remember that every foot of such a load is off-peak business. Certainly, here is an opportunity worthy of the best efforts of our industry! It is indeed the ideal business for us.

In the light of past performance the figures which I have just given may appear optimistic, but ten years from now they may show up as a very conservative under-estimation. In any event, a large new market for fuel is opening up, and if the gas industry is to secure any appreciable portion of this market it must have confidence in its own product. Certainly vision, optimism and confidence are needed to plan our compaign; for faint heart never won fair lady.

New Capital Needed

Certain manufacturers have already spent large sums of money in developing processes and equipment; now new capital is needed to develop markets. Here is where the gas utility can step in and help. Gas air-conditioning equipment does not sell itself. It has to be sold. And I think our experience with house heating and refrigeration proves conclusively that successful merchandising of gas equipment requires the wholehearted backing of the local gas utility.

To put gas air-conditioning across, gas companies are going to have to participate with the manufacturers in a campaign of intelligent advertising and sound salesmanship. All this will cost money, but it should be money well spent for the summer air-conditioning load is the perfect supplement to our house heating business. At any given price for gas the air-conditioning load is far more attractive to the gas company than an equivalent volume of house heating business.

In the realm of general scientific research on the value of air-conditioning regardless of how achieved, recent developments have been most favorable to the cause of gas. As you all know, gas equipment lends itself peculiarly well to the control of humidity. In this connection the work of the American Society of Heating and Ventilating Engineers during the past summer on the physiological reactions of men while carrying on light work in atmospheric conditions including effective temperatures from 77° to 92° with relative humidities of 60%, 75% and 90% is very encouraging. Similar tests, using somewhat dryer air, would appear to be desirable, and it seems to me that the American Gas Association should encourage work of this nature.

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* 1938 Report of Industrial and Commercial Air Conditioning Committee, Indutrial Gas Section, American Gas Association.

Tools Available Today

Now, let us examine carefully the air-conditioning tools that are available to the gas industry today:

Tool No. 1—The Gas Engine. Here is a tool especially suitable in certain locations for large commercial and industrial installations. The possibilities of expanding its field of application appear to be good.

Tool No. 2—The Dehumidifier. There are at least three well-designed gas-operated dehumidifiers on the market. Here is a tool that has been greatly improved during the past year and its cost reduced anywhere from 30% to 50%. Already favorably known in the air-conditioning business for its high-class performance, the dehumidifier, now more efficient and lower in cost than ever before, should have a correspondingly broader market. The modern dehumidifier with its cooling system can be used in many sections of our country to provide complete air-conditioning service of the highest order. Wherever refrigeration is imperative the low cost of the new models widens the market for split air-conditioning systems.

Tool No. 3—The Absorption Refrigeration Machine. There is one well designed machine now on the market and one or two others are expected to be put on commercial production some time this year. Here is a brand new tool, one that can do everything that the conventional electric unit does and more too, for here is the first machine to provide year-round air-conditioning.

Examine this array of tools critically and you will find that it constitutes a matched set of fine instruments. Each instrument has its own peculiar advantages and is unexcelled in certain fields of application. Collectively, these tools cover practically all requirements of air-conditioning, so that wherever natural gas is sold gas-operated air-conditioning equipment should forge to the front. There is high-grade, economical equipment for big installations, little installations, and for the most exacting specifications.

Let us not lose sight, however, of this one very important fact:—that while gas equipment is being perfected the manufacturers of electrical equipment are not standing still. Progress is being made on all fronts. Competition is extremely keen, and for some time gas is going to have to work very hard for every bit of air-conditioning business that it gets.

Practically all the equipment that the gas industry has been waiting for is now available and on the market. Since this is so, I believe that you will all agree that the time has come for the gas industry, especially those companies serving natural gas, to take an active part in the development of the air-conditioning business. A few companies already have crossed this Rubicon; but as yet there has been no united action.

Gas Company Program

Some companies are asking what should be done. Undoubtedly one of the first steps should be to air-condition gas company offices, as has been recommended by several of the A. G. A. committees. By so doing you not only make your customers comfortable, but give a practical demonstration of the value of true air-conditioning. I am glad to say that several of our progressive gas companies have already taken this step.

Another step that I believe all the larger companies should take is to establish an Air-Conditioning Department headed by a trained engineer. Regardless of the company's policies on appliance sales, this proposed department is needed to advise prospective buyers of air-conditioning systems and to see that gas equipment receives fair treatment in the various set-ups as submitted by local architects and contractors.

Possibly the greatest handicap that gas equipment
2527 has to face today is its lack of publicity and merchandising outlets. Local architects and contracting firms are, of course, much more familiar with conventional electric systems than with the newer gas units and need to be brought up to date and kept informed about the advantages of air-conditioning with gas. Here is one place where the gas company representative can do much pioneer and constructive work. In addition, I think that gas companies should make sizeable appropriations for advertising gas-

operated air-conditioning equipment, so that as public interest in air-conditioning is aroused there will be general recognition of the fact that gas is just as efficient for summer cooling as for winter heating.

Competitive Factors

If you should ask me when is the big market for air-conditioning going to open up, I should have to answer frankly that I don't know. In so far as the gas industry is concerned, it is my opinion that there are three main factors to be considered in any attempt to answer this question. The first is, Competitive Position of Available Equipment. Efficient, low cost and economical equipment is a prime requisite for new business. Since the above descriptive terms are used in their relative sense, we can say that factor No. 1 is at the present time favorable to a rapidly expanding business.

Factor No. 2 is concerned with merchandising methods and sales policy. Obviously, equipment manufacturers need the full co-operation of the gas industry. The need for an intensive and progressive sales campaign by gas companies and equipment manufacturers is urgent. The answer to factor No. 2 is largely in our own hands.

Factor No. 3 is concerned with the improvement in business conditions, which we are all hoping for. The new industry, air-conditioning, cannot by itself perform the impossible and correct all our economic ills, but by giving employment and by establishing higher living standards it can help business. Improved business will in turn stimulate the use of air-conditioning, and then, when good times return, if we have done our part, the summer demands for gas should grow by leaps and bounds.

2528 EXHIBIT NO. 178.

The Natural Gas Industry Provides Opportunities for Investment

By James S. Carroll

Statistician, Rauscher-Pierce & Company*

If any one industry of today were to be selected as one in which to confine the investment of funds, I would nominate the natural gas industry. This industry not only has had a very remarkable past, but has an extremely brilliant future.

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* Reprinted from The Southwestern Banker, November, 1938.

Today approximately 1,500 gas companies in the United States supply gas to more than 8,000 cities, towns and villages having a total population in excess of 80,000,000—nearly two-thirds of the entire population of the United States. In 1937 the natural gas industry received from its 7,038,000 customers the sum of $441,232,000 for the almost incomprehensible figure of 1,314,493,000,000 cu. ft. of gas. To reach these customers with natural gas service required 179,670 miles of transmission and distribution lines. At the present there are 24 states in which natural gas is being produced and marketed in commercial quantities. These figures give a brief picture of the enormous size to which the natural gas industry has grown in its comparatively few years as a servant to mankind.

Industry's Enviable Record

The major portion of the growth of this industry has taken place during the past 10 to 15 years, during almost half of which period this country was experiencing one of the most serious business recessions in its history. That its growth and development took place despite these obstacles gives the industry an enviable record. Most business barometers of today indicate that business activity is below the level of 1926 (the year generally selected by statistical companies to indicate a normal year), and far below the peak reached in 1929. However, in 1937 sales for the natural gas industry not only were far in excess of those for 1926, but also had registered a 35 per cent increase over sales for 1929. At the close of 1937 the industry had about 20 per cent more customers than it had in 1929. Its actual history during the depression also affords an interesting study. Revenues for the industry registered their lowest figure in 1933, in which year they showed only a 13 per cent decrease from the 1929 level. However, in no year did the total number of active customers decrease below the level of 1929. Even in 1932, in which year the total number of active cutomers was at its lowest, this business still maintained a four per cent customer increase over 1929. Contrast these figures with the Standard Statistical Index of Industrial Activity, which figure dropped from around 108 in 1929 to about 54 in 1932—half its previous level. In other words, the natural gas industry not only showed considerably more progress than business generally during the period preceding and through 1929, but indicated a great deal more stability during the 1929-32 decline. After 1932, the industry immediately soared to new records.

There are several definite reasons for this phenomenal growth in the utility field. First and foremost, natural gas is cheap. Per B.t.u. of heat, it is cheaper than either manufactured gas, coal, or fuel oil. But even on an equal price basis, it is more economical for industries in that it requires no storage place which demands a tie-up of capital in fuel inventories. It is more easily handled than coal or oil. Since it requires practically no labor for handling, industries have turned to it in a time of mounting labor costs. Also, it is a much cleaner fuel and more efficient in that it leaves no residue and gives an even and easily controlled heat.

Looking at the industry from an investment standpoint, it has many exceptional features. A natural gas company requires only a small amount of labor, which is a particularly important item during inflationary times or business booms. For instance, where there is approximately one employee for every $3,000 invested in plant and machinery in the automobile industry and one employee for each $7000 investment in the steel business, there is one employee for each $37,000 investment in the gas industry. Consequently, labor problems as well as increasing labor costs are eliminated to a great extent. In addition, natural gas companies are not burdened with the problem of inventories. Inventory losses have had serious effects on many industries during business declines, and for this reason usually necessitate a large working capital position. Another safety factor of the natural gas business is that a municipality must have access to a proven and convenient gas field before it can begin any competitive efforts. In fact, to my knowledge, there has never been any actual instance where a municipality installed a competing natural gas system.

Prospects for Expansion.

Prospects for the continued expansion of the industry, both internally and externally, are highly favorable. The American Gas Association, Inc., estimates that there is a market for over 700,000 house-heating customers in the territory now served by natural gas, after making reasonable allowance for mild climate, low buying power, and other factors; also, a market for 625,000 gas refrigerators, after making allowance for buying power and present saturation of automatic refrigerators. With transmission lines 1,200 miles long having already been
2529 profitably constructed, the industry should have further growth into fields now served by manufactured gas and other fuels. Natural gas adds to the general welfare by supplanting higher cost and dirtier fuels and for this reason alone an expanding market appears to be inevitable. Also, the industry has perfected a gas light which in the future may prove to be a commercial attraction. In addition, the definite success of gas refrigerators indicates further use of this fuel in the air-conditioning industry.

The majority of natural gas companies have held their funded debt to conservative figures and have provided for large sinking funds. For this reason these securities have maintained a good record. This record is somewhat illustrated in the October, 1938, issue of the Natural Gas Industry, published by the American Gas Association, Inc. The association has compiled a detailed operating statement for the entire industry for each of the past seven years. This statement shows that in no year did the industry as a whole fail to earn its interest and amortization charges, after providing for depreciation, less than 1.43 times (in 1933), while the average for this seven-year period was a coverage of over twice. The average interest coverage for 1937 for the industry was 2.80 times. In a recent bulletin published by Standard Bond Investments there is a list of 342 defaulted bonds, which list includes all domestic corporate bonds carried in the service which are currently in default of either interest or principal. There are only two natural gas company bonds on this list, and one of these defaulted prior to the company's changing from manufactured to natural gas.

Undoubtedly, the natural gas industry has proved that it possesses a remarkable stability as well as tremendous future possibilities, and for this reason provides ~~the~~ investor with many attractive investment opportunities.

2530

EXHIBIT NO. 179.

Annual Statistics of the Natural Gas Industry in 1938

(Cut)

American Gas Association
Statistical Bulletin No. 37
October, 1939

Paul Ryan, Chief Statistician
American Gas Association
420 Lexington Avenue New York City

2531

Foreword

The data shown in this bulletin present revised figures on the natural gas industry for the years 1929 to 1938, since companies formerly distributing manufactured gas but which were distributing natural gas at the beginning of 1938 have been included in the tabulation for all ten years. The tables therefore present a comparable and consistent picture of the operations of an identical group of companies over the ten year interval, and eliminate fictitious and misleading changes in customers, sales and revenues, etc., resulting from arbitrary reclassification of companies as natural gas or manufactured gas distributors in any particular year.

It should be noted that the line charts shown on top of pages 7, 9 and 11 are plotted on the logarithmic or ratio scale, and the charts therefore indicate percentage increase, facilitating direct comparisons between the slope of one curve and that of any other curve regardless of its location on the diagram. Such a chart compares percentage changes, while the arithmetic chart compares absolute changes.

Figures in these tables do not include natural gas used in field operations and in the manufacture of carbon black, or gas used by distributing companies in the conduct of their gas operations.

Companies selling mixed manufactured and natural gas are not included in these data.

NATURAL GAS INDUSTRY IN THE UNITED STATES

COMPARATIVE DATA ON THE NATURAL GAS INDUSTRY

1937 - 1938

Annual Gas Sales Per Customer
(Cubic Feet)

	1 9 3 8	*1 9 3 7*	*Change*	*Per Cent Change*
Domestic*	53,000	55,200	- 2,200	- 4.0
Commercial	192,700	204,400	- 11,700	- 5.7
Industrial & Elec. Gen. . .	18,081,800	21,294,900	-3,213,100	-15.1
Total	167,800	186,100	- 18,300	- 9.8

Annual Revenue Per Customer

	1 9 3 8	*1 9 3 7*	*Change*	*Per Cent Change*
Domestic*	$ 36.41	$ 38.06	-$ 1.65	- 4.3
Commercial	90.15	96.32	- 6.17	- 6.4
Industrial & Elec. Gen. . .	3,016.24	3,664.78	- 648.54	-17.7
Total	$ 57.61	$ 62.75	-$ 5.14	- 8.2

Miscellaneous Data

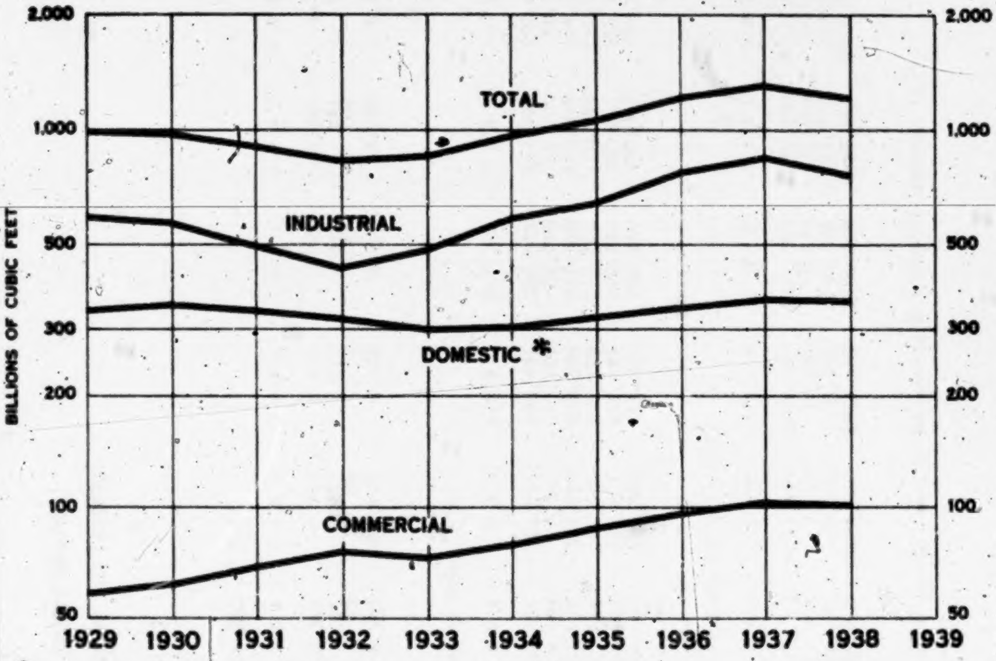
	1 9 3 8	*1 9 3 7*	*Change*	*Per Cent Change*
Population Served	33,785,000	33,127,000	+ 658,000	+ 2.0
Miles of Main	186,900	183,400	+ 3,500	+ 1.9
Employees	64,000	66,300	- 2,300	- 3.5

* Domestic Includes House Heating

TABLE 2

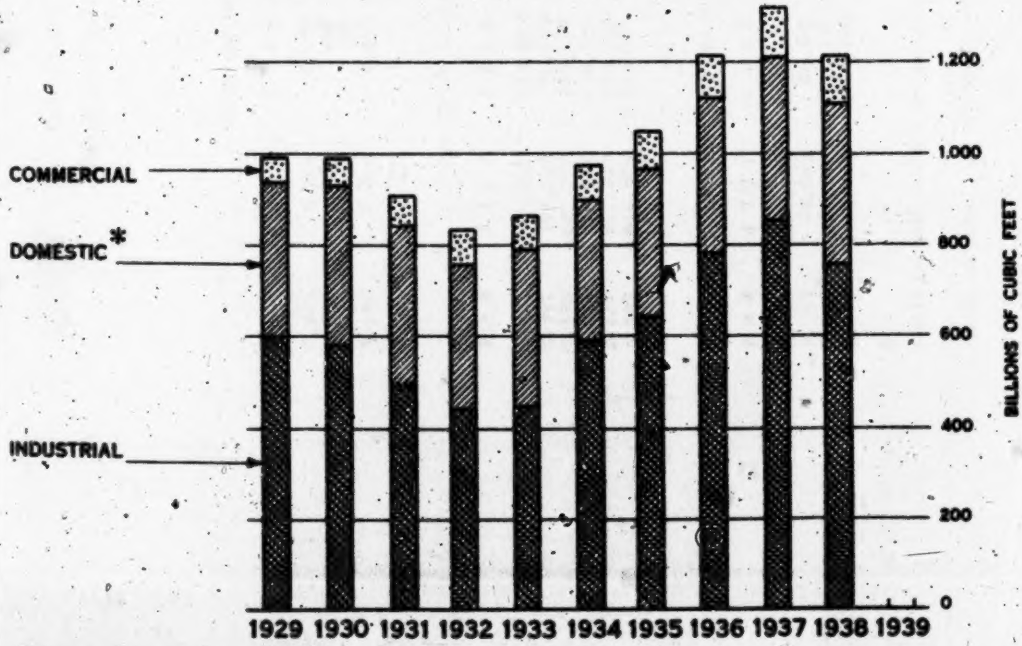
2536

GAS SALES - NATURAL GAS INDUSTRY



* Domestic Includes House Heating

GAS SALES - NATURAL GAS INDUSTRY



* Domestic Includes House Heating

2537

NATURAL GAS INDUSTRY IN THE UNITED STATES

COMPARATIVE DATA ON CUSTOMERS, SALES AND REVENUE

1929 - 1938

Thousands of Gas Customers at End of Year

	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Domestic*	6,665	6,521	6,292	6,104	5,911	5,716	5,671	5,777	5,840	5,540
Commercial	524	505	488	468	447	433	430	419	361	334
Industrial	42	40	37	33	33	28	27	27	22	22
Total	7,231	7,066	6,817	6,605	6,391	6,177	6,128	6,223	6,223	5,896

Gas Sales to Consumers (Millions of Cubic Feet)

	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Domestic*	352,964	359,890	339,893	320,733	303,321	300,286	320,641	340,591	347,979	335,418
Commercial	100,951	103,220	96,759	88,115	79,153	73,781	77,100	68,783	61,702	58,641
Industrial	589,398	681,230	623,198	519,719	465,771	385,720	328,394	359,568	460,095	484,270
Electric Generation	170,039	170,567	156,080	125,239	127,896	102,601	107,875	139,328	120,290	112,707
Total Ind. & Elec. Gen.	*759,437*	*851,797*	*779,278*	*644,958*	*593,667*	*488,321*	*436,269*	*498,896*	*580,385*	*596,977*
Total	1,213,352	1,314,907	1,215,930	1,053,806	976,141	862,388	834,010	908,270	990,066	991,036

Revenue from Sales to Consumers (Thousands of Dollars)

	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Domestic*	$242,658	$248,175	$237,210	$225,445	$213,619	$213,496	$228,063	$237,739	$237,485	$223,464
Commercial	47,240	48,642	46,463	42,314	38,376	37,165	38,995	33,899	33,994	32,579
Industrial & Elec. Gen.	126,682	146,591	128,771	108,629	95,072	79,228	75,593	90,608	114,378	120,207
Total	$416,580	$443,408	$412,444	$376,388	$347,067	$329,889	$342,651	$366,246	$385,857	$376,250

* Domestic Includes House Heating.

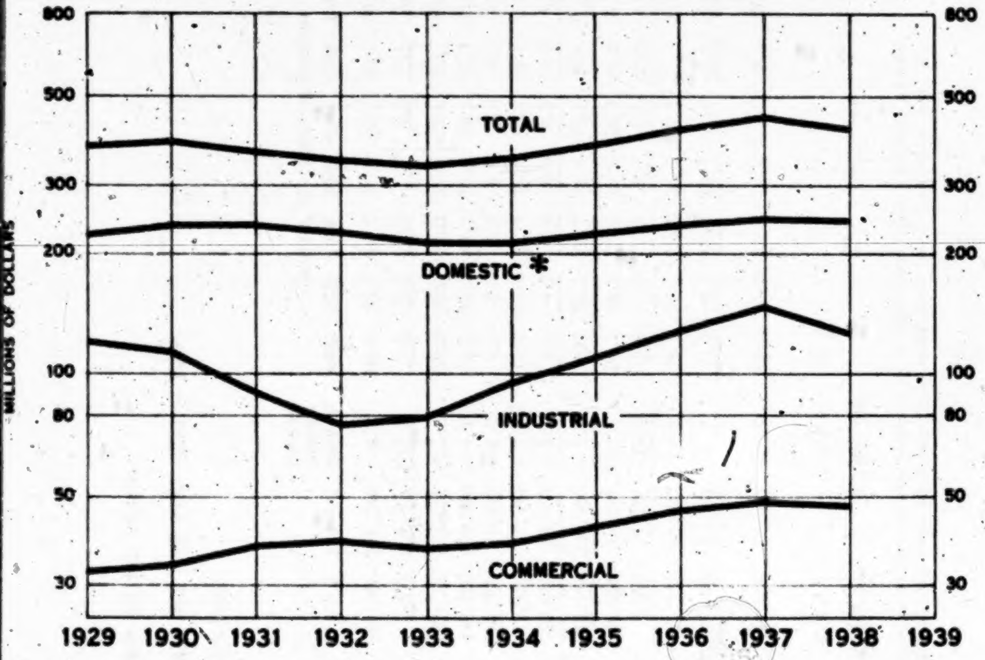
Note: These figures do not include natural gas used in field operations and in the manufacture of carbon black, or gas used by distributing companies in the conduct of their gas operations.

Companies selling mixed manufactured and natural gas are not included in these data.

TABLE 3

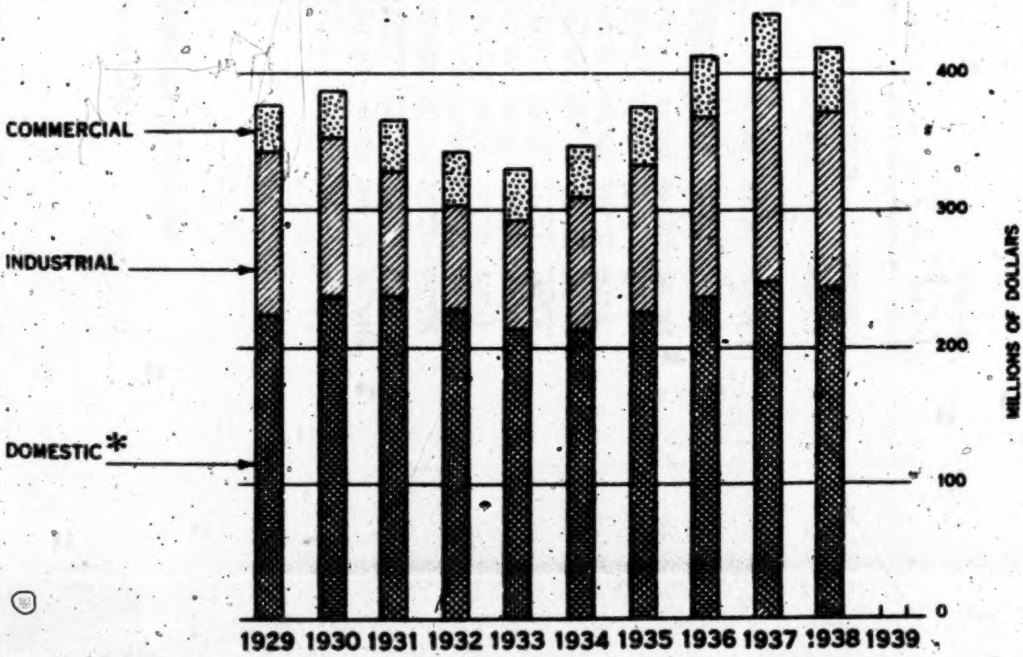
2538

GAS REVENUE - NATURAL GAS INDUSTRY



* Domestic Includes House Heating

GAS REVENUE - NATURAL GAS INDUSTRY



* Domestic Includes House Heating

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NATURAL GAS INDUSTRY IN THE UNITED STATES*

COMPARATIVE ESTIMATED INCOME STATEMENT FOR THE YEAR 1931 - 1938

(Thousands of Dollars)

	1938	1937	1936	1935	1934	1933	1932	1931	Percent Change 1938-37	Percent of Operating Revenue 1938	1937	1936	1935	1934	1933	1932	1931
Revenue from Gas Sales to Consumers	$416,580	443,408	412,444	376,388	347,067	329,889	342,651	366,246	- 6.1	98.4	98.7	99.0	99.0	99.2	99.2	99.4	98.9
Miscellaneous Operating Revenue	6,749	5,631	4,289	3,726	2,846	2,705	2,056	4,065	+19.9	1.6	1.3	1.0	1.0	0.8	0.8	0.6	1.1
Total Operating Revenue . . .	423,329	449,039	416,733	380,114	349,913	332,594	344,707	370,311	- 5.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Operating Expense**	216,236	225,417	205,033	195,759	191,753	185,256	182,350	199,968	- 4.1	51.1	50.2	49.2	51.5	54.8	55.7	52.9	54.0
Maintenance	17,272	16,614	17,503	15,205	13,297	12,971	13,788	15,553	+ 4.0	4.1	3.7	4.2	4.0	3.8	3.9	4.0	4.2
Retirement, Deple., Depre. Exp.	51,985	53,885	47,090	43,712	42,339	39,911	41,365	40,734	- 3.5	12.3	12.0	11.3	11.5	12.1	12.0	12.0	11.0
Taxes Accrued	40,047	41,312	37,506	31,930	31,142	29,268	30,679	29,995	- 3.1	9.4	9.2	9.0	8.4	8.9	8.8	8.9	8.1
Total Revenue Deductions . .	325,540	337,226	307,132	286,606	278,531	267,406	268,182	286,250	- 3.5	76.9	75.1	73.7	75.4	79.6	80.4	77.8	77.3
Utility Operating Income . . .	97,789	111,811	109,601	93,506	71,382	65,188	76,525	84,061	-12.5	23.1	24.9	26.3	24.6	20.4	19.6	22.2	22.7
Non-Operating Income	4,149	5,388	5,001	5,702	5,599	5,322	5,860	7,776	-23.0	1.0	1.2	1.2	1.5	1.6	1.6	1.7	2.1
Gross Corporate Income . . .	101,938	117,199	114,602	99,210	76,981	70,510	82,385	91,837	-13.0	24.1	26.1	27.5	26.1	22.0	21.2	23.9	24.8
Interest & Other Deductions . .	39,539	42,210	45,424	42,953	45,489	43,570	38,262	40,734	- 6.3	9.3	9.4	10.9	11.3	13.0	13.1	11.1	11.0
Net Income Available for Dividends and Surplus . . .	$ 62,399	74,989	69,178	56,257	31,492	26,940	44,123	51,103	-16.8	14.8	16.7	16.6	14.8	9.0	8.1	12.8	13.8

	1938	1937	1936	1935	1934
Utility Plant (000 omitted) . .	$2,441,840	$2,414,484	$2,369,490	$2,345,384	$2,330,984

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* Companies formerly distributing manufactured gas but which were distributing natural gas at the beginning of 1938 have been included in the above tabulation for all eight years. The data shown above for 1931 to 1938 are therefore not comparable with data on the natural gas industry previously issued for those years.

** Includes leased property rents.

TABLE 4

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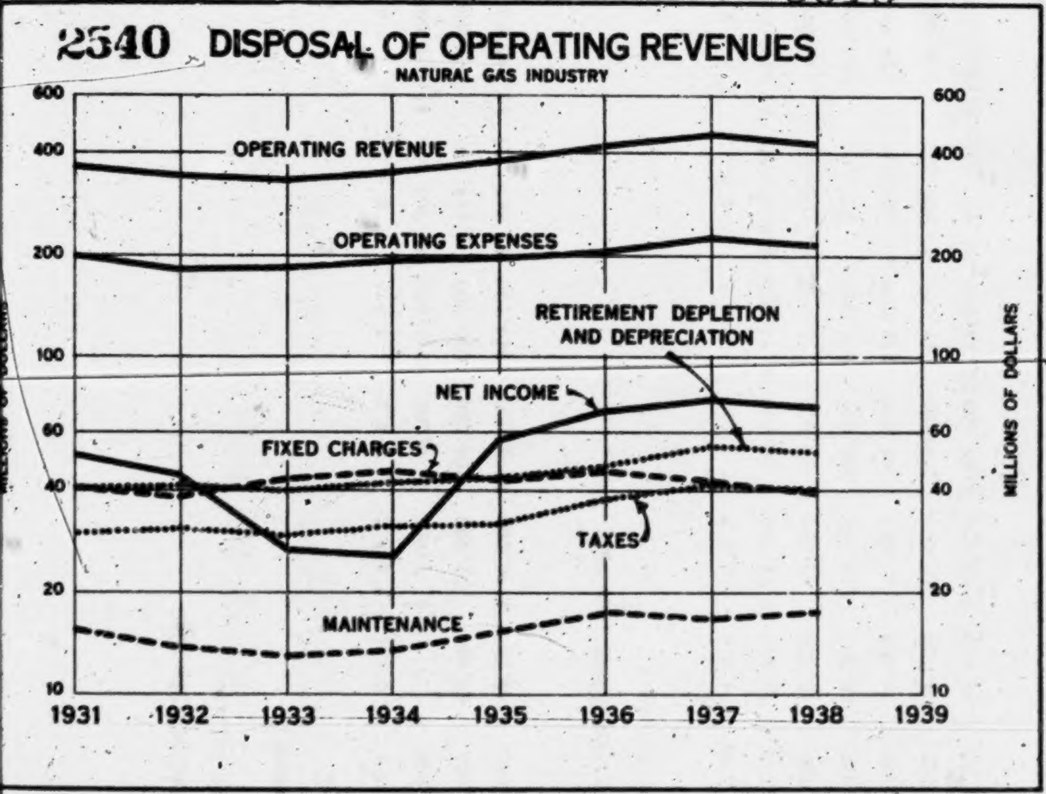
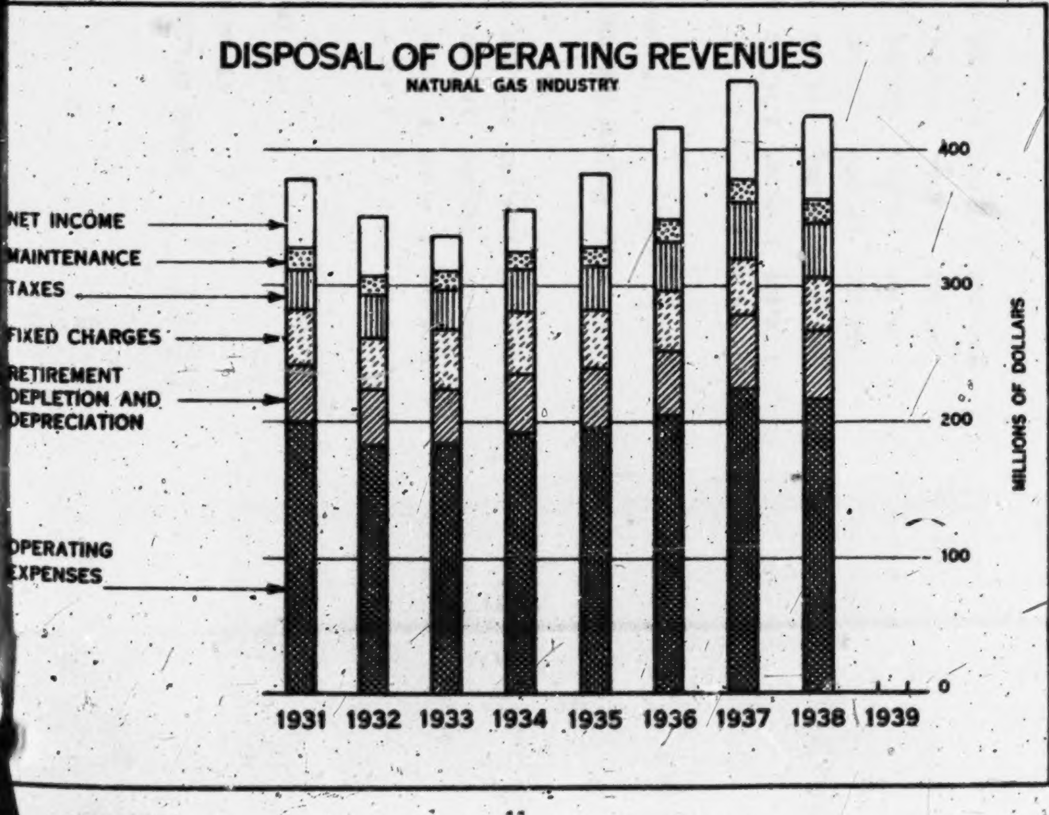

DISPOSAL OF OPERATING REVENUES
NATURAL GAS INDUSTRY


DISPOSAL OF OPERATING REVENUES
NATURAL GAS INDUSTRY

PUBLIC UTILITY FINANCING 1929-1938

(Thousands of Dollars)

(New Issues)

	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Capital Stock	$ 5,000	$ 6,000	$ 5,000	$ 2,000	$ 0	$ 7,000	$ 6,000	$253,000	$ 762,000	$1,229,000
Bonds and Notes	266,000	148,000	119,000	82,000	49,000	27,000	268,000	696,000	1,603,000	703,000
Total	$271,000	$154,000	$124,000	$ 84,000	$ 49,000	$ 34,000	$274,000	$949,000	$2,365,000	$1,932,000

PUBLIC UTILITY CONSTRUCTION EXPENDITURES 1929-1938

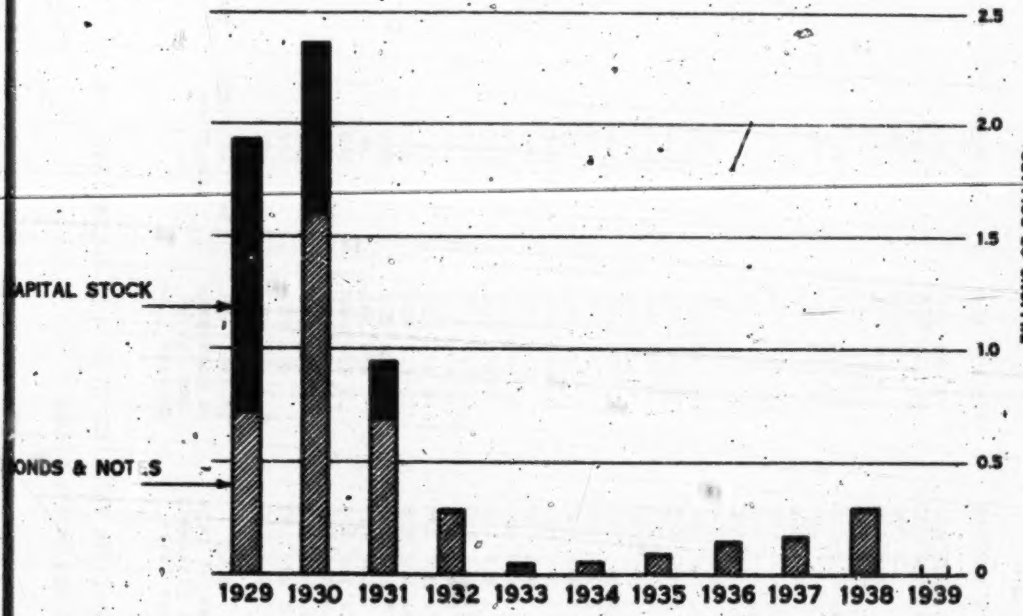
(Thousands of Dollars)

	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Manufactured Gas	$ 28,000	$ 36,000	$ 26,000	$ 28,000	$ 25,000	$ 21,000	$ 46,000	$ 72,000	$ 96,000	$ 113,000
Natural Gas	51,000	61,000	64,000	32,000	28,000	23,000	38,000	73,000	125,000	119,000
Electric Light & Power . .	482,000	455,000	290,000	193,000	148,000	129,000	285,000	596,000	919,000	853,000
Electric Railway	83,000	101,000	109,000	117,000	78,000	46,000	61,000	132,000	125,000	135,000
Telephone (Bell System) . .	297,000	324,000	244,000	185,000	174,000	163,000	239,000	391,000	585,000	588,000
Total	$941,000	$977,000	$733,000	$555,000	$453,000	$382,000	$669,000	$1,264,000	$1,850,000	$1,808,000

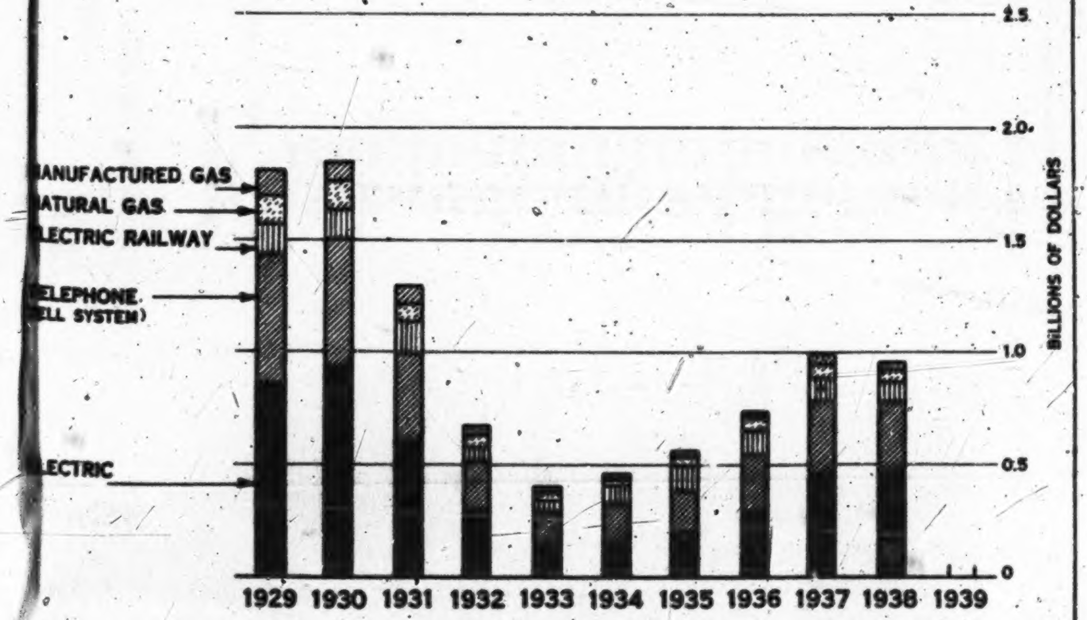
TABLE 5

PUBLIC UTILITY FINANCING

NEW ISSUES



PUBLIC UTILITY CONSTRUCTION



NATURAL GAS INDUSTRY IN THE UNITED STATES

POPULATION SERVED, CUSTOMERS, SALES, REVENUE, EMPLOYEES AND MILES OF MAIN BY STATES 1938

STATE	Population Served Dec. 31, 1938	Total Customers Dec. 31, 1938	Gas Sales to Consumers During 1938 MCF*	Revenue from Gas Sales to Consumers During 1938*	Employees Dec. 31, 1938	Miles Of Main Dec. 31, 1938
Alabama	306,000	31,260	13,413,100	$ 3,501,300	580	1,130
Arizona	145,500	28,940	4,396,700	1,952,600	290	450
Arkansas	415,000	78,480	25,239,600	6,069,700	590	3,340
California	5,833,500	1,656,870	178,507,900	79,707,300	12,110	23,380
Colorado	560,900	103,020	18,796,400	6,697,100	740	2,090
Florida	31,500	3,930	1,086,100	315,700	90	70
Georgia	734,900	82,730	14,751,300	5,797,000	610	1,400
Illinois	441,000	94,680	47,265,400	10,412,400	950	1,770
Indiana	297,900	51,000	15,032,100	4,847,200	320	1,640
Iowa	427,100	86,780	18,967,000	6,198,100	640	2,250
Kansas	1,175,700	230,840	64,311,400	17,255,700	2,350	10,820
Kentucky	951,500	180,180	12,464,700	6,637,000	1,490	3,090
Louisiana	1,017,000	189,540	106,433,900	17,949,200	1,690	3,220
Maryland	69,000	15,330	842,100	523,600	(a)	(a)
Michigan	1,979,300	480,410	19,245,000	20,099,800	2,990	3,770
Minnesota	108,400	10,740	10,278,900	2,385,900	40	570
Mississippi	388,900	49,150	13,338,800	3,711,300	520	1,430
Missouri	874,900	169,770	36,241,200	12,574,300	1,140	5,180
Montana	194,600	42,060	17,222,200	4,798,000	600	1,530
Nebraska	597,500	67,470	14,160,900	5,186,700	880	2,310
New Mexico	88,300	21,150	6,835,000	2,072,000	200	930
New York	1,709,300	336,080	37,461,700	18,269,900	940	2,990
North Dakota	36,000	6,110	1,532,500	606,700	60	430
Ohio	5,045,100	1,279,560	113,895,000	55,387,100	12,870	39,850
Oklahoma	1,289,100	274,190	63,269,000	15,318,100	2,020	10,430
Pennsylvania	4,290,000	688,610	86,389,100	37,564,600	6,010	20,510
South Dakota	66,100	16,130	5,554,800	1,827,100	120	240
Tennessee	307,200	4[illegible],060	9,011,700	3,552,900	440	990
Texas	3,191,800	660,020	197,723,900	48,421,900	9,480	29,520
Utah	240,300	26,360	12,089,100	2,691,000	10	950
Virginia	46,100	7,190	426,200	404,800	(a)	(a)
Washington	10,000	710	77,200	40,500	10	110
West Virginia	808,400	191,370	36,126,400	11,239,100	2,690	8,930
Wyoming	106,800	23,840	10,905,600	2,564,300	320	1,530
TOTAL	33,784,600	7,230,560	1,213,351,900	416,579,900	63,990	186,850

Notes: * Includes gas used in electric power plants. (a) Included in Ohio.

TABLE 6

NATURAL GAS INDUSTRY IN THE UNITED STATES

POPULATION SERVED, CUSTOMERS, SALES, REVENUE, EMPLOYEES AND MILES OF MAIN BY STATES 1937

STATE	Population Served Dec. 31, 1937	Total Customers Dec. 31, 1937	Gas Sales to Consumers During 1937 MCF*	Revenue from Gas Sales to Consumers During 1937*	Employees Dec. 31, 1937	Miles of Main Dec. 31, 1937
Alabama	305,100	29,800	16,372,100	$ 4,062,900	680	1,110
Arizona	133,300	26,610	2,100,700	1,703,800	330	420
Arkansas	412,700	75,580	28,492,700	6,836,400	540	3,330
California	5,364,100	1,604,010	185,373,400	81,287,300	12,010	22,840
Colorado	559,500	100,430	20,258,500	6,663,800	830	2,050
Florida	31,500	3,800	1,081,700	316,000	90	70
Georgia	709,300	79,920	13,862,900	5,540,500	830	1,360
Illinois	434,000	92,520	54,603,500	11,671,100	970	1,770
Indiana	297,200	48,800	9,018,000	3,909,100	380	1,600
Iowa	427,000	84,000	18,846,600	6,285,200	630	2,220
Kansas	1,165,000	222,570	72,626,500	18,374,400	2,310	10,700
Kentucky	921,500	176,820	13,073,700	6,815,600	1,370	3,060
Louisiana	1,013,600	180,150	116,657,000	18,950,700	1,700	3,170
Maryland	63,000	15,080	686,600	497,100	(a)	(a)
Michigan	1,971,200	475,790	19,556,800	20,094,600	3,160	3,620
Minnesota	106,400	14,200	8,973,800	2,118,600	30	490
Mississippi	385,000	45,860	14,009,200	3,866,900	490	1,390
Missouri	860,000	165,300	39,980,500	13,605,600	1,500	5,080
Montana	194,400	39,430	20,068,500	5,182,100	640	1,500
Nebraska	592,000	65,120	14,651,500	5,289,000	840	2,260
New Mexico	86,000	18,910	5,747,400	1,795,400	130	900
New York	1,709,000	331,800	40,017,700	18,665,100	970	2,970
North Dakota	36,000	5,900	1,640,300	633,100	70	420
Ohio	5,044,300	1,271,230	129,793,100	63,932,300	13,340	39,440
Oklahoma	1,245,000	265,810	78,802,000	16,835,400	2,280	10,100
Pennsylvania	4,290,000	679,660	108,102,400	44,283,700	5,980	20,390
South Dakota	66,100	15,680	5,800,800	1,899,400	120	220
Tennessee	307,200	45,310	8,526,100	3,500,200	460	980
Texas	3,193,400	642,290	199,937,800	50,567,600	10,080	28,600
Utah	240,300	25,330	12,819,400	2,615,700	10	910
Virginia	45,000	6,580	398,200	373,300	(a)	(a)
Washington	10,000	1,130	208,000	16,600	10	110
West Virginia	803,000	187,630	42,491,700	12,759,300	3,130	8,900
Wyoming	105,700	22,890	10,327,400	2,460,500	340	1,440
TOTAL	33,126,800	7,065,940	1,314,906,500	$443,408,300	66,250	183,420

Notes: *Includes gas used in electric power plants. (a) Included in Ohio.

TABLE 7

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I N D E X

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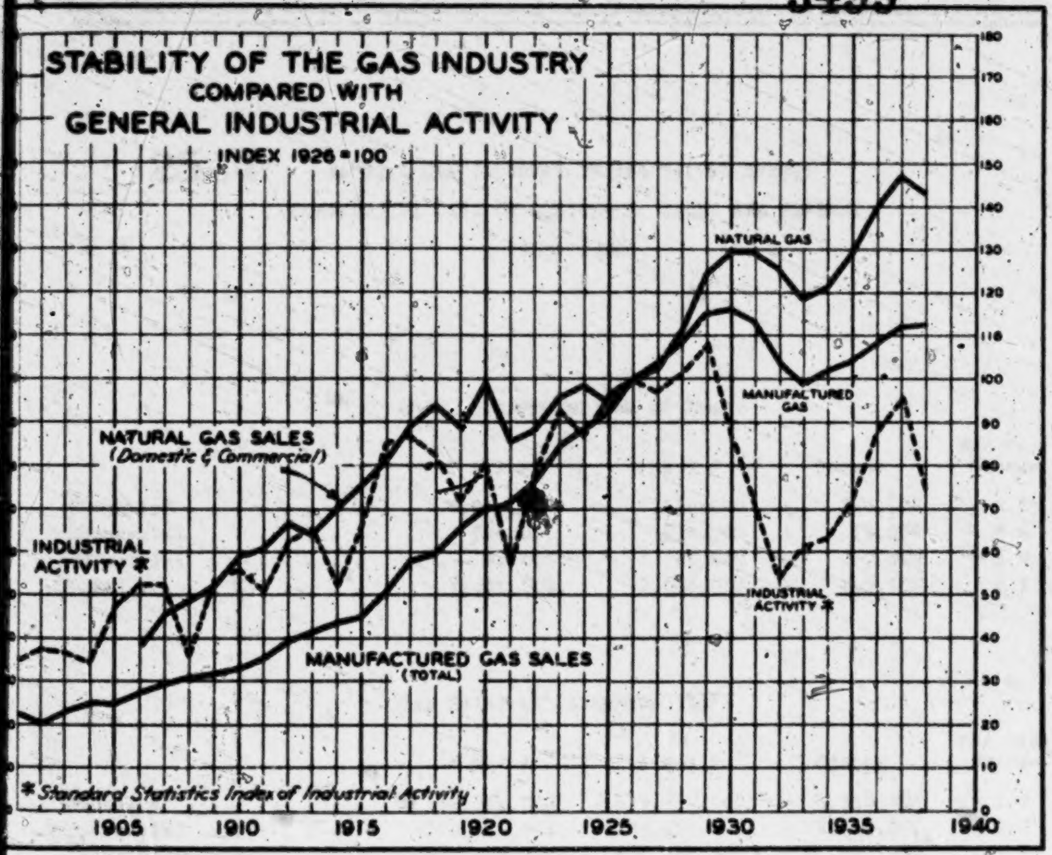
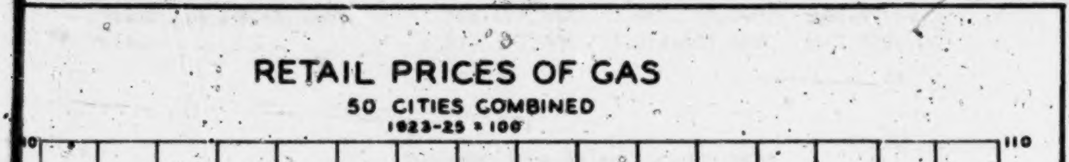
7. Population Served, Customers, Sales, Revenue, Employees and Miles of Main in 1937-by States 15



STABILITY OF THE GAS INDUSTRY COMPARED WITH GENERAL INDUSTRIAL ACTIVITY

INDEX 1926 = 100

* Standard Statistics Index of Industrial Activity



RETAIL PRICES OF GAS

50 CITIES COMBINED

1923-25 = 100

Source: U.S. Bureau of Labor Statistics

2534

NATURAL GAS INDUSTRY IN THE UNITED STATES
COMPARATIVE DATA ON CUSTOMERS, SALES AND REVENUE
1937- 1938

Gas Customers at End of Year

	1 9 3 8	*1 9 3 7*	*Change*	*Per Cent Change*
Domestic*	6,665,000	6,521,000	+ 144,000	+ 2.2
Commercial	524,000	505,000	+ 19,000	+ 3.8
Industrial	42,000	40,000	+ 2,000	+ 5.0
Total	7,231,000	7,066,000	+ 165,000	+ 2.3

Gas Sales to Consumers (MCF)

	1 9 3 8	*1 9 3 7*	*Change*	*Per Cent Change*
Domestic*	352,964,000	359,890,000	- 6,926,000	- 1.9
Commercial	100,951,000	103,220,000	- 2,269,000	- 2.2
Industrial	589,398,000	681,230,000	- 91,832,000	-13.5
Electric Generation . . .	170,039,000	170,567,000	- 528,000	- 0.3
Total Ind. & Elec. Gen. . .	*759,437,000*	*851,797,000*	*- 92,360,000*	*-10.8*
Total	1,213,352,000	1,314,907,000	-101,555,000	- 7.7

Revenue from Sales to Consumers

	1 9 3 8	*1 9 3 7*	*Change*	*Per Cent Change*
Domestic*	$ 242,658,000	$ 248,175,000	-$ 5,517,000	- 2.2
Commercial	47,240,000	48,642,000	- 1,402,000	- 2.9
Industrial & Elec. Gen. .	126,682,000	146,591,000	- 19,909,000	-13.6
Total	$ 416,580,000	$ 443,408,000	-$26,828,000	- 6.1

* Domestic Includes House Heating.

Note: These figures do not include natural gas used in field operations and in the manufacture of carbon black, or gas used by distributing companies in the conduct of their gas operations.

Companies selling mixed manufactured and natural gas are not included in these data.

TABLE 1

Exhibit 180

OPEN-MARKET RATES ON SHORT-TERM LOANS - NEW YORK CITY

Year	Prime Commercial Paper, 4 to 6 months Range (1)	Prime Bankers Acceptances, 90 days Range (1)	Time Loans, 90 Days* Range (1)	Average Rates on Call Loans** Renewal Rate Range (2)
	----Per cent per annum----			
1923	4-1/2 to 5-1/2	4 to 4-1/8	-	4.32 to 5.14
1924	3 to 4-3/4	2 to 4-1/8	-	2.00 to 4.39
1925	3-1/2 to 4-1/2	3 to 3-1/2	-	3.32 to 5.32
1926	4 to 4-3/4	3-1/8 to 3-7/8	4 to 5	3.81 to 5.16
1927	4 to 4-1/2	3-1/8 to 3-3/4	4 to 4-1/2	3.60 to 4.38
1928	4 to 5-1/2	3-3/8 to 4-1/2	4- /4 to 7-3/4	4.24 to 8.60
1929	5-1/2 to 6-1/4	3-3/4 to 5-1/2	4-3/4 to 9	4.43 to 9.23
1930	2-3/4 to 5	1-7/8 to 4	2 to 5	2.00 to 4.64
1931	2 to 4-1/4	7/8 to 3-1/4	1-1/4 to 4	1/45 to 2.70
1932	1-1/4 to 4	3/8 to 3	1/2 to 4	1.00 to 2.65
1933	1-1/4 to 4-1/2	1/4 to 3-5/8	1/2 to 3-1/2	.75 to 3.32
1934	3/4 to 1-1/2	1/8 to 1/2	3/4 to 1-1/4	1.00 to 1.00
1935	3/4 to 1	1/8 to 1/8	1/4 to 1	.25 to 1.00
1936	3/4 to 3/4	1/8 to 3/16	1 to 1-1/4	.75 to 1.00
1937	3/4 to 1	3/16 to 9/16	1-1/4 to 1-1/4	1.00 to 1.00
1938	5/8 to 1	7/16 to 7/16	1-1/4 to 1-1/4	1.00 to 1.00
Jan. 1939	1/2 to 5/8	7/16	1-1/4	1.00
Feb.	1/2 to 5/8	7/16	1-1/4	1.00
Mar.	1/2 to 5/8	7/16	1-1/4	1.00
April	1/2 to 5/8	7/16	1-1/4	1.00
May	1/2 to 5/8	7/16	1-1/4	1.00
June	1/2 to 5/8	7/16	1-1/4	1.00
July	1/2 to 5/8	7/16	1-1/4	1.00
Aug.	1/2 to 5/8	7/16	1-1/4	1.00
sept	3/8 to 3/4	Sept 7/16	Sept 1-1/4	Sept 1.00
week ended Oct 14	3/4	Oct 14 "	"	"

* Stock Exchange 90-day time loans.
(1) Range of Rates prevailing during the year (or month).
** Stock Exchange Call loans. Figures shown are based upon monthly averages of daily quotations.
(2) Annual Ranges shown for call loans are ranges of the twelve monthly averages.

Source: Annual Reports and Monthly Bulletins of Board of Governors of the Federal Reserve System.

INTEREST RATES CHARGED CUSTOMERS BY BANKS IN PRINCIPAL CITIES

	Year	NEW YORK CITY			EIGHT OTHER NORTHERN AND EASTERN CITIES		
		Monthly Average			Monthly Average		
		High	Low	Annual Average	High	Low	Annual Average
	1919	5.63%	5.36%	5.51%	5.86%	5.59%	5.73%
	1920	6.71	5.93	6.25	7.01	5.99	6.74
	1921	6.78	5.68	6.34	6.99	6.19	6.76
	1922	5.50	4.66	5.07	6.08	5.12	5.48
	1923	5.39	4.82	5.19	5.64	5.34	5.50
	1924	5.21	4.09	4.60	5.53	4.80	5.11
	1925	4.70	4.16	4.47	5.20	4.79	4.98
	1926	4.85	4.38	4.67	5.17	4.87	5.06
	1927	4.66	4.35	4.53	4.99	4.76	4.88
	1928	5.63	4.44	5.15	5.91	4.73	5.34
	1929	6.08	5.73	5.88	6.25	5.86	6.04
	1930	5.64	4.16	4.69	5.88	4.66	5.07
	1931	4.67	3.93	4.22	4.91	4.47	4.61
	1932	4.72	4.12	4.49	5.14	4.88	5.05
	1933	4.58	3.48	4.02	5.29	4.51	4.83
	1934	3.58	3.18	3.33	4.65	3.98	4.29
	1935	2.90	2.61	2.70	4.08	3.63	3.86
	1936	2.64	2.40	2.49	3.63	3.45	3.52
	1937	2.53	2.34	2.43	3.45	3.29	3.36
	1938	2.40	2.16	2.33	3.47	3.25	3.32
Jan	1939		2.29			3.41	
Feb			2.24			3.33	

Note: Computed by the Board of Governor of the Federal Reserve System, and represent rates ch
own customers as distinguished from open market rates. All averages are based on rates
loans - commercial loans, and demand and time loans on securities. The method of comput
(a) the relative importance of each of these 3 types of loans and (b) the relative impo
measured by total loans. In the 2 group averages the average rate for each city includ
portance of that city in the group, as measured by the loans of all banks.

The "high" shown for each year is the highest of the 12 monthly figures. The same expl

Source: Annual Reports and Monthly Bulletins of the Board of Governors of the Federal Reserve

INTEREST RATES CHARGED CUSTOMERS BY BANKS IN PRINCIPAL CITIES

NEW YORK CITY			EIGHT OTHER NORTHERN AND EASTERN CITIES			TWENTY-SEVEN SOUTHERN AND WESTERN CITIES		
Monthly Average			Monthly Average			Monthly Average		
High	Low	Annual Average	High	Low	Annual Average	High	Low	Annual Average
5.63%	5.36%	5.51%	5.86%	5.59%	5.73%	6.11%	5.93%	6.00%
6.71	5.93	6.25	7.01	5.99	6.74	7.08	6.16	6.75
6.78	5.68	6.34	6.99	6.19	6.76	7.13	6.67	6.99
5.50	4.66	5.07	6.08	5.12	5.48	6.56	[illegible]	6.14
5.39	4.82	5.19	5.64	5.34	5.50	5.99	5.83	5.94
5.21	4.09	4.60	5.53	4.80	5.11	6.02	5.47	5.71
4.70	4.16	4.47	5.20	4.79	4.98	5.61	5.53	5.58
4.85	4.38	4.67	5.17	4.87	5.06	5.68	5.54	5.61
4.66	4.35	4.53	4.99	4.76	4.88	5.72	5.52	5.60
5.63	4.44	5.15	5.91	4.73	5.34	5.91	5.53	5.70
6.08	5.73	5.88	6.25	5.86	6.04	6.29	5.94	6.14
5.64	4.16	4.69	5.88	4.66	5.07	6.12	5.43	5.72
4.67	3.93	4.22	4.91	4.47	4.61	5.56	5.28	5.39
4.72	4.12	4.49	5.14	4.88	5.05	5.68	5.55	5.62
4.58	3.48	4.02	5.29	4.51	4.83	5.68	5.42	5.56
3.58	3.18	3.33	4.65	3.98	4.29	5.40	4.92	5.17
2.90	2.61	2.70	4.08	3.63	3.86	4.95	4.51	4.69
2.64	2.40	2.49	3.63	3.45	3.52	4.51	4.14	4.35
2.53	2.34	2.43	3.45	3.29	3.36	4.21	4.15	4.17
2.40	2.16	2.33	3.47	3.25	3.32	4.16	4.04	4.11
2.29			3.41			4.10		
2.24			3.33			4.09		

uted by the Board of Governor of the Federal Reserve System, and represent rates charged by reporting banks to their customers as distinguished from open market rates. All averages are based on rates reported for 3 types of customer ns - commercial loans, and demand and time loans on securities The method of computing the averages takes into account the relative importance of each of these 3 types of loans and (b) the relative importance of each reporting bank, as sured by total loans. In the 2 group averages the average rate for each city included is weighted according to the im- tance of that city in the group, as measured by the loans of all banks.

"high" shown for each year is the highest of the 12 monthly figures. The same explanation applies to the "low"

nnual Reports and Monthly Bulletins of the Board of Governors of the Federal Reserve System.

2549

List of Cities Covered by the Data Shown on Page 2

New York City

Eight Northern and Eastern Cities

Chicago
Boston
Philadelphia
Cleveland
Detroit
Pittsburgh
Buffalo
Cincinnati

Twenty-Seven Southern and Western Cities

San Francisco
Los Angeles
St. Louis
Baltimore
Minneapolis
New Orleans
Kansas City
Dallas
Houston
Seattle
Atlanta
Louisville
Richmond
Denver
Portland
Omaha
Jacksonville
Birmingham
Salt Lake City
Nashville
Oklahoma City
Spokane
Little Rock
El Paso
Helena
Charlotte
San Antonio

2550

Discount Rates*
of the
New York and Chicago Federal Reserve Banks

1927-1939

New York Federal Reserve Bank

Effective Date of the New Rate	New Rate
August 5, 1927	3½%
February 3, 1928	4
May 18, 1928	4½
July 13, 1928	5
August 9, 1929	6
November 1, 1929	5
November 15, 1929	4½
February 7, 1930	4
March 14, 1930	3½
May 2, 1930	3
June 20, 1930	2½
December 24, 1930	2
May 8, 1931	1½
October 9, 1931	2½
October 16, 1931	3½
February 26, 1932	3
June 24, 1932	2½
March 3, 1933	3½
April 7, 1933	3
May 26, 1933	2½
October 20, 1933	2
February 2, 1934	1½
August 27, 1937	1

Chicago Federal Reserve Bank

Effective Date of the New Rate	New Rate
September 7, 1927	3½%
January 25, 1928	4
April 20, 1928	4½
July 11, 1928	5
November 23, 1929	4½
February 8, 1930	4
June 21, 1930	3½
January 10, 1931	3
May 9, 1931	2½
October 17, 1931	3½
June 25, 1932	2½
March 4, 1933	3½
May 27, 1933	3
October 21, 1933	2½
January 19, 1935	2
August 21, 1937	1½

The last rates shown were still in effect as of October 1, 1939.

Source: Annual Reports and Monthly Bulletins of Board of Governors of Federal Reserve System.

*Rates on rediscounts for and advances to member banks under sections 13 and 13a of the Federal Reserve Act except (1) those secured by direct and eligible guaranteed obligations of the United States and (2) advances to individuals secured by direct obligations of the United States.

2551 **Yields on Long-Term Federal and Municipal Bonds**

Year	U. S. Government(1)	Municipal(2) (15 Municipal Bonds)
1919	4.73%	4.46%
1920	5.32	4.98
1921	5.09	5.09
1922	4.30	4.23
1923	4.36	4.25
1924	4.06	4.20
1925	3.86	4.09
1926	3.68	4.09
1927	3.34	3.98
1928	3.33	4.05
1929	3.60	4.27
1930	3.29	4.07
1931	3.34	4.01
1932	3.68	4.65
1933	3.31	4.71
1934	3.12	4.03
1935	2.79	3.41
1936	2.65	3.07
1937	2.68	3.10
1938	2.56	2.91
Jan. 1939	2.47	2.70
Feb.	2.44	2.70
Mar.	2.34	2.67
Apr.	2.30	2.75
May	2.17	2.66
June	2.13	2.63
July	2.16	2.65
Aug.	2.21	2.75
Wk. ended 9/23/39	2.74	3.29

(1) Computed by Division of Research and Statistics of United States Treasury Department.

(2) Computed by Standard Statistics Company.

Source: Annual Reports and Monthly Bulletins of Board of Governors of Federal Reserve System.

10/20/39

2552

The Annalist Average of Yields On Ten High Grade Railroad Bonds*
1857–1939

Year	High	Low	Year	High	Low	Year	High	Low
1857	9.23%	7.58%	1890	4.96%	4.62%	1920	5.66%	5.12%
1858	8.18	7.11	1891	4.93	4.73	1921	5.46	4.81
1859	7.37	7.09	1892	4.69	4.59	1922	4.73	4.46
			1893	5.07	4.60	1923	4.82	4.62
1860	7.44	6.81	1894	4.68	4.53	1924	4.82	4.60
1861	7.49	7.10	1895	4.64	4.35	1925	4.66	4.55
1862	7.14	5.94	1896	4.75	4.44	1926	4.55	4.41
1863	6.03	5.44	1897	4.14	4.26	1927	4.37	4.11
1864	6.19	5.36	1898	4.40	4.09	1928	4.44	4.12
1865	7.41	6.40	1899	4.03	3.89	1929	4.61	4.42
1866	7.61	7.16						
1867	7.42	7.24	1900	4.01	3.86	1930	4.44	4.16
1868	7.44	7.17	1901	3.83	3.75	1931	5.21	4.15
1869	7.72	7.42	1902	3.85	3.72	1932	5.59	4.76
			1903	4.07	3.84	1933	5.17	4.46
1870	7.65	7.30	1904	3.99	3.85	1934	4.54	3.90
1871	7.42	7.25	1905	3.86	3.80	1935	3.80	3.71
1872	7.27	7.07	1906	4.00	3.85	1936	3.64	3.36
1873	7.50	7.06	1907	4.53	4.01	1937	3.74	3.38
1874	7.08	6.70	1908	4.27	4.02	1938	3.99	3.73
1875	6.63	6.30	1909	4.06	3.97			
1876	6.24	6.09					1939	
1877	6.26	6.11	1910	4.20	4.06			
1878	6.16	6.03	1911	4.13	4.07	Jan.	3.71	
1879	5.92	5.67	1912	4.08	4.02	Feb.	3.68	
			1913	4.22	4.03	Mar.	3.64	
1880	5.64	5.18	1914	4.23	4.01	April	3.74	
1881	5.22	5.04	1915	4.28	4.07	May	3.66	
1882	5.24	5.16	1916	4.12	4.04	June	3.61	
1883	5.21	5.07	1917	4.84	3.99	July	3.63	
1884	5.39	4.88	1918	5.06	4.57	Aug.	3.66	
1885	5.20	4.78	1919	5.14	4.84		4.04 wk. ended 9/23	
1886	4.67	4.47						
1887	4.78	4.56					3.86 wk. ended 10/14	
1888	4.63	4.50						
1889	4,53	4.26						

Source: Tne Annalist.

Note: For each of the years 1857 to 1938, inclusive, the high yield is the highest average monthly yield in the year; similarly, the low yield is the lowest average monthly yield in the year. For 1939, the average monthly yields are presented.

* In 1939 the number of bonds was reduced to seven.

10/20/39

Exhibit No. 180.

2553

The Annalist Average Of Yields On Ten High Grade Public Utility Bonds
1929–1939

	Year	High		Low
	1929	4.82%		4.60%
	1930	4.70		4.41
	1931	4.75		4.24
	1932	4.93		4.33
	1933	4.58		4.26
	1934	4.38		3.98
	1935	3.93		3.65
	1936	3.57		3.05
	1937	3.36		3.06
	1938	3.12		2.93
Jan.	1939		2.88%	
Feb.			2.86	
Mar.			2.86	
April			2.88	
May			2.83	
June			2.83	
July			2.85	
Aug.			2.85	
			3.26 9/23 wk. ended.	
			3.10 10/14 wk. ended.	

Source: The Annalist.

10/20/39

BOND YIELD AVERAGES - DOMESTIC CORPORATION BONDS
BY INDUSTRIAL GROUPS AND RATINGS
(COMPUTED BY STANDARD STATISTICS COMPANY, INC.)

Year	Public Utility						Railroad					
	A1+	A1	A	B1+	B1	B	A1+	A1	A	B1+	B1	B
Series begins with April, 1924. No annual average is given for 1924.												
	%	%	%	%	%	%	%	%	%	%	%	%
1925	4.92	5.15	5.58	6.[illegible]7	6.74	7.92	4.78	5.08	5.65	6.2[illegible]	[illegible]	7.51
1926	4.77	5.00	5.36	5.97	6.55	7.89	4.65	4.90	5.34	5.81	6.28	7.02
1927	4.63	4.87	5.18	5.67	6.18	6.72	4.48	4.70	5.03	5.43	5.76	6.38
1928	4.51	4.72	5.05	5.51	6.00	6.58	4.42	4.60	4.96	5.25	6.26	6.98
1929	4.73	4.94	5.26	5.88	6.49	7.19	4.74	4.91	5.30	5.74	6.45	7.61
1930	4.61	4.85	5.20	5.96	6.76	7.62	4.58	4.75	5.15	5.80	7.12	8.10
1931	4.36	4.65	5.24	6.06	7.57	9.00	4.49	4.85	5.71	6.72	7.60	9.46
1932	4.81	5.32	6.34	7.55	8.57	9.26	5.45	6.09	7.18	7.97	8.69	‡
1933	4.47	5.07	5.93	7.51	8.68	9.42	4.63	5.42	6.83	7.13	8.83	8.38
1934	4.00	4.58	5.32	6.29	8.14	9.17	4.07	4.44	5.33	6.65	7.84	9.19
1935	3.43	3.93	4.56	5.07	6.45	7.25	3.54	3.94	4.97	6.77	8.39	9.14
1936	3.23	3.61	4.15	4.56	5.43	6.12	3.36	3.72	4.26	5.01	5.86	6.60
1937	3.12	3.51	4.20	4.87	5.78	7.13	3.45	3.74	4.28	5.31	6.50	7.31
1938	2.88	3.37	4.19	5.27	6.98	7.93	3.55	4.09	5.25	6.74	8.54	*
Jan. 1939	2.72	3.10	3.83	4.93	6.70	7.12	3.46	3.85	4.56	6.04	7.57	*
Feb.	2.66	3.03	3.77	4.91	6.21	7.04	3.42	3.74	4.59	6.03	7.54	*
Mar.	2.64	2.94	3.77	4.81	6.15	6.58	3.39	3.74	4.54	6.03	7.48	*
Apr.	2.60	2.91	3.73	4.67	5.90	6.43	3.40	3.66	4.53	5.85	7.20	*
May	2.58	2.87	3.66	4.69	6.15	6.74	3.40	3.59	4.66	6.29	7.83	*
June	2.55	2.84	3.67	4.57	6.03	6.47	3.35	3.55	4.75	6.17	8.40	*
July	2.54	2.79	3.61	4.49	5.83	6.27	3.34	3.46	4.62	6.08	7.99	*
Aug.	2.52	2.65	3.57	4.42	5.47	6.12	3.36	3.41	4.52	6.02	7.76	*
Sept.	2.58	2.68	3.58	4.45	5.50	6.39	3.39	3.53	4.77	6.30	8.07	*
Oct.	3.17	3.31	4.02	4.70	5.78	6.61	3.62	3.92	4.88	6.17	7.37	*

20th Sept

‡ No averages given for this group for 1932.
* Insufficient number of issues to give representative yield.

Source. Standard Statistics Company, Inc., Standard Trade and Securities, Vol. 3 Statistical Section.

An average based upon yield to maturity of all active bonds (about 4,000) listed in Standard Bond Investments. No unusual yields due to conversion privileges, redemption, early maturity or other special causes have been included in the averages. Based on prices as of about the 20th of the preceding month.

BOND YIELD AVERAGES - DOMESTIC CORPORATION BONDS
BY INDUSTRIAL GROUPS AND RATINGS
(COMPUTED BY STANDARD STATISTICS COMPANY, INC.)

en for 1924.

Railroad						Industrial					
A1+	A1	A	B1+	B1	B	A1+	A1	A	B1+	B1	B
%	%	%	%	%	%	%	%	%	%	%	%
4.78	5.08	5.65	6.2[illegible]	[illegible]	7.51	5.04	5.57	6.12	6.84	7.60	8.75
4.65	4.90	5.34	5.81	6.28	7.02	4.88	5.41	6.00	6.61	7.09	8.22
4.48	4.70	5.03	5.43	5.76	6.38	4.72	5.21	5.85	6.42	6.77	7.33
4.42	4.60	4.96	5.25	6.26	6.98	4.69	5.16	5.69	6.25	6.68	6.98
4.74	4.91	5.30	5.74	6.45	7.61	4.88	5.46	5.86	6.34	6.81	7.35
4.58	4.75	5.15	5.80	7.12	8.10	4.72	5.29	5.92	6.74	7.63	8.24
4.49	4.85	5.71	6.72	7.60	9.46	4.64	5.27	6.40	7.45	8.42	9.35
5.45	6.09	7.18	7.97	8.69	*	5.40	6.24	7.15	8.26	8.70	9.07
4.63	5.42	6.83	7.13	8.83	8.38	4.82	5.36	6.11	7.45	8.16	9.21
4.07	4.44	5.33	6.65	7.84	9.19	4.14	4.67	5.03	6.19	7.23	9.28
3.54	3.94	4.97	6.77	8.39	9.14	3.64	4.34	[illegible].65	5.34	6.44	8.11
3.36	3.72	4.26	5.01	5.86	6.60	3.32	3.84	4.27	4.77	5.82	6.86
3.45	3.74	4.28	5.31	6.50	7.31	3.33	3.91	4.30	4.78	5.47	●
3.55	4.09	5.25	6.74	8.54	●	3.14	3.59	4.18	5.30	6.00	●
3.46	3.85	4.56	6.04	7.57	●	2.85	3.10	3.91	4.72	5.57	●
3.42	3.74	4.59	6.03	7.54	●	2.79	3.11	3.85	4.69	5.50	●
3.39	3.74	4.54	6.03	7.48	●	2.75	3.07	3.84	4.57	5.52	●
3.40	3.66	4.53	5.85	7.20	●	2.82	3.14	3.84	4.49	5.31	●
3.40	3.59	4.66	6.29	7.83	●	2.75	3.02	3.88	4.60	5.52	●
3.35	3.55	4.75	6.17	8.40	●	2.74	3.00	3.84	4.56	5.62	●
3.34	3.46	4.62	6.08	7.99	●	2.68	2.90	3.79	4.22	5.45	●
3.36	3.41	4.52	6.02	7.76	●	2.71	2.75	3.79	4.20	5.35	●
3.39	3.53	4.77	6.30	8.07	●	2.63	2.90	3.70	4.29	5.46	●
3.62	3.92	4.88	6.17	7.37	●	3.07	3.15	4.01	4.41	5.22	*

yield.

e and Securities, Vol. 3 Statistical Section.

ds (about 4,000) listed in Standard Bond Investments.
n, early maturity or other special causes have been
e 20th of the preceding month.

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EXHIBIT NO. 181.

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Arkansas Louisiana Gas Company

Arkansas Louisiana Gas Company is a subsidiary of Arkansas Natural Gas Corporation, a part of the Cities Service System. The Company produces, purchases, transmits, distributes and sells natural gas. Its operations are conducted in portions of Arkansas, Louisiana and Texas. The major portion of the Company's revenue is obtained from direct distribution of natural gas to residential, commercial, industrial and other customers in a few more than 100 communities in the three States. Among the larger cities served at retail are Little Rock, North Little Rock, Texarkana, Pine Bluff and Eldorado in Arkansas; Shreveport in Louisiana; and Texarkana in Texas. Natural gas is also sold at wholesale to Consumers Gas Company, an affiliate, for distribution in the City of Hot Springs, Arkansas. Natural gas is also sold at wholesale to other companies for distribution in certain small communities in Arkansas and Louisiana. The natural gas supply is obtained principally from fields located in Louisiana and Texas.

Financing in 1936.

In July of 1936 a public offering was made through underwriters of $10,000,000 principal amount of the Company's First Mortgage Bonds, 4% Series due July 1, 1951 and dated July 1, 1936. The price to the public was 98

exclusive of accrued interest. Underwriting commissions were 3% and incidental expenses were estimated at
2558 1.71% leaving net proceeds of 93.29% or $9,328,632.

After giving effect to sinking fund provisions, cost of money to the Company on the basis of such net proceeds was slightly under 5%.

The Company's financing in 1936 included also the delivery of $10,000,000 principal amount of 5% Debentures due July 1, 1952 to its parent company for the purpose of discharging in part certain obligations to the parent company.

Financing in 1939.

In September of 1939 announcement was made of the private sale of two new series of bonds and of the issuance of a new debenture issue, all to refund the 1936 financing. Specifically, the new securities were issued in the following amounts:

1. $3,300,000 of First Mortgage Bonds, Series A, 2¾%, dated Sept. 1, 1939 and due serially 1940 to 1944, sold to two New York Banks.
2. $9,700,000 of First Mortgage Bonds, Series B, 3¼%, dated Sept. 1, 1939 and due serially 1945 to 1954, sold to six insurance companies.
3. $6,500,000 of 4¼% Debentures due in 1955.

Proceeds from the sale of the two series of mortgage bonds were devoted to the retirement of:

1. $9,100,000 of First Mortgage 4% Bonds due July 1, 1951 representing the remaining amount outstanding of the original $10,000,000 issue of 1936.
2. $3,500,000 out of the $10,000,000 total of 5% Debentures issued in 1936 to Arkansas Natural Gas Corporation (parent company).

2559 The new $6,500,000 4¼% Debenture issue went to the parent company to discharge the balance of the $10,000,000 of 5% Debentures issued in 1936.

These three 1939 issues were all sold at par.

2560 Cities Service Gas Company.

Cities Service Gas Company is a subsidiary of Empire Gas & Fuel Company, a part of the Cities Service System. The Company operates approximately 4,300 miles of pipeline and sells gas to local distributing companies serving approximately 223 cities and communities, including Kansas City, St. Joseph, Springfield, Independence, Sedalia and Joplin, Missouri; Kansas City, Leavenworth, Atchison, Hutchinson, Ottawa, Topeka and Wichita, Kansas; and Bartlesville, Oklahoma.

In December of 1938 the Company sold privately to four banks and two insurance companies securities aggregating $35,000,000. This financing consisted of $20,000,000 of First Mortgage Pipeline 3¾% Bonds, scheduled to mature serially from March 20, 1947 to and including March 20, 1954, together with $15,000,000 of bank loans secured by an equal principal amount of First Pipeline Mortgage 3¼% Bonds scheduled to mature serially from March 20, 1940 to and including September 20, 1946.

Proceeds from this financing were used principally to retire $7,870,700 of Cities Service Gas Pipeline Company First Pipeline 6% Bonds due January 1, 1943 at 102 on February 28, 1939 and to retire $31,627,000 of Cities Service Gas Company First Pipeline 5½% Bonds due May 1, 1942 at 101 on February 28, 1939. Both of these refunded issues were obligations of Cities Service Gas Company.

2561 El Paso Natural Gas Company.

El Paso Natural Gas Company and its subsidiaries purchase natural gas from producers in the Lea County gas field in southeastern New Mexico, transmit it through a pipeline system and sell it at wholesale to public utilities and industrial customers located principally in or near El Paso, Texas; Douglas, Bisbee, Tucson, Superior and Phoenix, Arizona; and Cananea, Mexico. The pipeline system is in the neighborhood of 1,000 miles in length.

The derivation of operating revenue for the year 1938 was as follows:

Source	Amount	%
Public utilities including power plants	$2,264,666	46.0
Copper mining, smelting and refining	2,029,310	41.2
Other industrial	431,044	8.8
Gasoline, butane and propane	153,818	3.1
Crude oil and miscellaneous	45,062	0.9
	$4,923,900	100.0

Financing in 1936.

In June of 1936 a public offering was made through underwriters of $7,500,000 principal amount of First Mortgage Bonds, Series A, 4½%, due June 1, 1951 together with $3,750,000 of Convertible Debentures, 4¾%, due June 1, 1946. The bonds were offered to the public at 98½. After underwriting commissions of 3% and estimated incidental expenses of 1.35%, net proceeds were 94.15%, or $7,061,283.00 for the bonds. The convertible debentures were offered to the public at par. After underwriting commissions of 3½% and estimated incidental expenses of 1.35% net proceeds were 95.15%, or $3,568,142 for the 2562 convertible debentures. The cost of money on the bonds is estimated at somewhere between 5½% and 6% giving effect to the sinking fund requirements, but the cost has not been computed precisely because of inadequate information presently at hand with respect to the sinking fund. The cost of money for the debentures was 5.38% for the 10-year term. However, both of these issues were called for redemption (except that the debentures were almost entirely converted prior thereto) on January 16, 1939 pursuant to financing undertaken in December, 1938, which is discussed below.

By prospectus dated September 10, 1936, 60,000 shares of the Company's $3.00 par value common stock were offered at a price of $20.00 per share. However, this stock did not represent new financing inasmuch as the shares were already outstanding and were held by Clarence J. Shearn as Trustee under a declaration of trust of Engineer's Public Service Company, dated April 28, 1936.

Financing in 1937.

On October 1, 1937, the Company sold at private sale $1,200,000 of 4% First Mortgage Bonds, Series B, to four insurance companies at a price of 97¾ plus accrued interest. The proceeds were used to reimburse the treasury for part of construction costs previously expended. The bonds were dated June 1, 1937 and were to mature June 1, 1952. However, the issue was called for redemption at 102 on January 16, 1939 pursuant to the 1938 financing.

2562½ During 1937 the Company sold to its employees and officers other than the president 5,521 shares of common stock at $17.55 per share.

Financing in 1938.

In February, 1938, the Company borrowed from banks $600,000 on its notes scheduled to mature at the rate of $200,000 in two years and $400,000 in three years at an average interest rate of 3¼%.

On December 15, 1938, the Company negotiated a $4,000,000 loan from the Chase National Bank of the City of New York evidenced by 3% Serial Notes maturing semi-annually over a period of seven years from that date. On the same date the Company also sold privately $6,000,000 of 3½% First Mortgage Bonds to five insurance companies and an educational institution at a price of 98.5 net plus accrued interest. These Bonds are dated December 1, 1938 and mature December 1, 1935. A sinking fund begins on May 31, 1946 (in other words after the completion of the payment of the serial bank loan) and is calculated to retire the entire issue by maturity. Upon the basis of a net price of 98.5 for the 3½% Bonds, cost of money would be between 3.65% and 3.75% for maturities of from seven to fifteen years indicated by the terms of the sinking fund.

Proceeds from the December, 1938 financing were used in large part by the Company to call and retire all its notes and funded debt previously outstanding including the First Mortgage Series A and Series B Bonds, the 4¾% Convertible Debentures and the $600,000 of 2½% and 3½% Short Term Notes issued in February of 1938 as mentioned above. 2563 According to the Company's annual report to stockholders for the year 1938, this financing operation, in addition to retiring the short term notes, improved the Company's cash position by approximately $1,000,000. The report states also that all of the debentures were converted into common stock except two debentures presented by error after the time limit provided for conversion under the debenture agreement.

2564 Lone Star Gas Corporation and Lone Star Gas Company (A Subsidiary).

Lone Star Gas Corporation is a holding company, one of whose principal subsidiaries is Lone Star Gas Company. The Corporation also owns 30% of the capital stock of Northern Natural Gas Company.

The Lone Star System, which consists of the operating subsidiaries of the Corporation, produces, purchases, transmits and distributes natural gas in portions of Texas and Oklahoma and distributes natural gas (purchased from Northern Natural Gas Company) in Council Bluffs, Iowa. Natural gas is sold at retail in approximately 300 communities, including Dallas, Fort Worth, El Paso, Galveston, Waco, Wichita Falls, San Angelo and Abilene, Texas; and Council Bluffs, Iowa.

Lone Star Gas Company is engaged principally in the production and purchase of natural gas, the operation of a gas transmission system, and the sale of natural gas to System companies and to large industrial customers. It also serves Fort Worth and environs at retail.

Financing in 1936.

According to its annual report to stockholders the Corporation borrowed $2,900,000 "at satisfactory interest rates" to be repaid over a period of two and one-half years. Proceeds were used in connection with the redemption of 6% cumulative preference stock.

2565 Financing in 1937.

In August, 1937 the Corporation negotiated a $10,000,000 bank loan (Lone Star Gas Company concurrently negotiated a $6,000,000 bank loan). The banks and the amounts loaned by each are as follows:

$ 5,700,000	The Union Trust Company of Pittsburg.
2,500,000	The Chase National Bank of the City of New York.
1,000,000	The Mellon National Bank of Pittsburg.
600,000	The Farmers Deposit National Bank, Pittsburg.
200,000	The Union Savings Bank of Pittsburg.
$10,000,000	Total.

These notes are to mature in semi-annual installments aggregating $800,000 each from February 1, 1938 to and including February 1, 1942, and in a final installment of $2,800,000 on August 1, 1942. The notes are to bear interest at rates beginning at 1¾% for the first installment and increasing to 4% for the February 1st and August 1st, 1942 installments. The proceeds from these bank loans were used in connection with the redemption of $7,563,000 of Fifteen-Year 5% Debenture Gold Bonds due May 1, 1942, and the repayment of short term bank loans and notes.

In August of 1937 Lone Star Company negotiated bank loans in the amount of $6,000,000 as per the following schedules:

$3,420,000	The Union Trust Company of Pittsburg.
1,500,000	The Chase National Bank of the City of New York.
600,000	The Mellon National Bank of Pittsburg.
360,000	The Farmers Deposit National Bank, Pittsburg.
120,000	The Union Savings Bank of Pittsburg.
$6,000,000	Total.

The notes are to mature in semi-annual installments aggregating $450,000 each from February 1, 1938 to and including February 1, 1942, and in a final installment
2566 of $1,950,000 on August 1, 1942. The notes are to bear interest at rates beginning at 2% for the first installment and increasing to 4½% for the February 1st and August 1st, 1942 installments. The proceeds from these notes were used to discharge other bank loans and to effect a partial discharge of the Company's indebtedness to its parent company. A small amount was added to working capital.

Financing in 1938.

In August of 1938 a public offering was made through underwriters of $20,000,000 principal amount of the Corporation's Fifteen-Year 3½% Sinking Fund (Convertible) Debentures due August 1, 1953. At the same time, the Corporation negotiated bank loans in the amount of $11,300,000. Proceeds from this financing were used to retire the Corporation's 6½% Preferred Stock, retire all outstanding bank loans, and advance to subsidiary companies funds sufficient to retire bank loans and all outstanding bonds and preferred stock. Included among the retirements were all unmatured balances on the $16,000,000 of bank loans effected in 1937 as hereinabove described.

The Debentures were offered to the public at 102. After underwriting commissions of 2% and estimated incidental expenses of 0.64%, net proceeds were 99.36% or $19,871,440. The rate of cost of such net proceeds is 3.63%, giving effect to the sinking fund.

The $11,300,000 of bank loans carry interest at 2⅞% per
annum and mature as follows: $1,000,000 semi-annually
from February 1, 1939 to August 1, 1942, inclusive,
2567 and $550,000 semi-annually from February 1, 1943
to August 1, 1945, inclusive. The banks and the
amounts loaned by each are:

$ 6,780,000	The Union Trust Company of Pittsburg.
2,486,000	The Chase National Bank of the City of New York.
1,356,000	The Mellon National Bank of Pittsburg.
678,000	The Farmers Deposit National Bank, Pittsburg.
$11,300,000	Total.

Reduction of Interest Rate on Bank Loan.

In September of 1939 the Securities and Exchange Commission approved a reduction from 2⅞% to 2⅜% in the rate of interest on the bank loan made in 1938 as described above. Although the loan was originally for $11,300,000, the reduction in the interest rate applied only to $8,750,000 since the $1,000,000 maturity of February 1, 1939, the like maturity of August 1, 1939 and the $550,000 maturity of August 1, 1945 were paid prior to the change in the interest rate. Interest savings of $116,728 were effected by the change. No changes other than the interest rate were made in the bank loan.

2568 Mississippi River Fuel Corporation.

Mississippi River Fuel Corporation owns and operates approximately 450 miles of main pipeline with a capacity of 100,000,000 cubic feet of gas per day extending from the Richland and Monroe gas fields in northern Louisiana to the city of St. Louis, Missouri, and nearby points in Illinois. The Corporation's supply of natural gas is secured by contracts with producers in the Louisiana fields including Interstate Natural Gas Company, Inc., and Hope Producing Company. The Corporation sells at wholesale to the Laclede Gas Light Company which distributes gas in St. Louis and to Cahokia Manufacturing Gas Company. It also has contracts for the delivery of gas directly to industrial customers.

Early in 1937, the Corporation sold privately $10,000,-

000 of 4% First Mortgage Pipeline Bonds dated February 1, 1937 and due February 1, 1952. Proceeds were used for the redemption of approximately $9,482,000 of First Mortgage 6% Bonds due in 1944 at 105 on February 15, 1937.

The majority of the Corporation's Common stock is owned by a syndicate which includes Standard Oil Company (New Jersey), United Gas Corporation, Columbian Carbon Company and United Carbon Company.

2569 Northern Natural Gas Company.

Northern Natural Gas Company owns and operates a natural gas pipeline system, together with its subsidiaries, which produces, gathers, transmits and distributes natural gas. The line is approximately 2,000 miles long and extends from the Texas Panhandle and the Hugoton, Kansas, gas fields to South Dakota and Minnesota. The gas is sold at wholesale in Iowa, Kansas, Nebraska, South Dakota and Minnesota. Among the cities supplied are Omaha, Lincoln, Council Bluffs, Des Moines, Sioux City, Minneapolis and Rochester. The supply of natural gas is obtained largely through purchase contracts with producing companies but considerable acreage of proved leases and a number of producing wells are owned.

The Company's common stock is owned as follows:

30% by Lone Star Gas Corporation,
35% by North American Light & Power Company, and
35% by United Light & Railways Company.

Published reports indicate that during recent years prior to 1939 the Company has sold privately the following securities:

1. $16,000,000 of First Mortgage and First Lien Bonds, Series A, 4¾%, due July 1, 1947.
2. $2,000,000 of First Mortgage and First Lien Bonds, Series B, 4¼%, due July 1, 1947.
3. $3,000,000 of 4½% Debentures, dated July 1, 1938, due July 1, 1948.

No further details are available with respect to the foregoing financing.

2570 Financing in 1939.

The Company sold privately at par $16,000,000 principal amount of First Mortgage and First Lien, Series A, 3¼% Bonds due July 1, 1954 to five insurance companies.

A fee of one-half of one per cent was paid to a banking house for negotiating the sale.

Proceeds from the sale of the new bonds were applied toward the redemption of all previously outstanding funded debt, namely the Series A and B bonds and the 4½% debentures listed above (but in principal amounts reduced from those shown above).

Concurrently with the bond issue, the Company negotiated a bank loan of $6,000,000 at 2⅛%, maturing $500,000 on July 1, 1940 and semi-annually thereafter to and including January 1, 1946. Proceeds from this loan were to be applied as follows:

$3,600,000 for construction of approximately 240 miles of 16 inch transmission line from Sioux City, Iowa, to a point near Minneapolis, Minnesota.

$1,200,000 for compressor station property, laterals, etc.

Balance to defray cost of additions and improvements of present property.

Oklahoma Natural Gas Company purchases, produces (to a minor extent), distributes and sells natural gas at wholesale and retail. Production properties, transmission lines and distribution systems in Oklahoma constitute the major portion of the system but the Company also has two small groups of properties in Kansas which are not physically connected with the Oklahoma system. Among the principal communities served at retail are Tulsa and Oklahoma City. A small amount of revenue is derived from sales at wholesale at city gates. The Company purchases the major portion of its requirements from producers operating in a number of small fields throughout Oklahoma and principally in the general area around Tulsa and Oklahoma City. The system includes approximately 2200 miles of transmission lines and 1900 miles of distribution lines.

Financing in 1936.

In June of 1936 a public offering was made through underwriters of $20,000,000 principal amount of First Mortgage Bonds Series A, 4½% due May 1, 1951 and $10,000,000 principal amount of 5% Convertible Debentures due May 1, 1946.

The bonds were offered to the public at 98½. After underwriters' commissions of 3% and estimated incidental expenses of 0.66%, net proceeds were 94.84% or $18,967,087. The rate of cost for such net proceeds is 5.61% giving effect to the sinking fund requirements.

2572 The debentures were offered to the public at 100. After underwriters' commissions of 3½% and estimated incidental expenses of 0.66%, net proceeds were 95.84% or $9,583,543. The rate of cost for such net proceeds is 5.55%.

In October of 1936 a public offering was made of 22,200 shares of Convertible 6% Prior Preference Stock of $100 par value per share. The stock was offered to the public at $100 per share and underwriting commissions were $4.00 per share. Strictly speaking, the offering of these shares did not represent new financing inasmuch as the shares had been delivered to Gas Utilities Company on June 17, 1936 in exchange for $2,220,000 principal amount of 5% Serial Notes, Series B, due serially from November 1, 1936 to November 1, 1951 (such notes were those of Oklahoma Natural Gas Company who cancelled them upon receiving them pursuant to this exchange). The public offering in October of 1936 was thus made by the underwriters who received the stock from Gas Utilities Company, who in turn distributed the proceeds to its stockholders.

Pursuant to financing undertaken in 1939, as described below, all the securities involved in this 1936 financing were retired in 1939 insofar as amounts were then outstanding. Specifically, the redemptions were as follows:

1. Entire outstanding issue of First Mortgage Bonds, Series A, 4½%, due May 1, 1951, called for redemption at 105 on September 22, 1939.
2. Entire issue of 5% Convertible Debentures due May 1, 1946, called for redemption at 110 on October 7, 1939.
3. Entire issue of 6% Cumulative Convertible Prior Preference Stock called for redemption at $110 per share on October 2, 1939.

2573 Financing in 1939.

By prospectus dated August 17, 1939 the following securities of the Company were publicly offered through underwriters:

1. $17,000,000 principal amount of First Mortgage Bonds, Series B, 3¾%, due August 1, 1955 at 103½.
2. 58,000 shares of $5.50 Convertible Prior Preferred

stock (no par value; stated value $100.00 per share) with cumulative dividends at $104.00 per share.

The proceeds of this financing together with proceeds from an $8,000,000 bank loan, hereinafter described, were applied largely toward the redemption of the 1936 financing as already noted.

The new Series B bonds were offered at 103½ to yield 3.46% to the August 1, 1955 maturity date. After underwriting commissions (2%) and estimated incidental expenses ($0.55), net proceeds were $17,160,965 or 100.95% of par. The cost of these net proceeds is approximately 3.82% giving effect to sinking fund retirements, but not to call premiums and expenses on the retired 1936 issue, which premiums and expenses have not been deducted from the net proceeds here mentioned.

The new preferred stock was offered at $104.00 per share to yield 5.29%. Underwriting commissions of $3.00 per share and estimated incidental expenses of $0.49 per share left net proceeds of $100.51 per share. The dividend rate of $5.50 per share represents a cost of 5.47% on these net proceeds.

Simultaneously with the sale of the new bonds and stock the Company proposed to issue its unsecured promissory notes to banks evidencing a loan of $8,000,000 in the aggregate. The amount of the loan is subject to re-
2574 duction to the extent that conversion of the 1936 is-
sues prior to redemption reduces the need for funds for such redemption. The notes bear interest at 2.19% to April 1, 1940 and thereafter at 2.75%. The loan is scheduled to mature as follows, assuming a maximum loan of $8,000,000:

Amount	Date Due
$1,500,000	4-1-41
1,100,000	4-1-42
1,200,000	4-1-43
1,200,000	4-1-44
1,200,000	4-1-45
1,200,000	4-1-46
600,000	10-1-46
$8,000,000	

2575 Panhandle Eastern Pipe Line Company.

Panhandle Eastern Pipe Line Company, directly and through subsidiaries, produces, purchases, transmits and sells natural gas.

Panhandle Eastern Pipe Line Company operates a natural gas transmission line from the Amarillo gas field in the Texas Panhandle through the States of Oklahoma, Kansas, Missouri and Illinois to a point in Indiana near Dana, adjacent to the Illinois-Indiana State line. The major portion of gas transmitted is sold to distributing companies and other transmission companies for resale. Almost all of the balance is sold to industrial customers.

Among the principal distributing utilities obtaining gas from the Panhandle Eastern system are Central Illinois Electric and Gas Company, Central Illinois Light Company, Central Illinois Public Service Company, Illinois Iowa Power Company, Missouri Power & Light Company and Michigan Consolidated Gas Company (formerly Detroit City Gas Company). The supply for the last named company is transported from Panhandle's line to Detroit by Michigan Gas Transmission Corporation.

In March, 1937, a public offering was made through underwriters of $24,000,000 principal amount of First Mortgage and First Lien Bonds, Series A, 4% due March 1, 1952. The bonds were offered to the public at 97.50. After underwriting commissions of 2% and estimated incidental
expenses of 0.48%, net proceeds were 95.02% or $22,-
2576 805,528 for the issue. The rate of cost of such net
proceeds is 4.68%, giving effect to sinking fund requirements.

During 1937 the Company obtained bank loans of approximately $5,000,000, of which $2,000,000 was converted into 2½% notes due June 15, 1939.

Receivers of Missouri-Kansas Pipe Line Company held a transferable warrant evidencing the right to subscribe for 80,000 shares of Panhandle Eastern Pipe Line Company common stock at $25.00 per share. Pursuant to court order these rights were distributed in 1939 to holders of the stocks of Missouri-Kansas Pipe Line Company. This offering was covered by a prospectus dated July 29, 1939.

Columbia Oil and Gasoline Corporation by contract dated January 31, 1936 agreed with Panhandle Eastern Pipe Line Company, et al., to purchase at $25.00 per share any of the 80,000 shares not subscribed or purchased by exercise of the rights.

Net proceeds from the sale of the stock, estimated at $1,918,600 after expenses, were to be used to reimburse the treasury for part of expenditures made in 1936.

2577

Southern Natural Gas Company.

Southern Natural Gas Company (successor in reorganization to Southern Natural Gas Corporation) operates a natural gas pipeline system from the Monroe, Louisiana, gas field across Mississippi and Alabama and into Georgia. Gas is sold to distributing companies in these States and to a few industrial customers. Among the communities served by the distributing companies are Atlanta, Columbus, Decatur, Macon and Rome, Georgia; Anniston, Gadsden, Montgomery and Tuscaloosa, Alabama; and Columbus, Meridian and Vicksburg, Mississippi.

Financing in 1936.

In November of 1936 a public offering was made through underwriters of $15,000,000 principal amount of First Mortgage Pipe Line Sinking Fund Bonds 4½%, due October 1, 1951. The bonds were offered to the public at par. After underwriting commissions of 2½% and estimated incidental expenses of 1.21%, net proceeds were 96.29% or $14,444,000. The cost of such net proceeds is 5.13% giving effect to sinking fund requirements.

Financing in 1937.

In connection with the acquisition of Alabama Gas Company, the Company secured a bank loan in the amount of $2,000,000 of which $175,000 was repaid December 1, 1937, the balance to mature in installments of $175,000 on each June 1st and December 1st to and including December 1, 1939 and the final installment of $1,125,000 on June 1,
2578 1940. This loan carries interest at the rate of 4½% and was made by the New York Trust Company, New York.

In December, 1937 the Company sold to an insurance company $650,000 of a new series of its First Mortgage Pipeline Sinking Fund Bonds at 97¾ plus accrued interest. The bonds bear interest at 4½% and mature April 1, 1952. The proceeds were used to finance in part additional compressing facilities constructed during the year. A sinking fund is provided for the retirement of the bonds in approximately equal annual installments commencing in 1938.

Financing in 1939.

On March 10, 1939 the Company repaid to The New York Trust Company the balance of $1,475,000 due on the 4½% loan obtained in 1937 (see above). On the same date, the Company issued a 4½% collateral note for $900,000 to The First National Bank of Birmingham, Alabama. Proceeds from this new loan and treasury funds were used to repay the 1937 loan. The new loan is payable as follows:

$100,000 semi-annually on December 31, 1939, June 30th and December 31, 1940.

$150,000 on June 30 and December 31, 1941, and June 30th and December 31, 1942.

In October of 1939 the Company filed a declaration with the Securities and Exchange Commission in regard to the proposed reduction of the interest rate on the $900,000 loan from 4½% to 4%. The Company stated that the holder of the note has agreed to the reduction. Hearing has been set for October 13, 1939.

2579 Southwestern Development Company.

Southwestern Development Company is a holding company organized under the laws of Colorado in 1924. The Company owns 100% of the common stock of subsidiaries engaged in the production, transportation and/or distribution of natural gas for resale or sale to domestic, commercial and industrial customers in Texas and New Mexico. One of the most important communities served is Amarillo, Texas.

The Company also has the following interests:

42.50%	in Colorado Interstate Gas Company
26.62%	in Texoma Natural Gas Company
13.31%	in Natural Gas Pipeline Company of America
100.00%	in Canadian River Gas Company.

Mission Oil Company owns approximately 47% and Consolidated Oil Corporation owns about 51% of the stock of Southwestern Development Company.

Financing in 1936.

Pursuant to a loan agreement with Guaranty Trust Company of New York dated July 1, 1936 the Company issues its promissory notes to the bank in the amount of $6,376,348.36 to cover indebtedness of the same amount owing to the bank. The maturities and annual interest rates on this loan were:

Amount	Date Due	Interest Rate
$ 750,000.00	7-1-37	2%
750,000.00	7-1-38	2½%
750,000.00	7-1-39	3%
750,000.00	7-1-40	3½%
3,376,348.36	7-1-41	4%
$6,376,348.36		

2580 The Company also issued unsecured 4% notes due July 1, 1942 in the amount of $1,762,003.08 to common stockholders in payment of dividends. These notes were subsequently redeemed.

Financing in 1937.

A loan agreement with the same New York bank dated September 23, 1937 covered a 4% loan in the following particulars:

Amount	Date Due
$ 300,000.00	1-2-39
300,000.00	1-2-40
300,000.00	1-2-41
300,000.00	1-2-42
2,092,000.00	1-2-43
$3,292,000.00	

The proceeds were used to acquire $3,292,000 principal amount of South Plains Gas Company First Mortgage and Collateral Trust 6% Bonds due January 1, 1945. The Company acquired $150,000 of these bonds from Amarillo Gas Company and the balance from Consolidated Oil Corporation.

In 1937 the Company also issued $2,040,300 of unsecured 4% notes maturing July 1, 1943 in payment of a dividend on its common stock.

Financing in 1939.

An amendment of the July 1, 1936 loan agreement was entered into as of July 1, 1939 whereby the July 1, 1941 maturity of the July 1, 1936 loan agreement was largely extended and the interest rate reduced from 4% to 3½%. New maturities were:

2581

Amount	Date Due
$ 600,000.00	7-1-41
600,000.00	7-1-42
600,000.00	7-1-43
762,298.36	7-1-44
$2,562,298.36	

A third loan agreement was entered into with the same bank providing for the issuance of two notes, as follows:

1. A 3% collateral note in the amount of $2,921,784.46 dated August 1, 1939 to mature:

$ 359,486.10	on	7-1-40
600,000.00	on	7-1-41
600,000.00	on	7-1-42
600,000.00	on	7-1-43
762,298.36	on	7-1-44
$2,921,784.46		

This note was issued to refund a note of the same amount representing the balance due under the July 1, 1936 loan agreement as amended July 1, 1939.

2. A 3% collateral note in the amount of $4,962,084.46 to be dated on or before January 2, 1940 and to mature:

$ 359,486.10	on	7-1-40
750,000.00	on	7-1-41
750,000.00	on	7-1-42
750,000.00	on	7-1-43
750,000.00	on	7-1-44
1,602,598.36	on	7-1-45
$4,962,084.46		

This note will refund the unpaid balance of the $2,921,784.46 on the note dated August 1, 1939 (item No. 1 above) and will provide funds for the redemption of the $2,040,300 of dividend notes due July 1, 1943, to be redeemed in full on January 2, 1940.

A balance of $2,751,340 under the September 23, 2582 1937 loan agreement was paid. Funds for this purpose were secured by selling $3,150,000 principal amount of South Plains Gas Company 6% bonds (see 1937 financing re acquisition of these bonds) to West Texas Gas Company. (West Texas Gas Company had assumed these bonds in connection with its acquisition of South Plains Gas Company.) West Texas Gas Company obtained funds for purchase of these bonds by issuance of a note to the New York bank in the amount of $3,150,000 under a loan agreement of August, 1939. The note bears interest at 3% and matures $150,000 semi-annually on January 2 and July 1 beginning January 2, 1940 and continuing until January 1, 1945 when the balance of $1,650,000 becomes due. The South Plains Gas Company bonds were pledged as collateral after reducting the interest rate thereon from 6% to 3% and amending the sinking fund to conform with the note installments.

Amarillo Gas Company, a subsidiary of the Company, had borrowed $450,000 for refunding purposes from the same bank in 1937 by issuance of a 4% note dated August 1, 1937 and maturing serially July 1, 1938 to 1941. The note was guaranteed by the Company. A balance of $270,000 on this loan was refunded in 1939 by supplemental loan agreement dated August 1, 1939 covering a new 3% note maturing:

$50,000	on	July 1, 1940
50,000	on	July 1, 1941
50,000	on	July 1, 1942
50,000	on	July 1, 1943
70,000	on	July 1, 1944
$270,000		

TABLE I. COMPUTATION OF THE RATE OF RETURN ON NET INVESTMENT AFTER AMORTIZATION RESERVE WHEN A RETURN OF 8% IS ALLOWED ON THE TOTAL INVESTMENT TOGETHER WITH ANNUAL AMORTIZATION COMPUTED ON A STRAIGHT LINE BASIS. COMPUTATIONS ARE ILLUSTRATED BY REFERENCE TO AN INVESTMENT OF $1,000,000 OVER A TEN YEAR PERIOD

A	B	C	D	E	F	G	H
	Amortization Data			Investment Less Reserve		8% on The Total Investment (8% of $1,000,000)	Rate of Return on Net Investment (i.e., Investment Less Reserve) (G ÷ E)
		Amortization Reserve					
Year	Annual Allowance for Amortization	At First of Each Year	At End of Each Year	At First of Each Year	At End of Each Year		
1	$ 100,000	$ 0	$ 100,000	$1,000,000	$900,000	$80,000	8.00%
2	100,000	100,000	200,000	900,000	800,000	80,000	8.89
3	100,000	200,000	300,000	800,000	700,000	80,000	10.00
4	100,000	300,000	400,000	700,000	600,000	80,000	11.43
5	100,000	400,000	500,000	600,000	500,000	80,000	13.33
6	100,000	500,000	600,000	500,000	400,000	80,000	16.00
7	100,000	600,000	700,000	400,000	300,000	80,000	20.00
8	100,000	700,000	800,000	300,000	200,000	80,000	26.67
9	100,000	800,000	900,000	200,000	100,000	80,000	40.00
10	100,000	900,000	1,000,000	100,000	0	80,000	80.00
Totals	$1,000,000	xxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	$800,000	14.55%*

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* Average; obtained by dividing the total of column G ($800,000) by the total of column E ($5,500,000).

TABLE I. COMPUTATION OF THE RATE OF RETURN ON NET INVESTMENT AFTER AMORTIZATION RESERVE WHEN A RETURN OF 8% IS ALLOWED ON THE TOTAL INVESTMENT TOGETHER WITH ANNUAL AMORTIZATION COMPUTED ON A STRAIGHT LINE BASIS. COMPUTATIONS ARE ILLUSTRATED BY REFERENCE TO AN INVESTMENT OF $1,000,000 OVER A TEN YEAR PERIOD

Exhibit 182

	D	E	F	G	H	I	J
Data		Investment Less Reserve		8% on The Total Investment (8% of $1,000,000)	Rate of Return on Net Investment (i.e., Investment Less Reserve) (G ÷ E)	8% of Investment Less Reserve (8% of E)	Excess of 8% on Total Inv ment over 8% on Investme Less Reserve (G - I)
ization Reserve							
t of ear	At End of Each Year	At First of Each Year	At End of Each Year				
0	$ 100,000	$1,000,000	$900,000	$80,000	8.00%	$80,000	$ 0
0	200,000	900,000	800,000	80,000	8.89	72,000	8,000
0	300,000	800,000	700,000	80,000	10.00	64,000	16,000
0	400,000	700,000	600,000	80,000	11.43	56,000	24,000
0	500,000	600,000	500,000	80,000	13.33	48,000	32,000
0	600,000	500,000	400,000	80,000	16.00	40,000	40,000
0	700,000	400,000	300,000	80,000	20.00	32,000	48,000
0	800,000	300,000	200,000	80,000	26.67	24,000	56,000
0	900,000	200,000	100,000	80,000	40.00	16,000	64,000
0	1,000,000	100,000	0	80,000	80.00	8,000	72,000
x	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	$800,000	14.55%*	$440,000	$360,000

total of column G ($800,000) by the total of column E ($5,500,000).

TABLE 11. COMPUTATION OF THE RATE OF RETURN ON NET INVESTMENT AFTER AMORTIZATION RESERVE WHEN A RETURN OF 8% IS ALLOWED ON THE TOTAL INVESTMENT TOGETHER WITH ANNUAL AMORTIZATION ALLOWANCE COMPUTED ON A 2% SINKING FUND BASIS. COMPUTATIONS ARE ILLUSTRATED BY REFERENCE TO AN INVESTMENT OF $1,000,000 OVER A TEN YEAR PERIOD

A	B	C	D	E	F	G	H	I
				AMORTIZATION RESERVE		INVESTMENT LESS RESERVE		
YEAR	ANNUAL ALLOWANCE FOR AMORTIZATION ON A 2% SINKING FUND BASIS	ANNUAL INTEREST ACCRUAL ON AMORTIZATION RESERVE (2% OF E)	TOTAL ANNUAL ADDITION TO AMORTIZATION RESERVE (B + C)	AT FIRST OF EACH YEAR	AT END OF EACH YEAR	AT FIRST OF EACH YEAR	AT END OF EACH YEAR	8% ON TOTAL INVESTMENT (8% OF $1,000,000)
1	$ 91,327 #	0	$ 91,327	$ 0	$ 91,327	$1,000,000	$908,672	$80,000
2	91,327	1,826	93,153	91,327	184,480	908,672	815,519	80,000
3	91,327	3,689	95,016	184,480	279,496	815,519	720,503	80,000
4	91,327	5,589	96,916	279,496	376,412	720,503	623,587	80,000
5	91,327	7,528	98,855	376,412	475,267	623,587	524,732	80,000
6	91,327	9,505	100,832	475,267	576,099	524,732	423,900	80,000
7	91,327	11,521	102,848	576,099	678,947	423,900	321,052	80,000
8	91,327	13,578	104,905	678,947	783,852	321,052	216,147	80,000
9	91,327	15,677	107,004	783,852	890,856	216,147	109,143	80,000
10	91,327	17,817	109,144	890,856	1,000,000	109,143	0	80,000
TOTALS	$913,270	$86,730	$1,000,000	xxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxx	$800,000

$91,327 SET ASIDE AT THE END OF EACH YEAR WITH INTEREST AT 2% COMPOUNDED ANNUALLY WILL AMOUNT TO $1,000,000 AT THE END OF TEN YEARS.

AVERAGE* OBTAINED BY DIVIDING THE TOTAL OF COLUMN J ($713,270) BY THE TOTAL OF COLUMN G ($5,663,255).

TABLE II. COMPUTATION OF THE RATE OF RETURN ON NET INVESTMENT AFTER AMORTIZATION RESERVE WHEN A RETURN OF 8% IS ALLOWED ON THE TOTAL INVESTMENT TOGETHER WITH ANNUAL AMORTIZATION ALLOWANCE COMPUTED ON A 2% SINKING FUND BASIS. COMPUTATIONS ARE ILLUSTRATED BY REFERENCE TO AN INVESTMENT OF $1,000,000 OVER A TEN YEAR PERIOD

C	D	E	F	G	H	I	J	K
Annual Interest Accrual on Amortization Reserve (2% of E)	Total Annual Addition to Amortization Reserve (B + C)	Amortization Reserve At First of Each Year	Amortization Reserve At End of Each Year	Investment Less Reserve At First of Each Year	Investment Less Reserve At End of Each Year	8% on Total Investment (8% of $1,000,000)	8% on Total Investment Less Annual Interest Accrual on Amortization Reserve (I - C)	Rate of Return on Net Investment (i.e., Investment Less Reserve) (J ÷ G)
0	$ 91,327	$ 0	$ 91,327	$1,000,000	$908,672	$80,000	$ 80,000	8.00%
1,826	93,153	91,327	184,480	908,672	815,519	80,000	78,174	8.60
3,689	95,016	184,480	279,496	815,519	720,503	80,000	76,311	9.36
5,589	96,916	279,496	376,412	720,503	623,587	80,000	74,411	10.33
7,528	98,855	376,412	475,267	623,587	524,732	80,000	72,472	11.62
9,505	100,832	475,267	576,099	524,732	423,900	80,000	70,495	13.43
11,521	102,848	576,099	678,947	423,900	321,052	80,000	68,479	16.15
13,578	104,905	678,947	783,852	321,052	216,147	80,000	66,422	20.69
15,677	107,004	783,852	890,856	216,147	109,143	80,000	64,323	29.76
17,817	109,144	890,856	1,000,000	109,143	0	80,000	62,183	56.97
$86,730	$1,000,000	xxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxx	$800,000	$713,270	12.59%

EACH YEAR WITH INTEREST AT 2% COMPOUNDED ANNUALLY WILL AMOUNT TO $1,000,000 AT THE END OF TEN YEARS.

HE TOTAL OF COLUMN J ($713,270) BY THE TOTAL OF COLUMN G ($5,663,255).

TABLE III. COMPUTATION OF THE RATE OF RETURN ON NET INVESTMENT AFTER AMORTIZATION RESERVE WHEN A RETURN OF 8% IS ALLOWED ON THE TOTAL AMOUNT OF THE INVESTMENT TOGETHER WITH AN ANNUAL AMORTIZATION ALLOWANCE COMPUTED ON AN 8% SINKING FUND BASIS. COMPUTATIONS ARE ILLUSTRATED BY REFERENCE TO AN INVESTMENT OF $1,000,000 OVER A TEN YEAR PERIOD

A	B	C	D	E	F	G	H	I	J
				Amortization Reserve		Investment Less Reserve			
Year	Annual Allowance For Amortization on an 8% Sinking Fund Basis	Annual Interest Accrual on Amortization Reserve (8% of E)	Total Annual Addition to Amortization Reserve (B + C)	At First of Each Year	At End of Each Year	At First of Each Year	At End of Each Year (G - D)	8% on Total Investment (8% of $1,000,000)	8% on Investme Annual Accrual tization (I -
1	$ 69,029 #	$ 0	$ 69,029	$ 0	$ 69,029	$1,000,000	$930,971	$ 80,000	$ 80
2	69,029	5,523	74,552	69,029	43,581	930,971	856,419	80,000	74
3	69,029	11,487	80,516	143,581	24,097	856,419	775,903	80,000	6
4	69,029	17,929	86,958	224,097	1,055	775,903	688,945	80,000	6
5	69,029	24,885	93,914	311,055	04,969	688,945	595,031	80,000	5
6	69,029	32,398	10 427	404,969	06,396	595,031	493,604	80,000	4
7	69,029	40,512	109,541	506,396	615,937	493,604	384,063	80,000	39
8	69,029	49,275	118,304	615,937	734,24	384,063	265,759	80,000	30
9	69,029	58,739	127,768	734,241	862,00	265,759	137,991	80,000	2
10	69,029	68,962	137,991	862,009	1,000,00	137,991	-0-	80,000	1
Totals	$690,290	$309,710	$1,000,000	xxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxx	$800,000	$49

$69,029 SET ASIDE AT THE END OF EACH YEAR WITH INTEREST AT 8% COMPOUNDED ANNUALLY WILL AMOUNT TO $1,000,000 AT THE END OF TEN YEARS.

* AVERAGE; OBTAINED BY DIVIDING THE TOTAL OF COLUMN J ($490,290) BY THE TOTAL OF COLUMN G ($6,128,686)

TABLE III. COMPUTATION OF THE RATE OF RETURN ON NET INVESTMENT AFTER AMORTIZATION RESERVE WHEN A RETURN OF 8% IS ALLOWED ON THE TOTAL AMOUNT OF THE INVESTMENT TOGETHER WITH AN ANNUAL AMORTIZATION ALLOWANCE COMPUTED ON AN 8% SINKING FUND BASIS. COMPUTATIONS ARE ILLUSTRATED BY REFERENCE TO AN INVESTMENT OF $1,000,000 OVER A TEN YEAR PERIOD

D	E	F	G	H	I	J	K
TOTAL ANNUAL ADDITION TO AMORTIZATION RESERVE (B ÷ C)	AMORTIZATION RESERVE		INVESTMENT LESS RESERVE		8% ON TOTAL INVESTMENT (8% OF $1,000,000)	8% ON TOTAL INVESTMENT LESS ANNUAL INTEREST ACCRUAL ON AMORTIZATION RESERVE (I - C)	RATE OF RETURN NET INVESTMENT (I.E., INVESTME LESS RESERVE) (J ÷ G)
	AT FIRST OF EACH YEAR	AT END OF EACH YEAR	AT FIRST OF EACH YEAR	AT END OF EACH YEAR (G - D)			
$ 69,029	$ 0	$ 69,029	$1,000,000	$930,971	$ 80,000	$ 80,000	8.00%
74,552	69,029	143,581	930,971	856,419	80,000	74,477	8.00
80,516	143,581	224,097	856,419	775,903	80,000	68,513	8.00
86,958	224,097	311,055	775,903	688,945	80,000	62,071	8.00
93,914	311,055	404,969	688,945	595,031	80,000	55,115	8.00
101,427	404,969	506,396	595,031	493,604	80,000	47,602	8.00
109,541	506,396	615,937	493,604	384,063	80,000	39,488	8.00
118,304	615,937	734,241	384,063	265,759	80,000	30,725	8.00
127,768	734,241	862,009	265,759	137,991	80,000	21,261	8.00
137,991	862,009	1,000,000	137,991	-0-	80,000	11,038	8.00
$1,000,000	xxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxx	$800,000	$490,290	8.00%*

WITH INTEREST AT 8% COMPOUNDED ANNUALLY WILL AMOUNT TO $1,000,000 AT THE END OF TEN YEARS.

COLUMN J ($490,290) BY THE TOTAL OF COLUMN G ($6,128,686)

EXHIBIT 183

Table I. Number of Banks and Amount of Bank Deposits in the United States

December 31, 1923 — June 30, 1939
(Exclusive of Deposits Made By One Bank in Other Banks)

Date	All Banks in the United States		Member Banks of the Federal Reserve System		Non-Member Banks	
	Number of Banks	Amount of Deposits	Number of Banks	Amount of Deposits	Number of Banks	Amount of Deposits
		(000,000 omitted)		(000,000 omitted)		(000,000 omitted)
1923 —Dec. 31	29,505	$42,163	9,774	$24,996	19,731	$17,167
1924 " "	28,806	45,835	9,587	27,836	19,219	17,999
1925 " "	28,257	49,224	9,489	30,029	18,768	19,195
1926 " "	27,367	50,155	9,260	30,474	18,107	19,681
1927 " "	26,416	52,909	9,034	32,063	17,382	20,846
1928 " "	25,576	56,766	8,837	34,826	16,739	21,940
1929 " "	24,630	55,289	8,522	33,865	16,108	21,424
1930 " "	22,769	53,039	8,052	32,560	14,717	20,479
1931 " "	19,966	45,821	7,246	27,432	12,720	18,389
1932 " "	18,390	41,643	6,816	24,803	11,574	16,840
1933 " "	15,011	38,505	6,011	23,771	9,000	14,734
1934 " "	16,042	44,770	6,442	28,943	9,600	15,828
1935 " "	15,837	48,964	6,387	32,159	9,450	16,805
1936 " "	15,628	53,701	6,376	35,893	9,252	17,808
1937 " "	15,393	52,440	6,341	34,810	9,052	17,630
1938 " "	15,206	54,054	6,338	36,211	8,868	17,843
1939*—June 30	15,082	55,988	6,330	38,027	8,752	17,961

*Non-Member Bank data are preliminary.
Source of Data: Annual and Monthly Reports of the Board of Governors of the Federal Reserve System.

2501

Table II. Bank Deposits of All Member-Banks of the Federal Reserve System
December 31, 1923 to June 30, 1939
(Exclusive of Deposits Made By One Bank in Other Banks)

			Demand Deposits		Time Deposits	
		Total Deposits	Amount	% of Total Deposits	Amount	% of Total Deposits
		(000,000 omitted)	(000,000 omitted)		(000,000 omitted)	
1923	Dec. 31	$24,996	$16,345	65.39%	$ 8,651	34.61%
1924	" "	27,836	18,031	64.78	9,805	35.22
1925	" "	30,029	19,376	64.52	10,653	35.48
1926	" "	30,474	19,034	62.46	11,440	37.54
1927	" "	32,063	19,298	60.19	12,765	39.81
1928	" "	34,826	21,373	61.37	13,453	38.63
1929	" "	33,865	20,632	60.92	13,233	39.08
1930	" "	32,560	19,014	58.40	13,546	41.60
1931	" "	27,432	16,116	58.75	11,316	41.25
1932	" "	24,803	14,253	57.46	10,550	42.54
1933	" "	23,771	14,735	61.99	9,035	38.01
1934	" "	28,943	19,176	66.25	9,767	33.75
1935	" "	32,159	21,900	68.10	10,259	31.90
1936	" "	35,893	25,063	69.83	10,830	30.17
1937	" "	34,810	23,427	67.30	11,383	32.70
1938	" "	36,211	24,842	68.60	11,369	31.40
1939	June 30	38,027	26,464	69.59	11,563	30.41

Source: Annual and Monthly Reports of the Board of Governors of the Federal Reserve System.

2592

Table III

Average Annual Velocity or Turnover of Bank Deposits

1923 to 1938

Year	100 Leading Cities Excluding New York City	New York City
1923	37.3	69.9
1924	36.4	70.0
1925	37.8	76.3
1926	39.3	83.3
1927	40.8	90.5
1928	43.8	112.2
1929	47.2	132.4
1930	40.0	83.2
1931	32.9	56.8
1932	28.4	41.5
1933*	28.0	38.9
1934	26.8	36.7
1935	26.3	34.4
1936	26.4	33.8
1937	26.5	32.0
1938	23.4	27.0
1939†	22.5	23.2

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* Average of eleven months because of bank holiday in March, 1933.

† Average of first seven months.

Source: Federal Reserve Bank of New York, as reported in Standard Statistics Company's Trade and Securities Service, Volume 3, Statistical Section.

2593

TABLE IV

Total, Required and Excess Reserves of All Member Banks of the Federal Reserve System

Date	Total Reserves	Required Reserves	Excess Reserves
	(In Millions of Dollars)		
Dec. 31, 1923	$ 1,898	$ 1,884	$ 14
" " 1924	2,220	2,161	59
" " 1925	2,212	2,256	44*
" " 1926	2,194	2,250	56*
" " 1927	2,487	2,424	63
" " 1928	2,389	2,430	41*
" " 1929	2,355	2,428	73*
" " 1930	2,471	2,375	96
" " 1931	1,961	1,994	33*
" " 1932	2,509	1,933	576
" " 1933	2,729	1,870	859
" " 1934	4,096	2,282	1,814
" " 1935	5,587	2,743	2,844
Aug. 16, 1936	Requirements increased; see Table V		
Dec. 31, 1936	6,606	4,622	1,984
Mar. 1, 1937	Requirements increased; see Table V		
May 1, 1937	" " " " "		
Dec. 31, 1937	7,027	5,815	1,212
April 16, 1938	Requirements decreased; see Table V		
Dec. 31, 1938	8,724	5,519	3,205
Aug. 31, 1939	10,918	6,160	4,758
Sept. 20, 1939	11,549	6,274	5,275

* Deficiency.

Source: Annual and Monthly Reports of the Board of Governors of the Federal Reserve System.

2594

TABLE V

Reserve Requirements of Member Banks of the Federal Reserve System (Percentage of Deposits Required for Reserves)

	6/21/17 to 8/15/36	8/16/36 to 2/28/37	3/1/37 to 4/30/37	5/1/37 to 4/15/38	4/16/38 to Date
On Net Demand Deposits					
Central Reserve City	13%	19½%	22¾%	26%	22¾%
Reserve City	10	15	17½	20	17½
Country	7	10½	12¼	14	12
On Time Deposits					
All Member Banks	3	4½	5¼	6	5

Source: Annual and Monthly Reports of Board of Governors of the Federal Reserve System.

2595

TABLE VI

Monetary Gold Stock of the United States
(At the end of each month. In Millions of Dollars)

Month	1933	1934	1935	1936
January	$4,266	$4,033	$8,391	$10,182
February	4,093	7,438(1)	8,527	10,167
March	3,995	7,694	8,567	10,184
April	4,025	7,757	8,710	10,225
May	4,028	7,779	8,858	10,402
June	4,031	7,856	9,116	10,608
July	4,033	7,931	9,144	10,648
August	4,041	7,978	9,203	10,716
September	4,037	7,978	9,368	10,845
October	4,036	8,002	9,693	11,045
November	4,036	8,132	9,920	11,184
December	4,036	8,238	10,125	11,258

Month	1937	1938	1939
January	$11,358	$12,756	$14,682
February	11,436	12,776	14,874
March	11,574	12,795	15,258
April	11,799	12,869	15,791
May	11,990	12,919	15,957
June	12,318	12,963	16,110
July	12,446	13,017	16,238
August	12,567	13,136	16,646
September	12,741	13,760	
October	12,803	14,065	
November	12,774	14,312	
December	12,760	14,512	

(1) Reduction in the weight of the gold dollar, January 31, 1934, from 25.8 grains to 15 5/21 grains, nine-tenths fine, accounts for $2,806,000,000 of the February increase over the January figure. Since January 31, 1934 the gold stock has been valued at $35 per ounce as compared with the previous rate of $20.67.

Source: Annual and Monthly Reports of the Board of Governors of the Federal Reserve System.

GROSS DEBT OF THE UNITED STATES

End of Period	1933	1934	1935	1936	1937	1938	1939
January	$20,802(1)	$25,078	$28,476	$30,516	$34,503	$37,459	$39,641
February	20,935	26,055	28,526	30,520	34,601	37,636	39,864
March	21,362	26,158	28,824	31,459	34,732	37,560	39,990
April	21,441	26,118	28,669	31,425	34,944	37,513	40,068
May	21,853	26,155	28,639	31,636	35,216	37,424	40,282
June	22,539	27,053	28,701	33,779	36,427	37,167	40,440
July	22,610	27,189	29,123	33,444	36,719	37,194	40,661
August	23,099	27,080	29,033	33,380	37,048	37,596	
September	23,051	27,190	29,421	33,833	36,878	38,395	
October	23,050	27,188	29,462	33,833	36,959	38,426	
November	23,534	27,299	29,634	33,794	37,096	38,607	
December	23,814	28,479	30,557	34,407	37,286	39,439	

INVESTMENT OF ALL MEMBER BANKS IN DIRECT OBLIGATIONS OF THE

Date	Amount	Date	Am
December 31, 1932	$ 6,540	March 5, 1935	$ 9
		June 29, 1935	9
June 30, 1933	6,887	November 1, 1935	10
October 25, 1933	6,801	December 31, 1935	10
December 30, 1933	7,254		
		March 4, 1936	10
March 5, 1934	8,667	June 30, 1936	11
June 30, 1934	9,137	December 31, 1936	11
October 17, 1934	9,186		
December 31, 1934	9,906		

INVESTMENTS OF THE FEDERAL RESERVE BANKS IN DIRECT OBLIGATIONS OF THE UNITED STATES GOVERNMENT

End of Period	1933	1934	1935	1936	1937	1938	1939
January	$1,763(2)	$2,434	$2,430	$2,430	$2,430	$2,564	$2,574
February	1,866	2,432	2,430	2,430	2,430	2,564	2,564
March	1,838	2,447	2,437	2,430	2,430	2,580	2,564
April	1,837	2,431	2,430	2,430	2,525	2,564	2,571
May	1,990	2,430	2,430	2,430	2,526	2,564	2,564
June	1,998	2,432	2,433	2,430	2,526	2,564	2,551
July	2,028	2,432	2,430	2,430	2,526	2,564	2,488
August	2,129	2,432	2,432	2,430	2,526	2,564	2,426
September	2,277	2,431	2,430	2,430	2,526	2,563	
October	2,421	2,430	2,430	2,430	2,526	2,564	
November	2,432	2,430	2,430	2,430	2,564	2,564	
December	2,437	2,430	2,431	2,430	2,564	2,564	

(1) The figure for December 31, 1932 was $20,805 millions.
(2) The figure for December 31, 1932, was $ 1,855 millions

Source: For Gross Debt, Survey of Current Business. For Investments of All Member Banks in Direct Obligations of the United States Government, Annual and Monthly Reports of the Board of Governors of the Federal Reserve System. For Investments of the Federal Reserve Banks in Direct Obligations of the United States Government, Annual and Monthly Reports of the Board of Governors of the Federal Reserve System.

THE UNITED STATES

1936	1937	1938	1939
$30,516	$34,503	$37,459	$39,641
30,520	34,601	37,636	39,864
31,459	34,732	37,560	39,990
31,425	34,944	37,513	40,068
31,636	35,216	37,424	40,282
33,779	36,427	37,167	40,440
33,444	36,719	37,194	40,661
33,380	37,048	37,596	
33,833	36,878	38,395	
33,833	36,959	38,426	
33,794	37,096	38,607	
34,407	37,286	39,439	

INVESTMENT OF ALL MEMBER BANKS IN DIRECT OBLIGATIONS OF THE UNITED STATES GOVERNMENT

Date	Amount	Date	Amount	Date	Amount
December 31, 1932	$ 6,540	March 5, 1935	$ 9,821	March 31, 1937	$10,856
		June 29, 1935	9,971	June 30, 1937	10,870
June 30, 1933	6,887	November 1, 1935	10,080	December 31, 1937	10,574
October 25, 1933	6,801	December 31, 1935	10,501		
December 30, 1933	7,254			June 30, 1938	10,215
		March 4, 1936	10,564	Sept. 28, 1938	10,713
March 5, 1934	8,667	June 30, 1936	11,721	December 31, 1938	10,882
June 30, 1934	9,137	December 31, 1936	11,639		
October 17, 1934	9,186			March 29, 1939	10,691
December 31, 1934	9,906			June 30, 1939	10,946

INVESTMENTS OF THE FEDERAL RESERVE BANKS IN DIRECT OBLIGATIONS OF THE UNITED STATES GOVERNMENT

eriod	1933	1934	1935	1936	1937	1938	1939
	$1,763(2)	$2,434	$2,430	$2,430	$2,430	$2,564	$2,574
	1,866	2,432	2,430	2,430	2,430	2,564	2,564
	1,838	2,447	2,437	2,430	2,430	2,580	2,564
	1,837	2,431	2,430	2,430	2,525	2,564	2,571
	1,890	2,430	2,430	2,430	2,526	2,564	2,564
	1,998	2,432	2,433	2,430	2,526	2,564	2,551
	2,028	2,432	2,430	2,430	2,526	2,564	2,488
	2,129	2,432	2,432	2,430	2,526	2,564	2,426
	2,277	2,431	2,430	2,430	2,526	2,563	
	2,421	2,430	2,430	2,430	2,526	2,564	
	2,432	2,430	2,430	2,430	2,564	2,564	
	2,437	2,430	2,431	2,430	2,564	2,564	

,805 millions.

,855 millions

iness. For Investments of All Member Banks in Direct Obligations of the United States Government, ard of Governors of the Federal Reserve System. For Investments of the Federal Reserve Banks in es Government, Annual and Monthly Reports of the Board of Governors of the Federal Reserve System.

2597

EXHIBIT 184.

Continental Construction Corporation
Texoma Natural Gas Company
Details of
Items of Expense in Operation of
A Single Pipe Line
from
Texas to Joliet, Illinois
and
Certain Miscellaneous Data

2598

EXHIBIT 184.

BEFORE THE ILLINOIS COMMERCE COMMISSION.

The Peoples Gas Light and Coke Co.
In the matter of proposed change in rates for gas service in Chicago, as stated in Rate Schedule Ill. C. C. No. 14.
} No. 21170.

Exhibit 20,
Ralph W. Gallagher.

2599

Detail of Annual Expense

Single Line

Operation of Wells and Gathering Lines

A. Operation of Wells—Average per year—

Rent and building operation	$ 8,000	
Production Department	60,000	
Accounting	14,000	
Legal, including lawsuits & retainers	18,000	
Purchasing and stores	21,000	
Engineering Department	23,000	
Geological Department	34,000	
Land and Lease	14,000	
Maintenance of Wells	160,000	
Damages, injuries & Workmen's Compensation	8,000	
Taxes and Insurance	67,000	
Supplies	8,000	
Total		$435,000

B. Operation of Gathering Lines:

First Year—Pipelines and Compressor Stations—

Superintendent District Supts. Line Walkers Meter Men Clerks	20 men	$ 37,500	
Supplies and Car Expense		12,500	
Total First Year			$ 50,000

Fifteenth Year—

Pipelines

Superintendent Dist. Supts. Line Walkers Meter Men Clerks	26 men	$ 50,400
Supplies and Car Expense		17,000
Total (Pipelines)		$ 67,400

2600 Booster Stations			
Superintendents)			
Station Engineers)	36 men	$ 72,000	
Oilers)			
Cylinder oil and operation supplies		10,600	
Total (Booster Stations)		$82,600	
Total Fifteenth Year			$150,000
Average Annual Cost of operating Gathering Lines			100,000
Total Cost of Operation of Wells and Gathering Lines			535,000

2601 Rentals, Renewals, in Lieu Payments, Dry Hole Expenses and Royalties

Rentals	$ 56,000	
Renewals	35,000	
In lieu payments	12,000	
Dry Hole expenses	32,000	
Royalties	176,000	
Total		$311,000

2602 Maintenance of Gathering Lines

A. First Year 1½% x $4,589,000 = $ 69,000
B. 15th year 1½% x $7,109,000 = 107,000
C. Average for 15 years = 88,000

2603 Operation and Maintenance of Gasoline Plant

Operation labor	$ 40,000	
Operating supplies	20,000	
Fuel, Water, and Power	66,000	
Maintenance 2½%	19,000	
Tank Car Rental	30,000	
Brokerage	30,000	
Undistributed & unforeseen	45,000	
Total		$250,000

2604 Cost of Gas Purchased

Cost of gas at 6¢ per MCF—			$798,000
Add: Proportion of Net Revenue from Sale of Gasoline—			
Gross Revenue from Sale of Gasoline		$630,000	
Expense of Operating Gasoline Plant:			
Operating Expense	$250,000		
Amortization	51,000		
Interest	45,000		
Total Expense		346,000	
Net Revenue		$284,000	
¼ of Net Revenue to be paid for gas purchased, in addition to payments at rate of 6¢ per MCF—			71,000
Total Cost of Gas Purchased—			$869,000

2605 Operation and Maintenance of Compressor Stations

Operation of Compressor Stations			
Station Supts. Main Engineers Auxiliary Engineers Utility Men	80 men	$162,000	
Oilers (66 men)		118,800	
Cylinder oil & Operating Supplies		71,200	
Total			$352,000
Maintenance of Compressor Stations 2½% of $10,538,314 =			$263,000

2606 Operation of Main Line

Item	
Superintendents (14 men)	$36,000
Line Walkers (45 men)	67,500
Meter Station Employees (16 men)	27,900
Warehouse Employees (10 men)	18,000
Telephone Employees (13 men)	26,000
Rental for Leased Telephone Equipment	5,000
Automobile Expense	30,000
Sundry Supplies and Expense	27,600
Total	$238,000

2607 Maintenance of Main Pipe Line and Telephone System

1½% of $39,069,809 = $585,000.

(Above investment includes main pipeline, telephone system, interest during construction, and overhead)

2608 Insurance and Taxes

1½% of $55,977,123 ≑ $840,000

(Above investment includes pipeline, compressor stations, telephone, gathering system, interest during construction, and overhead).

2609 Administrative and other General Expenses

Salaries and wages (100 persons)	$380,000
Traveling expense	100,000
Automobile expense of administrative personnel, including depreciation	60,000
Rent	45,000
Legal Expense, including retainers	80,000
Personal liability insurance, injuries and damages	50,000
Telephone and telegraph	25,000
Stationery and printing	30,000
Miscellaneous	30,000
Total	$800,000

2610 Amortization of Cost of Gas Leases and Wells

A. Gas leases were amortized at the rate of 4.3% per year which is on the basis of a 15-year sinking fund with interest compounded annually at 6%. The investment involved is $15,429,768 and the annual expense is $665,000.

B. Gas wells were all amortized by the end of the 15-year period. Wells drilled or purchased in the first year were amortized in 15 years on the sinking fund basis. Wells drilled in the 10th year were amortized in 5 years. Thus this charge varies from year to year but averages $472,000.

2611 Amortization of Investment in Gathering Lines

Total investment amortized during the fifteen year period of operation. The amount spent the first year was amortized in 15 years, on the sinking fund method compounding the interest annually at 6%. The amount spent in the 5th year was amortized in 10 years, etc. The investment changes from $4,589,000 in the first year to $7,109,000 in the fifteenth.

2612 Amortization of Investment in Gasofine Plant

This plant was amortized in 10 years, assuming a net salvage value at the end of that time of 10%. Thus the amortization rate on this plant was computed at 7.6% per year on 90% of the investment. This gives $51,000 per year.

2613 Amortization of Main Line and Compressor Stations

This was computed on a fifteen year sinking fund basis compounding the interest annually at 6%. This gives an amortization rate of 4.3% per year which is applicable to $49,608,123, resulting in an annual figure of $2,140,000.

(Above investment includes pipeline, telephone, compressor stations, interest during construction, and overhead).

2614 Continental Construction Corporation Stock

Amount paid in for the 1,000 outstanding shares of Continental Construction Corporation stock............. $100,000.00

2615 Cost of Drilling Wells in Texas Panhandle

Wheeler County	$20,000
Gray County	25,000
Hutchinson County	25,000
Moore County	30,000

2616 Detail of Auto Expense

Average number of cars needed at one time	120	
Length of construction period	18 months	
Total number of car months	2,160	
Average useful life in months	10	
Total number of cars needed	216	
Cost Per Car For Average Life		
Average cost of car equipped	$800	
Re-sale value at end of useful period	200	
Writeoff per car		$ 600

10 Months Expense per car

Interest	$ 53	
Gasoline	400	
Oil	130	
Greasing	70	
Washing	52	
Repairs	165	
Storage	150	
License	15	
Insurance	25	
Tires	35	
		1,095
Total writeoff and expense per car		$ 1,695

Total Auto Expense 216 cars at $1,695	$366,000

2617

Detail of Miscellaneous Expense

Note: The following are the major items in the estimate of $593,966 for miscellaneous expense.

1.	Road Markers and Signs	$ 15,000
2.	Fence Step-Overs	10,000
3.	Bridges for Line Walkers	100,000
4.	Pipe Racks	20,000
5.	Sleeve Boxes	5,000
6.	Rock, Sandbags & Brush to stop washing	100,000
7.	Cattle Guards	25,000
8.	Auxiliary River Crossings	250,000

1. Gas pipeline crossing markers are being installed at county and state highway crossings. Various signs are being erected at river crossings and other vital points.

2. In certain districts, woven wire fences make it essential that fence step-overs be installed so line walkers may follow the line.

3. Bridges for line walkers will be required across certain streams to facilitate operations.

4 & 5. Racks and boxes are being erected at frequent intervals to store pipe and emergency sleeves.

6. As the backfill seasons, additional protection is being provided at points subject to erosion.

7. The line crosses large ranches where it is necessary to cut fences and install cattle guards due to lack of roads.

8. Additional river crossing capacity is yet to be provided.

STATE OF ILLINOIS

ILLINOIS COMMERCE COMMISSION

CERTIFICATE

The Peoples Gas Light and Coke Co.
Re: In the matter of proposed change in rates for gas service in Chicago, as stated in Rate Schedule Ill. C. C. No. 14 } 21170

I, Joseph E. Knight, do hereby certify that I am Secretary of the Illinois Commerce Commission of the State of Illinois and keeper of the records of said Commission.

I further certify that the above and foregoing is a true, correct and complete copy of Exhibit 20 introduced by Mr. Ralph W. Gallagher in the above entitled cause before the Illinois Commerce Commission.

Given under my hand and the seal of said Illinois Commerce Commission at Chicago, Illinois, this 25th day of October, A. D. 1939.

Joseph E. Knight
Joseph E. Knight
Secretary

2620 EXHIBIT 185.

FEDERAL POWER COMMISSION

Rate of Return Study
Part I
October, 1939

2621 Rate of Return Study

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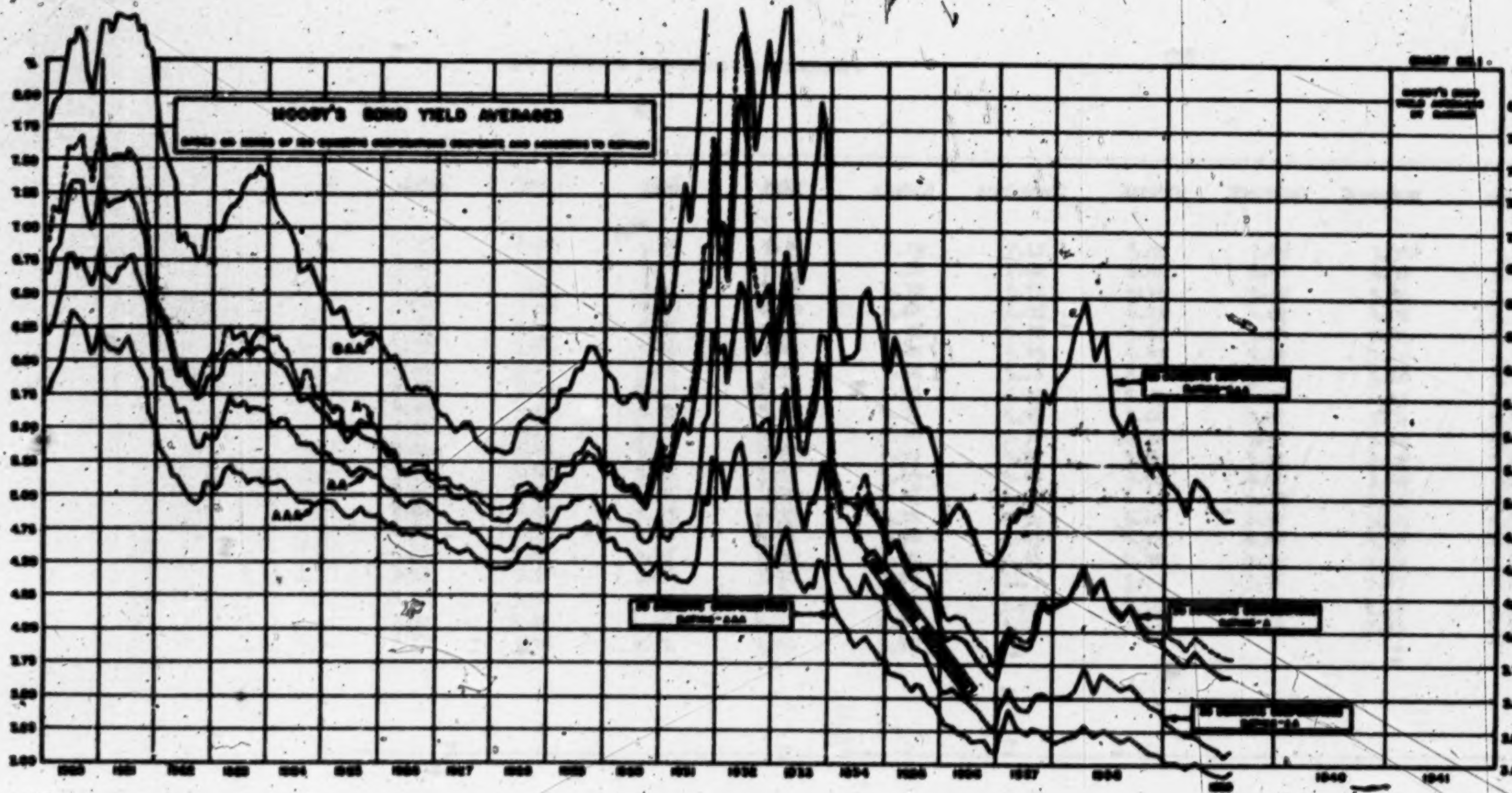
MOODY'S BOND YIELD AVERAGES
%
8.00
7.75
7.50
7.25
7.00
6.75
6.50
6.25
6.00
5.75
5.50
5.25
5.00
4.75
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1933
1934
1935
1936
1937
1938
1939
1940
1941

MOODY'S BOND YIELD AVERAGES

BASED ON BONDS OF 120 DOMESTIC CORPORATIONS—COMPOSITE AND ACCORDING TO RATINGS

UNIT: PERCENT PER ANNUM

120 DOMESTIC CORPORATIONS—COMPOSITE

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	6.65	6.81	6.86	7.02	7.26	7.29	7.29	7.29	7.12	6.99	7.09	7.34	7.08
1921	7.20	7.15	7.19	7.20	7.21	7.27	7.23	7.14	7.02	6.92	6.57	6.36	7.04
1922	6.35	6.24	6.17	6.01	5.89	5.92	5.84	5.78	5.71	5.76	5.88	5.89	5.95
1923	5.87	5.90	6.03	6.09	6.04	6.05	6.10	6.04	6.08	6.11	6.09	6.08	6.04
1924	6.01	5.98	5.96	5.94	5.88	5.79	5.70	5.72	5.72	5.67	5.63	5.61	5.81
1925	5.60	5.54	5.54	5.54	5.45	5.40	5.44	5.48	5.45	5.43	5.42	5.40	5.47
1926	5.34	5.29	5.31	5.25	5.17	5.16	5.17	5.18	5.18	5.18	5.14	5.10	5.21
1927	5.06	5.07	5.03	4.98	4.96	5.00	5.00	4.95	4.93	4.89	4.86	4.83	4.97
1928	4.83	4.83	4.82	4.83	4.88	4.99	5.02	5.04	5.02	5.00	4.97	5.01	4.94
1929	5.04	5.08	5.16	5.16	5.16	5.25	5.25	5.30	5.34	5.32	5.27	5.17	5.21
1930	5.17	5.18	5.08	5.05	5.04	5.05	5.02	4.97	4.92	5.02	5.17	5.38	5.09
1931	5.20	5.20	5.20	5.35	5.48	5.57	5.47	5.65	6.00	6.62	6.60	7.43	5.81
1932	6.87	6.83	6.62	7.31	7.94	8.01	7.69	6.45	6.08	6.12	6.24	6.31	6.87
1933	5.98	6.13	6.46	6.64	6.02	5.63	5.35	5.34	5.57	5.64	6.02	5.93	5.89
1934	5.52	5.10	5.02	4.87	4.85	4.81	4.81	4.96	5.03	4.92	4.86	4.79	4.96
1935	4.66	4.60	4.66	4.64	4.55	4.47	4.40	4.39	4.36	4.34	4.27	4.19	4.46
1936	4.04	3.95	3.95	3.97	3.96	3.94	3.90	3.85	3.79	3.75	3.71	3.67	3.87
1937	3.67	3.75	3.87	3.97	3.91	3.90	3.88	3.88	3.98	4.12	4.21	4.16	3.94
1938	4.19	4.23	4.36	4.50	4.28	4.40	4.17	4.09	4.17	4.03	3.95	3.95	4.19
1939	3.86	3.81	3.74	3.64	3.78	3.71	3.66	3.67					

SCHEDULE NO. 1
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MOODY'S BOND
YIELD AVERAGES
COMPOSITE

SCHEDULE NO. 1
PART F
MOODY'S BOND YIELD AVERAGES
RATING AAA

BASED ON BONDS OF 120 DOMESTIC CORPORATIONS-COMPOSITE AND ACCORDING TO RATINGS

UNIT: PERCENT PER ANNUM

30 DOMESTIC CORPORATIONS-RATING AAA

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	5.75	5.86	5.92	6.04	6.25	6.38	6.34	6.30	6.22	6.05	6.08	6.26	6.12
1921	6.14	6.06	6.08	6.06	6.11	6.18	6.12	5.99	5.93	5.84	5.60	5.50	5.97
1922	5.34	5.29	5.23	5.15	5.13	5.08	5.00	4.96	4.93	4.97	5.09	5.08	5.10
1923	5.04	5.07	5.18	5.22	5.16	5.15	5.14	5.08	5.12	5.11	5.09	5.09	5.12
1924	5.09	5.09	5.10	5.08	5.04	4.99	4.95	4.95	4.95	4.98	4.94	4.95	5.00
1925	4.95	4.95	4.91	4.87	4.83	4.83	4.87	4.90	4.87	4.85	4.84	4.85	4.88
1926	4.82	4.77	4.79	4.74	4.71	4.72	4.71	4.72	4.72	4.71	4.68	4.68	4.73
1927	4.66	4.67	4.62	4.58	4.57	4.58	4.60	4.55	4.54	4.51	4.49	4.46	4.57
1928	4.46	4.46	4.45	4.46	4.49	4.57	4.61	4.64	4.61	4.61	4.58	4.61	4.55
1929	4.62	4.66	4.70	4.69	4.70	4.77	4.77	4.79	4.80	4.77	4.76	4.67	4.73
1930	4.66	4.69	4.62	4.60	4.60	4.57	4.52	4.47	4.42	4.42	4.47	4.52	4.55
1931	4.42	4.43	4.39	4.40	4.37	4.35	4.36	4.40	4.55	4.99	4.94	5.32	4.58
1932	5.20	5.23	4.98	5.17	5.36	5.41	5.26	4.91	4.70	4.64	4.63	4.59	5.01
1933	4.44	4.48	4.64	4.78	4.63	4.46	4.35	4.30	4.36	4.34	4.44	4.50	4.49
1934	4.35	4.20	4.13	4.07	4.01	3.93	3.89	3.93	3.96	3.90	3.86	3.81	4.00
1935	3.77	3.69	3.67	3.66	3.65	3.61	3.56	3.60	3.59	3.52	3.47	3.44	3.60
1936	3.37	3.32	3.29	3.29	3.27	3.24	3.23	3.21	3.18	3.18	3.15	3.10	3.24
1937	3.10	3.22	3.32	3.42	3.33	3.28	3.25	3.24	3.28	3.27	3.24	3.21	3.26
1938	3.17	3.20	3.22	3.30	3.22	3.26	3.22	3.18	3.21	3.19	3.10	3.08	3.19
1939	3.01	3.01	2.99	3.02	2.97	2.92	2.89	2.93					

MOODY'S BOND YIELD AVERAGES

BASED ON BONDS OF 120 DOMESTIC CORPORATIONS–COMPOSITE AND ACCORDING TO RATINGS

UNIT: PERCENT PER ANNUM

30 DOMESTIC CORPORATIONS–RATING AA

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	6.19	6.28	6.42	6.94	6.78	6.79	6.69	6.76	6.65	6.56	6.63	6.84	6.59
1921	6.64	6.60	6.59	6.66	6.69	6.76	6.78	6.69	6.56	6.47	6.18	5.95	6.55
1922	5.94	5.80	5.72	5.71	5.62	5.64	5.57	5.44	5.75	5.36	5.45	5.41	5.59
1923	5.42	5.49	5.62	5.73	5.66	5.66	5.69	5.63	5.65	5.65	5.63	5.63	5.62
1924	5.75	5.52	5.57	5.56	5.49	5.43	5.38	5.38	5.38	5.35	5.32	5.31	5.44
1925	5.30	5.25	5.24	5.24	5.19	5.15	5.17	5.21	5.18	5.17	5.14	5.14	5.20
1926	5.07	5.04	5.05	4.99	4.94	4.92	4.95	4.95	4.97	4.95	4.93	4.89	4.97
1927	4.67	4.67	4.83	4.80	4.79	4.80	4.80	4.73	4.73	4.69	4.65	4.62	4.77
1928	4.61	4.61	4.59	4.60	4.64	4.75	4.79	4.82	4.79	4.78	4.75	4.77	4.71
1929	4.79	4.86	4.92	4.91	4.91	4.98	4.97	4.99	5.01	5.01	4.94	4.84	4.93
1930	4.86	4.89	4.80	4.78	4.77	4.76	4.74	4.68	4.65	4.67	4.75	4.85	4.77
1931	4.70	4.70	4.67	4.76	4.76	4.81	4.81	4.85	5.08	5.57	5.62	6.26	5.05
1932	6.08	6.13	5.85	6.11	6.38	6.60	6.51	5.83	5.94	5.51	5.57	5.60	5.96
1933	5.30	5.35	5.61	5.81	5.40	5.09	4.83	4.77	4.96	4.97	5.35	5.27	5.23
1934	5.00	4.70	4.55	4.43	4.37	4.30	4.28	4.34	4.42	4.36	4.28	4.27	4.46
1935	4.21	4.13	4.11	4.08	4.05	3.99	3.89	3.87	3.85	3.82	3.73	3.65	3.83
1936	3.57	3.55	3.45	3.57	3.53	3.51	3.48	3.44	3.41	3.37	3.31	3.28	3.49
1937	3.30	3.40	3.50	3.57	3.48	3.43	3.41	3.41	3.46	3.53	3.64	3.50	3.46
1938	3.50	3.51	3.56	3.73	3.56	3.68	3.62	3.57	3.60	3.53	3.46	3.42	3.56
1939	3.32	3.26	3.22	3.22	3.16	3.13	3.07	3.11					

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MOODY'S BOND
YIELD AVERAGES
RATING AA

SCHEDULE NO. 1
PAGE 4
MOODY'S BOND YIELD AVERAGES
RATING A

BASED ON BONDS OF 120 DOMESTIC CORPORATIONS—COMPOSITE AND ACCORDING TO RATINGS

UNIT: PERCENT PER ANNUM

30 DOMESTIC CORPORATIONS, RATING A

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	6.88	7.15	7.11	7.34	7.60	7.58	7.62	7.69	7.48	7.38	7.45	7.71	7.41
1921	7.92	7.90	7.53	7.53	7.50	7.56	7.53	7.43	7.23	7.03	6.62	6.39	7.28
1922	6.41	6.33	6.22	6.05	5.93	5.97	5.88	5.85	5.79	5.91	5.99	6.04	6.05
1923	6.04	6.07	6.24	6.25	6.17	6.13	6.21	6.06	6.15	6.23	6.22	6.22	6.17
1924	6.16	6.18	6.10	6.09	6.00	5.90	5.79	5.84	5.83	5.78	5.72	5.72	5.93
1925	5.70	5.61	5.66	5.63	5.46	5.44	5.51	5.96	5.53	5.54	5.51	5.46	5.59
1926	5.38	5.33	5.34	5.27	5.18	5.18	5.21	5.23	5.23	5.23	5.17	5.16	5.24
1927	5.11	5.13	5.12	5.06	5.05	5.06	5.04	5.01	5.01	4.97	4.94	4.92	5.04
1928	4.91	4.92	4.98	4.91	4.96	5.07	5.09	5.10	5.07	5.04	4.99	5.08	5.01
1929	5.10	5.14	5.24	5.23	5.24	5.31	5.32	5.39	5.43	5.38	5.33	5.21	5.28
1930	5.23	5.25	5.15	5.12	5.07	5.08	5.06	5.00	4.94	5.06	5.21	5.43	5.13
1931	5.26	5.29	5.30	5.52	5.65	5.75	5.64	5.88	6.29	6.88	6.90	7.70	6.01
1932	7.06	7.08	6.80	7.46	8.40	8.50	8.19	6.94	6.45	6.44	6.53	6.64	7.20
1933	6.16	6.30	6.64	6.85	6.29	5.88	5.98	5.51	5.70	5.76	6.22	6.21	6.09
1934	5.72	5.24	5.12	4.97	4.96	4.96	4.93	5.05	5.17	5.00	4.93	4.86	5.08
1935	4.74	4.63	4.67	4.69	4.59	4.52	4.48	4.49	4.48	4.49	4.45	4.35	4.55
1936	4.21	4.12	4.10	4.12	4.11	4.09	4.05	3.99	3.94	3.90	3.85	3.78	4.02
1937	3.77	3.85	3.97	4.04	3.98	3.96	3.94	3.94	4.02	4.16	4.24	4.20	4.01
1938	4.20	4.24	4.34	4.49	4.26	4.41	4.21	4.13	4.20	4.08	4.02	4.02	4.22
1939	3.97	3.94	3.87	3.97	3.92	3.86	3.83	3.80					

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MOODY'S BOND YIELD AVERAGES

BASED ON BONDS OF 120 DOMESTIC CORPORATIONS—COMPOSITE AND ACCORDING TO RATINGS

UNIT: PERCENT PER ANNUM

30 DOMESTIC CORPORATIONS—RATING BAA

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	7.78	7.94	7.97	8.17	8.39	8.39	8.92	8.79	8.14	7.99	8.21	8.56	8.20
1921	8.50	8.42	8.55	8.53	8.52	8.56	8.48	8.51	8.34	8.36	7.88	7.61	8.35
1922	7.70	7.55	7.45	7.14	6.89	6.97	6.89	6.85	6.75	6.78	6.98	7.02	7.08
1923	6.98	6.97	7.09	7.17	7.17	7.21	7.36	7.38	7.38	7.46	7.40	7.35	7.24
1924	7.24	7.14	7.08	7.03	6.97	6.82	6.67	6.69	6.73	6.62	6.94	6.46	6.83
1925	6.44	6.36	6.96	6.41	6.30	6.18	6.20	6.24	6.20	6.17	6.17	6.15	6.27
1926	6.09	6.02	6.05	5.98	5.86	5.80	5.79	5.81	5.79	5.81	5.77	5.68	5.87
1927	5.61	5.59	5.94	5.46	5.50	5.55	5.55	5.48	5.42	5.38	5.35	5.32	5.48
1928	5.35	5.33	5.32	5.33	5.42	5.55	5.58	5.61	5.59	5.58	5.55	5.60	5.46
1929	5.63	5.66	5.79	5.80	5.80	5.94	5.95	6.04	6.12	6.11	6.03	5.95	5.90
1930	5.92	5.89	5.73	5.70	5.72	5.78	5.77	5.73	5.65	5.94	6.25	6.71	5.90
1931	6.41	6.38	6.44	6.72	7.15	7.36	7.08	7.47	8.07	9.04	8.93	10.42	7.62
1932	9.15	8.67	8.83	10.46	11.63	11.52	10.79	8.82	7.61	7.87	8.84	8.42	9.30
1933	8.01	8.37	8.91	9.12	7.74	7.07	6.68	6.77	7.27	7.49	7.98	7.75	7.76
1934	7.01	6.27	6.26	6.01	6.05	6.06	6.13	6.49	6.57	6.40	6.37	6.23	6.32
1935	5.98	5.95	6.20	6.13	5.94	5.77	5.07	5.98	5.53	5.94	5.43	5.30	5.75
1936	5.00	4.80	4.86	4.91	4.94	4.90	4.84	4.74	4.62	4.54	4.52	4.53	4.77
1937	4.49	4.53	4.68	4.84	4.84	4.93	4.91	4.92	5.16	5.52	5.82	5.73	5.03
1938	5.89	5.97	6.30	6.47	6.06	6.25	5.63	5.49	5.65	5.36	5.23	5.27	5.80
1939	5.12	5.05	4.89	5.15	5.07	4.91	4.84	4.85					

Source of data: Moody's Bond Yield Averages are computed by Moody's Investors Service and are issued in their publications. The Bond Yield Averages are reproduced in Survey of Current Business, November 1937, 1938 Supplement, and March 1939. The above figures were taken from the last named source for the period from January 1920 to January 1939; and were taken direct from Moody's Bond Survey for the subsequent months.

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MOODY'S BOND
YIELD AVERAGES
RATING BAA

2630 Compilation of Moody's Bond Yield Averages.

In the compilation of Moody's Bond Yield Averages, daily yields for each individual bond are computed on the basis of closing prices. Unweighted arithmetic averages are computed to obtain each of the series shown. The monthly series are arithmetic averages of the daily figures.

Occasional substitutions in the bond list have been made when ratings have been changed, when a bond is called, when a bond sells too far above its call price, or because of approaching maturity. Suitable adjustments (usually small), which are gradually amortized, are introduced to prevent such substitutions from impairing the comparability of the series. No convertible or other unusual issues are included and the average maturity is close to [illegible] years.

Only 60 bonds were used in the averages from 1920 to 1927, inclusive. From 1928 to 1933, inclusive 120 bonds were used, no adjustment being required to connect the two series. Since 1933, it has not been possible to find a sufficient number of representative bonds for the Industrial AAA and AA groups; they contain, respectively, 4 and 3 issues. However, the averages for these groups are given equal weighting in combining them with other group averages.

Key to Moody's Bond Ratings.

Moody's Ratings are an indicator of the relative investment quality of bonds.

The Ratings are defined by Moody's Investors Service as follows:

AAA

Bonds carrying the AAA rating represent the highest type of bond investment. Principal and interest are protected by characteristically wide margins, the fluctuation in which is not at all likely to jeopardize the security. Among all rating groups, these bonds hold the best prospect of unchanging quality.

2631

AA

Bonds carrying the AA rating rank high by reason of asset and income protection but they lack one characteristic or another of the highest type of bond investment.

A

Bonds carrying the A rating are well within the sound investment classification. Security of principal and interest may be regarded as adequate but the borrower's position is subject to greater fluctuation or the bonds are more vulnerable to such fluctuation than in the case of the first two classes.

BAA

Bonds carrying the BAA rating comprise that large group of investments which are neither very good nor very bad. In this classification some speculative elements exist. The extent and stability of income and security may be satisfactory but certainly not noteworthy.

Source of definition of Ratings: Moody's Public Utilities, 1938, page viii.

2632 Bonds Used in Moody's Bond Yield Averages
According to Ratings
Rating Aaa

Industrials

Liggett & Myers 5s, 1951
Socony-Vacuum 3s, 1964
Standard Oil N. J. 3s, 1961
Texas Corp. 3s, 1959

Public Utilities

Brooklyn Edison 3¼s, 1966
Cincinnati Gas & Elec. 3¼s, 1966
Cons. Gas E. L. & P., Balto. 3s, 1969
Duquesne Light 3½s, 1965
Illinois Bell Tel. 3½s, 1970
New York Edison 3¼s, 1965
Pacific Tel. & Tel. "B" 3½s, 1966
Philadelphia Electric 3½s, 1967
Southwestern Bell 3s, 1968
West Penn Power 3½s, 1966

Railroads

Chesapeake & Ohio 4½s, 1992
Cincinnati Union Term. 3⅜s, 1969
Hocking Valley 4½s, 1999
Norfolk & Western 4s, 1996
Union Pacific 4s, 2008

Note—Because of the limited number of suitable issues, the Industrial Aaa group now temporarily consists of four issues, and the Railroad Aaa group of five issues.

Source—The Commercial and Financial Chronicle, August 19, 1939.

2633

Rating Aa

Industrials

Lorillard Co. 5s, 1951
Shell Union Oil 2½s, 1954
Swift & Co. 3¾s, 1950

Public Utilities

American Tel. & Tel. 3¼s, 1961
Atlantic City Electric 3¼s, 1964
Commonwealth Edison 3½s, 1968
Consolidated Edison N. Y. 3½s, 1956
Detroit Edison 3½s, 1966
Louisville Gas & Elec. 3½s, 1966
Ohio Power 3¼s, 1968
Pacific Gas & Elec. 3¾s, 1961
Southern Calif. Edison ref. 3¾s, 1960
Virginia El. & Pr. 3½s, 1968

Railroads

Atch. Topeka & Santa Fe gen. 4s, 1995
Chesapeake & Ohio "D" 3½s, 1996
Chicago Lake Shore & East. 4½s, 1969
Chicago Union Station 3¾s, 1963
Duluth Missabe & Iron Range 3½s, 1962
Monongahela Ry. 4s, 1960
Oregon-Wash. R. R. & Nav. 4s, 1961
Pennsylvania 4½s, 1960
Union Pacific 3½s, 1971
Virginian Ry. 3¾s, 1966

Note—Because of the limited number of suitable issues, the Industrial Aa group now temporarily consists of three issues.

2634 **Rating A**

Industrials

Bethlehem Steel 3¾s, 1966
Crane Co. 3½s, 1951
Fairbanks Morse 4s, 1956
Inland Steel 3¾s, 1961
Koppers Co. 4s, 1951
National Steel 3s, 1965
Tide Water Assoc. Oil 3½s, 1952
Youngstown Sheet & Tube 4s, 1961

Public Utilities

Central Illinois Pub. Serv. 3¾s, 1968
Central Maine Power 3½s, 1966
Gulf States Utilities 3½s, 1969
Indianapolis Power & Light 3¾s, 1968
Lake Superior Dist. Pr. 3½s, 1966
Montana Power 3¾s, 1966
Ohio Edison 3¾s, 1972
Pennsylvania Pr. & Lt. 3½s, 1969
Sioux City Gas & Elec. 4s, 1966
Wisconsin Public Service 4s, 1961

Railroads

Atch. Topeka & S. Fe. R. M. div. 4s, 1965
Chicago & Western Indiana 4s, 1952
Great Northern 4¼s, 1961
Lexington & Eastern 5s, 1965
N. Y. Connecting RR 4½s, 1953
Northern Central Ry. 4½s, 1974
Pennsylvania 4¼s, 1984
Piedmont & Northern 3¾s, 1966
Pgh. Cin. Chic. & St. L. 5s, 1975
Texas & Pacific 1st. 5s, 2000

Note—Because of the limited number of suitable issues, the Industrial A group now temporarily consists of eight issues.

2635

Rating Baa

Industrials

- Anaconda Copper 4½s, 1950
- Armour Co. of Del. 4s, 1955
- Crown Cork & Seal 4s, 1950
- Goodrich (B. F.) 4¼s, 1956
- Jones & Laughlin 4¼s, 1961
- McCroy Stores 5s, 1951
- Republic Steel 4½s, 1961
- Revere Copper & Brass 4¼s, 1956
- Wheeling Steel 4½s, 1966
- Wilson & Co. 4s, 1955

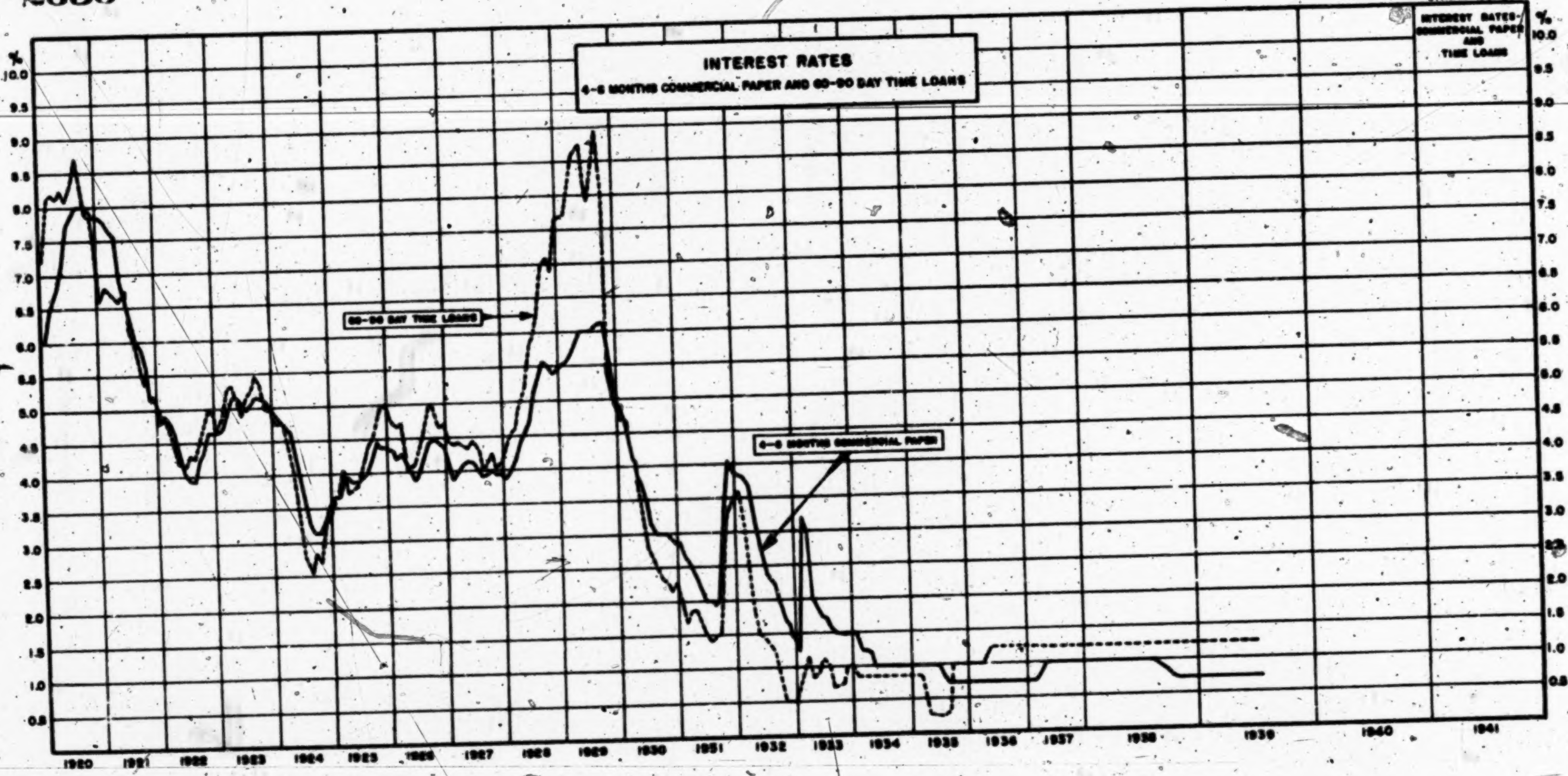
Public Utilities

- Arkansas Pr. & Lt. 5s, 1956
- Carolina Pr. & Lt. 5s, 1956
- Illinois Pr. & Lt. 5s, 1956
- Iowa-Nebraska Lt. & Pr. 5s, 1957
- Minnesota Pr. & Lt. 4½s, 1978
- New Orleans Pub. Serv. 5s, 1955
- Northern Indiana Pub. Serv. 4½s, 1970
- Penn Central Lt. & Pr. 4½s, 1977
- Peoples Gas Light & Coke 4s, 1981
- Wisconsin Pr. & Lt. 4s, 1966

Railroads

- Atlantic Coast Line 4s, 1952
- Chicago Burl. & Quincy 4½s, 1977
- Great Northern 4½s, 1976
- Louisiana & Nashville 3¾s, 2003
- Louisville & Nashville 3¾s, 2003
- Northern Pacific 4s, 1997
- Pennsylvania 4½s, 1970
- Reading "A" 4½s, 1997
- Texas & Pacific 5s, 1980
- Western Maryland 4s, 1952

CHART NO. 2


INTEREST RATES-
COMMERCIAL PAPER
AND
TIME LOANS
INTEREST RATES
4-6 MONTHS COMMERCIAL PAPER AND 60-90 DAY TIME LOANS
60-90 DAY TIME LOANS
4-6 MONTHS COMMERCIAL PAPER
%
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
1939
1940
1941

2637

4-6 MONTHS COMMERCIAL PAPER AND 60-90 DAY TIME LOANS

UNIT: PERCENT

4-6 MONTHS COMMERCIAL PAPER

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	6.00	6.41	6.66	6.81	7.16	7.72	7.84	8.00	8.00	8.00	7.94	7.88	7.37
1921	7.63	7.75	7.63	7.55	6.88	6.63	6.28	6.00	5.90	5.65	5.13	5.13	6.53
1922	4.88	4.88	4.78	4.60	4.25	4.03	3.94	3.91	4.85	4.38	4.63	4.63	4.53
1923	4.63	4.69	5.00	5.13	5.13	4.88	4.94	5.03	5.16	5.13	5.09	4.98	4.98
1924	4.88	4.75	4.50	4.63	4.53	3.91	3.53	3.23	3.13	3.13	3.88	3.96	3.91
1925	3.63	3.65	3.94	3.95	3.88	3.88	3.93	4.00	4.45	4.56	4.38	4.38	4.07
1926	4.31	4.19	4.25	4.19	4.00	3.88	3.97	4.45	4.45	4.50	4.56	4.38	4.34
1927	4.13	3.88	4.00	4.09	4.13	4.13	4.02	3.90	3.91	4.00	3.94	3.93	4.01
1928	3.88	4.00	4.15	4.40	4.95	4.70	5.13	5.39	5.59	5.50	5.38	5.63	4.84
1929	5.50	5.56	5.69	5.90	6.00	6.00	6.00	6.09	6.13	6.13	5.42	5.00	5.78
1930	4.75	4.63	4.19	3.88	3.72	3.50	3.13	3.00	3.00	3.00	2.97	2.88	3.56
1931	2.94	2.64	2.58	2.38	2.18	2.00	2.00	1.94	2.01	3.89	4.05	3.88	2.64
1932	3.88	3.84	3.83	3.70	3.27	2.94	2.53	2.32	2.85	2.07	1.75	1.65	2.96
1933	1.45	1.45	3.21	3.03	2.08	1.98	1.75	1.75	1.53	1.50	1.50	1.50	1.67
1934	1.50	1.50	1.26	1.25	1.19	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.14
1935	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.86	0.75	0.75	0.75	0.75	0.81
1936	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
1937	0.75	0.75	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94
1938	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.78	0.75	0.75	0.93
1939	0.75	0.75	0.75	0.75	0.75	0.75	0.75						

Source of data: Standard Trade and Securities (Published by Standard Statistics Company, Inc.) Volume 3, page A-26, dated January 21, 1938, and Current Statistics Section. The following explanation was furnished with the interest rates - "From 1890 to date the data have been computed by the Standard Statistics Co. from data appearing in the Commercial and Financial Chronicle. Data earlier than March 1924 are for 60-90 day commercial paper. At this time rates for both maturities were practically identical. July 1930, a change was made to extra-choice from choice, double name as the latter became inactive."

SCHEDULE NO. 8
PAGE 1
INTEREST RATES
4-6 MONTHS
COMMERCIAL
PAPER

2638

INTEREST RATES

4-6 MONTHS COMMERCIAL PAPER AND 60-90 DAY TIME LOANS

UNIT: PERCENT

60-90 DAY TIME LOANS

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	7.25	8.13	8.19	8.10	8.25	8.06	8.28	8.72	8.41	7.89	7.85	7.30	8.04
1921	6.60	6.81	6.75	6.68	6.60	6.75	6.20	6.00	5.65	5.38	5.19	5.13	6.14
1922	4.75	4.85	4.74	4.41	4.19	4.13	4.30	4.22	4.44	4.71	4.96	4.93	4.55
1923	4.66	4.85	5.23	5.31	5.11	4.88	5.13	5.25	5.44	5.31	4.99	4.94	5.09
1924	4.75	4.72	4.67	4.31	3.94	3.26	2.75	2.92	2.81	2.66	3.21	3.34	3.58
1925	3.64	3.66	4.05	3.85	3.63	3.80	3.94	4.38	4.45	4.78	4.93	4.99	4.18
1926	4.77	4.63	4.70	4.19	4.05	4.13	4.38	4.67	4.93	4.95	4.64	4.69	4.56
1927	4.47	4.38	4.40	4.36	4.31	4.44	4.34	3.98	4.11	4.25	4.05	4.15	4.27
1928	4.94	4.51	4.61	4.93	5.19	5.73	5.94	6.30	6.97	7.09	6.88	7.63	5.94
1929	7.65	7.69	8.00	8.60	8.70	8.15	7.90	8.88	8.94	7.88	5.44	4.83	7.72
1930	4.70	4.66	4.16	4.05	3.41	2.88	2.66	2.90	2.44	2.38	2.16	2.28	3.19
1931	2.07	1.68	1.84	1.88	1.66	1.50	1.40	1.43	1.90	2.88	3.38	3.33	2.05
1932	3.62	3.63	3.13	2.45	1.63	1.49	1.43	1.38	1.27	0.90	0.51	0.90	1.83
1933	0.90	0.76	2.91	1.18	0.84	0.90	1.11	1.05	0.62	0.63	0.77	1.01	1.05
1934	1.00	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
1935	0.88	0.88	0.68	0.61	0.27	0.25	0.25	0.25	0.31	1.00	1.00	1.00	0.57
1936	1.00	1.00	1.00	1.00	1.17	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.16
1937	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
1938	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
1939	1.25	1.25	1.25	1.25	1.25	1.25	1.25						

Source of data: Standard Trade and Securities (Published by Standard Statistics Company, Inc.) Volume 3, page A-25, dated January 21, 1938, and Current Statistics Section. The following note was furnished with the interest rates - "The above interest rates are averages by The Standard Statistics Co. from rates quoted weekly in The Commercial and Financial Chronicle."

3601

SCHEDULE NO.8
PAGE 2
INTEREST RATES-
60-90 DAY TIME
LOANS

5

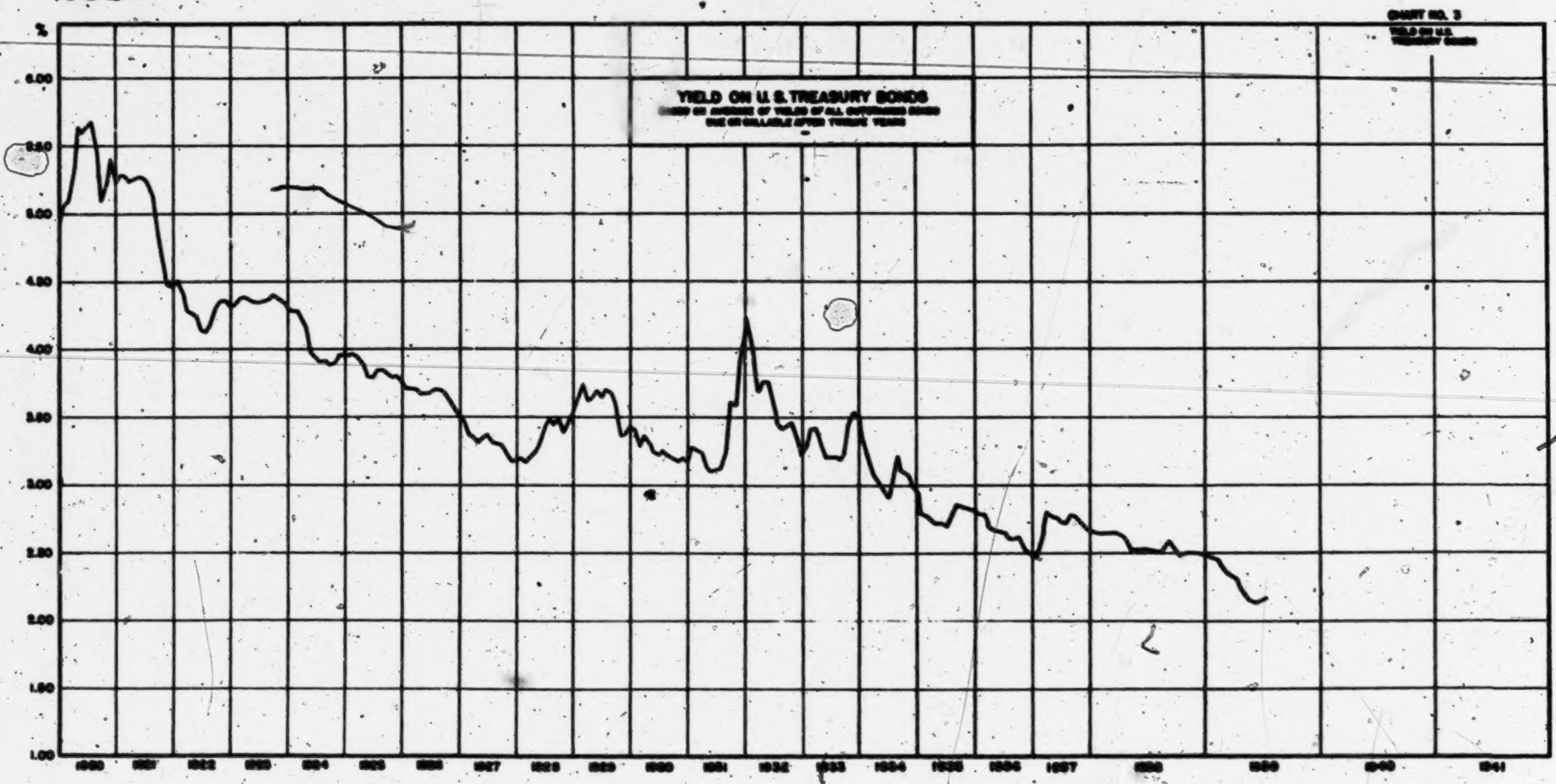


CHART NO. 3
YIELD ON U.S. TREASURY BONDS

YIELD ON U.S. TREASURY BONDS
BASED ON AVERAGE OF YIELDS OF ALL OUTSTANDING BONDS
DUE OR CALLABLE AFTER TWELVE YEARS

YIELD ON UNITED STATES TREASURY BONDS

BASED ON AVERAGE OF YIELDS OF ALL OUTSTANDING BONDS DUE OR CALLABLE AFTER TWELVE YEARS

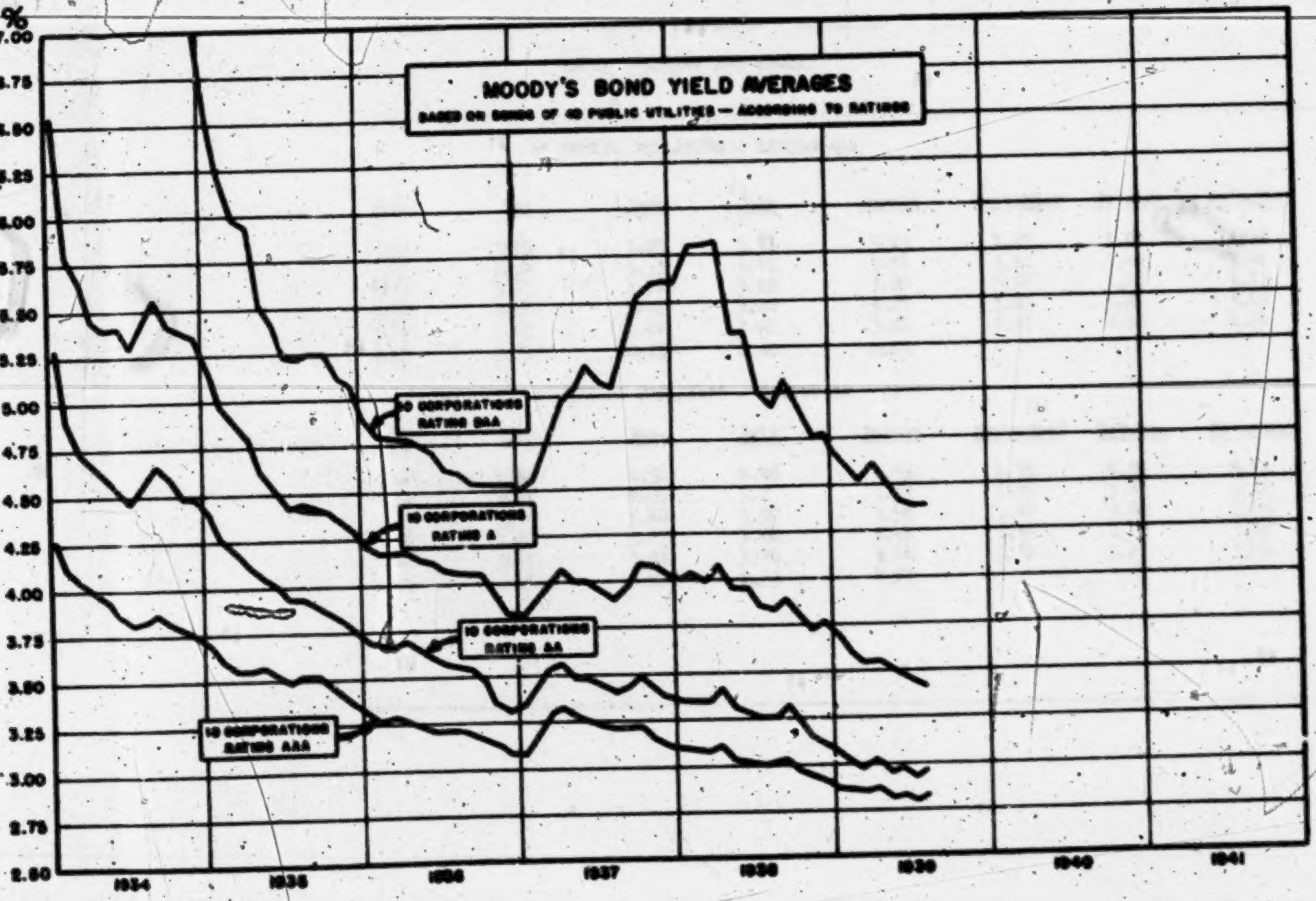
UNIT: PERCENT PER ANNUM

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	4.93	5.05	5.09	5.28	5.58	5.53	5.57	5.67	5.44	5.08	5.21	5.40	5.32
1921	5.23	5.28	5.27	5.24	5.27	5.27	5.26	5.22	5.12	4.83	4.64	4.47	5.09
1922	4.45	4.50	4.42	4.28	4.26	4.24	4.14	4.12	4.19	4.30	4.36	4.35	4.30
1923	4.32	4.33	4.38	4.39	4.37	4.34	4.34	4.35	4.36	4.40	4.37	4.35	4.36
1924	4.30	4.28	4.28	4.23	4.15	3.98	3.94	3.91	3.92	3.87	3.90	3.96	4.06
1925	3.96	3.95	3.96	3.93	3.87	3.79	3.79	3.85	3.85	3.82	3.79	3.80	3.86
1926	3.77	3.71	3.71	3.70	3.67	3.67	3.68	3.70	3.70	3.68	3.62	3.56	3.68
1927	3.51	3.48	3.37	3.35	3.51	3.54	3.36	3.32	3.30	3.29	3.23	3.17	3.34
1928	3.18	3.19	3.17	3.20	3.24	3.29	3.42	3.49	3.46	3.48	3.39	3.46	3.33
1929	3.52	3.62	3.74	3.63	3.64	3.69	3.64	3.70	3.68	3.60	3.36	3.37	3.60
1930	3.43	3.41	3.29	3.37	3.31	3.25	3.25	3.26	3.24	3.21	3.19	3.22	3.29
1931	3.20	3.30	3.27	3.26	3.16	3.13	3.15	3.18	3.25	3.63	3.63	3.93	3.34
1932	4.26	4.11	3.92	3.68	3.76	3.76	3.58	3.45	3.42	3.43	3.45	3.35	3.68
1933	3.22	3.31	3.42	3.42	3.30	3.21	3.20	3.21	3.19	3.22	3.46	3.53	3.31
1934	3.50	3.32	3.20	3.11	3.02	2.98	2.92	3.03	3.20	3.10	3.07	3.01	3.12
1935	2.88	2.79	2.77	2.74	2.72	2.72	2.69	2.76	2.89	2.85	2.83	2.83	2.79
1936	2.80	2.77	2.71	2.68	2.66	2.66	2.65	2.61	2.60	2.62	2.53	2.51	2.65
1937	2.47	2.46	2.60	2.80	2.76	2.76	2.72	2.72	2.77	2.76	2.71	2.67	2.68
1938	2.65	2.64	2.64	2.62	2.51	2.52	2.52	2.51	2.58	2.48	2.90	2.49	2.56
1939	2.47	2.44	2.34	2.30	2.17	2.13	2.16						

Source of data: The computations were made by the U.S. Treasury Department and represent monthly data which are averages of daily figures. Beginning January 1926, average yields are based on all outstanding Treasury bonds not due or callable for 12 years or more. Earlier figures are for Treasury bonds not due or callable for 8 years or more, together with certain Liberty Loan issues. The yields are published in the Survey of Current Business from which the above figures were taken.

SCHEDULE NO. 3
YIELD ON U.S. TREASURY BONDS

CHART NO. 4
MOODY'S BOND YIELD AVERAGES PUBLIC UTILITIES BY RATINGS



MOODY'S BOND YIELD AVERAGES

BASED ON BONDS OF 40 PUBLIC UTILITIES - ACCORDING TO RATINGS

UNIT: PERCENT PER ANNUM

10 PUBLIC UTILITIES - RATING AAA

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1934	4.25	4.10	4.03	3.97	3.93	3.85	3.81	3.83	3.87	3.82	3.78	3.74	3.92
1935	3.69	3.61	3.55	3.55	3.56	3.53	3.47	3.51	3.51	3.46	3.41	3.36	3.52
1936	3.30	3.26	3.28	3.26	3.23	3.21	3.19	3.20	3.18	3.16	3.13	3.07	3.21
1937	3.07	3.16	3.29	3.33	3.28	3.25	3.22	3.20	3.21	3.21	3.15	3.11	3.21
1938	3.10	3.09	3.08	3.10	3.03	3.02	3.01	3.01	3.02	2.96	2.94	2.92	3.03
1939	2.87	2.87	2.86	2.87	2.83	2.83	2.80	2.83					

10 PUBLIC UTILITIES - RATING AA

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1934	5.29	4.88	4.73	4.66	4.60	4.52	4.46	4.55	4.65	4.59	4.49	4.44	4.66
1935	4.40	4.26	4.19	4.11	4.05	4.00	3.93	3.93	3.90	3.85	3.81	3.76	4.02
1936	3.70	3.68	3.67	3.69	3.65	3.60	3.57	3.55	3.54	3.48	3.35	3.31	3.57
1937	3.33	3.43	3.53	3.56	3.48	3.47	3.48	3.41	3.63	3.46	3.42	3.37	3.45
1938	3.35	3.35	3.34	3.42	3.31	3.28	3.26	3.26	3.31	3.23	3.14	3.10	3.28
1939	3.05	3.01	2.99	3.01	2.96	2.97	2.93	2.97					

SCHEDULE NO. 4
PAGE 1
MOODY'S BOND
YIELD AVERAGES
PUBLIC UTILITIES
BY RATINGS

MOODY'S BOND YIELD AVERAGES

BASED ON BONDS OF 40 PUBLIC UTILITIES, ACCORDING TO RATINGS

UNIT: PERCENT PER ANNUM

10 PUBLIC UTILITIES - RATING A

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1934	6.56	5.78	5.66	5.44	5.39	5.40	5.29	5.43	5.56	5.40	5.38	5.36	5.55
1935	5.18	4.96	4.88	4.79	4.61	4.53	4.42	4.44	4.43	4.40	4.35	4.29	4.61
1936	4.21	4.17	4.17	4.17	4.14	4.12	4.07	4.06	4.03	4.04	3.95	3.83	4.08
1937	3.82	3.89	4.00	4.07	4.00	3.99	3.94	3.89	3.96	4.09	4.08	4.03	3.98
1938	4.01	4.03	3.99	4.08	3.95	3.85	3.86	3.84	3.88	3.79	3.73	3.76	3.90
1939	3.68	3.59	3.54	3.55	3.50	3.47	3.43	3.41					

10 PUBLIC UTILITIES - RATING BAA

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1934	8.86	7.98	7.58	7.18	7.17	7.80	7.36	7.66	7.62	7.38	7.21	7.03	7.49
1935	6.60	6.20	5.99	5.94	5.51	5.41	5.22	5.22	5.25	5.24	5.12	5.07	5.56
1936	4.88	4.80	4.78	4.77	4.76	4.72	4.62	4.59	4.56	4.53	4.53	4.53	4.67
1937	4.50	4.55	4.76	4.98	5.02	5.17	5.06	5.04	5.25	5.53	5.99	5.60	5.09
1938	5.59	5.79	5.80	5.82	5.32	5.33	5.01	4.93	5.05	4.90	4.77	4.77	5.28
1939	4.66	4.59	4.53	4.62	4.50	4.41	4.39	4.39					

Source of data: Moody's Bond Yield Averages for Public Utilities are computed by Moody's Investors Service and are issued in their publications. The above figures were taken from Moody's Bond Survey, October 5, 1936 supplement, for the period from January 1934 to September 1936, inclusive, and were taken from later supplements to Moody's Bond Survey for subsequent months.

SCHEDULE NO. 4
PAGE 2
MOODY'S BOND
YIELD AVERAGES-
PUBLIC UTILITIES
BY RATINGS

Public Utilities

Aaa

Brooklyn Edison 3¼s, 1966
Cincinnati Gas & Elec. 3¼s, 1966 (holding Co.)
Cons. Gas. E. L. & P., Balto. 3s, 1969
Duquesne Light 3½s, 1965
Illinois Bell Tel. 3½s, 1970
New York Edison 3¼s, 1965
Pacific Tel. & Tel. "B" 3½s, 1966
Philadelphia Electric 3½s, 1967
Southwestern Bell 3s, 1968
West Penn Power 3½s, 1966

Aa

American Tel. & Tel. 3¼s, 1961
Atlantic City Elec. 3¼s, 1964
Commonwealth Edison 3½s, 1968
Consolidated Edison N. Y. 3½s, 1956
Detroit Edison 3½s, 1966
Louisville Gas & Elec. 3½s, 1966
Ohio Power 3¼s, 1968
Pacific Gas & Elec. 3¾s, 1961
Southern Calif. Edison ref. 3¾s, 1960
Virginia El. & Pr. 3½s, 1968

A

Central Illinois Pub. Serv. 3¾s, 1968
Central Maine Power 3½s, 1966
Gulf States Utilities 3½s, 1969
Indianapolis P. & L. 3¾s, 1968
Lake Superior Dist. Pr. 3½s, 1966
Montana Power 3¾s, 1966
Ohio Edison 3¾s, 1972
Pennsylvania Pr. & Lt. 3¾s, 1969
Sioux City Gas & Elec. 4s, 1966
Wisconsin Pub. Serv. 4s, 1961

Baa

Arkansas Pr. & Lt. 5s, 1956
Carolina Pr. & Lt. 5s, 1956
Illinois Pr. & Lt. 5s, 1956
Iowa-Nebraska Lt. & Pr. 5s, 1957
Minnesota Pr. & Lt. 4½s, 1978
New Orleans Pub. Serv. 5s, 1955
Northern Indiana Pub. Serv. 4½s, 1970
Penn. Central Lt. & Pr. 4½s, 1977
Peoples Gas Light & Coke 4s, 1981
Wisconsin Pr. & Lt. 4s, 1966

2645

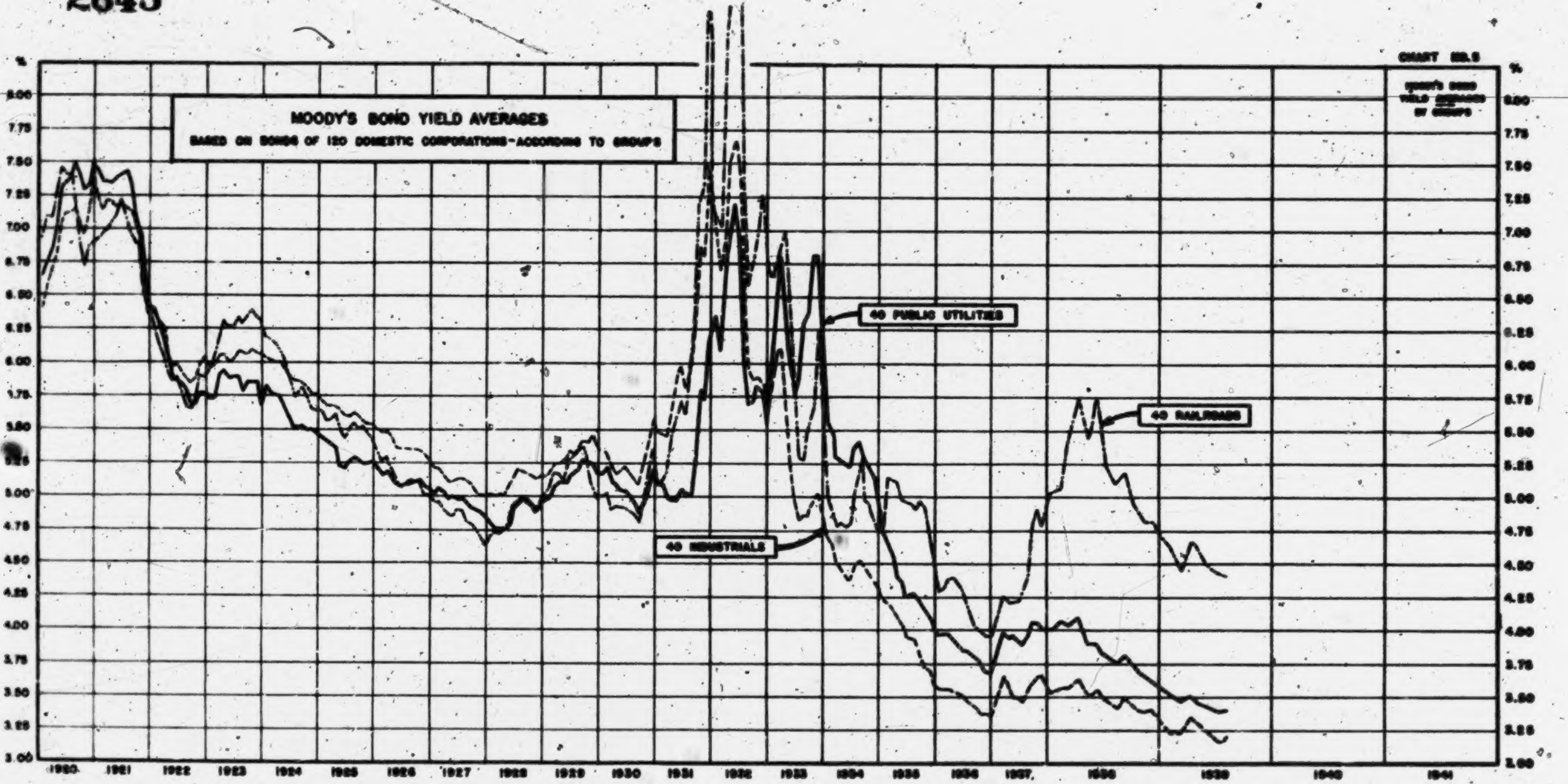


CHART 22.5
MOODY'S BOND YIELD AVERAGES BY GROUPS
MOODY'S BOND YIELD AVERAGES
BASED ON BONDS OF 120 DOMESTIC CORPORATIONS-ACCORDING TO GROUPS
40 PUBLIC UTILITIES
40 RAILROADS
40 INDUSTRIALS
%
8.00
7.75
7.50
7.25
7.00
6.75
6.50
6.25
6.00
5.75
5.50
5.25
5.00
4.75
4.50
4.25
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BASED ON BONDS OF 120 DOMESTIC CORPORATIONS—ACCORDING TO GROUPS

UNIT: PERCENT PER ANNUM

40 INDUSTRIALS

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	6.39	6.57	6.66	6.78	7.01	7.11	7.12	7.15	7.05	6.97	7.11	7.39	6.94
1921	7.27	7.14	7.22	7.21	7.16	7.19	7.17	7.13	7.06	6.93	6.61	6.36	7.04
1922	6.37	6.31	6.25	6.08	5.96	5.99	5.91	5.88	5.79	5.88	5.98	6.05	6.04
1923	5.95	5.97	6.04	6.05	5.99	6.01	6.07	6.07	6.05	6.10	6.07	6.06	6.04
1924	6.03	6.01	6.00	6.00	5.94	5.89	5.86	5.85	5.84	5.81	5.76	5.75	5.90
1925	5.72	5.66	5.68	5.66	5.64	5.59	5.58	5.61	5.59	5.54	5.54	5.53	5.61
1926	5.49	5.46	5.48	5.43	5.35	5.34	5.35	5.34	5.34	5.33	5.32	5.26	5.37
1927	5.21	5.20	5.15	5.10	5.10	5.11	5.12	5.10	5.07	5.02	5.01	5.00	5.10
1928	5.01	5.00	5.01	5.00	5.07	5.14	5.19	5.18	5.16	5.14	5.13	5.15	5.10
1929	5.14	5.18	5.24	5.24	5.27	5.34	5.32	5.34	5.41	5.40	5.45	5.35	5.31
1930	5.34	5.32	5.23	5.16	5.17	5.21	5.17	5.12	5.08	5.24	5.37	5.58	5.25
1931	5.41	5.40	5.44	5.65	5.89	5.97	5.79	5.93	6.33	6.86	6.79	[illegible]	6.08
1932	7.20	7.02	6.71	7.02	7.55	7.68	7.40	6.37	5.96	5.89	5.90	[illegible]	6.71
1933	5.66	5.83	6.10	6.10	5.60	5.21	4.95	4.84	4.87	4.87	4.99	5.03	5.34
1934	4.87	4.73	4.65	4.53	4.47	4.41	4.39	4.47	4.52	4.47	4.40	4.37	4.52
1935	4.31	4.26	4.20	4.18	4.11	4.07	3.95	3.94	3.91	3.83	3.73	3.71	4.02
1936	3.59	3.57	3.56	3.57	3.55	3.54	3.52	3.48	3.44	3.42	3.37	3.37	3.50
1937	3.36	3.46	3.58	3.65	3.55	3.51	3.50	3.47	3.55	3.63	3.65	3.66	3.55
1938	3.54	3.57	3.58	3.64	3.51	3.55	3.48	3.43	3.50	3.43	3.39	3.40	3.50
1939	3.31	3.29	3.29	3.35	3.30	3.23	3.17	3.21					

SCHEDULE NO. 5
PAGE 1
MOODY'S BOND
YIELD AVERAGES
INDUSTRIALS

BASED ON BONDS OF 120 DOMESTIC CORPORATIONS-ACCORDING TO GROUPS

UNIT: PER CENT PER ANNUM

40 PUBLIC UTILITIES

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	6.63	6.76	6.83	7.03	7.30	7.35	7.37	7.48	7.40	7.38	7.31	7.49	7.19
1921	7.43	7.35	7.35	7.34	7.38	7.41	7.42	7.34	7.08	6.85	6.98	6.37	7.27
1922	6.40	6.31	6.20	6.05	5.87	5.87	5.83	5.78	5.68	5.67	5.77	5.76	5.93
1923	5.72	5.73	5.90	5.93	5.88	5.89	5.89	5.77	5.85	5.85	5.85	5.86	5.83
1924	5.82	5.77	5.76	5.74	5.67	5.59	5.52	5.51	5.58	[illegible]	[illegible]	[illegible]	[illegible]
1925	5.44	5.41	5.39	5.35	5.22	5.20	5.25	5.28	5.26	[illegible]	[illegible]	[illegible]	[illegible]
1926	5.20	5.15	5.17	5.12	5.08	5.06	5.08	5.09	5.10	5.11	5.07	[illegible]	[illegible]
1927	5.02	5.05	5.05	4.98	4.99	4.98	4.98	4.94	4.98	4.95	[illegible]	[illegible]	[illegible]
1928	4.79	4.77	4.75	4.75	4.79	4.90	4.93	4.97	4.96	4.93	4.90	4.95	[illegible]
1929	4.96	5.00	5.07	5.09	5.09	5.15	5.16	5.22	5.27	[illegible]	[illegible]	5.17	[illegible]
1930	5.17	5.20	5.10	5.08	5.04	5.03	5.00	4.94	4.97	4.93	[illegible]	5.21	[illegible]
1931	5.09	5.09	4.99	4.97	4.97	5.04	5.00	5.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1932	6.20	6.36	6.10	6.66	6.98	7.21	6.97	6.93	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1933	5.56	5.90	6.41	6.82	6.34	5.99	5.78	5.90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1934	6.24	5.98	5.50	5.31	5.27	5.04	5.23	5.37	5.53	[illegible]	[illegible]	5.15	[illegible]
1935	4.97	4.76	4.65	4.60	4.43	4.37	4.26	4.28	4.27	[illegible]	4.17	4.12	[illegible]
1936	4.02	3.96	3.98	3.97	3.95	3.91	3.86	3.85	3.83	3.80	[illegible]	3.69	[illegible]
1937	3.68	3.76	3.90	3.99	3.95	3.97	3.92	3.89	3.96	4.08	4.16	4.05	3.93
1938	4.01	4.07	4.05	4.11	3.90	3.90	3.79	3.76	3.82	3.73	3.65	3.63	3.67
1939	3.57	3.52	3.48	3.51	3.45	3.42	3.39	3.40					

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SCHEDULE NO. 5
PAGE 2
MOODY'S BOND
YIELD AVERAGES
PUBLIC UTILITIES

SCHEDULE NO. 9 .6
PAGE 3
MOODY'S BOND YIELD AVERAGES
RAILROADS

MOODY'S BOND YIELD AVERAGES
BASED ON BONDS OF 120 DOMESTIC CORPORATIONS—ACCORDING TO GROUPS

UNIT: PERCENT PER ANNUM

40 RAILROADS

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	6.93	7.09	7.08	7.26	7.46	7.40	7.39	7.23	6.91	6.72	6.86	7.15	7.12
1921	6.91	6.97	6.99	7.06	7.08	7.22	7.10	6.97	6.90	6.88	6.52	6.37	6.91
1922	6.28	6.11	6.07	5.91	5.85	5.88	5.77	5.66	5.65	5.72	5.89	5.88	5.89
1923	5.94	6.00	6.16	6.30	6.26	6.27	6.33	6.28	6.33	6.39	6.34	6.31	6.24
1924	6.18	6.17	6.14	6.09	6.02	5.88	5.73	5.78	5.81	5.72	5.65	5.63	5.90
1925	5.63	5.56	5.57	5.60	5.48	5.41	5.48	5.54	5.50	5.52	5.46	5.42	5.51
1926	5.33	5.26	5.28	5.18	5.09	5.06	5.08	5.11	5.10	5.10	5.02	5.00	5.13
1927	4.96	4.95	4.90	4.86	4.85	4.90	4.89	4.80	4.79	4.75	4.68	4.66	4.83
1928	4.70	4.73	4.72	4.74	4.78	4.91	4.94	4.98	4.94	4.93	4.87	4.95	4.85
1929	5.00	5.06	5.17	5.16	5.12	5.26	5.28	5.34	5.36	5.30	5.11	4.99	5.18
1930	5.00	5.02	4.89	4.92	4.94	4.91	4.89	4.86	4.80	4.91	5.10	5.34	4.96
1931	5.09	5.11	5.17	5.45	5.60	5.70	5.62	6.01	6.43	7.20	7.28	8.46	6.09
1932	7.20	7.10	7.04	8.24	9.30	9.14	8.70	6.96	6.98	6.75	7.00	7.27	7.61
1933	6.71	6.65	6.67	7.00	6.11	5.68	5.31	5.28	5.54	5.67	6.25	5.95	6.09
1934	5.45	4.99	4.91	4.78	4.81	4.78	4.80	5.05	5.15	4.99	4.98	4.86	4.96
1935	4.75	4.81	5.14	5.14	5.12	4.99	4.97	4.95	4.91	4.97	4.90	4.73	4.95
1936	4.50	4.31	4.32	4.38	4.40	4.35	4.31	4.22	4.09	4.02	4.00	3.98	4.24
1937	3.95	4.03	4.15	4.26	4.22	4.22	4.21	4.28	4.43	4.66	4.91	4.79	4.34
1938	5.02	5.06	5.44	5.75	5.44	5.75	5.85	5.09	5.18	4.94	4.83	4.82	5.21
1939	4.70	4.63	4.46	4.66	4.60	4.47	4.42	4.41					

Source of data: Moody's Bond Yield Averages are computed by Moody's Investors Service and are issued in their publications. The Bond Yield Averages are reproduced in Survey of Current Business, November 1937, 1938 Supplement, and March 1939. The above figures were taken from the last named source for the period from January 1920 to January 1939; and were taken direct from Moody's Bond Survey for the subsequent months.

2649 **Industrials**

Aaa

Liggett & Myers 5s, 1951
Socony-Vacuum 3s, 1964
Standard Oil N. J. 3s, 1961
Texas Corp. 3s, 1959

Aa

Lorillard Co. 5s, 1951
Shell Union Oil 2½s, 1954
Swift & Co. 3¾s, 1950

A

Bethlehem Steel 3¾s, 1966
Crane Co. 3½s, 1951
Fairbanks Morse 4s, 1956
Inland Steel 3¾s, 1961
Koppers Co. 4s, 1951
National Steel 3s, 1965
Tide Water Assoc. Oil 3½s, 1952
Youngstown Sheet and Tube 4s, 1961

Baa

Anaconda Copper 4½s, 1950
Armour Co. of Del. 4s, 1955
Crown Cork & Seal 4s, 1950
Goodrich (B. F.) 4¼s, 1956
Jones & Laughlin 4¼s, 1961
McCroy Stores 5s, 1951
Republic Steel 4½s, 1961
Revere Copper & Brass 4¼s, 1956
Wheeling Steel 4½s, 1966
Wilson Steel 4s, 1955

Note—Because of the limited number of suitable issues, the Industrial Aaa group now temporarily consist of four issues, the Industrial Aa group of three issues, and the Industrial A group of eight issues.

Source—The Commercial and Financial Chronicle, August 19, 1939.

2650 **Public Utilities**

Aaa

Brooklyn Edison 3¼s, 1966
Cincinnati Gas & Elec. 3¼s, 1966

Cons. Gas E. L. & P., Balto. 3s, 1969
Duquesne Light 3½s, 1965
Illinois Bell Tel. 3½s, 1970
New York Edison 3¼s, 1965
Pacific Tel. & Tel. "B" 3½s, 1966
Philadelphia Electric 3½s, 1967
Southwestern Bell 3s, 1968
West Penn Power 3½s, 1966

Aa

American Tel. & Tel. 3¼s, 1961
Atlantic City Elec. 3¼s, 1964
Commonwealth Edison N. Y. 3½s, 1968
Consolidated Edison N. Y. 3½s, 1956
Detroit Edison 3½s, 1966.
Louisville Gas & Elec. 3½s, 1966
Ohio Power 3¼s, 1968
Pacific Gas & Elec. 3¾s, 1961
Southern Calif. Edison ref. 3¾s, 1960
Virginia El. & Pr. 3½s, 1968

A

Central Illinois Pub. Serv. 3¾s, 1968
Central Maine Power 3½s, 1966
Gulf States Utilities 3½s, 1969
Indianapolis P. & L. 3¾s, 1968
Lake Superior Dist. Pr. 3½s, 1966
Montana Power 3¾s, 1966
Ohio Edison 3¾s, 1972
Pennsylvania Pr. & Lt. 3½s, 1969
Sioux City Gas & Elec. 4s, 1966
Wisconsin Pub. Serv. 4s, 1961

Baa

Arkansas Pr. & Lt. 5s, 1956
Carolina Pr. & Lt. 5s, 1956
Illinois Pr. & Lt. 5s, 1956
Iowa-Nebraska Lt. & Pr. 5s, 1957
Minnesota Pr. & Lt. 4½s, 1978
New Orleans Pub. Serv. 5s, 1955
Northern Indiana Pub. Serv. 4½s, 1970
Penn. Central Lt. & Pr. 4½s, 1977
Peoples Gas Light & Coke 4s, 1981
Wisconsin Pr. & Lt. 4s, 1966

Railroads

Aaa

Chesapeake & Ohio 4½s, 1992
Cincinnati Union Term. 3⅜s, 1969
Hocking Valley 4½s, 1999
Norfolk & Western 4s, 1996
Union Pacific 4s, 2008

Aa

Atch. Topeka & S. Fe gen. 4s, 1995
Chesapeake & Ohio "D" 3½s, 1996
Chicago Lake Shore & East. 4½s, 1969
Chicago Union Station 3¾s, 1963
Duluth Missabe & I. R. 3½s, 1962
Monongahela Ry. 4s, 1960
Ore-Wash. R. R. & Nav. 4s, 1961
Pennsylvania 4½s, 1960
Union Pacific 3½s, 1971
Virginian Ry. 3¾s, 1966

A

Atch. Topeka & S. Fe. R. M. div. 4s, 1965
Chicago & Western Indiana 4s, 1952
Great Northern 4¼s, 1961
Lexington & Eastern 5s, 1965
N. Y. Connecting RR 4½s, 1953
Northern Central Ry. 4½s, 1974
Pennsylvania 4¼s, 1984
Piedmont & Northern 3¾s, 1966
Pgh. Cin. Chic. & St. L. 5s, 1975
Texas & Pacific 1st 5s, 2000

Baa

Atlantic Coast Line 4s, 1952
Chicago Burl. & Quincy 4½s, 1977
Great Northern 4½s, 1976
Louisiana & Nashville 3⅞s, 2003
Louisville & Nashville 3¾s, 2003
Northern Pacific 4s, 1997
Pennsylvania 4½s, 1970
Reading "A" 4½s, 1997
Texas & Pacific 5s, 1980
Western Maryland 4s, 1952

Note—Because of the limited number of suitable issues, the Railroad Aaa group now temporarily consists of five issues.

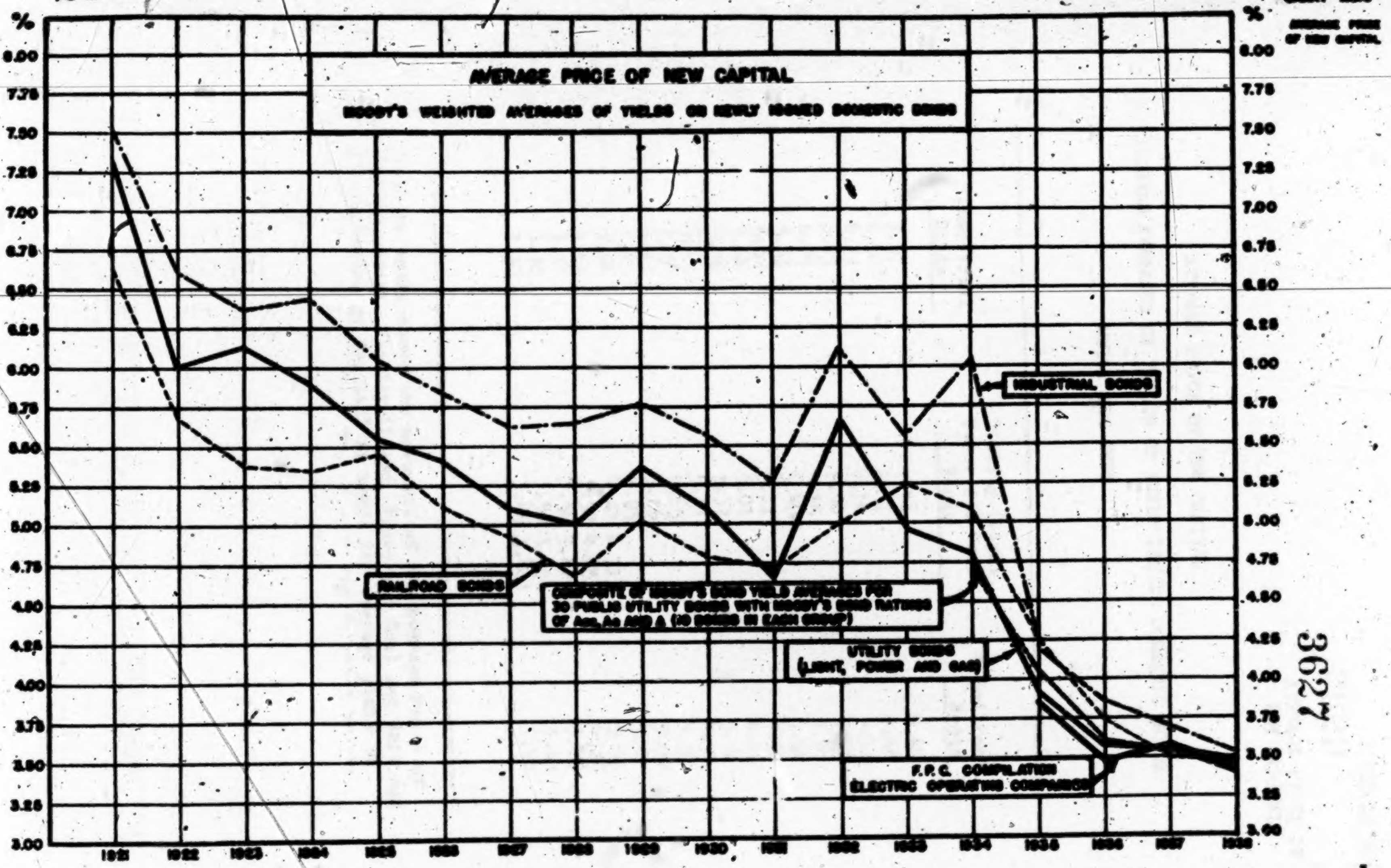
CHART NO.6
AVERAGE PRICE OF NEW CAPITAL
AVERAGE PRICE OF NEW CAPITAL
MOODY'S WEIGHTED AVERAGES OF YIELDS ON NEWLY ISSUED DOMESTIC BONDS
%
8.00
7.75
7.50
7.25
7.00
6.75
6.50
6.25
6.00
5.75
5.50
5.25
5.00
4.75
4.50
4.25
4.00
3.75
3.50
3.25
3.00
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
INDUSTRIAL BONDS
RAILROAD BONDS
COMPOSITE OF MOODY'S BOND YIELD AVERAGES FOR 30 PUBLIC UTILITY BONDS WITH MOODY'S BOND RATINGS OF Aaa, Aa AND A (10 BONDS IN EACH GROUP)
UTILITY BONDS (LIGHT, POWER AND GAS)
F.P.C. COMPILATION ELECTRIC OPERATING COMPANIES

SCHEDULE NO. 6

AVERAGE PRICE OF
NEW CAPITAL

AVERAGE PRICE OF NEW CAPITAL

MOODY'S WEIGHTED AVERAGES OF YIELDS ON NEWLY ISSUED DOMESTIC BONDS

UNIT: PER CENT

Year	Industrial Bonds	Utility (Light, Power and Gas) Bonds	Railroad Bonds
1921	7.57	7.34	6.64
1922	6.62	6.02	5.68
1923	6.37	6.14	5.38
1924	6.43	5.90	5.34
1925	6.05	5.55	5.45
1926	5.83	5.40	5.12
1927	5.62	5.11	4.94
1928	5.64	5.01	4.68
1929	5.76	5.37	5.02
1930	5.57	5.11	4.79
1931	5.26	4.65	4.73
1932	6.12	5.66	5.00
1933	5.56	4.95	5.24
1934	6.04	4.81 4.71)	5.09
1935	4.19	3.92 4.05)	4.25
1936	3.87	3.56 3.62) *	3.76
1937	3.70	3.56 3.55)	3.49
1938	3.52	3.49 3.40)	3.47

Note: The above table shows the movement of the Average Price of Capital for Industrial, Utility (Light, Power and Gas) and Railroad Bonds. By the "Price of Capital" is meant the average yield to maturity on newly issued bonds. The figures are weighted by the amounts of all new issues floated in any year.

Source of above: Moody's Industrials, 1939, pages a35 and a36; and Moody's Public Utilities, 1939, pages a7 and a8.

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* Represents composite of Moody's bond yield averages for 30 public utility bonds of three rating groups, Aaa, Aa and A, each group consisting of 10 bonds (see Schedule No. 4), as follows:

Year	Aaa	Aa	A	Average
1934	3.92	4.66	5.55	4.71
1935	3.52	4.02	4.61	4.05
1936	3.21	3.57	4.08	3.62
1937	3.21	3.45	3.98	3.55
1938	3.03	3.28	3.90	3.40

YIELD TO PURCHASERS - ELECTRIC UTILITY BONDS SOLD IN 1935, 1936, 1937, AND 1938

SUMMARY, ACCORDING TO YEARS

1935

Rating	Number of Issues	Total Principal Amount	Average Yield %
Aaa	12	$ 264,531,000	3.46
Aa	21	505,232,900	3.78
A	10	165,563,500	4.2[illegible]
Baa	4	11,500,000	5.28
Ba	1	7,500,000	6.00
No Rating Assigned	6	67,130,000	3.63
Total	54	$ 1,021,457,400	3.81

1936

Rating	Number of Issues	Total Principal Amount	Average Yield %
Aaa	11	$ 273,178,500	3.16
Aa	22	514,946,500	3.39
A	20	281,509,400	3.73
Baa	5	59,250,000	4.03
Ba	3	4,792,800	4.74
B	1	2,300,000	4.90
No Rating Assigned	15	157,666,500	3.56
Total	77	$ 1,293,645,700	3.48

1937

Rating	Number of Issues	Total Principal Amount	Average Yield %
Aaa	4	$ 147,000,000	3.37
Aa	10	252,029,000	3.52
A	7	121,264,000	3.72
Baa	6	13,251,000	4.64
No Rating Assigned	15	36,078,000	3.76
Total	42	$ 569,622,000	3.63

1938

Rating	Number of Issues	Total Principal Amount	Average Yield %
Aaa	3	$ 27,000,000	3.00
Aa	17	503,075,000	3.31
A	13	273,000,740	3.74
Baa	3	16,800,000	4.24
No Rating Assigned	18	94,912,000	3.15
Total	54	$ 914,787,740	3.43
Total - 1935, 1936, 1937, and 1938	227	$ 3,799,512,840	3.58

Note: The above Summary of Average Yield was prepared from all known bond issues of Electric Operating Utilities, sold in 1935, 1936, 1937, and 1938.

SCHEDULE [illegible]
PAGE 1
BOND YIELDS ACCORDING TO YEARS

YIELD TO PURCHASERS - ELECTRIC UTILITY BONDS SOLD IN 1935, 1936, 1937, AND 1938

SUMMARY, ACCORDING TO RATINGS

Aaa Rating

Year	Number of Issues	Total Principal Amount	Average Yield %
1935	12	$ 264,531,000	3.48
1936	11	273,178,500	3.18
1937	4	147,000,000	3.37
1938	3	27,000,000	3.00
Total	30	$ 711,709,500	3.32

A Rating

Year	Number of Issues	Total Principal Amount	Average Yield %
1935	10	$ 165,563,500	4.28
1936	20	281,509,400	3.73
1937	7	121,264,000	3.72
1938	13	273,000,740	3.74
Total	50	$ 841,337,640	3.84

Aa Rating

Year	Number of Issues	Total Principal Amount	Average Yield %
1935	21	$ 505,232,900	3.78
1936	22	514,948,500	3.39
1937	10	252,029,000	3.52
1938	17	503,075,000	3.31
Total	70	$ 1,775,285,400	3.50

Baa Rating

Year	Number of Issues	Total Principal Amount	Average Yield %
1935	4	$ 11,500,000	5.28
1936	5	59,250,000	4.03
1937	6	13,251,000	4.64
1938	3	16,800,000	4.24
Total	18	$ 100,801,000	4.29

SCHEDULE NO. 7
PAGE 2
BOND YIELDS—
ACCORDING TO
RATINGS

2856

YIELD TO PURCHASERS - ELECTRIC UTILITY BONDS SOLD IN 1935, 1936, 1937, AND 1938

SUMMARY, ACCORDING TO RATINGS

Ba Rating

Year	Number of Issues	Total Principal Amount	Average Yield %
1935	1	$ 7,500,000	6.00
1936	3	4,792,800	4.74
Total	4	$ 12,292,800	5.50

B Rating

Year	Number of Issues	Total Principal Amount	Average Yield %
1936	1	$ 2,300,000	4.50
Total	1	$ 2,300,000	4.50

No Rating Assigned

Year	Number of Issues	Total Principal Amount	Average Yield %
1935	6	$ 67,130,000	3.63
1936	15	157,666,500	3.56
1937	15	35,078,000	3.78
1938	18	94,912,000	3.18
Total	54	$ 354,786,500	3.49

	Number of Issues	Total Principal Amount	Average Yield %
Total - 1935, 1936, 1937, and 1938	227	$ 1,730,512,850	3.58

Note: The above Summary of Average Yield was prepared from all known issues of Electric Operating Utilities, sold in 1935, 1936, 1937, and 1938.

SCHEDULE NO. 7
PAGE 3
BOND YIELDS ACCORDING TO RATINGS

3635

2657

YIELD TO PURCHASERS - ELECTRIC UTILITY BONDS SOLD IN PERIOD FROM JANUARY 1, 1939 TO AUGUST 31, 1939

Company	Month of Offering	Issue	Principal Amount	Price to Public Amount	Price to Public Yield %
		Rating Aaa			
Consolidated Gas Electric Light and Power Company of Baltimore	June	First & Refunding 3s, Series P, 1969	$7,000,000	105.00	2.75
Total - Rating Aaa			$7,000,000		2.75
		Rating Aa			
Kansas Power & Light Co.	July	First Mtg. 3½s, 1969	$26,500,000	108½	3.06
Northern States Power Co. (Wisc.)	March	First Mtg. 3½s, 1964	17,500,000	106	3.15
Rochester Gas & Electric Corp.	June	General 3½s, Series J, 1969	8,323,000	105½	2.97
Total - Rating Aa			$52,323,000		3.08
		Rating A			
Central Maine Power Co.	February	First & General 3½s, Series J, 1966	$ 4,500,000	102	3.39
Commonwealth Edison Co.	April	Debentures, 3½s, 1958	25,283,300	100	3.50
Gulf States Utilities Co.	June	First & Refunding, Series D, 3½s, 1969	27,300,000	106 3/4	3.15
New York State Electric & Gas Corp.	June	First Mtg. 3 3/4s, 1964	13,000,000	102	3.63
Otter Tail Power Co.	March	First Mtg. 3½s, 1969	1,200,000	98	3.61
Pennsylvania Power & Light Co.	August	First Mtg. 3½s, 1969	95,000,000	105½	3.21
Washington Water Power Co.	June	First Mtg. 3½s, 1964	22,000,000	105	3.21
West Texas Utilities Co.	June	First Mtg. 3 3/4s, Series A, 1969	18,000,000	101 3/4	3.65
Total - Rating A			$206,283,300		3.31

3637

SCHEDULE NO. 5
PAGE 1
BOND YIELDS-
JANUARY TO
AUGUST, 1939

YIELD TO PURCHASERS - ELECTRIC UTILITY BONDS SOLD IN PERIOD FROM JANUARY 1, 1939 TO AUGUST 31, 1939

Company	Month of Offering	Issue	Principal Amount	Price to Public Amount	Price to Public Yield %
		Rating Baa			
Central Illinois Electric & Gas Co.	June	First Mtg. 3 3/4s, 1964	$14,750,000	100¼	3.77
Central Ohio Light & Power Co.	August	First Mtg. Series C, 4s, 1964	4,100,000	103⅜	3.80
Central Power & Light Co.	August	First Mtg. Series A, 3 3/4s, 1969	25,000,000	101	3.70
Community Public Service Co.	March	First Mtg. 4s, 1964	6,600,000	100	4.00
Iowa Public Service Co.	August	First Mtg. 3 3/4s, 1969	14,250,000	101	3.70
Kansas Power Co.	July	First Mtg. Series A, 4s, 1964	5,000,000	101½	3.90
Montana-Dakota Utilities Co.	May	First Mtg. 4½s, 1954	9,000,000	101	4.44
Pennsylvania Power & Light Co.	August	Debentures 4½s, 1974	28,500,000	104	4.26
Total - Rating Baa			$107,200,000		3.96
		Rating Ba			
Arkansas-Missouri Power Corp.	May	First Mtg. 5s, 1957	$ 500,000	101	4.91
Southern Utah Power Co.	May	First Mtg. Series A, 5½s, 1960	99,000	97	5.75
Upper Michigan Power & Light Co.	August	First Mtg. S. F. Series A, 4s, 1959	1,050,000	100½	3.96
Total - Rating Ba			$1,649,000		4.36

SCHEDULE NO. 8
PAGE 2
BOND YIELDS-
JANUARY TO
AUGUST, 1939

2659

YIELD TO PURCHASERS - ELECTRIC UTILITY BONDS SOLD IN PERIOD FROM JANUARY 1, 1939 TO AUGUST 31, 1939

Company	Offering	Issue	Principal Amount	Price to Public Amount	Price to Public Yield %
		No Rating Assigned			
Colorado Central Power Co.	May	First Mtg. Series A, 4½s, 1959	$ 725,000	105¾	4.07*
Columbus & Southern Ohio Electric Co.	January	First & Collateral 3½s, 1968	1,900,000	100 (A)	3.50*
Commonwealth Edison Co.	May	First Mtg. Series J, 3¼s, 1979	114,500,000	102	3.16*
Dakota Power Co.	July	First Mtg. 4¼s, 1960	675,000	100 (A)	4.25*
Indiana & Michigan Electric Co.	July	First Mtg. 3¼s, 1969	22,500,000	103	3.10*
Litchfield Electric Light & Power Co.	July	First Mtg. 4s, 1964	450,000	104	3.75*
Maine Consolidated Power Co.	June	First Mtg. Series A, 4s, 1964	300,000	102½	3.84
Rupert Electric Co.	May	First Mtg. 4½s, 1954	304,000	118	3.00
Northwestern Wisconsin Electric Co.	July	First Mtg. 5s, 1954	125,000	100	5.00*
Public Electric Light Co.	January	First Mtg. Series C, 4s, 1961	100,000	100 (A)	4.00
Southern California Edison Co., Ltd.	June	First & Refunding 3¼s, 1964	30,000,000	104.37	3.00*
Total - No Rating Assigned			$171,579,000		3.14
GRAND TOTAL			$596,074,300		3.36

* Private sales

(A) Assumed price of par

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SCHEDULE NO. 8
PAGE 3
BOND YIELDS-
JANUARY TO
AUGUST,1939

COST OF MONEY TO ISSUING COMPANIES AND YIELD TO PUBLIC
OF ELECTRIC UTILITY PREFERRED STOCKS SOLD IN 1935, 1936, 1937 AND 1938

Company	Offering Date	Issue	Number of Shares	Net Price to Company: Per Share	Net Price to Company: Total	Net Price to Company: Cost	Price to Public: Per Share	Price to Public: Total	Price to Public: Yield
Cleveland Electric Illuminating Co., The	Oct. 1935	Cum. Pfd. $4.50, no par	254,995	100.00	$ 25,499,500	4.50%	102.75	$ 26,200,736	4.38%
Total 1935					$ 25,499,500	4.50%		$ 26,200,736	4.38%
Central Illinois Light Co.	Apr. 1936	Cum. Pfd. 4½%, $100 par	117,037	98.73	$ 11,555,063	4.56%	102.00	$ 11,937,774	4.41%
Dayton Power & Light Co.	June 1936	" " 4½%, $100 par	100,000	99.42	9,942,000	4.53%	102.50	10,250,000	4.39%
Public Service Company of New Hampshire	Aug. 1936	" " $5.00, no par	4,860	94.19	457,763	5.31%	97.25	472,635	5.14%
Rochester Gas & Electric Corp.	Sept.1936	" " 5%, $100 par	40,000	98.30	3,932,000	5.09%	102.00	4,080,000	4.90%
Cumberland County Power & Light Co.	Oct. 1936	" " 5½%, $100 par	10,000	99.38	993,800	5.53%	103.00	1,030,000	5.34%
Southern Indiana Gas & Electric Co.	Oct. 1936	" " 4.8%, $100 par	85,895	99.38	8,536,245	4.83%	102.75	8,825,711	4.67%
Central Hudson Gas & Electric Corp.	Nov. 1936	" " 4½%, $100 par	3,404	103.53	352,416	4.35%	105.00	357,420	4.29%
Missouri Power & Light Co.	Dec. 1936	" " $6.00, no par	15,000	98.39	1,475,850	6.10%	101.50	1,522,500	5.91%
Public Service Company of New Hampshire	Dec. 1936	" " $5.00, no par	11,500	96.75	1,112,625	5.17%	100.00	1,150,000	5.00%
Total 1936					$ 38,357,762	4.77%		$ 39,626,040	4.62%
Consumers Power Co.	Jan. 1937	Cum. Pfd. $4.50, no par	547,788	97.23	$ 53,261,427	4.63%	100.50	$ 55,052,694	4.48%
Northern States Power Co.	Feb. 1937	" " $5.00, no par	275,000	99.94	27,483,500	5.00%	103.00	28,325,000	4.85%
Ohio Public Service Co.	Aug. 1937	"1st " 5½%, $100 par	16,000	87.89	1,406,240	6.26%	92.50	1,480,000	5.95%
Total 1937					$ 82,151,167	4.76%		$ 84,857,694	4.63%

COST OF MONEY TO ISSUING COMPANIES AND YIELD TO PUBLIC

OF ELECTRIC UTILITY PREFERRED STOCKS SOLD IN 1935, 1936, 1937 AND 1938

Company	Offering Date	Issue	Number of Shares	Net Price to Company: Per Share	Net Price to Company: Total	Net Price to Company: Cost	Price to Public: Per Share	Price to Public: Total	Price to Public: Yield
Cumberland County Power & Light Co.	Feb. 1938	Cum. Pfd. 5½%, $100 par	10,000	92.39	$ 923,900	5.95%	97.00	$ 970,000	5.67%
New York & Queens Elec. Lt. & Pr. Co.	Aug. 1938	Non-Cum. Pfd. 5%, $100 par	8,772	97.49	855,182	5.13%	100.00	877,200	5.00%
Union Electric Company of Missouri	Nov. 1938	Cum. Pfd. $5.00, no par	130,000	102.03	13,263,900	4.90%	106.00	13,780,000	4.92%
Public Service Company of New Hampshire	Dec. 1938	" " $5.00, no par	8,737	85.84	749,984	5.82%	91.00	795,067	5.49%
Pennsylvania Power Co.	Dec. 1938	" " $5.00, no par	42,000	97.31	4,087,020	5.14%	101.00	4,242,000	4.95%
Total 1938					$ 19,879,986	5.04%		$ 20,664,267	4.85%
Total 1935, 1936, 1937 and 1938					$165,887,315	4.77%		$171,346,737	4.62%

Note: The above covers all known Preferred Stock Issues of Electric Operating Utilities sold in 1935, 1936, 1937 and 1938. The cost of money is the cost, after deduction of all expenses in connection with the sale of stock, and this cost was obtained from "Security Issues of Electric and Gas Utilities, 1935, 1936, 1937 and 1938", issued by the Securities and Exchange Commission. The yield to purchasers is the yield based on the offering price of stocks.

SCHEDULE NO. 9
PAGE 2
COST OF MONEY
AND YIELD-
PREFERRED STOCKS

YIELD TO PURCHASERS - ELECTRIC UTILITY PREFERRED STOCKS SOLD IN PERIOD FROM JANUARY 1, 1939 TO AUGUST 31, 1939

Company	Month of Offering	Issue	Price to Public Amount	Price to Public Yield %
Arkansas-Missouri Power Corp.	May	3,604 shs. 6% Cumulative Preferred ($50 par)	$ 43.50	6.90
Central Ohio Light & Power Co.	August	2,200 shs. $6 Preferred	90.00	6.67
Consolidated Gas Electric Light and Power Company of Baltimore	April	1,705 shs. 4% Series B Preferred ($100 par)	112.50	4.00 (A)
New York State Electric & Gas Corp.	June	60,000 shs. 5½% Preferred	100.00	5.50
San Antonio Public Service Co.	July	45,000 shs. 6% Cumulative Preferred	104.00	5.77
West Penn Power Co.	July	297,077 shs. 4½% Preferred	110.00	4.09
Wisconsin Gas & Electric Co.	July	20,242 shs. 4½% Series	100.00	4.50 (B)
TOTAL				4.63*

(A) Total issue was 223,063 shares 4% Series B Preferred Stock. Of the total number of shares, 221,358 shares were exchanged for 5% Series A Preferred Stock, and the remaining 1,705 shares were offered at $112.50 per share.

(B) Total issue was 46,480 shares 4½% Series Preferred Stock. Of the total number of shares, 26,238 shares were exchanged for 6% Series Preferred Stock, and the remaining 20,242 were offered at par.

* Weighted average.

SCHEDULE NO.10
YIELD-PREFERRED
STOCKS-JANUARY
TO AUGUST 1939

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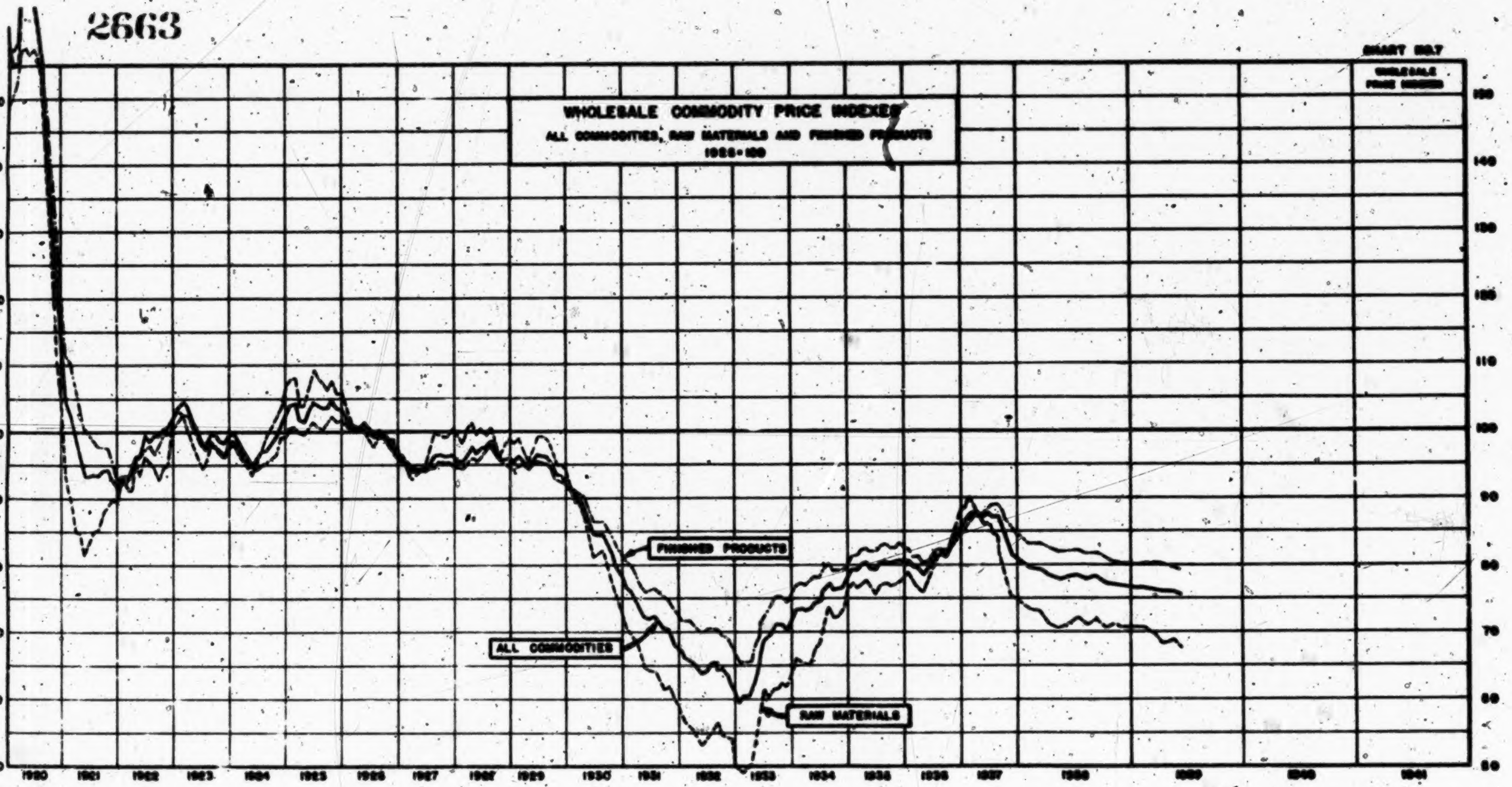
WHOLESALE COMMODITY PRICE INDEXES
ALL COMMODITIES, RAW MATERIALS AND FINISHED PRODUCTS
1926=100
WHOLESALE PRICE INDEXES
FINISHED PRODUCTS
ALL COMMODITIES
RAW MATERIALS
150
140
130
120
110
100
90
80
70
60
50
1920
1921
1922
1923
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1928
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1930
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1936
1937
1938
1939
1940
1941

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WHOLESALE COMMODITY PRICE INDEXES

ALL COMMODITIES, RAW MATERIALS AND FINISHED PRODUCTS

1926 = 100

ALL COMMODITIES

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	157.7	157.1	158.6	165.5	167.2	166.5	165.8	161.4	155.2	144.2	133.4	120.7	154.4
1921	114.0	104.9	102.4	98.9	96.2	93.4	93.4	93.5	93.4	94.1	94.2	92.9	97.6
1922	91.4	92.9	92.8	93.2	96.1	96.3	99.4	98.6	99.3	99.6	100.5	100.7	96.7
1923	102.0	103.3	104.5	103.9	102.9	100.3	98.4	97.8	99.7	99.4	98.4	98.1	100.6
1924	99.6	99.7	98.5	97.3	95.9	94.9	95.6	97.0	97.1	98.2	99.1	101.5	98.1
1925	102.9	104.0	104.2	101.9	101.6	103.0	104.3	103.9	103.4	103.6	104.5	103.4	103.5
1926	103.2	102.0	100.6	100.3	100.5	100.4	99.5	99.1	99.7	99.4	98.4	97.9	100.0
1927	96.5	95.8	94.7	94.1	94.2	94.1	94.3	95.2	96.3	96.6	96.3	96.4	95.4
1928	96.4	95.6	95.5	96.6	97.5	96.7	97.4	97.6	98.8	96.7	95.8	95.8	96.7
1929	95.9	95.4	96.1	95.5	94.7	95.2	96.5	96.3	96.1	95.1	93.5	93.3	95.3
1930	92.5	91.4	90.2	90.0	88.8	86.8	84.4	84.3	84.4	83.0	81.3	79.6	86.4
1931	78.2	76.8	76.0	74.8	73.2	72.1	72.0	72.1	71.2	70.3	70.2	68.6	73.0
1932	67.3	66.3	66.0	65.5	64.4	63.9	64.5	65.2	65.3	64.4	63.9	62.6	64.9
1933	61.0	59.8	60.2	60.4	62.7	65.0	68.9	69.5	70.8	71.2	71.1	70.8	66.0
1934	72.2	73.6	73.7	73.3	73.7	74.6	74.8	76.4	77.6	76.5	76.5	76.9	75.0
1935	78.8	79.5	79.4	80.1	80.2	79.8	79.4	80.5	80.7	80.5	80.6	80.9	80.0
1936	80.6	80.6	79.6	79.7	78.6	79.2	80.5	81.6	81.6	81.5	82.4	84.2	80.8
1937	85.9	86.3	87.8	88.0	87.4	87.2	87.9	87.5	87.4	85.4	83.3	81.7	86.3
1938	80.9	79.8	79.7	78.7	78.1	78.3	78.8	78.1	78.3	77.6	77.5	77.0	78.6
1939	76.9	76.9	76.7	76.2	76.2	75.6							

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SCHEDULE D.11
PAGE 1
PRICE INDEXES
ALL COMMODITIES

ALL COMMODITIES, RAW MATERIALS AND FINISHED PRODUCTS

1926 = 100

RAW MATERIALS

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	159.8	155.1	153.7	161.8	163.4	166.0	166.1	160.6	154.4	140.6	127.4	111.4	151.8
1921	105.4	93.5	89.6	85.0	84.6	82.2	83.6	85.1	85.8	87.9	88.9	89.3	88.3
1922	89.3	93.3	91.7	91.6	95.9	93.5	101.2	100.4	99.8	97.8	99.2	99.9	96.0
1923	102.3	103.2	102.8	100.7	98.1	96.5	94.5	95.2	98.0	97.7	97.0	96.6	98.5
1924	97.9	98.2	96.5	96.3	94.4	93.3	95.9	97.9	97.1	99.3	100.1	103.2	97.6
1925	106.9	107.8	108.0	103.9	104.1	106.3	109.0	108.0	107.3	106.3	107.4	105.7	106.7
1926	105.9	103.7	100.9	100.6	100.6	100.0	98.5	97.8	99.3	99.5	96.2	96.9	100.0
1927	97.3	96.0	94.0	92.7	93.9	94.1	94.7	97.6	99.9	99.5	99.0	99.2	96.5
1928	100.3	99.1	98.1	100.2	101.8	99.4	100.4	99.2	100.5	97.3	96.2	97.4	99.1
1929	97.8	98.1	99.0	97.0	95.3	96.6	99.1	99.2	98.9	97.1	94.8	95.0	97.5
1930	94.0	91.8	89.3	89.8	87.8	84.9	81.1	81.8	82.1	79.9	76.8	74.2	84.3
1931	72.7	70.6	69.5	68.3	66.5	64.7	64.3	64.1	62.7	61.5	62.0	60.2	65.6
1932	58.3	56.9	56.1	55.5	53.9	53.8	55.7	55.7	56.2	54.6	54.2	52.1	55.1
1933	52.2	51.4	50.4	50.0	53.7	58.2	61.8	60.6	61.7	61.8	62.4	61.9	56.5
1934	64.1	66.0	65.9	65.1	65.1	67.3	66.3	71.6	73.9	72.1	72.2	73.1	68.7
1935	76.6	77.4	76.8	77.5	77.6	76.4	75.8	77.1	77.3	77.1	77.2	77.7	77.1
1936	78.1	79.1	77.4	77.0	75.8	77.6	79.8	81.5	81.8	82.1	83.1	85.6	79.9
1937	88.1	88.3	90.1	88.7	87.1	86.1	88.5	84.8	84.4	80.7	77.2	75.4	84.8
1938	74.9	73.6	73.2	71.3	70.7	71.4	72.3	71.4	72.0	70.9	71.5	70.9	72.0
1939	70.9	70.9	70.1	68.5	66.9	67.7							

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ALL COMMODITIES, RAW MATERIALS AND FINISHED PRODUCTS

1926 = 100

FINISHED PRODUCTS

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	148.5	150.5	152.3	157.2	157.8	156.7	157.7	156.5	152.1	144.3	136.8	126.5	149.8
1921	119.2	111.7	110.1	107.4	103.1	100.7	99.4	98.7	97.9	97.8	97.5	95.2	103.3
1922	92.4	92.6	93.6	94.3	96.2	97.6	97.9	96.7	98.0	99.4	99.7	99.6	96.5
1923	100.1	101.1	102.4	102.4	101.0	99.7	96.2	97.2	98.3	97.8	96.5	96.2	99.2
1924	98.2	98.3	97.3	95.9	95.2	94.5	94.1	95.0	95.5	95.9	96.8	99.0	96.3
1925	99.1	100.4	100.9	99.8	99.6	100.5	102.1	100.8	100.3	101.3	102.1	101.5	100.6
1926	101.8	101.1	100.4	100.2	100.7	100.9	99.9	99.6	99.8	99.3	98.5	96.3	100.0
1927	96.2	95.9	95.1	94.7	94.4	94.2	94.3	94.2	94.7	95.6	95.3	95.3	95.0
1928	94.8	94.5	94.4	95.2	96.0	95.7	96.4	97.3	98.3	96.8	95.9	95.2	95.9
1929	94.7	94.3	94.8	95.0	94.6	95.0	95.6	95.2	95.0	94.2	92.9	92.7	94.5
1930	92.1	91.5	90.9	90.7	90.1	88.4	86.6	86.2	86.4	85.4	84.1	82.8	88.0
1931	81.5	80.3	79.6	78.3	76.9	76.0	76.1	76.4	75.9	75.1	74.8	73.3	77.0
1932	72.1	71.4	71.5	71.1	70.3	70.0	70.5	70.7	70.4	69.6	69.3	68.4	70.4
1933	66.7	65.7	65.7	65.7	67.2	69.0	72.2	73.4	74.8	75.4	75.8	74.8	70.5
1934	76.0	77.0	77.2	77.1	77.8	78.2	78.2	79.2	80.1	79.2	79.3	79.5	78.2
1935	80.8	81.5	81.7	82.3	82.4	82.2	82.0	83.0	83.1	82.7	82.7	83.1	82.2
1936	82.4	82.2	81.3	81.6	80.5	80.7	81.6	82.4	82.3	82.0	82.6	83.8	82.0
1937	84.9	85.4	86.4	87.4	87.5	87.7	88.8	89.0	89.1	88.1	86.7	85.3	87.2
1938	84.3	83.3	83.4	82.7	82.1	82.2	82.5	81.8	81.8	81.1	80.5	80.2	82.2
1939	80.0	80.2	80.2	80.1	79.9	79.6							

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Source of data: The Commodity Price Indexes were computed by the United States Bureau of Labor Statistics and are contained in their publications. The Price Indexes are reproduced in Standard Trade and Securities (Published by Standard Statistics Company, Inc.) Volume 3, pages D-4 and D-5, dated June 5, 1936, and Current Statistics Section. The above figures were taken from Standard Trade and Securities.

SCHEDULE EC-11
PAGE 3
PRICE INDEXES
FINISHED
PRODUCTS

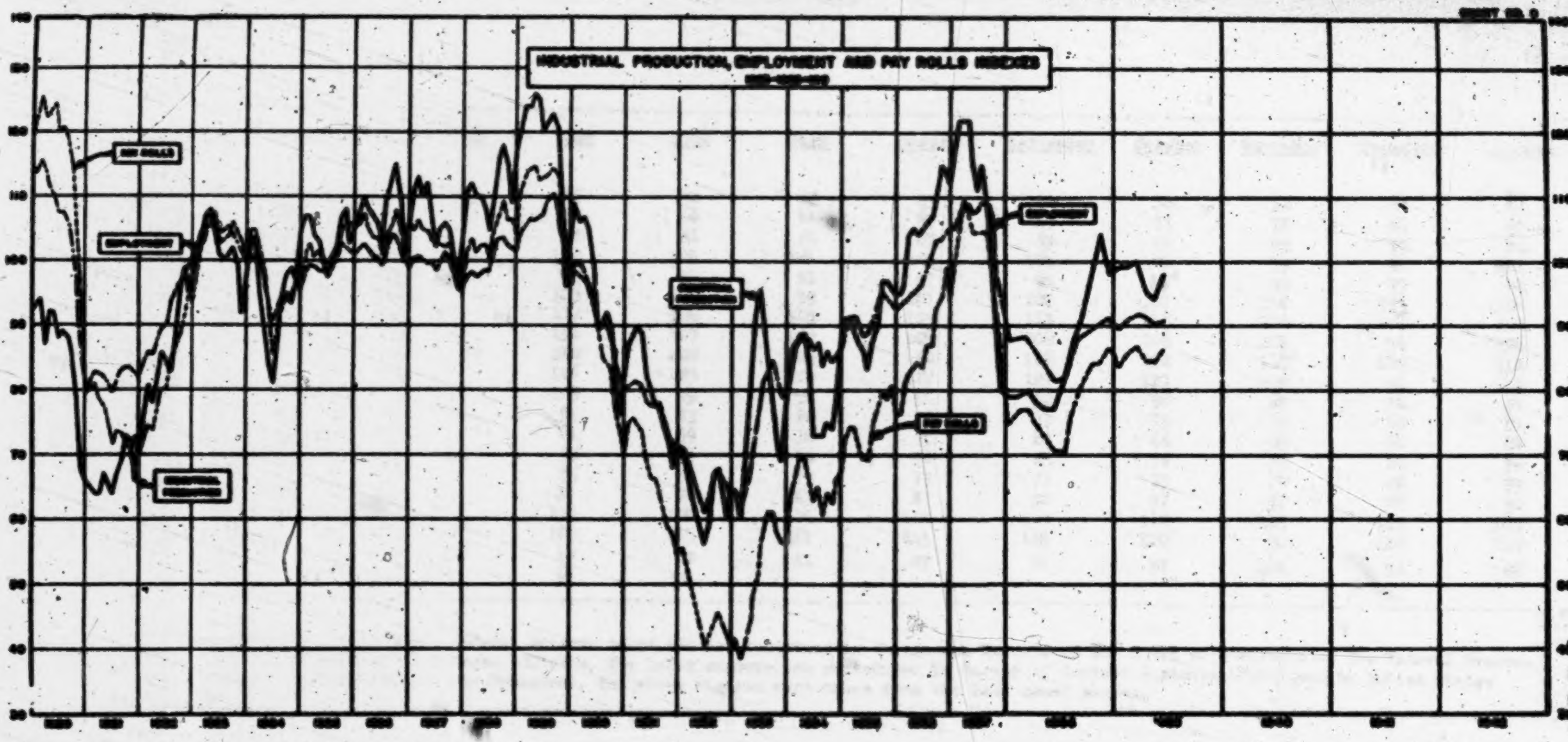
CHART NO. 6
INDUSTRIAL PRODUCTION, EMPLOYMENT AND PAY ROLLS INDEXES
PAY ROLLS
EMPLOYMENT
INDUSTRIAL PRODUCTION
110
70

2668

INDUSTRIAL PRODUCTION, EMPLOYMENT AND PAY ROLLS INDEXES

1923-1925 = 100

INDUSTRIAL PRODUCTION

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	92	93	94	87	92	92	88	89	88	86	78	66	87
1921	66	65	64	64	67	66	64	67	69	73	72	66	67
1922	72	76	81	78	82	86	84	83	89	96	99	95	85
1923	99	101	105	107	108	105	101	100	101	102	99	92	101
1924	99	104	103	96	90	86	81	87	95	98	99	97	95
1925	105	107	107	104	103	100	99	101	102	107	108	105	104
1926	105	108	110	108	107	106	103	109	113	115	110	101	108
1927	106	111	113	110	112	107	102	105	106	105	102	96	106
1928	105	111	112	110	110	108	105	110	116	118	115	109	111
1929	117	121	124	124	126	125	120	122	123	121	108	96	119
1930	103	109	106	107	105	99	90	90	92	90	84	76	96
1931	82	87	89	90	89	83	80	78	77	75	72	68	81
1932	71	71	68	64	61	59	58	59	67	68	65	60	64
1933	64	64	60	67	79	91	96	90	85	78	72	69	76
1934	77	83	87	88	89	84	73	73	73	75	74	78	79
1935	88	91	91	89	87	86	83	87	90	97	97	96	90
1936	95	95	96	104	105	104	105	106	107	110	115	114	105
1937	112	117	122	122	122	115	111	115	109	102	90	80	110
1938	79	79	80	78	77	77	81	87	91	97	104	98	86
1939	100	99	100	95	94	98							

Source of data: The computations were made by the Federal Reserve Board, and are contained in the Annual Reports of the Board of Governors of The Federal Reserve System and in the monthly issues of the Federal Reserve Bulletin. The index numbers are reproduced in Survey of Current Business (Published by United States Department of Commerce, Bureau of Foreign and Domestic Commerce). The above figures were taken from the last named source.

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FORMULA NO. 12
PAGE 1

INDUSTRIAL
PRODUCTION
INDEX

INDUSTRIAL PRODUCTION, EMPLOYMENT AND PAY ROLLS INDEXES

1923-1925 = 100

EMPLOYMENT

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	114.3	113.3	115.6	114.0	111.1	110.1	107.5	107.4	106.1	102.1	95.6	88.0	107.1
1921	79.5	81.7	82.9	82.3	82.0	81.2	79.7	81.1	83.0	83.7	83.7	82.7	82.0
1922	82.4	84.5	85.8	85.7	87.9	89.6	90.5	93.1	95.1	96.6	98.0	99.1	90.7
1923	100.2	102.4	104.6	105.1	105.2	105.7	104.6	104.8	105.3	104.0	102.8	101.1	103.8
1924	100.1	101.7	101.9	100.1	96.8	93.8	90.6	92.0	94.8	95.0	94.5	96.1	96.4
1925	96.6	98.3	99.2	99.1	96.6	96.4	96.3	100.0	101.9	102.6	102.2	101.8	99.8
1926	101.0	102.0	102.5	101.8	100.8	100.6	99.6	102.8	104.0	103.6	101.6	100.3	101.7
1927	98.6	100.2	100.9	100.3	99.6	99.7	98.6	99.9	101.2	100.2	98.0	96.5	99.5
1928	95.3	97.2	98.2	97.8	97.8	98.5	98.4	101.1	103.3	103.5	102.6	102.1	99.7
1929	101.7	104.1	105.4	106.7	106.5	106.8	107.3	109.2	110.3	105.0	104.6	100.7	106.0
1930	98.2	98.3	97.9	97.3	95.6	93.6	90.4	89.7	90.7	88.7	85.4	82.9	92.4
1931	80.1	80.8	81.8	81.2	80.6	78.8	77.7	77.9	78.3	75.5	72.7	72.0	78.1
1932	70.0	71.2	70.1	67.8	65.2	63.2	62.0	62.7	66.1	67.2	66.3	65.1	66.3
1933	63.3	64.7	62.3	63.9	66.8	71.6	76.2	81.3	85.0	84.6	81.2	79.3	73.4
1934	78.8	83.7	87.2	88.6	89.0	87.8	86.3	87.4	83.5	85.9	84.3	85.6	85.7
1935	86.6	89.6	91.1	91.3	90.0	88.3	88.9	91.7	93.8	95.2	94.5	94.0	91.3
1936	92.1	92.2	93.4	94.7	95.4	95.9	97.1	99.9	101.9	103.2	103.3	104.4	97.8
1937	102.7	105.3	107.7	108.8	108.9	107.5	108.0	109.1	109.0	107.2	101.1	94.5	105.8
1938	87.8	88.2	87.7	85.7	83.4	81.6	81.9	85.7	88.8	89.5	90.5	91.2	86.8
1939	89.5	90.7	91.4	91.2	90.1	90.7							

Source of data: The computations were made by the United States Bureau of Labor Statistics, and are contained in their publications. The Employment Indexes are reproduced in Survey of Current Business (Published by United States Department of Commerce, Bureau of Foreign and Domestic Commerce). The above figures were taken from the last named source.

INDUSTRIAL PRODUCTION, EMPLOYMENT AND PAY ROLLS INDEXES

1923-1925 = 100

PAY ROLLS

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	119.1	117.4	125.4	122.3	123.0	124.4	120.0	120.6	116.9	114.4	105.0	95.5	117.2
1921	80.6	80.1	82.0	78.5	77.4	75.6	71.6	73.6	73.3	71.9	70.9	72.7	75.6
1922	69.6	72.5	74.4	73.6	77.0	80.0	80.2	84.1	87.0	88.7	92.2	94.5	81.2
1923	93.9	97.8	102.6	103.8	107.3	107.2	102.9	103.1	103.8	105.9	103.9	102.7	102.9
1924	98.9	104.5	104.5	102.0	97.6	91.6	85.3	89.1	92.4	94.6	93.1	97.6	96.0
1925	96.0	101.0	102.8	100.4	101.4	99.2	97.5	100.1	99.4	105.3	105.1	105.5	101.1
1926	101.6	105.7	107.2	104.9	103.5	103.7	99.4	103.8	105.1	106.0	104.3	103.6	104.2
1927	98.6	104.8	106.6	105.0	104.8	103.2	99.1	102.5	102.1	102.7	98.9	100.0	102.4
1928	96.6	102.0	103.5	101.3	102.3	102.7	100.2	104.6	106.2	109.5	106.2	106.9	103.5
1929	103.8	110.8	113.0	114.1	114.3	112.7	108.6	113.5	114.4	113.7	104.9	101.2	110.4
1930	96.5	99.6	95.7	98.5	96.1	92.9	88.0	87.8	84.8	82.9	77.3	75.4	89.4
1931	70.3	74.4	75.9	74.7	73.6	69.9	65.6	65.4	63.8	61.8	58.3	57.8	67.8
1932	54.0	55.4	53.6	49.6	46.8	43.7	40.4	41.4	44.0	45.8	43.6	42.4	46.7
1933	40.3	41.4	38.3	40.4	44.4	49.1	52.7	58.6	61.3	61.1	57.3	55.5	50.1
1934	56.1	62.9	67.2	69.6	69.7	67.4	62.8	65.1	60.8	64.0	62.5	66.2	64.5
1935	67.5	72.6	74.3	74.4	71.7	69.9	69.1	74.0	76.7	79.4	78.6	80.4	74.1
1936	76.7	76.6	80.3	82.3	83.9	84.1	83.4	87.1	86.9	92.5	94.0	96.8	85.6
1937	94.4	99.7	105.5	109.3	109.7	107.0	104.6	106.2	104.4	104.5	92.9	84.2	102.0
1938	75.0	76.9	77.1	74.6	72.9	70.8	70.6	76.9	82.0	83.8	84.1	86.5	77.5
1939	83.4	85.4	86.9	84.9	84.4	86.2							

Source of data: The computations were made by the United States Bureau of Labor Statistics, and are contained in their publications. The Pay Roll Indexes are reproduced in Survey of Current Business (Published by United States Department of Commerce, Bureau of Foreign and Domestic Commerce). The above figures were taken from the last named source.

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SCHEDULE NO. 12
PAGE 3
PAY ROLLS
INDEX

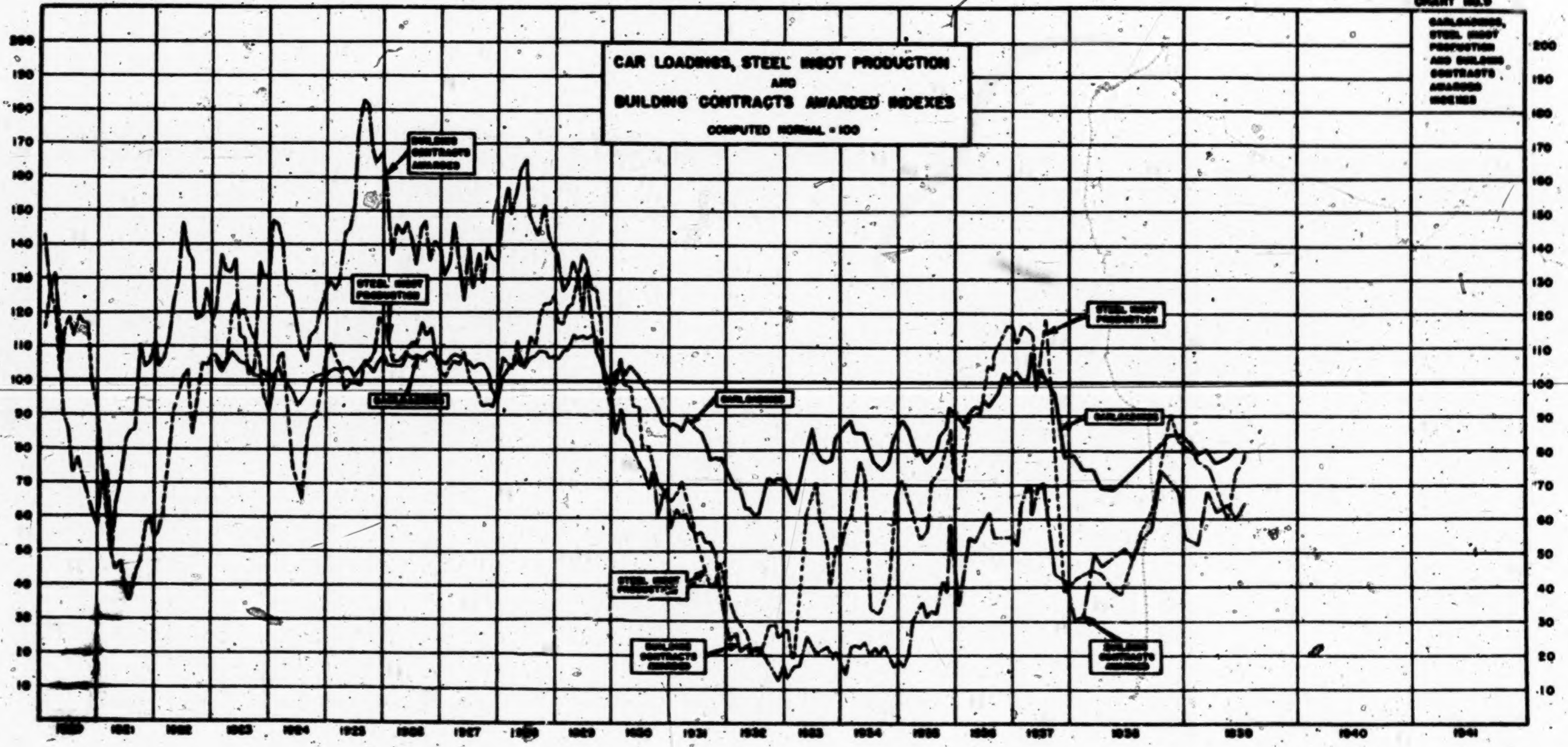

CHART NO. 9

CARLOADINGS, STEEL INGOT PRODUCTION AND BUILDING CONTRACTS AWARDED INDEXES

CAR LOADINGS, STEEL INGOT PRODUCTION AND BUILDING CONTRACTS AWARDED INDEXES

COMPUTED NORMAL = 100

COMPUTED NORMAL = 100

CARLOADINGS

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1923	105.9	102.7	105.6	108.5	107.5	105.7	104.8	103.3	101.6	101.3	103.0	100.6	104.2
1924	101.6	104.7	101.5	99.1	96.7	92.5	94.8	97.1	100.3	101.5	101.9	101.6	99.4
1925	102.7	103.7	102.6	103.7	103.9	101.4	103.1	105.4	104.5	102.2	105.6	107.8	103.9
1926	104.7	104.5	104.2	104.3	107.9	106.8	107.8	107.1	107.6	108.6	107.0	105.9	106.4
1927	103.7	106.6	108.0	107.4	108.2	105.5	104.1	105.2	105.0	102.4	97.8	95.4	103.9
1928	101.4	102.5	104.8	104.9	107.3	104.0	106.6	107.5	109.0	108.5	105.2	105.5	105.6
1929	106.8	108.9	109.1	113.8	112.9	113.5	112.8	113.4	112.8	108.4	101.6	100.8	109.6
1930	102.2	104.5	101.6	105.3	103.1	100.8	98.9	97.4	94.6	91.5	87.7	87.1	97.9
1931	87.3	86.5	85.6	89.6	87.9	85.9	84.8	81.2	76.6	77.6	76.4	76.7	83.0
1932	74.1	71.7	69.[illegible]	68.9	63.2	63.5	60.9	61.5	66.7	72.0	71.0	71.9	67.9
1933	71.9	66.7	64.2	70.8	75.0	82.5	86.6	80.1	77.5	76.8	77.2	83.0	76.1
1934	86.0	87.4	89.1	85.8	85.0	85.7	80.2	77.0	75.7	74.7	76.8	82.4	82.2
1935	87.1	88.3	86.7	82.7	79.3	80.2	76.3	78.1	80.4	84.8	87.3	93.7	83.7
1936	90.9	89.2	87.4	91.0	93.1	92.3	95.1	93.0	94.7	97.2	102.8	101.3	94.0
1937	95.1	103.1	100.2	101.7	108.9	100.2	104.0	101.7	99.4	96.1	86.2	78.3	97.9
1938	79.5	74.9	74.2	69.7	69.3	70.6	72.9	74.4	78.1	81.5	84.2	84.2	76.1
1939	82.8	79.3	80.1	76.5	77.8	80.9							

Note: The above figures are adjusted for secular trend and seasonal variation.

Source of data: The computations were made by The Annalist (Published by the New York Times Company) and are contained in this publication. The figures are reproduced in various issues of Survey of Current Business (Publication of United States Department of Commerce). The above indices were taken direct from The Annalist and from the Survey of Current Business.

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SCHEDULE NO. 13
PAGE 1

CARLOADINGS
INDEX

COMPUTED NORMAL = 100

STEEL INGOT PRODUCTION

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	115.0	122.7	121.3	102.5	114.2	118.3	112.4	118.7	116.8	116.4	101.0	92.9	112.7
1921	79.7	64.6	49.4	42.3	47.1	39.3	35.5	43.1	45.9	58.6	59.2	53.9	51.6
1922	55.4	61.9	75.3	90.5	97.1	101.2	103.2	84.0	92.4	105.7	105.3	107.7	90.0
1923	107.7	104.7	105.6	119.6	123.4	119.6	120.5	114.2	111.3	104.5	94.7	91.7	109.8
1924	98.5	107.4	109.3	92.2	75.2	70.2	65.4	82.3	89.2	89.6	96.8	107.4	90.3
1925	111.1	106.8	105.3	95.5	99.2	99.3	98.5	105.2	105.4	108.7	119.1	118.9	105.9
1926	111.8	105.5	105.8	107.3	109.2	111.7	111.2	117.7	113.8	115.8	108.5	102.8	110.1
1927	101.3	104.3	106.0	105.1	108.4	101.9	99.4	96.7	92.7	93.1	92.2	97.0	99.8
1928	107.3	104.8	103.8	112.1	104.2	105.2	113.1	110.6	118.4	122.7	122.2	125.5	112.5
1929	117.2	116.4	121.9	122.5	128.5	137.1	133.7	127.2	126.4	117.8	101.3	94.2	120.4
1930	98.2	100.8	99.1	98.4	93.0	92.4	80.4	80.9	75.6	70.1	66.6	66.2	85.8
1931	65.0	66.7	70.6	65.3	61.2	53.6	50.1	44.5	40.2	40.3	46.3	38.8	53.6
1932	39.4	37.1	31.7	29.3	26.7	22.5	21.8	20.9	25.4	28.2	28.3	25.1	28.0
1933	26.6	27.9	19.8	32.5	45.0	62.1	84.4	70.2	57.7	53.4	40.3	52.8	47.7
1934	49.6	57.2	61.8	70.6	76.4	72.8	39.1	33.6	33.1	36.2	41.8	56.2	52.4
1935	70.3	72.1	66.1	60.8	57.9	54.1	56.6	70.7	73.5	76.4	80.7	86.1	68.7
1936	73.0	71.8	77.1	90.3	90.6	91.1	96.5	105.2	104.0	110.5	114.1	117.3	95.1
1937	116.3	111.9	116.8	116.0	114.4	97.9	110.6	119.1	103.2	82.3	54.3	38.7	98.5
1938	43.3	44.0	45.0	43.9	39.6	38.3	48.7	56.2	62.0	74.4	91.3	83.3	55.8
1939	79.7	77.6	76.1	70.4	61.1	72.7	79.3						

Note: The above figures are adjusted for secular trend and seasonal variation.
Source of data: The computations were made by the Standard Statistics Company, Inc., and are contained in their publication, Standard Trade and Securities, Volume 3, page D-26, dated June 5, 1936, and Current Statistics Section.

STEEL INGOT
PRODUCTION
INDEX

CARLOADINGS, STEEL INGOT PRODUCTION AND BUILDING CONTRACTS AWARDED INDEXES

COMPUTED NORMAL = 100

BUILDING CONTRACTS AWARDED

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	141.6	125.7	131.3	113.7	90.1	86.0	73.1	77.0	71.9	66.3	62.3	57.5	91.4
1921	67.4	73.2	90.5	63.8	69.4	82.7	84.7	85.9	110.1	104.0	103.4	110.9	84.0
1922	103.9	106.9	111.7	123.6	128.9	148.0	137.7	133.2	118.0	116.7	126.6	117.6	122.9
1923	121.3	136.6	132.4	131.9	135.4	113.1	112.5	102.1	103.7	135.1	130.6	130.1	123.7
1924	147.0	145.8	140.9	127.2	124.3	114.2	108.8	105.8	113.7	114.8	120.2	126.4	124.3
1925	129.5	127.8	129.2	143.8	144.5	151.8	173.3	162.3	162.3	166.0	164.1	167.2	145.2
1926	157.3	137.7	145.9	143.4	146.4	140.7	138.4	145.2	147.3	135.8	141.1	138.1	142.8
1927	131.4	133.1	146.4	133.7	123.6	138.9	127.7	137.3	129.2	139.5	136.0	135.8	134.5
1928	148.6	156.7	149.1	154.8	162.0	145.1	149.5	144.5	142.9	151.3	142.3	138.6	150.5
1929	137.7	125.4	128.5	135.1	130.9	120.2	131.2	116.2	108.8	108.6	100.6	96.7	120.2
1930	84.8	91.8	84.6	82.8	79.3	75.9	73.7	64.3	73.8	60.1	66.9	64.0	75.8
1931	57.2	62.1	60.3	60.9	57.3	54.7	55.7	52.5	52.5	48.9	38.5	35.6	53.0
1932	29.0	24.6	26.7	21.7	23.4	20.2	23.0	22.9	22.9	27.2	20.0	13.7	22.1
1933	18.0	13.9	16.2	17.0	22.6	25.9	22.7	21.1	22.2	23.4	20.3	21.3	20.4
1934	18.8	14.5	23.2	23.4	22.3	24.0	20.0	22.3	20.3	23.0	20.9	16.1	20.7
1935	19.6	16.7	21.7	31.0	33.3	36.0	31.6	33.5	33.4	42.0	38.9	38.1	33.2
1936	44.7	34.8	47.6	53.4	53.4	56.2	59.3	65.3	54.6	[illegible]	52.1	55.7	53.0
1937	54.3	52.2	64.3	69.9	61.6	69.0	70.5	64.6	50.2	44.0	46.2	42.6	57.5
1938	30.6	31.9	49.0	46.2	49.8	51.1	46.7	54.6	57.3	75.0	70.7	68.2	52.9
1939	54.5	53.6	68.8	62.1	64.2	60.1	65.0						

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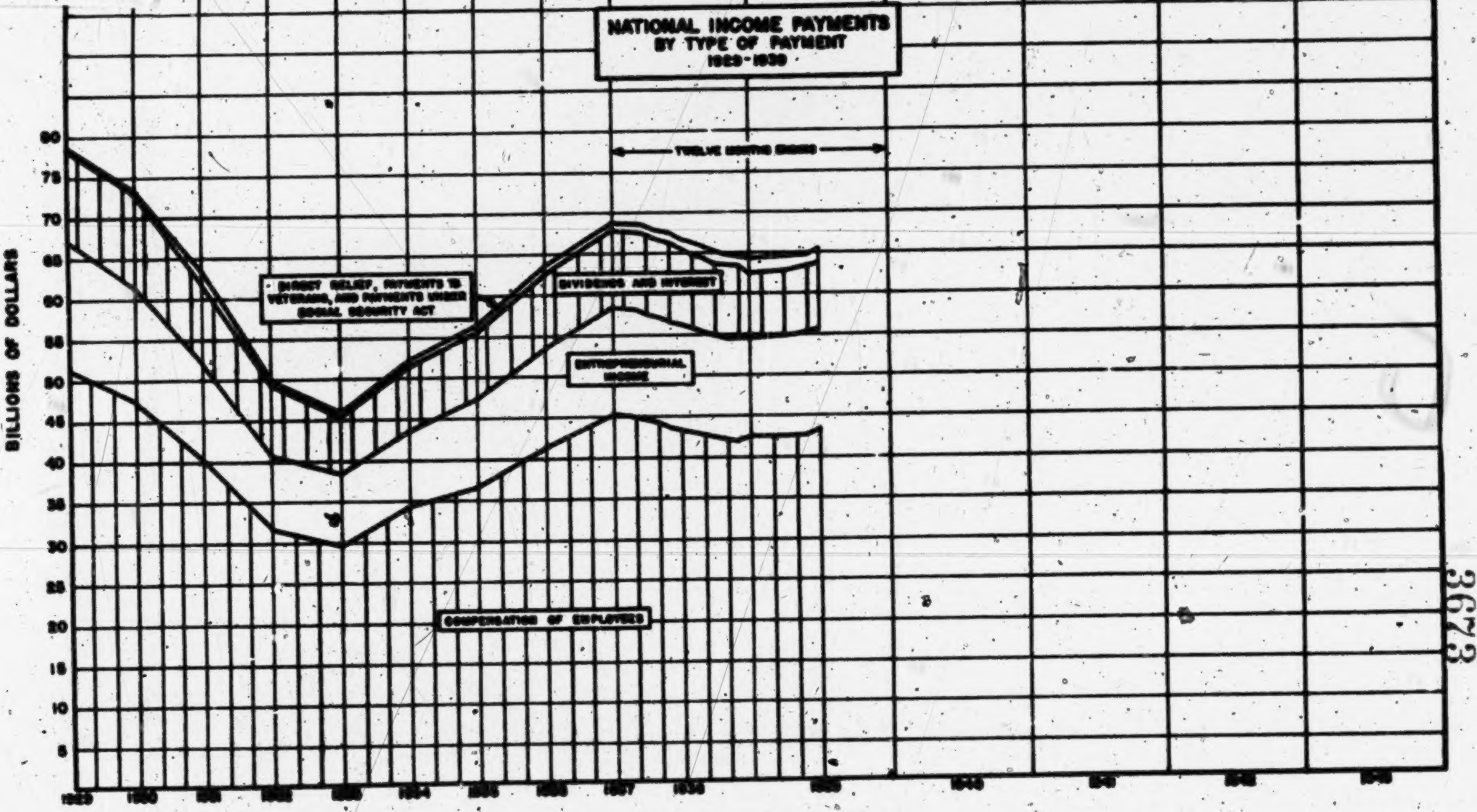
Note: The above figures are adjusted for secular trend and seasonal variation.

Source of data: The computations were made by the Standard Statistics Company, Inc., and are contained in their publication, Standard Trade and Securities, Volume 3, page D-33, dated June 5, 1936, and Current Statistics Section.

SCHEDULE NO.13
PAGE 3

BUILDING
CONTRACTS
AWARDED
INDEX



NATIONAL INCOME PAYMENTS
BY TYPE OF PAYMENT
1929-1939

3673

NATIONAL INCOME PAYMENTS
YEARS 1929 TO 1939, INCLUSIVE
(MILLIONS OF DOLLARS)

Year or Period	Total Income Payments	Compensation of Employees	Entrepreneurial Withdrawals and Net Rents and Royalties	Dividends and Interest	Direct and Other Relief (A)	Payments to Veterans (B)	Benefit Payments under Social Security Act (C)
Year							
1929	78,574	51,478	15,717	11,331	48	-	-
1930	73,350	47,522	14,346	11,396	86	-	-
1931	63,117	40,161	11,931	9,913	205	907	-
1932	49,597	31,542	9,445	8,017	446	147	-
1933	45,921	29,591	8,634	7,088	554	54	-
1934	52,223	34,048	9,711	7,746	690	26	-
1935	56,086	36,666	10,640	7,812	949	19	-
1936	64,447	41,595	11,880	8,881	664	1,427	-
1937	68,972	45,384	13,040	9,963	877	128	-
12 Months Ended 1938							
Jan. 31	68,912	45,223	13,065	9,605	900	110	9
Feb. 28	68,699	44,987	13,062	9,594	983	97	36
Mar. 31	68,361	44,668	13,015	9,562	944	84	88
Apr. 30	67,918	44,295	12,967	9,464	964	74	134
May 31	67,455	43,861	12,980	9,444	982	67	181
June 30	66,804	43,420	12,860	9,242	1,003	49	230
July 31	66,230	43,006	12,770	9,117	1,022	37	278
Aug. 31	65,731	42,619	12,694	9,059	1,038	25	333
Sept. 30	65,185	42,334	12,566	8,829	1,051	20	385
Oct. 31	64,802	42,105	12,479	8,715	1,061	12	430
Nov. 30	64,699	42,037	12,421	8,702	1,066	6	457
Dec. 31	64,200	42,096	12,348	8,185	1,067	-	503
1939							
Jan. 31	64,225	42,232	12,259	8,093	1,068	-	533
Feb. 28	64,343	42,387	12,265	8,071	1,069	-	551
Mar. 31	64,533	42,563	12,255	8,096	1,070	-	559
Apr. 30	64,629	42,696	12,250	8,054	1,072	-	557
May 31	64,787	42,849	12,251	8,069	1,077	-	561
June 30	65,117	43,091	12,253	8,128	1,079	-	566

Source of Data: Statistics compiled by the U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, and published in Survey of Current Business. The above data for the years 1929 to 1937, inclusive, were taken from, and the twelve-months' moving totals for the years 1938 and 1939 are based on the monthly figures contained in, the aforementioned publication. For the sources and methods used in developing the statistics, see pp. 15-20 of the October, 1938 issue of Survey of Current Business.

Notes: (A) Includes Social Security benefits prior to 1938.
(B) Subsequent to December 1937, cash payments to veterans are included with direct relief.
(C) Includes benefits paid to retired railroad employees under Railroad Retirement Act.

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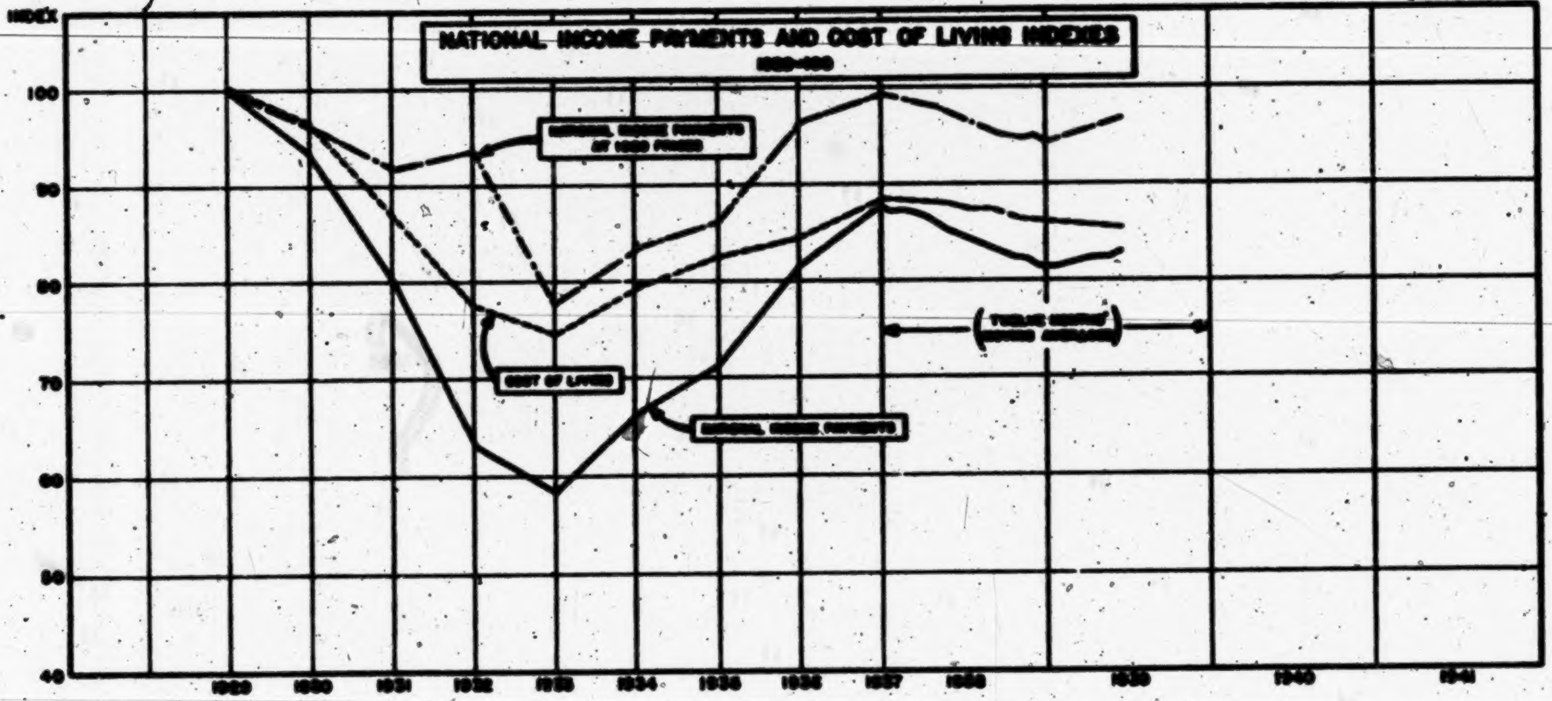
SCHEDULE NO.14
NATIONAL INCOME PAYMENTS

CHART NO. 11


NATIONAL INCOME PAYMENTS AND COST OF LIVING INDEXES
1929=100
INDEX
100
90
80
70
60
50
40
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
1939
1940
1941
NATIONAL INCOME PAYMENTS AT 1929 PRICES
COST OF LIVING
NATIONAL INCOME PAYMENTS
TWELVE MONTHS' MOVING AVERAGES

Year or Period (a)	National Income Payments (1) (1929=100) (b)	Cost of Living(2) (Monthly Average 1923=100) (c)	National Income Payments At 1929 Prices (d)=(b) ÷ (c)
Year			
1929	100.0	100.1	100.0
1930	93.4	96.7	96.6
1931	80.3	87.2	92.1
1932	63.1	77.9	~~93.2~~ 81.0
1933	58.4	74.9	77.9
1934	66.4	79.4	83.6
1935	71.3	82.6	86.3
1936	81.9	84.8	96.5
1937	87.8	88.5	99.2
2 Mos.Ended			
1938			
Jan. 31	87.7	88.6	99.0
Feb. 28	87.4	88.5	98.7
Mar. 31	87.0	88.4	98.4
Apr. 30	86.4	88.3	97.8
May 31	85.8	88.1	97.4
June 30	85.0	87.9	96.7
July 31	84.3	87.7	96.1
Aug. 31	83.7	87.5	95.6
Sept.30	83.0	87.2	95.2
Oct. 31	82.5	86.9	94.9
Nov. 30	82.3	86.6	95.0
Dec. 31	81.7	86.4	94.5
1939			
Jan. 31	81.7	86.2	94.8
Feb. 28	81.9	86.1	95.1
Mar. 31	82.1	85.9	95.6
Apr. 30	82.3	85.8	95.9
May 31	82.5	85.6	96.4
June 30	82.9	85.5	96.9

Source of Data:

(1) Statistics compiled by the U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, and published in Survey of Current Business.

(2) Statistics compiled by the National Industrial Conference Board and reproduced in Survey of Current Business.

Note: The monthly index figures for 1938 and 1939 represent twelve-months' moving averages computed from the monthly figures contained in the aforementioned publication.

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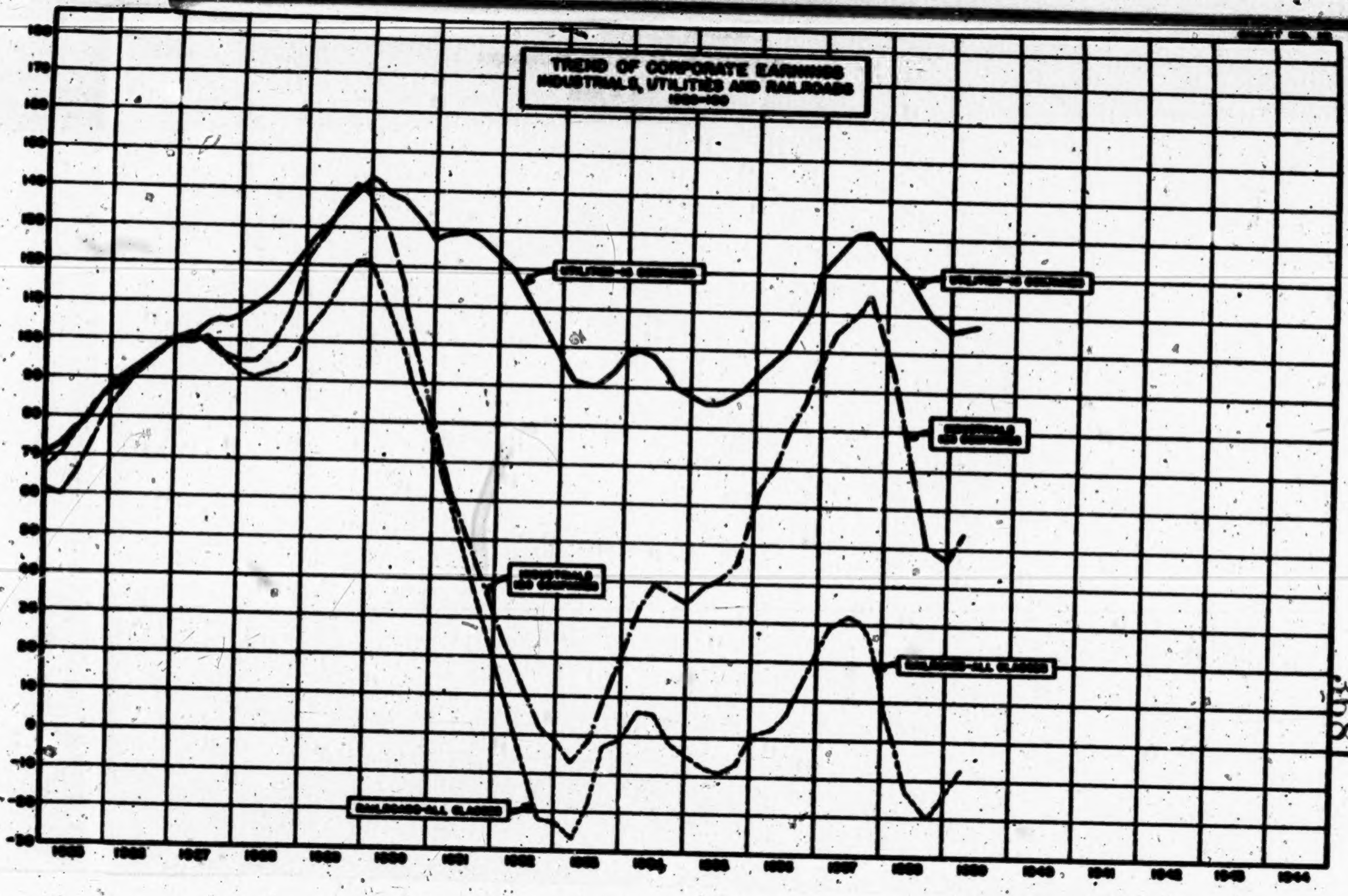

TREND OF CORPORATE EARNINGS
INDUSTRIALS, UTILITIES AND RAILROADS
1926=100

3681

TREND OF CORPORATE EARNINGS

INDUSTRIALS, UTILITIES AND RAILROADS

1926 = 100

INDUSTRIALS (120 COMPANIES)

Quarterly Earnings				Moving Average of Earnings	
78.5	51.6	48.2	66.1	Year ended Dec. 31, 1924	61.1
51.6	48.2	66.1	74.2	" " Mar. 31, 1925	60.0
48.2	66.1	74.2	78.3	" " June 30, "	66.7
66.1	74.2	78.3	83.4	" " Sept. 30, "	75.5
74.2	78.3	83.4	94.7	" " Dec. 31, "	82.7
78.3	83.4	94.7	98.8	" " Mar. 31, 1926	88.8
83.4	94.7	98.8	92.1	" " June 30, "	92.3
94.7	98.8	92.1	103.2	" " Sept. 30, "	97.2
98.8	92.1	103.2	105.8	" " Dec. 31, "	100.0
92.1	103.2	105.8	98.3	" " Mar. 31, 1927	99.9
103.2	105.8	98.3	94.2	" " June 30, "	100.4
105.8	98.3	94.2	92.7	" " Sept. 30, "	97.8
98.3	94.2	92.7	89.4	" " Dec. 31, "	93.7
94.2	92.7	89.4	106.7	" " Mar. 31, 1928	95.8
92.7	89.4	106.7	110.6	" " June 30, "	99.9
89.4	106.7	110.6	124.5	" " Sept. 30, "	107.8
106.7	110.6	124.5	135.9	" " Dec. 31, "	121.9
110.6	124.5	135.9	138.2	" " Mar. 31, 1929	127.3
124.5	135.9	138.2	143.9	" " June 30, "	135.6
135.9	138.2	143.9	145.2	" " Sept. 30, "	140.8
138.2	143.9	145.2	124.3	" " Dec. 31, "	137.9
143.9	145.2	124.3	106.5	" " Mar. 31, 1930	130.0
145.2	124.3	106.5	94.9	" " June 30, "	117.7
124.3	106.5	94.9	72.0	" " Sept. 30, "	99.4
106.5	94.9	72.0	52.5	" " Dec. 31, "	81.5

Quarterly Earnings				Moving Average of Earnings	
94.9	72.0	52.5	45.6	Year ended Mar. 31, 1931	66.3
72.0	52.5	45.6	48.1	" " June 30, "	54.6
52.5	45.6	48.1	33.9	" " Sept. 30, "	45.0
45.6	48.1	33.9	3.2	" " Dec. 31, "	32.7
48.1	33.9	3.2	8.4	" " Mar. 31, 1932	23.4
33.9	3.2	8.4	5.4	" " June 30, "	12.7
3.2	8.4	5.4	(6.3)	" " Sept. 30, "	2.7
8.4	5.4	(6.3)	(12.7)	" " Dec. 31, "	(1.3)
5.4	(6.3)	(12.7)	(12.6)	" " Mar. 31, 1933	(6.6)
(6.3)	(12.7)	(12.6)	25.8	" " June 30, "	(1.5)
(12.7)	(12.6)	25.8	43.8	" " Sept. 30, "	11.1
(12.6)	25.8	43.8	28.6	" " Dec. 31, "	21.4
25.8	43.8	28.6	37.4	" " Mar. 31, 1934	33.9
43.8	28.6	37.4	49.1	" " June 30, "	39.7
28.6	37.4	49.1	33.2	" " Sept. 30, "	37.1
37.4	49.1	33.2	22.8	" " Dec. 31, "	35.6
49.1	33.2	22.8	49.7	" " Mar. 31, 1935	38.7
33.2	22.8	49.7	55.6	" " June 30, "	40.3
22.8	49.7	55.6	51.5	" " Sept. 30, "	44.9
49.7	55.6	51.5	92.7	" " Dec. 31, "	62.4
55.6	51.5	92.7	75.2	" " Mar. 31, 1936	68.8
51.5	92.7	75.2	96.0	" " June 30, "	78.9
92.7	75.2	96.0	83.6	" " Sept. 30, "	86.9
75.2	96.0	83.6	130.7	" " Dec. 31, "	96.4

SCHEDULE NO.16
PAGE 1
TREND OF
EARNINGS–
INDUSTRIALS

2681

TREND OF CORPORATE EARNINGS

INDUSTRIALS, UTILITIES AND RAILROADS

1926 = 100

INDUSTRIALS (120 COMPANIES)

Quarterly Earnings				Moving Average of Earnings					
96.0	83.6	130.7	109.6	Year	ended	Mar. 31,	1937	105.0
83.6	130.7	109.6	113.5	"	"	June 30,	"	109.4
130.7	109.6	113.5	104.4	"	"	Sept. 30,	"	114.6
109.6	113.5	104.4	92.8	"	"	Dec. 31,	"	105.1
113.5	104.4	92.8	38.7	"	"	Mar. 31,	1938	87.4
104.4	92.8	38.7	35.8	"	"	June 30,	"	67.9
92.8	38.7	35.8	32.2	"	"	Sept. 30,	"	49.9
38.7	35.8	32.2	79.0	"	"	Dec. 31,	"	46.4
35.8	32.2	79.0	64.7	"	"	Mar. 31,	1939	53.9

3685

SCHEDULE NO.16
PAGE 2

TREND OF
EARNINGS-
INDUSTRIALS

2682

TREND OF CORPORATE EARNINGS

INDUSTRIALS, UTILITIES AND RAILROADS

1926 = 100

UTILITIES (15 COMPANIES)

Quarterly Earnings				Moving Average					
67.5	68.4	69.5	75.6	Year	ended	Dec. 31,	1924	70.3
68.4	69.5	75.6	79.9	"	"	Mar. 31,	1925	73.3
69.5	75.6	79.9	84.4	"	"	June 30,	"	77.4
75.6	79.9	84.4	90.5	"	"	Sept.30,	"	82.6
79.9	84.4	90.5	94.4	"	"	Dec. 31,	"	87.3
84.4	90.5	94.4	95.0	"	"	Mar. 31,	1926	91.1
90.5	94.4	95.0	96.2	"	"	June 30,	"	94.0
94.4	95.0	96.2	103.9	"	"	Sept.30,	"	97.4
95.0	96.2	103.9	104.8	"	"	Dec. 31,	"	100.0
96.2	103.9	104.8	102.4	"	"	Mar. 31,	1927	101.8
103.9	104.8	102.4	107.1	"	"	June 30,	"	104.6
104.8	102.4	107.1	108.6	"	"	Sept.30,	"	105.8
102.4	107.1	108.6	109.2	"	"	Dec.. 31,	"	106.8
107.1	108.6	109.2	114.8	"	"	Mar. 31,	1928	109.9
108.6	109.2	114.8	120.4	"	"	June 30,	"	113.3
109.2	114.8	120.4	128.2	"	"	Sept.30,	"	118.2
114.8	120.4	128.2	132.4	"	"	Dec. 31,	"	124.0
120.4	128.2	132.4	137.2	"	"	Mar. 31,	1929	129.6
128.2	132.4	137.2	138.1	"	"	June 30,	"	134.0
132.4	137.2	138.1	146.1	"	"	Sept.30,	"	138.5
137.2	138.1	146.1	148.5	"	"	Dec. 31,	"	142.5
138.1	146.1	148.5	125.1	"	"	Mar. 31,	1930	139.5
146.1	148.5	125.1	130.1	"	"	June 30,	"	137.5
148.5	125.1	130.1	129.9	"	"	Sept.30,	"	133.4
125.1	130.1	129.9	125.7	"	"	Dec. 31,	"	127.7

Quarterly Earnings				Moving Average				
130.1	129.9	125.7	129.4	Year	ended	Mar. 31,	1931	128.8
129.9	125.7	129.4	131.8	"	"	June 30,	"	129.2
125.7	129.4	131.8	121.6	"	"	Sept.30,	"	127.2
129.4	131.8	121.6	111.1	"	"	Dec. 31,	"	123.5
131.8	121.6	111.1	111.1	"	"	Mar. 31,	1932	118.9
121.6	111.1	111.1	102.1	"	"	June 30,	"	111.5
111.1	111.1	102.1	92.7	"	"	Sept.30,	"	104.3
111.1	102.1	92.7	80.3	"	"	Dec. 31,	"	96.6
102.1	92.7	80.3	89.3	"	"	Mar. 31,	1933	91.1
92.7	80.3	89.3	98.7	"	"	June 30,	"	90.3
80.3	89.3	98.7	107.4	"	"	Sept.30,	"	93.9
89.3	98.7	107.4	97.4	"	"	Dec. 31,	"	98.2
98.7	107.4	97.4	95.6	"	"	Mar. 31,	1934	99.8
107.4	97.4	95.6	86.3	"	"	June 30,	"	96.7
97.4	95.6	86.3	82.5	"	"	Sept.30,	"	90.5
95.6	86.3	82.5	88.1	"	"	Dec. 31,	"	88.2
86.3	82.5	88.1	88.4	"	"	Mar. 31,	1935	86.3
82.5	88.1	88.4	88.0	"	"	June 30,	"	86.8
88.1	88.4	88.0	93.9	"	"	Sept.30,	"	89.6
88.4	88.0	93.9	101.1	"	"	Dec. 31,	"	92.9
88.0	93.9	101.1	102.2	"	"	Mar. 31,	1936	96.3
93.9	101.1	102.2	109.6	"	"	June 30,	"	101.7
101.1	102.2	109.6	123.9	"	"	Sept.30,	"	109.2
102.2	109.6	123.9	147.2	"	"	Dec. 31,	"	120.7

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SCHEDULE NO.16
PAGE 3
TREND OF
EARNINGS-
UTILITIES

TREND OF CORPORATE EARNINGS

INDUSTRIALS, UTILITIES AND RAILROADS

1926 = 100

UTILITIES (15 COMPANIES)

Quarterly Earnings				Moving Average					
109.6	123.9	147.2	121.3	Year	ended	Mar. 31,	1937	125.5
123.9	147.2	121.3	127.7	"	"	June 30,	"	130.0
147.2	121.3	127.7	127.7	"	"	Sept.30,	"	131.0
121.3	127.7	127.7	126.3	"	"	Dec. 31,	"	125.8
127.7	127.7	126.3	102.0	"	"	Mar. 31,	1938	120.9
127.7	126.3	102.0	104.0	"	"	June 30,	"	115.0
126.3	102.0	104.0	104.8	"	"	Sept.30,	"	109.3
102.0	104.0	104.8	113.2	"	"	Dec. 31,	"	106.0
104.0	104.8	113.2	113.4	"	"	Mar. 31,	1939	106.9

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SCHEDULE NO.16
PAGE 3
TREND OF
EARNINGS
UTILITIES

2684

TREND OF CORPORATE EARNINGS

INDUSTRIALS, UTILITIES AND RAILROADS

1926 = 100

RAILROADS (ALL CLASS 1 RAILS)

Quarterly Earnings				Moving Average of Earnings	
76.1	55.0	60.4	81.1	Year ended Dec. 31, 1924	68.2
55.0	60.4	81.1	83.6	" " Mar. 31, 1925	70.0
60.4	81.1	83.6	81.2	" " June 30, "	76.6
81.1	83.6	81.2	89.4	" " Sept.30, "	83.8
83.6	81.2	89.4	89.4	" " Dec. 31, "	85.9
81.2	89.4	89.4	96.1	" " Mar. 31, 1926	89.0
89.4	89.4	96.1	99.6	" " June 30, "	93.6
89.4	96.1	99.6	101.9	" " Sept.30, "	96.8
96.1	99.6	101.9	102.4	" " Dec. 31, "	100.0
99.6	101.9	102.4	103.5	" " Mar. 31, 1927	101.9
101.9	102.4	103.5	89.6	" " June 30, "	99.4
102.4	103.5	89.6	88.1	" " Sept.30, "	95.9
103.5	89.6	88.1	88.7	" " Dec. 31, "	92.5
89.6	88.1	88.7	100.4	" " Mar. 31, 1928	91.7
88.1	88.7	100.4	93.5	" " June 30, "	92.7
88.7	100.4	93.5	95.3	" " Sept.30, "	94.5
100.4	93.5	95.3	121.0	" " Dec. 31, "	102.6
93.5	95.3	121.0	118.2	" " Mar. 31, 1929	107.0
95.3	121.0	118.2	124.5	" " June 30, "	114.8
121.0	118.2	124.5	119.9	" " Sept.30, "	120.9
118.2	124.5	119.9	118.0	" " Dec. 31, "	120.2
124.5	119.9	118.0	80.3	" " Mar. 31, 1930	110.7
119.9	118.0	80.3	82.8	" " June 30, "	100.3
118.0	80.3	82.8	70.1	" " Sept.30, "	87.8
80.3	82.8	70.1	68.0	" " Dec. 31, "	75.3

Quarterly Earnings				Moving Average of Earnings	
82.8	70.1	68.0	23.6	Year ended Mar. 31, 1931	61.1
70.1	68.0	23.6	32.1	" " June 30, "	48.5
68.0	23.6	32.1	21.4	" " Sept.30, "	36.3
23.6	32.1	21.4	9.7	" " Dec. 31, "	21.7
32.1	21.4	9.7	(25.0)	" " Mar. 31, 1932	9.6
21.4	9.7	(25.0)	(38.7)	" " June 30, "	(8.2)
9.7	(25.0)	(38.7)	(32.7)	" " Sept.30, "	(21.7)
(25.0)	(38.7)	(32.7)	7.6	" " Dec. 31, "	(22.2)
(38.7)	(32.7)	7.6	(43.8)	" " Mar. 31, 1933	(26.9)
(32.7)	7.6	(43.8)	(3.5)	" " June 30, "	(18.1)
7.6	(43.8)	(3.5)	29.7	" " Sept.30, "	(2.5)
(43.8)	(3.5)	29.7	12.8	" " Dec. 31, "	(1.2)
(3.5)	29.7	12.8	(7.0)	" " Mar. 31, 1934	8.0
29.7	12.8	(7.0)	(4.2)	" " June 30, "	7.8
12.8	(7.0)	(4.2)	(9.0)	" " Sept.30, "	(1.9)
(7.0)	(4.2)	(9.0)	2.5	" " Dec. 31, "	(4.4)
(4.2)	(9.0)	2.5	(19.9)	" " Mar. 31, 1935	(7.7)
(9.0)	2.5	(19.9)	(10.1)	" " June 30, "	(9.1)
2.5	(19.9)	(10.1)	(4.0)	" " Sept.30, "	(7.9)
(19.9)	(10.1)	(4.0)	34.3	" " Dec. 31, "	0.8
(10.1)	(4.0)	34.3	(12.8)	" " Mar. 31, 1936	1.9
(4.0)	34.3	(12.8)	3.0	" " June 30, "	5.1
34.3	(12.8)	3.0	31.0	" " Sept.30, "	13.9
(12.8)	3.0	31.0	64.5	" " Dec. 31, "	21.4

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SCHEDULE NO.16
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TREND OF
EARNINGS—
RAILROADS

2685

TREND OF CORPORATE EARNINGS

INDUSTRIALS, UTILITIES AND RAILROADS

1926 = 100

RAILROADS (ALL CLASS 1 RAILS)

Quarterly Earnings				Moving Average of Earnings		
3.0	31.0	68.5	13.1	Year ended	Mar. 31, 1937	28.9
31.0	68.5	13.1	13.8	" "	June 30, "	31.6
68.5	13.1	13.8	19.2	" "	Sept.30, "	28.7
13.1	13.8	19.2	9.0	" "	Dec. 31, "	13.8
13.8	19.2	9.0	(49.0)	" "	Mar. 31, 1938	(1.8)
19.2	9.0	(49.0)	(41.0)	" "	June 30, "	(15.5)
9.0	(49.0)	(41.0)	1.5	" "	Sept.30, "	(19.9)
(49.0)	(41.0)	1.5	29.2	" "	Dec. 31, "	(14.8)
(41.0)	1.5	29.2	(19.8)	" "	Mar. 31, 1939	(7.5)

Note: The "Standard Trade and Securities" Index Numbers of Quarterly Earnings of Industrials, Utilities and Railroads have been reduced to twelve months moving averages. By this process, each quarterly index number is made to express an average of that of the quarter in question combined with those of the three preceding quarters. Seasonal variations are eliminated.
Source of Index Numbers of Quarterly Earnings: Standard Trade and Securities (Published by Standard Statistics Company, Inc.) Volume 3, Current Statistics Section.

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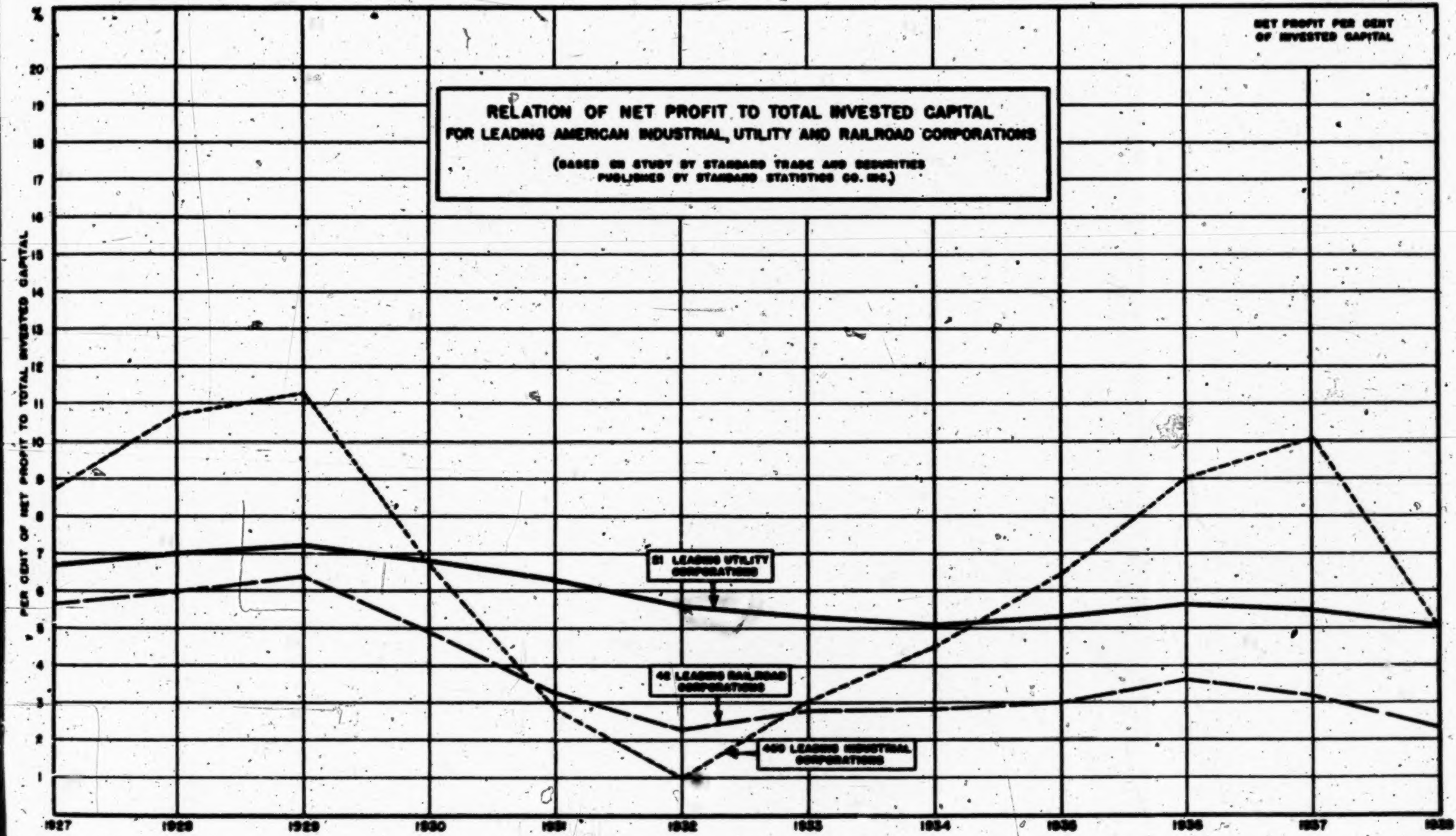
TREND OF
EARNINGS-
RAILROADS

SCHEDULE NO.16
PAGE 6

CHART NO. 13



RELATION OF NET PROFIT TO TOTAL INVESTED CAPITAL
FOR LEADING AMERICAN INDUSTRIAL, UTILITY AND RAILROAD CORPORATIONS

(BASED ON STUDY BY STANDARD TRADE AND SECURITIES
PUBLISHED BY STANDARD STATISTICS CO. INC.)

RELATION OF NET PROFIT TO TOTAL INVESTED CAPITAL FOR LEADING AMERICAN INDUSTRIAL, UTILITY AND RAILROAD CORPORATIONS

UNIT: $1,000,000

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
400 Leading Industrial Corporations												
Total Invested Capital	$25,161	$26,814	$28,803	$29,451	$28,092	$26,176	$26,653	$24,921	$24,710	$25,150	$25,181	$26,582
Net Profit	2,193	2,869	3,255	1,945	817	242	793	1,116	1,579	2,275	2,539	1,358
% of Net Profit to Total Invested Capital	8.7%	10.7%	11.3%	6.6%	2.9%	0.9%	3.0%	4.5%	6.4%	9.0%	10.1%	5.1%
21 Leading Utility Corporations												
Total Invested Capital	$ 6,695	$ 7,470	$ 8,119	$ 8,929	$ 9,339	$ 9,232	$ 9,113	$ 8,761	$ 8,778	$ 8,582	$ 8,529	$ 8,699
Net Profit	447	526	587	604	588	514	482	443	462	473	467	440
% of Net Profit to Total Invested Capital	6.7%	7.0%	7.2%	6.8%	6.3%	5.6%	5.3%	5.1%	5.3%	5.6%	5.5%	5.1%

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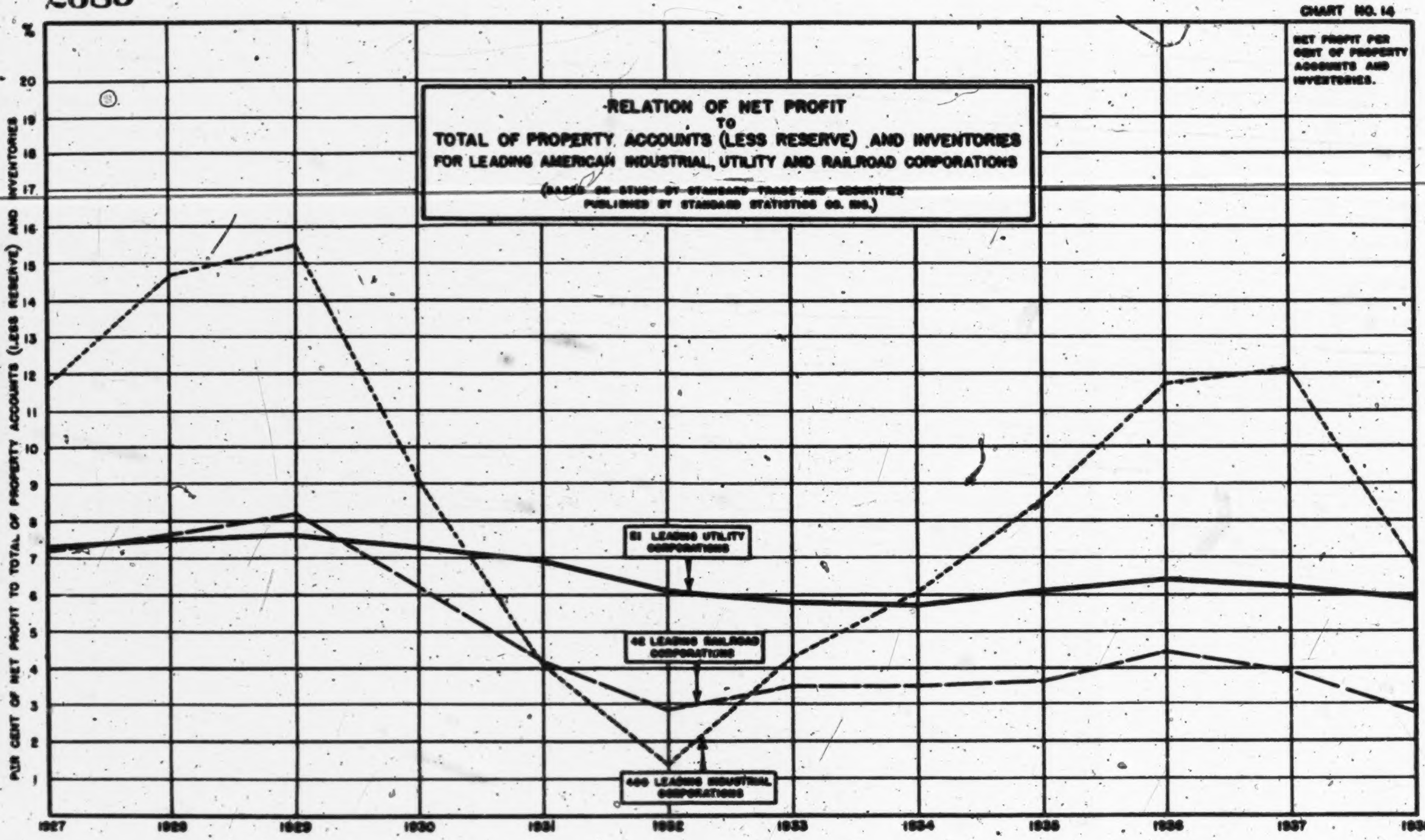


CHART NO. 14

RELATION OF NET PROFIT
TO
TOTAL OF PROPERTY ACCOUNTS (LESS RESERVE) AND INVENTORIES
FOR LEADING AMERICAN INDUSTRIAL, UTILITY AND RAILROAD CORPORATIONS

(BASED ON STUDY BY STANDARD TRADE AND SECURITIES
PUBLISHED BY STANDARD STATISTICS CO. INC.)

RELATION OF NET PROFIT TO TOTAL OF PROPERTY ACCOUNTS (LESS RESERVE) AND INVENTORIES FOR LEADING AMERICAN INDUSTRIAL, UTILITY AND RAILROAD CORPORATIONS

UNIT: $1,000,000

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
400 Leading Industrial Corporations												
Property Accounts (Less Reserve)	$13,780	$14,286	$15,273	$16,437	$16,439	$15,475	$14,830	$14,249	$13,916	$14,178	$14,863	$14,571
Inventories	5,015	5,206	5,824	5,347	4,477	3,819	4,231	4,507	4,763	5,238	6,103	5,468
Total	$18,795	$19,492	$21,097	$21,784	$20,916	$19,294	$19,061	$18,756	$18,679	$19,416	$20,966	$20,039
Net Profit	2,199	2,849	3,255	1,945	817	[illegible]	793	1,116	1,579	2,275	2,534	1,358
% of Net Profit to Property Accounts and Inventories	11.7%	14.6%	15.4%	8.9%	3.9%	1.3%	4.2%	6.0%	8.5%	11.7%	12.1%	6.8%
21 Leading Utility Corporations												
Property Accounts (Less Reserve)	$ 5,930	$ 6,870	$ 7,518	$ 8,104	$ 8,367	$ 8,347	$ 8,234	$ 7,597	$ 7,552	$ 7,307	$ 7,372	$ 7,288
Inventories	113	142	160	161	140	114	119	118	[illegible]	126	136	136
Total	$ 6,043	$ 7,012	$ 7,678	$ 8,265	$ 8,507	$ 8,461	$ 8,353	$ 7,715	$ 7,[illegible]	$ 7,433	$ 7,505	$ 7,424
Net Profit	447	526	587	604	585	514	482	443	462	473	467	440
% of Net Profit to Property Accounts and Inventories	7.4%	7.5%	7.6%	7.3%	6.9%	6.1%	5.8%	5.7%	6.1%	6.4%	6.2%	5.9%

RELATION OF NET PROFIT TO TOTAL OF PROPERTY ACCOUNTS (LESS RESERVES) AND INVENTORIES FOR LEADING AMERICAN INDUSTRIAL, UTILITY AND RAILROAD CORPORATIONS

UNIT: $1,000,000

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
42 Leading Railroad Corporations												
Property Accounts (Less Reserve)	$14,576	$14,823	$15,176	$15,601	$15,559	$15,712	$15,550	$15,25[illegible]	$15,163	$15,141	$15,205	$15,106
Inventories	419	373	372	[illegible]	[illegible]	260	[illegible]	[illegible]	[illegible]	[illegible]	313	260
Total	$14,995	$15,196	$15,5[illegible]	$15,953	$15,867	$15,972	$15,731	$15,5[illegible]	$15,3[illegible]	$15,393	$15,51[illegible]	$15,3[illegible]
Net Profit	1,082	1,153	1,269	990	698	462	556	583	560	661	609	424
% of Net Profit to Property Accounts and Inventories	7.2%	7.6%	8.2%	6.2%	4.4%	2.9%	3.5%	3.5%	3.6%	4.4%	3.9%	2.8%

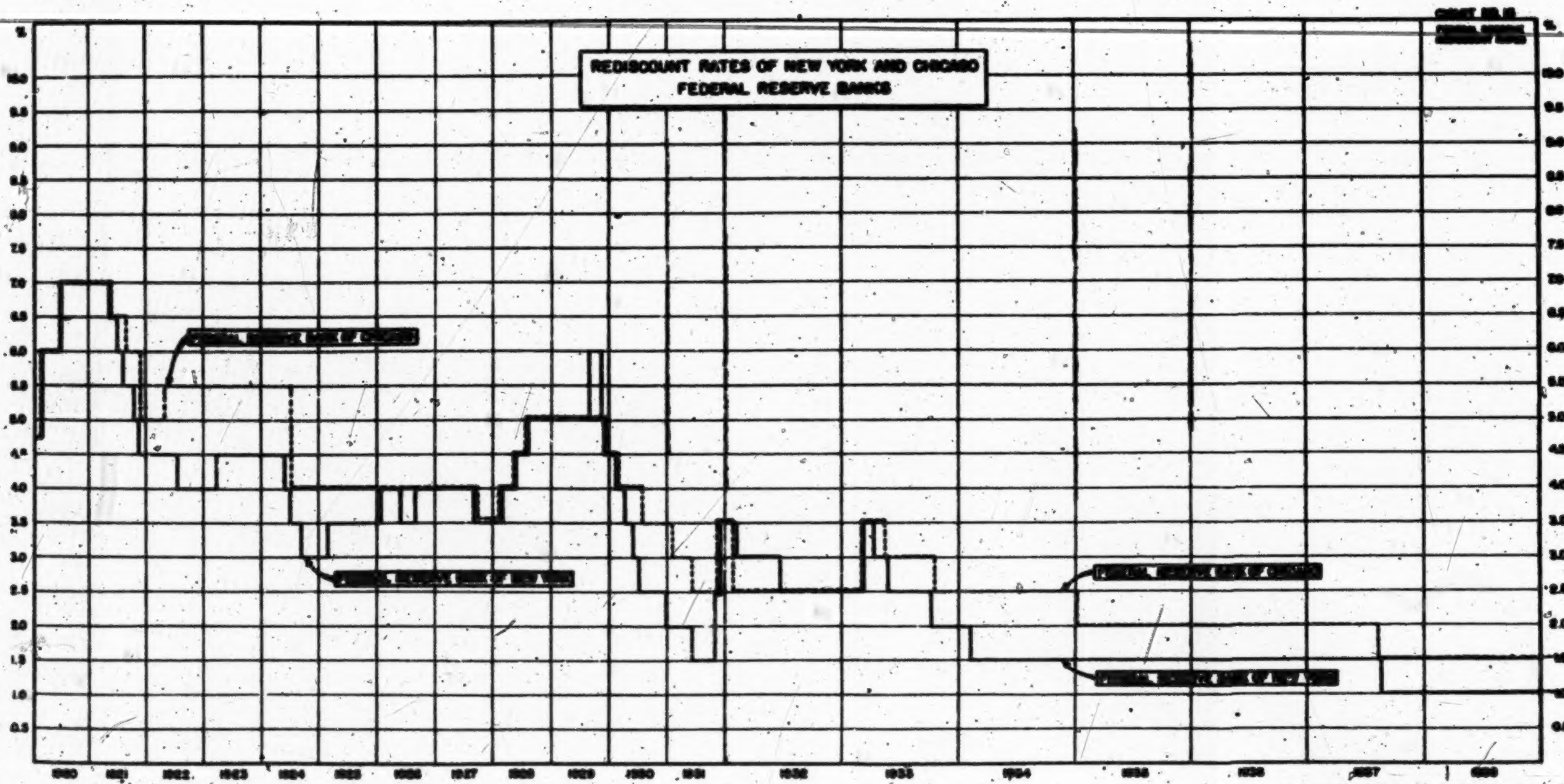
Note:

Net Profit – Represents the amount available for fixed charges after depreciation, etc.

Source of above:

Standard Trade and Securities (Published by Standard Statistics Co., Inc.) Volume 3, Section J, dated August 25, 1939.

SCHEDULE NO. 15
PAGE 2
RELATION OF
PROFITS TO
PROPERTY
ACCOUNTS AND
INVENTORIES



REDISCOUNT RATES OF NEW YORK AND CHICAGO FEDERAL RESERVE BANKS

NO CHANGES IN RATES SINCE AUG. 1937.

DERAL RESERVE BANK OF NEW YORK

FFECTIVE DATE OF RATES	RATES
ril 6, 1918	4 3/4
n 23, 1920	6
ne 1, "	7
y 5, 1921	6½
ne 16, "	6
ly 21, "	5½
pt 22, "	5
v 3, "	4½
ne 22, 1922	4
b 23, 1923	4½
y 1, 1924	4
ne 12, "	3½
g 8, "	3
b 27, 1925	3½
n 4, 1926	4
ril 23, "	3½
g 13, "	4
g 5, 1927	3½
b 3, 1928	4
y 18, "	4½
ly 13, "	5
9, 1929	6
v 1, "	5
v 15, "	4½
b 7, 1930	4
r 14, "	3½
y 2, "	3
ne 20, "	2½
c 24, "	2
y 8, 1931	1½
t 9, "	2½
t 16, "	3½
b 26, 1932	3
ne 24, "	2½
r 3, 1933	3½
r 7, "	3

FEDERAL RESERVE BANK OF NEW YORK

EFFECTIVE DATE OF RATES	RATES
May 26, 1933	2½
Oct 20, "	2
Feb 2, 1934	1½
Aug 27, 1937	1

FEDERAL RESERVE BANK OF CHICAGO:

EFFECTIVE DATE OF RATES	RATES
July 15, 1918	4 3/4
Jan 24, 1920	6
June 1, "	7
May 7, 1921	6½
July 30, "	6
Nov 3, "	5
Mar 25, 1922	5½
June 14, 1924	4
Sept 7, 1927	3½
Jan 25, 1928	4
Apr 20, "	4½
July 11, "	5
Nov 23, 1929	4½
Feb 8, 1930	4
June 21, "	3½
Jan 10, 1931	3
May 9, "	2½
Oct 17, "	3½
Jan 25, 1932	2½
Mar 4, 1933	3½
May 27, "	3
Oct 21, "	2½
Jan 19, 1935	2
Aug 21, 1937	1½

te The rates are on 61 to 90 day commercial, agriculture and livestock paper
the end of 1921 and on "all classes" of paper from the beginning of 1922 to
e

urce of data: Standard Trade and Securities (Published by Standard Statistics
pany, Inc) Volume 8. page A-24, dated January 21 1938

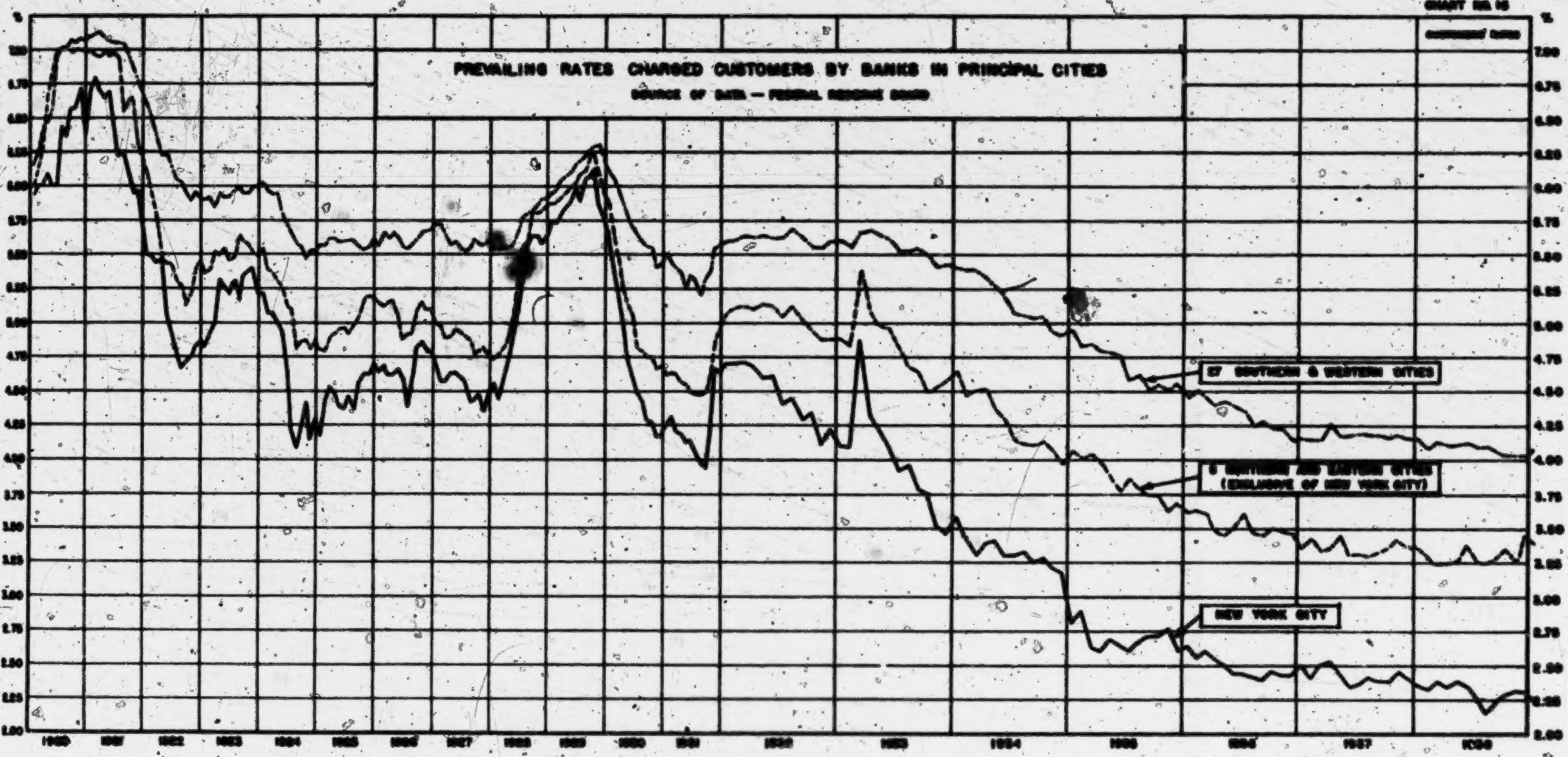


CHART NO. 16
%
PREVAILING RATES CHARGED CUSTOMERS BY BANKS IN PRINCIPAL CITIES
SOURCE OF DATA — FEDERAL RESERVE BOARD
27 SOUTHERN & WESTERN CITIES
8 NORTHERN AND EASTERN CITIES
(EXCLUSIVE OF NEW YORK CITY)
NEW YORK CITY
7.00
6.75
6.50
6.25
6.00
5.75
5.50
5.25
5.00
4.75
4.50
4.25
4.00
3.75
3.50
3.25
3.00
2.75
2.50
2.25
2.00
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
]

PREVAILING RATES CHARGED CUSTOMERS BY BANKS IN PRINCIPAL CITIES

WEIGHTED AVERAGES　　UNIT: PER CENT

NEW YORK CITY

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	5.93	6.00	6.00	6.09	6.00	6.00	6.43	6.36	6.57	6.57	6.71	6.36	6.25
1921	6.71	6.76	6.70	6.65	6.64	6.45	6.21	6.25	6.11	5.93	5.96	5.85	6.36
1922	5.90	5.36	5.43	5.46	5.06	4.93	5.16	4.65	4.70	4.76	4.82	4.86	5.07
1923	4.88	4.91	4.96	5.32	5.27	5.21	4.89	5.18	5.32	5.37	5.30	5.21	5.19
1924	5.21	5.07	5.06	4.98	4.89	4.91	5.21	4.69	4.80	4.41	4.13	4.89	5.08
1925	4.16	4.43	4.53	4.48	4.38	4.36	4.46	4.50	4.57	4.66	4.64	4.70	4.57
1926	4.64	4.68	4.62	4.62	4.66	4.78	4.38	4.68	4.81	4.65	4.79	4.79	4.67
1927	4.66	4.56	4.56	4.63	4.63	4.60	4.56	4.41	4.56	4.59	4.55	4.60	4.53
1928	4.95	4.64	4.59	4.72	4.97	5.09	5.38	5.59	5.63	5.63	5.56	5.63	5.15
1929	5.74	5.73	5.81	5.85	5.88	5.93	5.88	6.05	6.08	6.08	5.86	5.76	5.88
1930	5.64	5.35	5.32	4.91	4.74	4.59	4.88	4.41	4.45	4.66	4.17	4.16	4.69
1931	4.84	4.51	4.30	4.17	4.11	4.13	4.05	3.97	3.93	4.57	4.67	4.64	4.52
1932	4.71	4.71	4.72	4.69	4.55	4.61	4.62	4.45	4.50	4.35	4.18	4.22	4.69
1933	4.12	4.11	4.88	4.33	4.86	4.10	3.93	3.97	3.77	3.76	3.58	3.48	4.02
1934	3.58	3.43	3.51	3.39	3.42	3.30	3.30	3.32	3.38	3.38	3.22	3.15	3.33
1935	2.83	2.90	2.64	2.61	2.65	2.66	2.61	2.67	2.72	2.78	2.77	2.61	2.70
1936	2.64	2.96	2.61	2.54	2.52	2.56	2.46	2.38	2.40	2.46	2.43	2.43	2.49
1937	2.50	2.41	2.50	2.53	2.46	2.34	2.36	2.41	2.39	2.38	2.45	2.40	2.43
1938	2.36	2.34	2.40	2.36	2.40	2.36	2.27	2.16	2.25	2.29	2.33	2.33	2.32
1939	2.25	2.24	(1)										

(1) Series discontinued. New revised series on somewhat different basis to be substituted.

EXHIBIT NO. [illegible]
PAGE 1
[illegible] BANK
NEW YORK

WEIGHTED AVERAGES UNIT: PER CENT

5 OTHER NORTHERN AND EASTERN CITIES

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	5.99	6.15	6.32	6.68	6.79	6.98	7.01	7.08	6.98	7.00	7.00	6.97	6.74
1921	6.99	6.95	6.94	6.72	6.94	6.97	6.93	6.59	6.62	6.65	6.32	6.39	6.76
1922	6.08	5.89	5.77	5.46	5.43	5.43	5.31	5.27	5.12	5.88	5.35	5.96	[illegible]
1923	5.52	5.38	5.58	5.49	5.56	5.45	5.47	5.64	5.59	5.57	5.51	5.38	[illegible]
1924	5.53	5.38	5.37	5.31	5.26	5.12	5.09	4.80	4.57	4.87	4.80	4.67	[illegible]
1925	4.80	4.79	4.89	4.92	4.95	4.95	4.90	4.98	5.04	5.16	5.80	5.17	[illegible]
1926	5.14	5.11	5.15	5.17	5.07	4.87	4.92	4.91	5.08	5.15	5.09	5.09	[illegible]
1927	4.99	4.98	4.88	4.90	4.95	4.93	4.90	4.87	4.77	4.79	4.88	4.76	[illegible]
1928	4.73	4.76	4.81	4.91	5.04	5.38	5.57	5.39	5.80	5.80	5.02	5.91	[illegible]
1929	5.87	5.86	5.41	6.00	6.09	6.02	6.08	6.11	5.46	5.85	6.12	5.46	[illegible]
1930	5.88	5.66	5.47	5.82	5.13	5.06	4.81	4.79	4.74	4.73	4.66	4.48	[illegible]
1931	4.61	4.63	4.62	4.57	4.75	4.49	4.88	4.57	4.48	4.68	4.57	4.91	[illegible]
1932	5.07	5.13	5.14	5.10	5.14	5.13	5.05	5.12	5.05	4.96	4.88	4.88	[illegible]
1933	4.89	4.94	5.39	5.09	4.93	4.97	4.82	4.68	4.65	4.51	4.95	4.95	[illegible]
1934	4.65	4.49	4.58	4.58	4.35	4.30	4.15	4.12	4.11	4.13	4.03	4.57	[illegible]
1935	4.08	4.02	4.05	3.99	3.88	3.78	3.67	3.79	3.75	3.75	3.63	3.72	[illegible]
1936	3.62	3.65	3.60	3.47	3.45	3.51	3.62	3.47	3.45	3.90	3.47	3.36	[illegible]
1937	3.36	3.43	3.36	3.35	3.45	3.38	3.32	3.49	3.33	3.57	3.28	3.38	[illegible]
1938	3.37	3.89	3.88	3.86	3.87	3.38	3.88	3.38	3.38	3.57	3.38	3.47	[illegible]
1939	3.41	3.33	(1)										

(1) Series discontinued. New revised series on somewhat different basis to be substituted.

3715

[illegible]
PAGE 2
[illegible]

WEIGHTED AVERAGES UNIT: PER CENT

27 SOUTHERN AND WESTERN CITIES

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	6.18	6.26	6.43	6.47	6.56	6.88	7.00	6.99	7.07	7.04	7.08	7.07	6.75
1921	7.10	7.11	7.13	7.09	7.06	7.05	7.04	7.03	6.96	6.85	6.74	6.67	6.95
1922	6.96	6.46	6.35	6.82	6.23	6.13	6.04	6.02	5.94	5.89	5.94	5.90	6.14
1923	5.90	5.91	5.83	5.94	5.98	5.91	5.96	5.98	5.94	5.85	5.95	5.99	5.94
1924	6.02	5.91	5.89	5.89	5.79	5.69	5.63	5.57	5.95	5.47	5.53	5.75	5.71
1925	5.57	5.75	5.61	5.61	5.58	5.59	5.59	5.80	5.75	5.73	5.85	5.82	5.58
1926	5.56	5.65	5.62	5.65	5.61	5.55	5.95	5.96	5.80	5.88	5.67	5.68	5.61
1927	5.72	5.71	5.65	5.57	5.52	5.54	5.92	5.53	5.61	5.96	5.96	5.60	5.60
1928	5.53	5.53	5.96	5.98	5.96	5.67	5.77	5.80	5.82	5.87	5.90	5.91	5.70
1929	5.94	5.98	6.04	6.07	6.10	6.16	6.17	6.22	6.27	6.29	6.29	6.20	6.14
1930	6.12	6.05	5.98	5.86	5.75	5.69	5.63	5.98	5.95	5.54	5.40	5.43	5.72
1931	5.90	5.43	5.80	5.36	5.88	5.34	5.30	5.20	5.32	5.38	5.53	5.56	5.59
1932	5.61	5.62	5.64	5.63	5.64	5.62	5.63	5.68	5.63	5.56	5.75	5.60	5.62
1933	5.60	5.56	5.66	5.68	5.66	5.62	5.58	5.53	5.55	5.50	5.82	5.43	5.56
1934	5.40	5.39	5.40	5.34	5.28	5.19	5.07	5.05	5.04	5.05	4.93	4.92	5.17
1935	4.95	4.94	4.85	4.80	4.79	4.76	4.98	4.63	4.91	4.95	4.51	4.95	4.69
1936	4.67	4.51	4.56	4.40	4.63	4.39	4.35	4.25	4.29	4.22	4.23	4.14	4.54
1937	4.16	4.15	4.15	4.21	4.17	4.18	4.19	4.18	4.18	4.16	4.17	4.15	4.17
1938	4.16	4.09	4.15	4.13	4.13	4.14	4.12	4.12	4.07	4.06	4.05	4.05	4.11
1939	4.10	4.09	(1)										

(1) Series discontinued. New revised series on somewhat different basis to be substituted.

See Page 4 of this Schedule, for Note and Source of Data.

SCHEDULE NO. 26
PAGE 3
CUSTOMERS' RATES
SOUTH AND WEST

PREVAILING RATES CHARGED CUSTOMERS BY BANKS IN PRINCIPAL CITIES

Note: Figures relate to rates charged by reporting banks to their own customers as distinguished from open-market rates. All averages are based on rates reported for three types of customer loans- commercial loans, and demand and time loans on securities. The method of computing the average takes into account (a) the relative importance of each of these three types of loans and (b) the relative importance of each reporting bank, as measured by total loans. In the two group averages (8 Other Northern and Eastern Cities, and 27 Southern and Western Cities) the average rate for each city included is weighted according to the importance of that city in the group, as measured by loans of all banks.

Source of data: The average rates of interest were computed by the Federal Reserve Board, and are contained in the Annual Reports of the Board of Governors of The Federal Reserve System and in the monthly issues of the Federal Reserve Bulletin. The interest rates are reproduced in Standard Trade and Securities, Volume 3, page A-29, dated January 21, 1938, and in Current Statistics Section. The above figures were taken from the last named source.

8 Other Northern and Eastern Cities

1. Chicago
2. Boston
3. Philadelphia
4. Cleveland
5. Detroit
6. Pittsburgh
7. Buffalo
8. Cincinnati

27 Southern and Western Cities

1. San Francisco
2. Los Angeles
3. St. Louis
4. Baltimore
5. Minneapolis
6. New Orleans
7. Kansas City
8. Dallas
9. Houston
10. Seattle
11. Atlanta
12. Louisville
13. Richmond
14. Denver
15. Portland, Ore.
16. Omaha
17. Jacksonville
18. Birmingham
19. Salt Lake City
20. Nashville
21. Oklahoma City
22. Spokane
23. Little Rock
24. El Paso
25. Helena
26. Charlotte
27. San Antonio

2699

SCHEDULE No. 21

Department Store Sales
United States and Chicago Federal Reserve District
Monthly Average 1923-1925=100

Year	United States	Chicago Federal Reserve District
1923	98	99
1924	99	98
1925	103	103
1926	106	108
1927	107	110
1928	108	116
1929	111	118
1930	102	103
1931	92	87
1932	69	65
1933	67	64
1934	75	74
1935	79	80
1936	88	91
1937	92	98
1938	85	87

Source of Data:

Statistics compiled by the Board of Governors of the Federal Reserve System for the United States for all years and for the Chicago Federal Reserve District through 1930. The latter index was subsequently carried forward by the Survey of Current Business until the Chicago Federal Reserve Bank started the computation for its own district. Both indexes are reproduced in the Survey of Current Business from which the above figures were taken.

SCHEDULE No. 22

Factory Employment and Pay Rolls Indexes
United States, State of Illinois and Chicago Industrial Area
Monthly Average 1929-1931=100

Year	United States (1)	State of Illinois (2)	Chicago Industrial Area (2)
		Factory Employment	
1929	114.9	117.5	116.4
1930	100.2	101.3	101.5
1931	84.7	81.3	82.1
1932	71.9	64.7	64.6
1933	79.6	68.3	66.0
1934	92.9	80.9	77.5
1935	99.0	85.1	79.2
1936	107.4	94.4	86.8
1937	117.8	107.1	99.4
1938	97.3	85.9	81.0
12 Mos. Ended			
8/31/39	101.4	88.0	82.0
9/30/39	112.1	88.8	82.7
		Factory Pay Rolls	
1929	123.8	130.5	130.1
1930	100.2	100.0	100.1
1931	76.0	69.3	69.6
1932	52.4	44.2	43.8
1933	56.2	45.9	42.6
1934	72.3	60.7	56.1
1935	83.1	69.6	61.5
1936	96.2	83.6	72.5
1937	114.9	105.2	92.3
1938	87.3	78.7	70.3
12 Mos. Ended			
8/31/39	95.9	84.0	73.8
9/30/39	92.	85.2	74.6

Source of Data:

Above indexes computed from date reproduced in the Survey of Current Business, a U. S. Department of Commerce publication, as follows:

(1) Based on index computed by the U. S. Department of Labor, Bureau of Labor Statistics, but adjusted to reflect comparison with the monthly average for the three years 1929–1931, instead of the average for the base period 1923–1925 as published.

(2) Based on index computed by the Illinois Department of Labor, but adjusted to reflect comparison with the monthly average for the three years 1929–1931, instead of the average for the base period 1925–1927 as published.

2701 SCHEDULE No. 23

Factory Average Weekly Earnings Indexes
United States and State of Illinois
Monthly Average 1929-1931=100

Year	United States (1)		State of Illinois (2)	
	Dollars	Index	Dollars	Index
1929	$ 28.55	111.2	$ 28.67	108.2
1930	25.84	100.7	27.17	102.6
1931	22.62	88.1	23.60	89.1
1932	17.05	66.4	18.66	70.4
1933	17.71	69.0	18.21	68.7
1934	20.12	78.4	20.42	77.1
1935	22.28	86.8	22.15	83.6
1936	24.64	96.0	24.05	90.8
1937	27.09	105.5	26.86	101.4
1938	24.49	95.4	25.07	94.6
12 Mos. Ended 7/31/39	26.12	101.7	25.98	98.1

Source of Data:

Above indexes computed from data reproduced in Survey of Current Business, a U. S. Department of Commerce publication, as follows:

(1) Index computed from data compiled by the National Industrial Conference Board covering 2000 manufacturing plants representing 25 industries, which in 1937 employed about 1,900,000 wage earners. Similar data, compiled by the U. S. Department of Labor, Bureau of Labor Statistics and covering 89 industries, were not used inasmuch as the data are not available prior to 1932. The base period for this index is the average for the three years 1929-1931.

(2) Based on index computed by the Illinois Department of Labor, but adjusted to reflect comparison with the monthly average for the three years 1929-1931, instead of the average for the base period 1925-1927, as published, which is $28.36 taken as 100.

2702 SCHEDULE No. 24

Gas, Electric and Telephone Utility Companies Serving the City of Chicago
Total Operating Revenues, Years 1929-1938

Year	The Peoples Gas, Light and Coke Company		Commonwealth Edison Company		Illinois Bell Telephone Company	
	Revenues	% of 1929-31 Average	Revenues	% of 1929-31 Average	Revenues	% of 1929-31 Average
	Gas		Electric		Telephone	
1929	$37,012,136	104.1	$83,486,745	101.0	$90,899,378	100.3
1930	35,969,186	101.1	84,004,439	101.7	92,279,788	101.8
1931	33,738,058	94.8	80,417,050	97.3	88,689,990	97.9
1932	33,427,337	94.0	74,364,244	90.0	77,688,148	85.7
1933	30,735,202	86.4	72,552,161	87.8	72,204,381	79.7
1934	33,241,230	93.4	75,929,639	91.9	73,300,070	80.9
1935	34,891,342	98.1	79,635,224	96.4	75,048,617	82.8
1936	37,072,933	104.2	83,655,722	101.2	81,371,162	89.8
1937	37,123,542	104.4	88,451,292	107.0	87,489,839	96.5
1938	37,976,207	106.8	92,926,649	112.4	87,187,670	96.2

Source of Data:

Moody's Public Utilities Manual, 1935-1939 editions.

2704

EXHIBIT 186.

FEDERAL POWER COMMISSION.

Rate of Return Study.

Part II.

October, 1939.

2705

Rate of Return Study.

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NATURAL GAS INDUSTRY IN THE UNITED STATES
NATIONAL REVENUES FROM SALES TO CONSUMERS, GAS SALES TO CONSUMERS (M.C.F.), AND NUMBER OF GAS CUSTOMERS

Years 1929 to 1938, Inclusive

Year	Total	Domestic(1)	Commercial	Industrial(2)	Miscellaneous	Total	Domestic(1)	Commercial	Industrial(2)	Miscellaneous
	Revenues From Sales to Consumers					Average Annual Revenue Per M.C.F. of Gas Sales (3)				
1929	$ 376,250,000	$ 223,464,000	$ 32,579,000	$ 117,857,000	$ 2,350,000	$ 0.380	$ 0.667	$ 0.555	$ 0.201	$ 0.201
1930	385,857,000	237,485,000	33,994,000	112,171,000	2,207,000	0.390	0.682	0.551	0.197	0.212
1931	366,246,000	237,739,000	37,899,000	89,276,000	1,332,000	0.403	0.698	0.551	0.182	0.138
1932	342,651,000	228,063,000	38,995,000	74,134,000	1,459,000	0.411	0.711	0.506	0.174	0.160
1933	329,889,000	213,496,000	37,165,000	77,748,000	1,480,000	0.383	0.711	0.504	0.162	0.170
1934	347,067,000	213,619,000	38,376,000	93,123,000	1,949,000	0.356	0.704	0.485	0.160	0.173
1935	376,388,000	225,445,000	42,314,000	106,593,000	2,036,000	0.357	0.703	0.480	0.169	0.158
1936	412,444,000	237,210,000	46,463,000	126,636,000	2,135,000	0.339	0.698	0.480	0.166	0.148
1937	443,219,000	248,069,000	48,613,000	143,894,000	2,643,000	0.337	0.689	0.471	0.172	0.161
1938	419,474,000	244,339,000	47,574,000	125,108,000	2,453,000	0.349	0.700	0.476	0.170	0.162
	Gas Sales To Consumers (M.C.F.)					Average Annual Gas Sales (M.C.F.) Per Customer (3)				
1929	991,036,000	335,418,000	58,641,000	585,271,000	11,706,000	173.7	62.5	184.8	30,642.5	7,804.0
1930	990,066,000	347,979,000	61,702,000	569,992,000	10,393,000	161.7	60.5	177.6	29,081.2	4,724.1
1931	908,270,000	340,591,000	68,783,000	489,217,000	9,679,000	146.1	59.0	165.3	21,646.8	4,399.5
1932	834,010,000	320,641,000	77,100,000	427,151,000	9,118,000	135.5	56.1	185.3	17,393.9	4,559.0
1933	862,388,000	300,286,000	73,781,000	479,629,000	8,692,000	143.1	53.7	182.5	19,656.9	4,828.9
1934	976,141,000	303,321,000	79,153,000	582,387,000	11,280,000	156.8	52.4	190.4	22,838.7	5,936.8
1935	1,053,876,000	320,733,000	88,115,000	632,073,000	12,885,000	164.0	53.8	202.6	22,493.7	6,781.6
1936	1,215,930,000	339,893,000	96,759,000	764,820,000	14,458,000	183.8	55.4	215.9	24,592.3	7,229.0
1937	1,316,140,000	360,284,000	103,306,000	836,166,000	16,384,000	191.9	56.7	222.0	23,422.0	7,123.5
1938	1,200,607,000	349,285,000	99,845,000	736,313,000	15,164,000	170.7	53.6	207.6	19,846.7	6,593.0
	Average Number of Customers During Year					Average Annual Revenue Per Customer (3)				
1929	5,703,000	5,365,000	317,400	19,100	1,500	$ 65.97	$ 41.65	$ 102.64	$ 6,170.52	$ 1,566.67
1930	6,122,100	5,752,900	347,400	19,600	2,200	63.03	41.28	97.85	5,723.01	1,003.18
1931	6,215,500	5,774,500	416,200	22,600	2,200	58.92	41.70	91.06	3,950.26	605.45
1932	6,155,600	5,712,900	416,100	24,600	2,000	55.66	39.92	93.72	3,013.58	729.50
1933	6,027,600	5,597,100	404,300	24,400	1,800	54.56	38.14	91.92	3,186.39	822.22
1934	6,226,500	5,783,400	415,700	25,500	1,900	55.74	36.94	92.32	3,651.88	1,025.79
1935	6,424,900	5,959,900	435,000	28,100	1,900	58.58	37.82	97.27	3,793.34	1,071.58
1936	6,616,900	6,135,700	448,100	31,100	2,000	62.33	38.66	103.69	4,071.90	1,067.50
1937	6,859,300	6,356,000	465,300	35,700	2,300	64.62	39.03	104.48	4,030.64	1,149.13
1938	7,033,700	6,513,400	480,900	37,100	2,300	59.64	37.52	98.93	3,372.18	1,066.52

Source of Data: "Monthly Summary of Gas Company Statistics, Annual Supplement", issued by the American Gas Association in March, 1939.

(1) Includes natural gas sold for house heating.

(2) Includes natural gas sold to electric utilities for use in generating electric energy.

(3) Computed averages.

Note: These figures do not include natural gas used in field operations and in the manufacture of carbon black, or gas used by distributing companies in the conduct of their own operations.

Companies selling mixed manufactured and natural gas are not included in these data.

SCHEDULE NO.1

NATURAL GAS INDUSTRY IN THE UNITED STATES*
COMPARATIVE ESTIMATED INCOME STATEMENT FOR THE YEARS 1931-1937

(Thousands of Dollars)

	1937	1936	1935	1934	1933	1932	1931	Percent of Operating Revenue 1937	1936	1935	1934	1933	1932	1931
Revenue From Gas Sales to Consumers	$441,232	$410,607	$374,546	$345,348	$328,124	$340,711	$364,186	98.7	99.0	99.0	99.2	99.2	99.4	98.9
Miscellaneous Operating Revenue	5,610	4,251	3,708	2,832	2,691	2,044	4,042	1.3	1.0	1.0	0.8	0.8	0.6	1.1
Total Operating Revenue	$446,842	$414,858	$378,254	$348,180	$330,815	$342,755	$368,228	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Operating Expense **	$222,527	$202,866	$193,666	$189,062	$180,956	$178,575	$197,002	49.8	48.9	51.2	54.3	54.7	52.1	53.5
Maintenance	16,533	17,424	15,130	13,231	12,902	13,710	15,466	3.7	4.2	4.0	3.8	3.9	4.0	4.2
Uncollectible Bills	1,787	1,245	1,135	1,740	3,308	2,742	1,841	0.4	0.3	0.3	0.5	1.0	0.8	0.5
Taxes Accrued	41,109	37,337	31,774	30,988	29,111	30,505	29,826	9.2	9.0	8.4	8.9	8.8	8.9	8.1
Retirement, Depletion, Depreciation Exp.	53,622	46,878	43,499	42,130	39,698	41,131	40,505	12.0	11.3	11.5	12.1	12.0	12.0	11.0
Total Revenue Deductions	$335,578	$305,750	$285,204	$277,151	$265,975	$266,663	$284,640	75.1	73.7	75.4	79.6	80.4	77.8	77.3
Net Operating Income	$111,264	$109,108	$ 93,050	$ 71,029	$ 64,840	$ 76,092	$ 83,588	24.9	26.3	24.6	20.4	19.6	22.2	22.7
Non-Operating Income	5,362	4,978	5,674	5,571	5,293	5,827	7,733	1.2	1.2	1.5	1.6	1.6	1.7	2.1
Gross Corporate Income	$116,626	$114,086	$ 98,724	$ 76,600	$ 70,133	$ 81,919	$ 91,321	26.1	27.5	26.1	22.0	21.2	23.9	24.8
Interest and Amortization Charges, Etc.	42,003	45,220	42,743	45,263	43,337	38,046	40,505	9.4	10.9	11.3	13.0	13.1	11.1	11.0
Net Income Available for Dividends and Surplus	$74,623	$68,866	$55,981	$31,337	$26,796	$43,873	$50,816	16.7	16.6	14.8	9.0	8.1	12.8	13.8

	1937	1936	1935	1934
Fixed Capital (000 omitted)	$2,400,944	$2,355,950	$2,331,844	$2,317,444

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* Companies formerly distributing manufactured gas but which were distributing natural gas at the beginning of 1937 have been included in the above tabulation for all seven years. The data shown above for 1931 to 1937 are therefore not comparable with data on the natural gas industry previously issued for those years.

** Includes leased property rents.

Source of Data: "Annual Statistics of the Natural Gas Industry in 1937, Statistical Bulletin No. 33", issued by the American Gas Association in October, 1938.

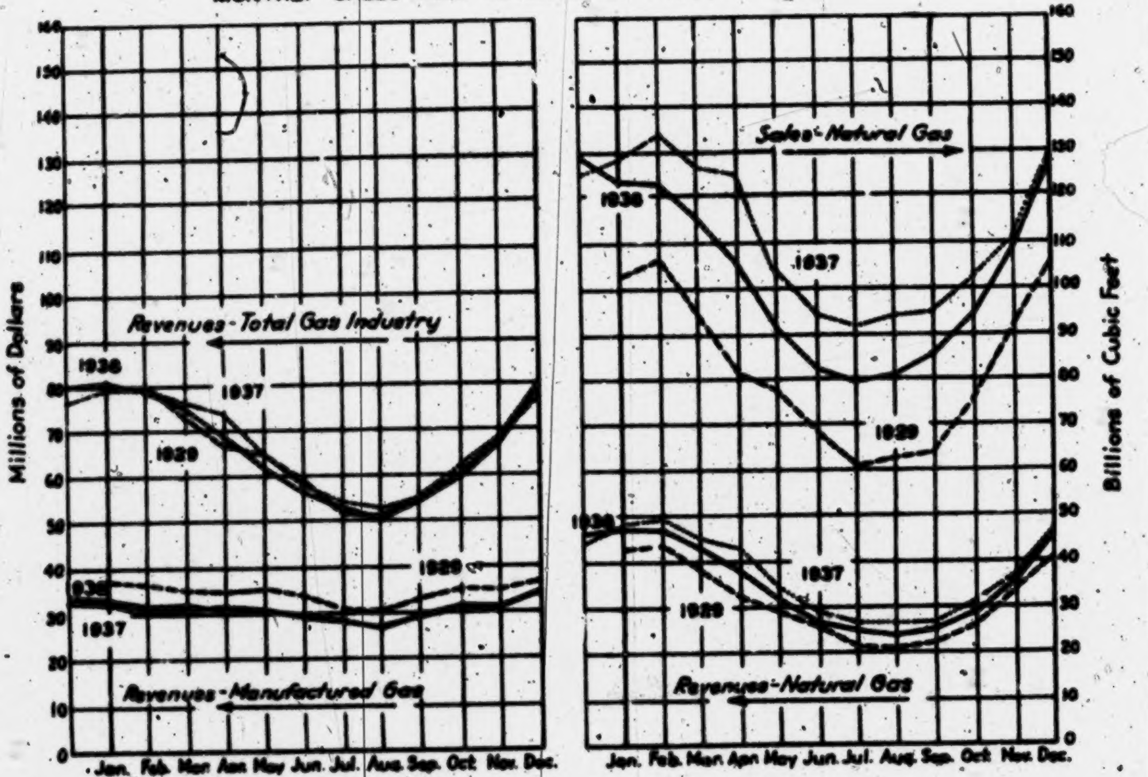
Note: Companies selling mixed manufactured and natural gas are not included in these data.

SCHEDULE NO. 2

CHART NO. 1

SALES AND REVENUES OF GAS INDUSTRY

MONTHLY SALES AND REVENUES OF THE GAS INDUSTRY

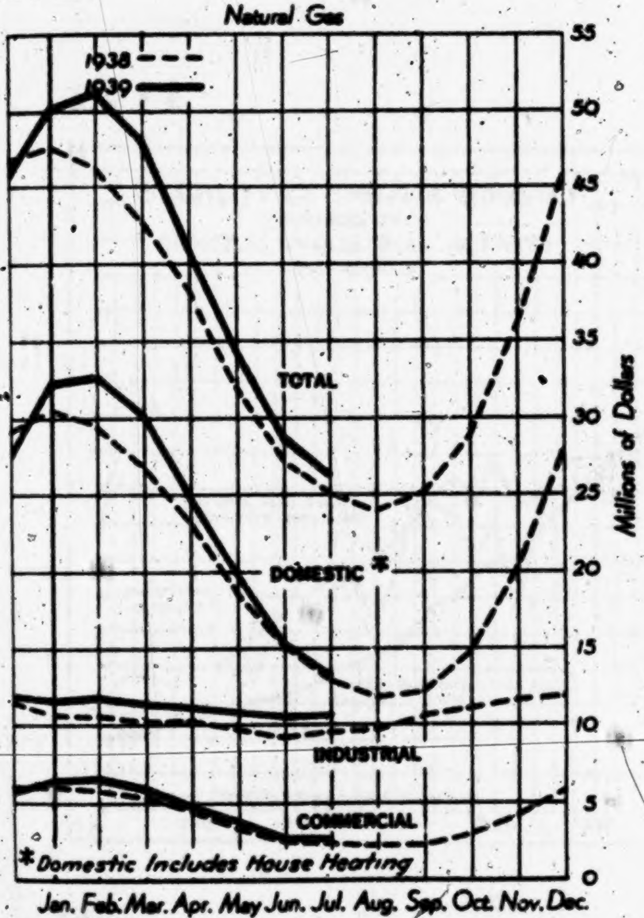


Source:
"Monthly Summary of Gas Company Statistics", for month of December 1938, page No. 1, issued by the American Gas Association.

CHART NO.2

NATURAL GAS
REVENUES
1938-1939

2710 **MONTHLY REVENUES**

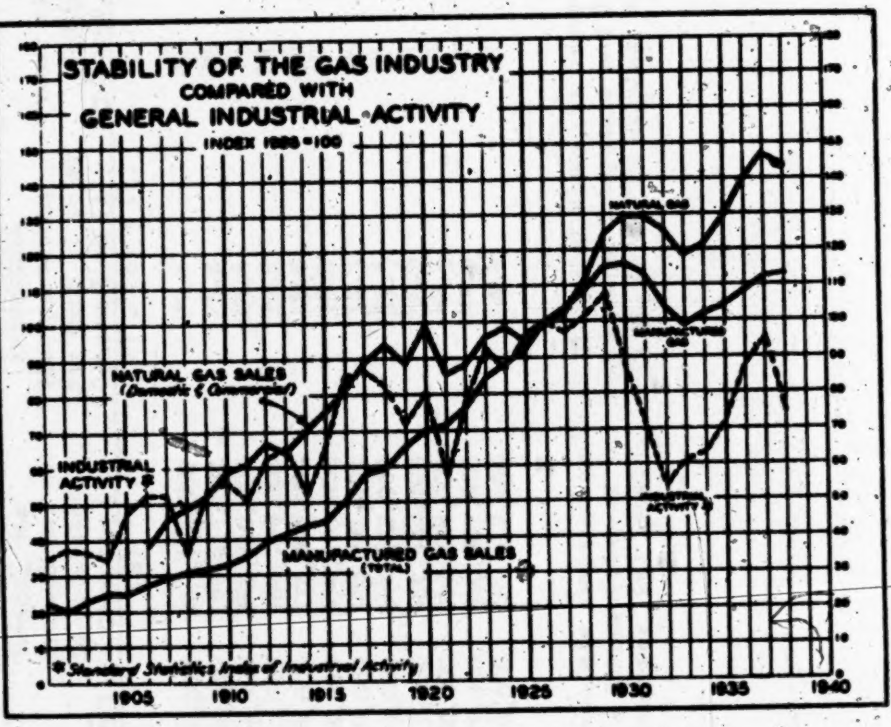


Source:
"Monthly Summary of Gas Company Statistics" for month of July, 1939, page No.1, issued by the American Gas Association.

CHART NO. 3

STABILITY OF
GAS INDUSTRY

2711



Source:
"Annual Statistics of The Natural Gas Industry in 1937, Statistical Bulletin No.33, October 1938", page No.4, issued by the American Gas Association.

(All Gas Quantities in Thousand Cubic Feet)

Year	Total Natural Gas Production	Total Natural Gas Consumption(1)	Natural Gas Transported in Interstate Commerce (2)	Interstate Transportation, Per Cent of Total Consumption (1)	Number of States in which Natural Gas Was	
					Produced (3)	Consumed
(a)	(b)	(c)	(d)	(e) = (d) ÷ (c)		
1926	1,313,019,000	704,344,000	209,361,000	29.7	22	23
1927	1,445,428,000	751,702,000	194,217,000	25.8	24	25
1928	1,568,139,000	819,144,000	241,210,000	29.4	24	25
1929	1,917,693,000	951,261,000	324,779,000	34.1	26	27
1930	1,943,421,000	951,854,000	378,803,000	39.8	26	30
1931	1,686,436,000	917,488,000	330,307,000	36.0	24	35
1932	1,555,990,000	856,720,000	329,781,000	38.5	24	35
1933	1,555,474,000	872,159,000	344,652,000	39.5	24	35
1934	1,770,721,000	980,513,000	408,382,000	41.6	24	35
1935	1,916,595,000	1,087,398,000	462,224,000	42.5	24	35
1936	2,167,802,000	1,258,629,000	566,907,400	45.0	24	35
1937	2,447,620,000	1,410,636,000	682,612,000	48.4	24	35

Source of data:

Years 1926 to 1934, inclusive--Data compiled by U. S. Bureau of Mines, as represented at page 160 of record of hearing before a Subcommittee of the Committee on Interstate and Foreign Commerce, House of Representatives, 74th Congress, 2nd Session, on H. R. 11662 "To Regulate the Transportation and Sale of Natural Gas in Interstate Commerce and for Other Purposes", April 1936.

Years 1935-1936 - U. S. Bureau of Mines, "Minerals Year Book", 1937 and 1938 editions.

Year 1937 - U. S. Bureau of Mines, "Mineral Market Reports, No. M.M.S. 682", issued December 13,1938.

(1) Excluding gas used for field operations and manufacture of carbon black. Natural gas used for latter purpose is used in the State in which it is produced.

(2) Excluding amounts transported to Canada and Mexico.

(3) Five states produce over 80 percent of total natural gas production. These states, ranked according to volume of gas produced in 1937, are Texas, Oklahoma, California, Louisiana and West Virginia.

SCHEDULE No. 4

Natural Gas Transported to State of Illinois From Other States Years 1928 to 1937, Inclusive

		State from which Transported			
Year	Total	Texas	Louisiana	Kansas	Other
		Thousand Cubic Feet			
1928	—	—	—	—	—
1929	156,000	—	156,000	—	—
1930	6,712,000	—	6,712,000	—	—
1931	11,894,000	4,166,000	7,553,000	—	175,000
1932	27,675,000	18,348,000	8,330,000	719,000	278,000
1933	31,713,000	19,766,000	10,704,000	974,000	269,000
1934	43,220,000	29,952,000	10,971,000	2,019,000	278,000
1935	55,874,000	39,886,000	13,574,000	2,107,000	307,000
1936	71,654,000	51,800,000	17,214,000	2,385,000	255,000
1937	77,610,000	56,957,000	17,367,000	2,973,000	313,000

Source of Data:
U. S. Bureau of Mines Publications—
Years 1926 to 1931, inclusive—"Mineral Resources of the United States".
Years 1932 to 1936, inclusive—"Minerals Year Book".
Year 1937—"Mineral Market Reports, No. M. M. S. 682", issued December 31, 1938.

Schedule
Page 1

Securities of Natural Gas Companies
Summary According to Classes of Holders

Company and Issues	Total Securities Outstanding	Held by Public	Held by Institutions	Held by Affilia
Arkansas-Louisiana Gas Co.				
Bonds and Debentures:				
1st Mtg. 2¾%, 1940-44	$ 3,300,000	$ —	$ 3,300,000	$ —
1st Mtg. 3½%, 1945-54	9,700,000	—	9,700,000	—
Debentures, 4½%, 1955	6,500,000	—	—	6,500
	$ 19,500,000	$ —	$ 13,000,000	$ 6,500
Common Stock, 298,988 shs. Par $50	14,949,400	—	—	14,949
Total	$ 34,449,400	$ —	$ 13,000,000	$ 21,449
Canadian River Gas Co.				
1st Mtg. 6%	$ 6,244,000	$ —	$ —	$ 6,244
Common Stock	1	—	—	
Total	$ 6,244,001	$ —	$ —	$ 6,244
Chicago District Pipeline Co.				
Notes Payable	$ 2,769,897	$ —	$ —	$ 2,769
Common Stock, 1,000 shs. No Par	10,000	—	—	10
Total	$ 2,779,897	$ —	$ —	$ 2,779
Cities Service Gas Co.				
Bonds and Debentures:				
1st Mtg. 3¼-3¾%, 1940-54	$ 35,000,000	$ —	$ 35,000,000	$ —
Debentures, 5½%, 1956	8,000,000	—	—	8,000
	$ 43,000,000	$ —	$ 35,000,000	$ 8,000
Common Stock, 300,000 shs. No Par	30,000,000	—	—	30,000
Total	$ 73,000,000	$ —	$ 35,000,000	$ 38,00
Colorado Interstate Gas Co.				
1st & Coll. Trust 3½%, 1948	$ 10,898,000	$ —	$ 4,865,000	$ 6,03
Preferred Stock, 6%, Par $100	2,000,000	—	—	2,00
Common Stock, 1,250,000 shs. No Par	2,352,941	—	—	2,35
Total	$ 15,250,941	$ —	$ 4,865,000	$ 10,38
East Ohio Gas Co.				
Preferred Stock, 7%, Par $100	$ 10,000,000	$ —	$ —	$ 10,00
Common Stock, Par $100	28,500,000	—	—	28,50
Total	$ 38,500,000	$ —	$ —	$ 38,50
El Paso Natural Gas Co.				
Bonds and Notes:	$ 6,000,000	$ —	$ 6,000,000	$ —
1st Mtg. 3½%, 1953	3,480,000	—	3,480,000	—
Serial Bank Notes				
	$ 9,480,000	$ —	$ 9,480,000	$ —
Preferred Stock, 7% Cum., Par $100	1,479,700	1,479,700	—	—
Common Stock	1,802,559	1,802,559	—	—
Total	$ 12,762,259	$ 3,282,259	$ 9,480,000	$ —

El Paso Natural Gas Co. also has recorded $3,486,435 Premium on Common Stock.

Exhibit No. 186.

Schedule No. 5
Page 2

Schedule of Natural Gas Companies
Summary According to Classes of Holders

Company and Issues	Total Securities Outstanding	Held by Public	Held by Institutions	Held by Affiliates
uitable Gas Co.				
otes Payable	$ 13,540,408	$ —	$ —	$ 13,540,408
ommon Stock, Par $100	3,300,000	—	—	3,300,000
Total	$ 16,840,408	$ —	$ —	$ 16,840,408
pe Natural Gas Co.				
ommon Stock, Par $100	$ 27,969,300	$ —	$ —	$ 27,969,300
uston Gulf Gas Co.				
onds, Debentures and Notes:				
1st & Coll. 6%, 1943	$ 4,238,000	$ 3,813,000	$ 425,000	$ —
Debentures 6½%, 1943	1,850,000	1,443,000	407,000	—
Notes 7%, 1945	1,900,000	—	—	1,900,000
	$ 7,988,000	$ 5,256,000	$ 832,000	$ 1,900,000
referred Stocks:				
7%, Series A, Par $100	$ 806,300	$ 11,100	$ —	$ 795,200
7%, Series B, Par $100	1,500,000	1,000	—	1,499,000
	$ 2,306,300	$ 12,100	$ —	$ 2,294,200
ommon Stock, 517,008 shs. No Par	$ 5,170,080	$ 21,160	$ —	$ 5,148,920
Total	$ 15,464,380	$ 5,289,260	$ 832,000	$ 9,343,120
ian Territory Illuminating Oil Co.				
otes Payable:				
Affiliates	$ 21,947,028	$ —	$ —	$ 21,947,028
Bank	6,000,000	—	6,000,000	—
	$ 27,947,028	$ —	$ 6,000,000	$ 21,947,028
ommon Stock:				
Class A, Par $1	$ 1,304,600	$ 98,476	$ —	$ 1,206,124
Class B, Par $1 (Voting)	7,090,037	1,924,327	—	5,165,710
	$ 8,394,637	$ 2,022,803	$ —	$ 6,371,834
Total	$ 36,341,665	$ 2,022,803	$ 6,000,000	$ 28,318,862
state Natural Gas Co.				
mmon Stock, 952,953 shs. No Par	$ 6,529,530	$ 1,893,564	$ —	$ 4,635,966
nois Gas Corp.				
mmon Stock, Par $100	$ 22,671,400	$ —	$ —	$ 22,671,400

Schedule No
Page 3

Securities of Natural Gas Companies
Summary According to Classes of Holders

Company and Issues	Total Securities Outstanding	Held by Public	Institutions	Affiliate
Lone Star Gas Co.				
Notes:				
Mortgage Note	$ 214,100	$ 214,100	$ —	$ —
Notes, 4½%, 1953	19,600,000	—	—	19,600,0
	$ 19,814,100	$ 214,100	$ —	$ 19,600,0
Common Stock, 514,000 shs. No Par	28,113,220	—	—	28,113,2
Total	$ 47,927,320	$ 214,100	$ —	$ 47,713,2
Manufacturers Light and Heat Co., The				
Notes Payable	$ 360,000	$ —	$ —	$ 360,0
Common Stock, Par $50	22,530,400	6,300	—	22,524,1
Total	$ 22,890,400	$ 6,300	$ —	$ 22,884,1
Memphis Natural Gas Co.				
Notes	$ 1,700,000	$ —	$ 1,700,000	$ —
Common Stock, Par $5	4,593,400	2,381,615	—	2,211,7
Total	$ 6,293,400	$ 2,381,615	$ 1,700,000	$ 2,211,7
Mississippi River Fuel Corp.				
Bonds and Notes:				
1st Mtg. 4%, 1952	$ 8,999,000	$ —	$ 8,999,000	$ —
Notes, 6%, 1940	3,010,000	—	—	3,010,
	$ 12,009,000	$ —	$ 8,999,000	$ 3,010,
Common Stock, Par $10	6,552,200	—	—	6,552,
Total	$ 18,561,200	$ —	$ 8,999,000	$ 9,562,
Mountain Fuel Supply Co.				
Common Stock, Par $10	$ 19,899,025	$ 15,090,455	$ —	$ 4,808,
Natural Gas Pipeline Co. of America				
1st Mtg. 6%, 1946	$ 44,400,000	$ —	$ —	$ 44,400
Common Stock, 1,500,000 shs. No Par	3,000,000	—	—	3,000
Total	$ 47,400,000	$ —	$ —	$ 47,400
Northern Natural Gas Co.				
1st Mtg. 3½%, 1954	$ 16,000,000	$ —	$ 16,000,000	$ —
Common Stock, 203,000 shs. No Par	19,273,460	—	—	19,273
Total	$ 35,273,460	$ —	$ 16,000,000	$ 19,273

Schedule No. 5
Page 4

Securities of Natural Gas Companies
Summary According to Classes of Holders

Company and Issues	Total Securities Outstanding	Held by Public	Held by Institutions	Held by Affiliates
hio Fuel Gas Co.				
Notes:				
4% due 1940-46	$ 5,250,000	$ —	$ 5,250,000	$ —
Affiliates	6,734,363	—	—	6,734,363
	$ 11,984,363	$ —	$ 5,250,000	$ 6,734,363
Common Stock, Par $50	67,190,150	—	—	67,190,150
Total	$ 79,174,513	$ —	$ 5,250,000	$ 73,924,513
lahoma Natural Gas Co.				
onds and Notes:				
1st Mtg. B. 3¼%, 1955	$ 17,000,000	$ 17,000,000	$ —	$ —
Bank Loans	8,000,000	—	8,000,000	—
	$ 25,000,000	$ 17,000,000	$ 8,000,000	$ —
referred Stock:				
$5.50 Preferred, Par $100	$ 5,800,000	$ 5,800,000	$ —	$ —
$3 Preferred, Par $50	4,552,500	4,552,500	—	—
	$ 10,352,500	$ 10,352,500	$ —	$ —
ommon Stock, Par $15	$ 8,249,790	$ 8,249,790	$ —	$ —
Total	$ 43,602,290	$ 35,602,290	$ 8,000,000	$ —
handle Eastern Pipe Line Co.				
onds and Notes:				
1st Mtg. A, 4%, 1952	$ 23,500,000	$ 4,483,244	$ 19,016,756	$ —
Bank Loans	2,000,000	—	2,000,000	—
	$ 25,500,000	$ 4,483,244	$ 21,016,756	$ —
referred Stock:				
$6, Series A	$ 10,000,000	$ —	$ —	$ 10,000,000
$6, Series B	1,000,000	—	—	1,000,000
	$ 11,000,000	$ —	$ —	$ 11,000,000
ommon Stock, 728,652 shs. No Par	$ 18,216,300	$ —	$ —	$ 18,216,300
Total	$ 54,716,300	$ 4,483,244	$ 21,016,756	$ 29,216,300
h Penn Oil Co.				
mmon Stock, Par $25	$ 25,000,000	$ 20,681,425	$ —	$ 4,318,575

Schedule No.

Securities of Natural Gas Companies
Summary According to Classes of Holders

Company and Issues	Total Securities Outstanding	Held by		
		Public	Institutions	Affiliate
Southern California Gas Co.				
Bonds:				
1st Mtg. 4%, 1965	$ 15,000,000	$ 10,378,924	$ 4,621,076	$ —
1st Mtg. 4½%, 1961	12,500,000	9,369,826	3,130,174	—
	$ 27,500,000	$ 19,748,750	$ 7,751,250	$ —
Preferred Stock:				
6% Stock, Par $25	$ 3,998,900	$ 2,961,800	$ —	$ 1,037,1
6% Stock, Series A, Par $25	19,575,800	19,575,800	—	—
	$ 23,574,700	$ 22,537,600	$ —	$ 1,037,1
Common Stock, Par $25	$ 28,800,000	$ —	$ —	$ 28,800,0
Total	$ 79,874,700	$ 42,286,350	$ 7,751,250	$ 29,837,1

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Company and Issues	Total Securities Outstanding	Public	Institutions	Affiliate
Southern Counties Gas Co. of California				
1st Mtg. 4½%, 1968	$ 11,500,000	$ 9,432,860	$ 2,067,140	$ —
Common Stock, Par $100	8,000,000	—	—	8,000,0
Total	$ 19,500,000	$ 9,432,860	$ 2,067,140	$ 8,000,0
Southern Natural Gas Co.				
Bonds and Notes:				
1st Mtg. 4½%, 1951	$ 12,939,000	$ 6,668,982	$ 6,270,018	$ —
1st Mtg. 4½%, 1952	616,000	—	616,000	—
Adj. Mtg. 1960	5,771,523	2,864,523	—	2,907,
Notes 4½%	1,475,000	—	1,475,000	—
	$ 20,801,523	$ 9,533,505	$ 8,361,018	$ 2,907,
Common Stock, Par $7.50	5,189,776	2,698,667	—	2,491,
Total	$ 25,991,299	$ 12,232,172	$ 8,361,018	$ 5,398,
Texoma Natural Gas Co.				
Gas & P. L. Mtg. 6%, 1946	$ 18,750,000	$ —	$ —	$ 18,750
Common Stock, 10,000 shs. No Par	500,000	—	—	500
Total	$ 19,250,000	$ —	$ —	$ 19,250
United Fuel Gas Co.				
Notes:				
4% 1940-46	$ 5,250,000	$ —	$ 5,250,000	$ —
Affiliates	13,036,278	—	—	13,036,
	$ 18,286,278	$ —	$ 5,250,000	$ 13,036,
Common Stock, Par $1	30,000,000	—	—	30,000,
Total	$ 48,286,278	$ —	$ 5,250,000	$ 43,036,

Exhibit No. 186.

Schedule No. 5

Securities of Natural Gas Companies
Summary According to Classes of Holders

Company and Issues	Total Securities Outstanding	Held by: Public	Held by: Institutions	Held by: Affiliates
nited Gas Pipe Line Co.				
Bonds and Debentures:				
Northern Texas 6%, 1940	$ 910,000	$ —	$ —	$ 910,000
Debentures, 6%, 1952	23,000,000	—	—	23,000,000
	$ 23,910,000	$ —	$ —	$ 23,910,000
Common Stock, 100,000 shs. No Par	96,772,535	—	—	96,772,535
Total	$ 120,682,535	$ —	$ —	$120,682,535
ited Natural Gas Co.				
Common Stock	$ 15,125,000	$ —	$ —	$ 15,125,000
Grand Total	$1,038,250,901	$154,898,697	$153,572,164	$729,780,040

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nd Total by Types of Securities:				
Bonds, Debentures and Notes	$ 418,882,597	$ 65,668,459	$153,572,164	$199,641,974
Preferred Stock	60,713,200	34,381,900	—	26,331,300
Common Stock	558,655,104	54,848,338	—	503,806,766
Grand Total	$1,038,250,901	$154,898,697	$153,572,164	$729,780,040

BONDS, DEBENTURES AND NOTES OF NATURAL GAS COMPANIES

HOLDINGS BY PUBLIC

Company	Issue	Total Outstanding	Held by Public (a)	Ratings		Times Fixed Charges Earned 1938	% of Funded Debt to Fixed Capital Dec. 31, 1938	Market Quotations 1937		Market Quotations 1938	
				Moody's	Poor's			High	Low	High	Low
Houston Gulf Gas Co.	1st & Coll. 6%, 1943	$ 4,238,000	$ 3,813,000	Baa	B**	1.30	43.80	105 1/2	97	104 1/2	97 1/2
" " " "	Debentures, 6½%, 1943	1,850,000	1,443,000	Ba	B*			103 3/4	95 1/2	103 1/2	96
Lone Star Gas Co.	Mortgage Note	214,100	214,100	-	-	3.88(c)	23.54	-	-	-	-
Oklahoma Natural Gas Co.	1st Mtg.B, 3 3/4%, 1955 (b)	17,000,000	17,000,000	Baa	B**	1.91	56.87	-	-	-	-
Panhandle Eastern Pipe Line Co.	1st Mtg.A, 4½%, 1952	23,500,000	4,483,244	A	A	3.33	43.55	101 5/8	97	105 1/4	98
Southern California Gas Co.	1st Mtg. 4%, 1965	15,000,000	10,378,924	Aaa	A**	5.29	20.83	107 1/2	101 3/8	110 1/4	106 3/4
" " " "	1st Mtg. 4½%, 1961	12,500,000	9,369,826	Aaa	A**			108 1/2	105	108 1/4	105 1/2
Southern Counties Gas Co. of Calif.	1st Mtg. 4½%, 1968	11,500,000	9,432,860	Aa	A*	3.58	37.24	105 1/2	102 1/2	106 1/2	103 1/2
Southern Natural Gas Co.	1st Mtg. 4½%, 1951	12,939,000	6,668,982	Baa	B**	1.82	68.86	101 1/2	94 1/2	102	91
" " " "	Adjustment Mtg. 6%, 1960	5,771,523	2,864,523	B	B			95	73 1/2	91 1/2	72
TOTAL		$104,512,623	$65,668,459	-	-	-	-	-	-	-	-

Notes: (a) The difference between Total Outstanding and Held by Public, is held by Institutions and Affiliates.
(b) Sold in August, 1939.
(c) Based on 1937 instead of 1938.
(d) Weighted yield on issued represented.

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Schedule No. 5A

BONDS, DEBENTURES AND NOTES OF NATURAL GAS COMPANIES

HOLDINGS BY PUBLIC

Total Outstanding	Held by Public (a)	Ratings Moody's	Ratings Poor's	Times Fixed Charges Earned 1938	% of Funded Debt to Fixed Capital Dec. 31, 1938	Market Quotations 1937 High	Market Quotations 1937 Low	Market Quotations 1938 High	Market Quotations 1938 Low	Market Quotations 1939 Latest	Approximate Yield to Maturity
$ 4,238,000	$ 3,813,000	Baa	B**	1.30	43.80	105 1/2	97	104 1/2	97 1/2	9/30 103 1/2	5.13
1,850,000	1,443,000	Ba	B*			103 3/4	95 1/2	103 1/2	96	9/30 102	5.90
214,100	214,100	-	-	3.88(c)	23.54	-	-	-	-	-	-
17,000,000	17,000,000	Baa	B**	1.91	56.87	-	-	-	-	9/30 102 1/2	3.55
23,500,000	4,483,244	A	A	3.33	43.55	101 5/8	97	105 1/4	98	9/30 103 7/8	3.63
15,000,000	10,378,924	Aaa	A**	5.29	20.83	107 1/2	101 3/8	110 1/4	106 3/4	9/30 105 3/8	3.70
12,500,000	9,369,826	Aaa	A**			108 1/2	105	108 1/4	105 1/2	9/30 107 1/8	4.00
11,500,000	9,432,860	Aa	A*	3.58	37.24	105 1/2	102 1/2	106 1/2	103 1/2	10/3 104 5/8	4.20
12,939,000	6,668,982	Baa	B**	1.82	68.86	101 1/2	94 1/2	102	91	10/3 105	3.90
5,771,523	2,864,523	B	B			95	73 1/2	91 1/2	72	10/3 96	6.35
$104,512,623	$65,668,459	-	-	-	-	-	-	-	-	-	4.02 (d)

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blic, is held by Institutions and Affiliates.

(c) Based on 1937 instead of 1938.
(d) Weighted yield on issues represented.

BONDS, DEBENTURES AND NOTES OF NATURAL GAS COMPANIES

HOLDINGS BY INSTITUTIONS

Company and Issue	Total Outstanding	Holding Institution	Amount	% of Total Outstanding
Arkansas-Louisiana Gas Co.				
First Mtg. 2 3/4%, A, 1940-44	$ 3,300,000(a)	(Guaranty Trust Co. of New York	$ 2,800,000	
(This issue and the issue directly below were sold in September 1939 to replace First Mtg., 4%, 1951, and portion of 5% Debentures held by holding company.)		(Central Hanover Bank & Trust Co.	500,000	
		Total	$ 3,300,000	100.0
First Mtg., 3½%, B, 1945-54	9,700,000(a)	(Equitable Life Assurance Society of U. S.	$ 4,850,000	
(See note under issue directly above.)		(Metropolitan Life Insurance Co.	3,550,000	
		(Massachusetts Mutual Life Ins. Co.	400,000	
		(Sun Life Assurance Co. of Canada	350,000	
		(Teachers Ins. & Annuity Association of America	300,000	
		(Provident Mutual Ins. Co. of Philadelphia	250,000	
		Total	$ 9,700,000	100.0
Cities Service Gas Co.				
First Pipeline, 3½% & 3 3/4%, 1940-54	35,000,000(b)	(In possession of four banks and two insurance (companies:		
		(Purchased outright: 3 3/4% Bonds	$20,000,000	
		(Held as collateral for loans, 3½% Bonds	15,000,000	
		Total	$35,000,000	100.0
Colorado Interstate Gas Co.				
First & Coll. S. F. 3½%, 1948	10,898,000(c)	Mutual Life Insurance Co. of N. Y.	$ 4,865,000	44.6
El Paso Natural Gas Co.				
First Mtg., 3½%, 1953	6,000,000(c)	(Sun Life Assurance Co. of Canada	$ 891,102 (1)	
		(Equitable Life Assurance Society of U. S.	2,250,000	
		(Massachusetts Mutual Life Ins. Co.	275,000	
		(Metropolitan Life Ins. Co.	2,000,000	
		(Mutual Life Ins. Co. of N. Y.	475,000	
		(------------------------------	108,898	
		Total	$ 6,000,000	100.0 (2)
Serial Bank Notes, 3%, 1939-45	3,480,000(b)	Chase National Bank	$ 3,480,000	100.0

BONDS, DEBENTURES AND NOTES OF NATURAL GAS COMPANIES

HOLDINGS BY INSTITUTIONS

Company and Issue	Total Outstanding	Holding Institution	Amount	% of Total Outstanding
Houston Gulf Gas Co.				
First & Collateral, A, 6%, 1943	$ 4,238,000(c)	(Princeton University	$ 200,000	
		(9 Other Institutions	225,000	
		Total	$ 425,000	10.0
Debentures, 6½%, 1943	1,850,000(c)	(Massachusetts Mutual Life Ins. Co.	$ 163,000	
		(7 Other Institutions	244,000	
		Total	$ 407,000	22.0
Indian Territory Illuminating Oil Co.				
Notes Payable, 3-3½%, 1940-43	6,000,000(e)	(Guaranty Trust Co. N. Y.	$ 6,000,000	100.0
Memphis Natural Gas Co.				
Notes	1,700,000(e)	Various banks	1,700,000	100.0
Mississippi River Fuel Corp.				
First P. L. 4%, 1952	8,999,000(c)	(Equitable Life Assurance Society of U.S.	$ 2,250,000	
		(Metropolitan Life Ins. Co.	3,374,000	
		(Mutual Life Insurance Co. of N. Y.	1,166,000	
		(Prudential Insurance Co. of America	2,250,000	
		(Retirements not considered above	(41,000)	
		Total	$ 8,999,000	100.0
Northern Natural Gas Co.				
First Mtg. & First Lien, A, 3½%, 1954 (Sold in August 1939, to replace First Mtg. 4 3/4%, 1947; First Mtg. 4½%, 1947; and Debentures 4½%, 1948.)	16,000,000(d)	(Metropolitan Life Insurance Co.	$ 5,400,000	
		(Equitable Life Assurance Society of U. S.	3,600,000	
		(Prudential Insurance Co. of America	3,600,000	
		(Travelers Insurance Co.	2,400,000	
		(Sun Life Assurance Co. of Canada	1,000,000	
		Total	$16,000,000	100.0
Ohio Fuel Gas Co.				
4% Notes, 940-46	5,250,000(c)	(Metropolitan Life Insurance Co.	$ 4,375,000	
		(Mutual Life Insurance Co. of N. Y.	875,000	
		Total	$ 5,250,000	100.0

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BONDS, DEBENTURES AND NOTES OF NATURAL GAS COMPANIES

HOLDINGS BY INSTITUTIONS

Company and Issue	Total Outstanding	Holding Institution	Amount	% of Total Outstanding
Oklahoma Natural Gas Co.				
Notes	$ 8,000,000	Various bank loans	$ 8,000,000	100.0
Panhandle Eastern Pipe Line Co.				
First Mtg. A. 4%, 1952	23,500,000(c)	(Equitable Life Assurance Society of U. S.	$ 5,000,000	
		(Massachusetts Mutual Life Ins. Co.	897,000	
		(Metropolitan Life Ins. Co.	4,400,000	
		(Mutual Life Insurance Co. of N. Y.	1,500,000	
		(Provident Mutual Life Ins. Co.	250,000	
		(Prudential Insurance Co. of America	1,000,000	
		(Sun Life Assurance Co. of Canada	2,930,756 (1)	
		(34 Other Institutions	8,034,000	
		Total	$19,016,756	80.9
Bank Loans	2,000,000	Various banks	$ 2,000,000	100.0
Southern California Gas Co.				
First Mortgage & Ref. 4%, 1965	15,000,000(c)	(Connecticut General Life Ins. Co.	500,000	
		(John Hancock Mutual Life Ins. Co.	300,000	
		(Massachusetts Mutual Life Ins. Co.	575,000	
		(New England Mutual Life Ins. Co.	250,000	
		(Pacific Mutual Life Ins. Co.	400,000	
		(Penn Mutual Life Ins. Co.	250,000	
		(66 Other Institutions	2,346,076	
		Total	$ 4,621,076	30.8
First Mtg. & Ref. 4½%, 1961	12,500,000(c)	(General American Life Ins. Co.	$ 200,000	
		(John Hancock Mutual Life Ins. Co.	200,000	
		(Massachusetts Mutual Life Ins. Co.	400,000	
		(Penn Mutual Life Ins. Co.	400,000	
		(Stanford University	300,000	
		(Supreme Council of the Royal Arcanum	200,000	
		(48 Other Institutions	1,430,174	
		Total	$ 3,130,174	25.0

BONDS, DEBENTURES AND NOTES OF NATURAL GAS COMPANIES

HOLDINGS BY INSTITUTIONS

Company and Issue	Total Outstanding	Holding Institution	Amount	% of Total Outstanding
Southern Counties Gas Co.				
First Mtg. 4½%, 1968	$11,500,000(c)	(Massachusetts Mutual Life Ins. Co.	$ 325,000	
		(Pacific Mutual Life Ins. Co.	400,000	
		(33 Other Institutions	1,342,140	
		Total	$ 2,067,140	18.0
Southern Natural Gas Co.				
First Mtg. P. L. 4½%, 1951	12,939,000(c)	(Insurance Co. of North America	$ 250,000	
		(Massachusetts Mutual Life Ins. Co.	400,000	
		(Metropolitan Life Ins. Co.	3,000,000	
		(Modern Woodmen of America	250,000	
		(Provident Mutual Life Ins. Co.	300,000	
		(Sun Life Assurance Co. of Canada	435,018 (1)	
		(Travelers Insurance Co.	300,000	
		(34 Other Institutions	1,335,000	
		Total	$ 6,270,018	48.5
First Mtg. P. L. 4½%, 1952	616,000(c)	(Metropolitan Life Ins. Co.	$ 616,000	100.0
Note 4½%	1,475,000(b)	(First National Bank, Birmingham, Ala.	$ 1,475,000	100.0
United Fuel Gas Co.				
Serial Notes, 4%, 1940-46	5,250,000(c)	(Metropolitan Life Ins. Co.	$ 4,375,000	
		(Mutual Life Ins. Co. of N. Y.	875,000	
		Total	$ 5,250,000	100.0
GRAND TOTAL			$153,572,164	

Notes: (1) Listed at book value.
(2) Moody's Public Utilities, 1939, shows entire amount of bonds sold to institutions.

Source of Data: (a) S.E.C. Holding Company Release No. 1731, dated September 26, 1939.
(b) Moody's Public Utilities, 1939.
(c) Poor's Institutional Holdings of Securities, 1939.
(d) S.E.C. Holding Company Release No. 1667, dated August 4, 1939.
(e) Standard Corporation Records.

BONDS, DEBENTURES AND NOTES OF NATURAL GAS COMPANIES

HOLDINGS BY AFFILIATES

Company and Issue	Total Outstanding	Holding Affiliate	Amount	% of Total Outstanding
Arkansas-Louisiana Gas Co.				
Debentures, 4½%, 1955	$ 6,500,000	Arkansas Natural Gas Corp.	$ 6,500,000	100.0
Canadian River Gas Co.				
First Mtg. 6%	6,244,000	Colorado Interstate Gas Co.	$ 6,244,000	100.0
Chicago District Pipeline Co.				
Notes Payable	2,769,897	Natural Gas Investment Co.	$ 2,769,897	100.0
Cities Service Gas Co.				
Debentures 5½%, 1956	8,000,000	Cities Service Co. and subsidiaries	$ 8,000,000	100.0
Colorado Interstate Gas Co.				
1st & Coll. Trust 3½%, 1948	10,898,000	(Imperial Oil Ltd. (Standard Oil Co. (N.J.)	$ 6,033,000	55.4
Equitable Gas Co.				
Notes Payable	13,540,408	Affiliated Companies	$13,540,408	100.0
Houston Gulf Gas Co.				
7% Notes, 1945	1,900,000	United Gas Pipe Line Co.	$ 1,900,000	100.0
Indian Territory Illuminating Oil Co.				
Notes Payable	21,947,028	Cities Service Co.	$21,947,028	100.0

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BONDS, DEBENTURES AND NOTES OF NATURAL GAS COMPANIES

HOLDINGS BY AFFILIATES

Company and Issue	Total Outstanding	Holding Affiliate	Amount	% of Total Outstanding
Lone Star Gas Co.				
Notes, 4½%, 1953	$19,600,000	Lone Star Gas Corp.	$19,600,000	100.0
Manufacturers Light and Heat Co. (The)				
Notes Payable	360,000	Columbia Gas & Electric Corp.	$ 360,000	100.0
Mississippi River Fuel Corp.				
Notes, 6%, 1940	3,010,000	(Standard Oil Co. (N.J.) (United Gas Corp. (Columbian Carbon Co. (United Carbon Co.	$ 3,010,000	100.0
Natural Gas Pipeline Co. of America				
1st Mtg. 6%, 1946	44,400,000	(Cities Service Co. (Natural Gas Investment Co. (Standard Oil Co. (N.J.) (Southwestern Development Co. (Texas Co. (Columbian Carbon Co.	$44,400,000	100.0
Ohio Fuel Gas Co.				
Notes	6,734,363	Columbia Gas & Electric Corp.	$ 6,734,363	100.0
Southern Natural Gas Co.				
Adjustment Mtg., 1960	5,771,523	Federal Water Service Corp.	$ 2,907,000	50.4
Texoma Natural Gas Co.				
Gas & P. L. Mtg., 6%, 1946	18,750,000	Natural Gas Pipeline Co. of America	$18,750,000	100.0

BONDS, DEBENTURES AND NOTES OF NATURAL GAS COMPANIES

HOLDINGS BY AFFILIATES

Company and Issue	Total Outstanding	Holding Affiliate	Amount	% of Total Outstanding
United Fuel Gas Co.				
Notes	$13,036,278	Columbia Gas & Electric Corp.	$13,036,278	100.0
United Gas Pipe Line Co.				
Debentures 6%, 1952	23,000,000	United Gas Corp.	$23,000,000	100.0
Northern-Texas Utilities, 1st Mtg., 6%, 1940	910,000	Electric Bond & Share Co.	$ 910,000	100.0
GRAND TOTAL			$199,641,974	

PREFERRED STOCKS OF NATURAL GAS COMPANIES

HOLDINGS BY PUBLIC

Company	Issue	Total Outstanding	Held by Public (a)	Poor's Rating	Times Dividend Requirements Earned 1938	Times Fixed Charges & Dividends Earned 1938	Market Quo		
							1937		1
							High	Low	High
El Paso Natural Gas Co.	7% Cum. Pref. - Par $100	$ 1,479,700	$ 1,479,700	B**	20.12	4.73	-	-	-
Houston Gulf Gas Co.	7% Pref. Series A - Par $100	806,300	11,100	C*	1.08	1.02	-	-	-
" " " "	7% Pref. Series B - Par $100	1,500,000	1,000	C*	1.08	1.02	-	-	-
Oklahoma Natural Gas Co. (b)	$5.50 Conv. Prior Pref. - Par $100	5,800,000	5,800,000	B*	4.20 (c)	1.50	-	-	-
" " " "	$3 Pref. - Par $50	4,552,500	4,552,500	B	3.74 (c)	1.32	32 5/8	19½	41½
Southern California Gas Co.	6% Cum. Pref. - Par $25	3,998,900	2,961,800	A*	4.29	2.66	31 3/4	28¼	31 3/
" " " "	6% Cum. Pref. Series A, Par $25	19,575,800	19,575,800	A*	4.29	2.66	31	27½	32
TOTAL		$ 37,713,200	$34,381,900	-	-	-	-	-	-

Notes:
(a) The difference between Total Outstanding and Held by Public, is held by Affiliates.
(b) Sold in August 1939.
(c) Computed on basis of Preferred Dividends requirements on stock outstanding in September 1939, and 1938 Earnings.
(d) Weighted yield on issues represented.

Schedule No. 5D

PREFERRED STOCKS OF NATURAL GAS COMPANIES

HOLDINGS BY PUBLIC

Total Outstanding	Held by Public (a)	Poor's Rating	Times Dividend Requirements Earned 1938	Times Fixed Charges & Dividends Earned 1938	Market Quotations 1937 High	1937 Low	1938 High	1938 Low	1939 Latest		Current Yield
$ 1,479,700	$ 1,479,700	B**	20.12	4.73	-	-	-	-	9/30	108	6.48
806,300	11,100	C*	1.08	1.02	-	-	-	-		-	-
1,500,000	1,000	C*	1.08	1.02	-	-	-	-		-	-
100 5,800,000	5,800,000	B*	4.20 (c)	1.50	-	-	-	-	9/30	104½	5.26
4,552,500	4,552,500	B	3.74 (c)	1.32	32 5/8	19½	41½	21½	9/30	42¼	7.10
3,998,900	2,961,800	A*	4.29	2.66	31 3/4	28¼	31 3/8	28½	9/30	30	5.00
19,575,800	19,575,800	A*	4.29	2.66	31	27½	32	27½	9/30	30¼	4.96
$ 37,713,200	$34,381,900	-	-	-	-	-	-	-		-	5.35 (d)

y Public, is held by Affiliates.

ts on stock outstanding in September 1939, and 1938 Earnings.

Schedule No. 5B

PREFERRED STOCKS OF NATURAL GAS COMPANIES

HOLDINGS BY AFFILIATES

Company and Issue	Total Outstanding	Holding Affiliate	Amount	% of Total Outstanding
Colorado Interstate Gas Co.				
6% Preferred - Par $100	$ 2,000,000	Standard Oil Co. (N.J.)	$1,000,000	50.0
		Consolidated Oil Corp.	1,000,000	50.0
			$2,000,000	100.0
East Ohio Gas Co.				
7% Cum. Preferred - Par $100	10,000,000	Standard Oil Co. (N.J.)	$10,000,000	100.0
Houston Gulf Gas Co.				
7% Cum. Preferred, A - Par $100	806,300	United Gas Corp.	$ 795,200	98.6
7% Cum. Preferred, B - Par $100	1,500,000	United Gas Corp.	1,499,000	99.9
Panhandle Eastern Pipe Line Co.				
$6 Preferred, A - Par $100	10,000,000	Columbia Oil & Gasoline Corp.	$10,000,000	100.0
$6 Preferred, B - Par $100	1,000,000	Columbia Oil & Gasoline Corp.	$ 1,000,000	100.0
Southern California Gas Co.				
6% Cum. Preferred - Par $25	3,998,900	Pacific Lighting Corp.	$ 1,037,100	26.0
Grand Total			$26,331,300	

Source of Data: Moody's Public Utilities, 1939

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COMMON STOCKS OF NATURAL GAS COMPANIES

HOLDINGS BY PUBLIC

Company	Total Outstanding		Total Held by Public (a)		Par Value	Earnings per Share	Per Share Dividends Paid 1938	Poor's Rating	1937		1938		1939 Latest Quotation	Percent Earnings to Latest Quotations
	Shares	Amount	Shares	Amount					High	Low	High	Low		
El Paso Natural Gas Co.	600,853	$ 1,802,559(b)	600,853	$ 1,802,559	3.00	3.30	2.00	B	29	14 1/2	29 7/8	17	10/6 40 5/8	8.12
Houston Gulf Gas Co.	517,008	5,170,080	21,160	21,160	No Par	.03	-	-	-	-	-	-	-	-
Indian Territory Illuminating Oil Co. Class "A"	1,304,600	1,304,600	98,476	98,476	1.00	(.03)	-	C	4 7/8	1	1 1/2	3/4	9/30 2 (e)	(.015)
Class "B"	7,090,037	7,090,037	1,924,327	1,924,327	1.00	(.03)	-	C	4 7/8	1	1 5/8	7/8	9/30 1 1/2 (e)	(.02)
Interstate Natural Gas Co.	952,953	6,529,530	276,356	1,893,564(c)	No Par	2.13	1.75	B	33 1/2	17	25	17 1/2	9/30 23 1/2 (e)	9.06
Manufacturers Light & Heat Co.	450,608	22,530,400	126	6,300	50.00	3.96	Not Reported	-	-	-	-	-	-	-
Memphis Natural Gas Co.	918,680	4,593,400	476,323	2,381,615	5.00	.55	.45	B	7	2 1/4	4 7/8	3	9/30 4 5/8	11.89
Mountain Fuel Supply Co.	1,989,902	19,899,025	1,509,045	15,090,455	10.00	.38	.25	C**	12 7/8	3 7/8	6 5/8	4 1/4	9/30 4 5/8 (e)	8.22
Oklahoma Natural Gas	549,986	8,249,790	549,986	8,249,790	15.00	1.70	-	C**	14 3/4	6 5/8	14 1/2	6 3/4	9/30 15 7/8	10.71
South Penn Oil Co.	1,000,000	25,000,000	827,257	20,681,425	25.00	1.44	1.75	-	56	35	39	28 3/4	9/30 39	3.69
Southern Natural Gas Co. (d)	691,970	5,189,776	359,825	2,698,667	7.50	1.37(d)	.50(f)	-	-	-	-	-	9/30 13 1/2 (e)	10.15
Total	-	$107,359,197	-	$54,848,338		-	-	-	-	-	-	-	-	7.33 (g)

Notes: (a) The difference between Total Outstanding and Held by Public, is held by Affiliates.
(b) Exclusive of premium on Common Stock of $3,486,435.
(c) Based on average value per share.
(d) Based on common stock issued in May 1939.
(e) Bid prices.
(f) Represents initial dividend paid 6/30/39.
(g) Weighted average based only on stocks with earnings.

COMMON STOCKS OF NATURAL GAS COMPANIES

HOLDINGS BY AFFILIATES

Company and Issue	Total Outstanding	Holding Affiliate	Amount	% of Total Outstanding
Arkansas-Louisiana Gas Co.				
Common - 298,988 shs. - Par $50	$14,949,400	Arkansas Natural Gas Corp.	$14,949,400	100.0
Canadian River Gas Co.				
Common	1	Southwestern Development Co.	$ 1	100.0
Chicago District Pipeline Co.				
Common - 1,000 shs. - No Par	10,000	Natural Gas Investment Co.	$ 10,000	100.0
Cities Service Gas Co.				
Common - 300,000 shs. - No Par	30,000,000	Empire Gas & Fuel Co.	$30,000,000	100.0
Colorado Interstate Gas Co.				
Common - 1,250,000 shs. - No Par	2,352,941	(Southwestern Development Co. (42½%) (Standard Oil Co. (N.J.) (42½%) (Public Service Co. of Colo. (15%)	$ 2,352,941	100.0
East Ohio Gas Co.				
Common - Par $100	28,500,000	Standard Oil Co. (N.J.)	$28,500,000	100.0
Equitable Gas Co.				
Common - Par $100	3,300,000	Pittsburgh & West Virginia Gas Co.	$ 3,300,000	100.0
Hope Natural Gas Co.				
Common - Par $100	27,969,300	Standard Oil Co. (N.J.)	$27,969,300	100.0

COMMON STOCKS OF NATURAL GAS COMPANIES

HOLDINGS BY AFFILIATES

Company and Issue	Total Outstanding	Holding Affiliate	Amount	% of Total Outstanding
Houston Gulf Gas Co.				
Common - 517,008 shs. - No Par	$ 5,170,080	United Gas Pipe Line Co.	$ 5,148,920	99.6
Indian Territory Illuminating Oil Co.				
Common A - 1,304,600 shs. - Par $1 (a)	1,304,600	Cities Service Co.	$ 1,206,124	92.5
Common B - 7,090,037 shs. - Par $1 (a)	7,090,037	(Empire Gas & Fuel Co.	$ 4,863,689	68.6
		(Cities Service Co.	302,021	4.3
			$ 5,165,710	72.9 Voting Stock
Interstate Natural Gas Co.				
Common - 952,953 shs. - No Par	6,529,530	(Standard Oil Co. (N.J.) (54%) (Columbian Carbon Co. (17%)	$ 4,635,966	71.0
Iriquois Gas Corp.				
Common - Par $100	22,671,400	National Fuel Gas Co.	$22,671,400	100.0
Lone Star Gas Co.				
Common - 540,000 shs. - No Par	28,113,220	Lone Star Gas Corp.	$28,113,220	100.0
Manufacturers Light and Heat Co., The				
Common - Par $50	22,530,400	Columbia Gas & Electric Corp.	$22,524,100	99.7
Memphis Natural Gas Co.				
Common - Par $5	4,593,400	Commonwealth Gas Corp.	$ 2,211,785	48.2
Mississippi River Fuel Corp.				
Common - Par $10	6,552,200	(Standard Oil Co. (N.J.) (22%) (United Gas Corp. (46%) (Columbian Carbon Co. (17%) (United Carbon Co. (15%)	$ 6,552,200	100.0

COMMON STOCKS OF NATURAL GAS COMPANIES

HOLDINGS BY AFFILIATES

Company and Issue	Total Outstanding	Holding Affiliate	Amount	% of Total Outstanding
Mountain Fuel Supply Co.				
Common - Par $10	$19,899,025	Ohio Oil Co., The	$ 4,808,570	24.37
Natural Gas Pipeline Co. of America				
Common - 1,500,000 shs. - No Par	3,000,000	(Cities Service Co. (26.629%) (Standard Oil Co. (N.J.) (13.3145%) (Texas Corp. (17.5832%) (Natural Gas Investment Co. (26.629%) (Southwestern Development Co.(13.3145%) (Columbian Carbon Co. (2.5298%)	$ 3,000,000	100.0
Northern Natural Gas Co.				
Common - 203,000 shs. - No Par	19,273,460	(Lone Star Gas Corp. (30%) (North American Light & Power Co.(35%) (United Light & Railways Co. (35%)	$19,273,460	100.0
Ohio Fuel Gas Co.				
Common - Par $50	67,190,150	Columbia Gas & Electric Corp.	$67,190,150	100.0
Panhandle Eastern Pipe Line Co.				
Common - 728,652 shs. - No Par	18,216,300	Columbia Oil & Gasoline Corp. (55.49%) Missouri Kansas Pipe Line Co. (44.51%)	$18,216,300	100.0
South Penn Oil Co.				
Common - Par $25	25,000,000	Tide Water Associated Oil Co.	$ 4,318,575	17.3
Southern California Gas Co.				
Common - Par $25	28,800,000	Pacific Lighting Corp.	$28,800,000	100.0
Southern Counties Gas Co. of California				
Common - Par $100	8,000,000	Pacific Lighting Corp.	$ 8,000,000	100.0

COMMON STOCKS OF NATURAL GAS COMPANIES

HOLDINGS BY AFFILIATES

Company and Issue	Total Outstanding	Holding Affiliate		Amount	% of Total Outstanding
Southern Natural Gas Co.					
Common - Par $7.50	$ 5,000,000	Federal Water Service Corp.		$ 2,491,109	48.0
Texoma Natural Gas Co.					
Common	500,000	(Cities Service Co. (Natural Gas Investment Co. (Southwestern Development Co. (Texas Corp. (Columbian Carbon Co.	(26.629%) (26.629%) (26.629%) (17.5832%) (2.5298%)	$ 500,000	100.0
United Fuel Gas Co.					
Common - Par $1	30,000,000	Columbia Gas & Electric Corp.		$30,000,000	100.0
United Gas Pipe Line Co.					
Common - 100,000 shs. - No Par	96,772,535	United Gas Corp.		$96,772,535	100.0
United Natural Gas Co.					
Common	15,125,000	National Fuel Gas Co.		$15,125,000	100.0
GRAND TOTAL				$503,806,766	

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BONDS OF NATURAL GAS COMPANIES SOLD IN PERIOD FROM JANUARY 1, 1935 TO SEPTEMBER 30, 1939

COST OF MONEY TO ISSUING COMPANIES AND YIELD TO PUBLIC

Company	Approximate Offering Date	Issue	Principal Amount	Net Cost to C	
				Amount	Co
		Moody's Aaa Rating			
Southern California Gas Co.	July 1935	1st & Ref. Mtg. 4%, 1965	$ 15,000,000	98.09	4
		Moody's A Rating			
Arkansas-Louisiana Gas Co.	July 1936	1st Mtg. 4%, 1951	$ 10,000,000	93.29	4.
Panhandle Eastern Pipe Line Co.	March 1937	1st Mtg. & 1st Lien, 4%, 1952	24,000,000	95.02	4.
			$ 34,000,000	-	
		Moody's Baa Rating			
Oklahoma Natural Gas Co.	June 1936	1st Mtg. A, 4½%, 1951	$ 20,000,000	94.89	4.
" " " "	August 1939	1st Mtg. B, 3 3/4%, 1955	17,000,000	(a)	(
Southern Natural Gas Co.	November 1936	1st Mtg. Pipe Line, 4½%, 1951	15,000,000	96.29	4.
			$ 52,000,000	-	
		Moody's Ba Rating			
El Paso Natural Gas Co. (c)	June 1936	1st Mtg. 4½%, 1951	$ 7,500,000	94.14	5.
Northern Oklahoma Gas Co.	March 1936	1st Mtg. & Coll. Trust, S.F. 5%, 1946	1,000,000	93.58	5
			$ 8,500,000	-	
		No Rating Assigned (All Issues Privately Sold)			
Mississippi River Fuel Corp.	February 1937	1st Mtg. P. L. 4%, 1952	$ 10,000,000	(a)	(
Southern Natural Gas Co.	October 1937	1st Mtg. P. L. 4½%, 1952	650,000	(a)	(
El Paso Natural Gas Co.	October 1937	1st Mtg. B, 4%, 1952	1,200,000	(a)	(
" " " " "	December 1938	1st Mtg. 3 1/2%, 1953	6,000,000	(a)	(
Cities Service Gas Co.	December 1938	1st Mtg. P.L. 3 3/4%, 1947-54	20,000,000	(a)	(
Arkansas-Louisiana Gas Co.	September 1939	1st Mtg. 2 3/4%, A, 1940-44	3,300,000	(a)	(
" " " "	September 1939	1st Mtg. 3½%, B, 1945-54	9,700,000	(a)	(
Northern Natural Gas Co.	August 1939	1st Mtg. 3¼%, A, 1954	16,000,000	(a)	(
			$ 66,850,000		
Grand Total			$176,350,000	-	

Notes:
(a) Net cost to company not available.
(b) Assumed price of par.
(c) El Paso Natural Gas Company's First Mtg. 4½% Bonds, due in 1951, were retired on January 16, 1939. The funds for the purpose were obtained from the sale in December 1938 of $6,000,000 First Mtg. 3½% Bonds, due in 1953, and from bank loans.

Source of Data: Issues in Period from January 1, 1935 to December 31, 1938 from "Security Issues of Electric and Gas Utilities, 1935-1936-1937-193
Exchange Commission. Issues in Period from January 1, 1939 to September 30, 1939 from "Supplements to Moody's Public Utilities".

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TURAL GAS COMPANIES SOLD IN PERIOD FROM JANUARY 1, 1935 TO SEPTEMBER 30, 1939

COST OF MONEY TO ISSUING COMPANIES AND YIELD TO PUBLIC

Issue	Principal Amount	Net Cost to Company Amount	Net Cost to Company Cost %	Price to Public Amount	Price to Public Yield %
Moody's Aaa Rating					
1st & Ref. Mtg. 4%, 1965	$ 15,000,000	98.09	4.11	101.50	3.91
Moody's A Rating					
1st Mtg. 4%, 1951	$ 10,000,000	93.29	4.62	98.00	4.18
1st Mtg. & 1st Lien, 4%, 1952	24,000,000	95.02	4.46	97.50	4.23
	$ 34,000,000	-	-	97.65	4.22
Moody's Baa Rating					
1st Mtg. A, 4½%, 1951	$ 20,000,000	94.89	4.99	98.50	4.64
1st Mtg. B, 3 3/4%, 1955	17,000,000	(a)	(a)	103.50	3.46
1st Mtg. Pipe Line, 4½%, 1951	15,000,000	96.29	4.85	100.00	4.50
	$ 52,000,000	-	-	100.57	4.21
Moody's Ba Rating					
1st Mtg. 4½%, 1951	$ 7,500,000	94.14	5.06	98.50	4.64
1st Mtg. & Coll. Trust, S.F. 5%, 1946	1,000,000	93.58	5.85	100.00	5.00
	$ 8,500,000	-	-	98.68	4.68
No Rating Assigned (All Issues Privately Sold)					
1st Mtg. P. L. 4%, 1952	$ 10,000,000	(a)	(a)	100.00(b)	4.00
1st Mtg. P. L. 4½%, 1952	650,000	(a)	(a)	97.75	4.71
1st Mtg. B, 4%, 1952	1,200,000	(a)	(a)	97.75	4.20
1st Mtg. 3 1/2%, 1953	6,000,000	(a)	(a)	99.00	3.59
1st Mtg. P.L. 3 3/4%, 1947-54	20,000,000	(a)	(a)	100.00	3.75
1st Mtg. 2 3/4%, A, 1940-44	3,300,000	(a)	(a)	100.00	2.75
1st Mtg. 3½%, B, 1945-54	9,700,000	(a)	(a)	100.00	3.50
1st Mtg. 3¼%, A, 1954	16,000,000	(a)	(a)	100.00	3.25
	$ 66,850,000			99.85	3.59
	$176,350,000	-	-	99.72	3.97

Bonds, due in 1951, were retired on
were obtained from the sale in
nds, due in 1953, and from bank loans.

December 31, 1938 from "Security Issues of Electric and Gas Utilities, 1935-1936-1937-1938", issued by Securities and
om January 1, 1939 to September 30, 1939 from "Supplements to Moody's Public Utilities".

Schedule

PREFERRED STOCKS OF NATURAL GAS COMPANIES SOLD IN PERIOD FROM JANUARY 1, 1935 TO SEPTEMBER 30, 1939

YIELD TO PUBLIC

Company	Approximate Offering Date	Issue	Poor's Rating	Number of Shares	Price to Public	
					Per Share	Total
Oklahoma Natural Gas Co. (a) (1)	October 1936	Prior Pfd. Stock Conv. 6%, $100 par	B*	22,200	100.00	$2,220,000
Oklahoma Natural Gas Co. (2)	August 1939	$5.50 Prior Pfd. Stock, no par	B*	58,000	104.00	6,032,000
Total				-	-	$8,252,000

Note: (a) This issue was called for redemption on October 7, 1939. The funds for the purpose were obtained from sale of $5.50 prior pfd. stock in August 1939.

Source of Data:

(1) "Security Issues of Electric and Gas Utilities, 1935-1936-1937-1938", Issued by Securities and Exchange Commission.
(2) Supplements to Moody's Public Utilities.

Schedule No. 7

RAL GAS COMPANIES SOLD IN PERIOD FROM JANUARY 1, 1935 TO SEPTEMBER 30, 1939

YIELD TO PUBLIC

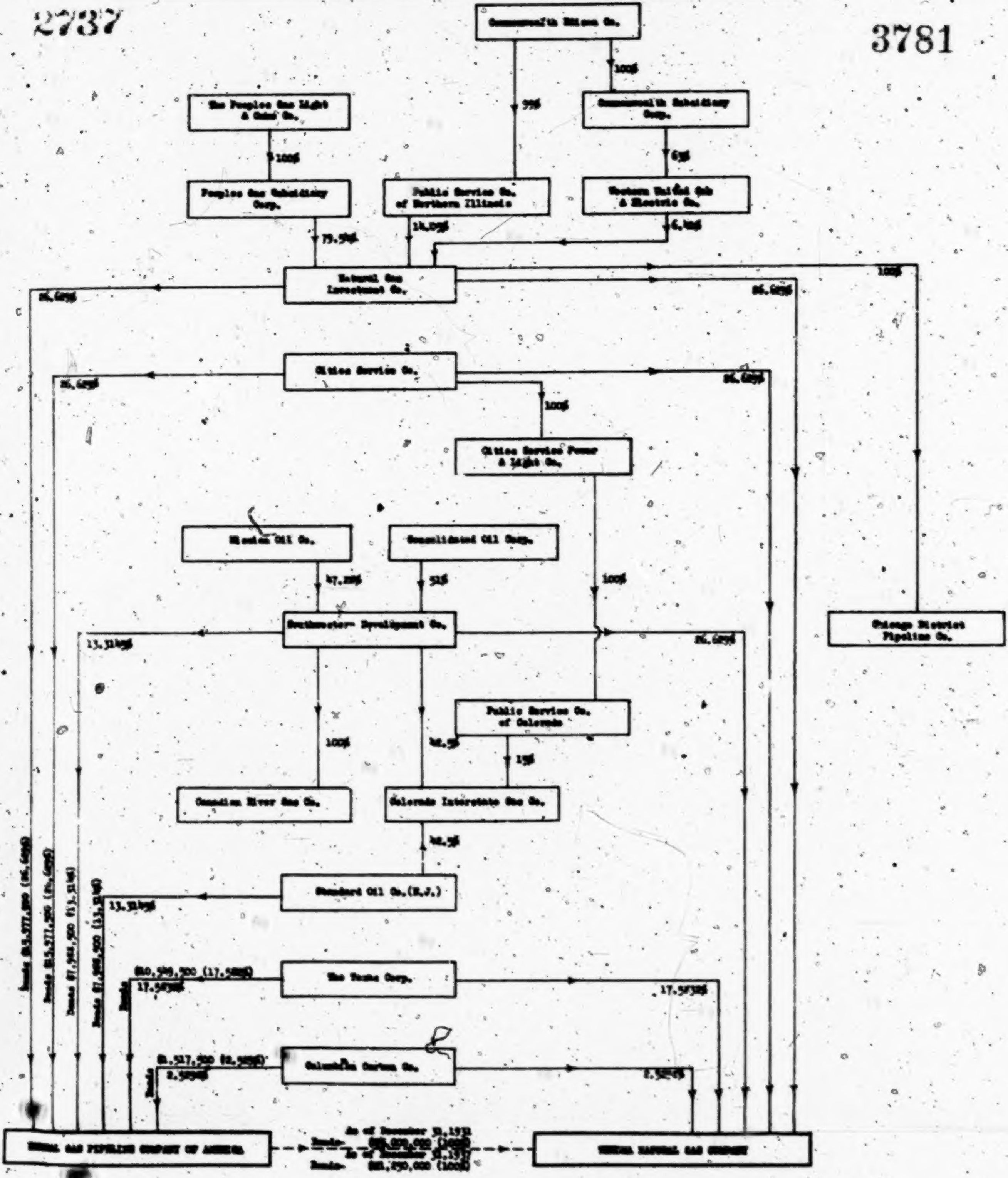
Issue	Poor's Rating	Number of Shares	Price to Public Per Share	Total	Yield %
Stock Conv. 6%, $100 par	B*	22,200	100.00	$2,220,000	6.00
Pfd. Stock, no par	B*	58,000	104.00	6,032,000	5.29
		-	-	$8,252,000	5.48

The funds for the purpose were
9.

935-1936-1937-1938", Issued by Securities and Exchange Commission.

[illegible] AFFILIATES ([illegible]) WITH NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY

CHART NO. 4


Commonwealth Edison Co.
100%
99%
The Peoples Gas Light & Coke Co.
Commonwealth Subsidiary Corp.
100%
63%
Peoples Gas Subsidiary Corp.
Public Service Co. of Northern Illinois
Western United Gas & Electric Co.
79.5%
14.05%
6.45%
Natural Gas Investment Co.
26.685%
26.685%
100%
Cities Service Co.
26.685%
26.685%
100%
Cities Service Power & Light Co.
Mission Oil Co.
Consolidated Oil Corp.
47.20%
51%
100%
Southwestern Development Co.
13.314%
26.685%
Chicago District Pipeline Co.
Public Service Co. of Colorado
100%
42.5%
15%
Canadian River Gas Co.
Colorado Interstate Gas Co.
42.5%
Standard Oil Co.(N.J.)
13.314%
Bonds $15,577,500 (26.685%)
Bonds $15,577,500 (26.685%)
Bonds $7,988,500 (13.314%)
Bonds $7,988,500 (13.314%)
The Texas Corp.
$10,549,500 (17.583%)
Bonds
17.583%
17.583%
Columbian Carbon Co.
$1,517,500 (2.589%)
Bonds
2.589%
2.589%
NATURAL GAS PIPELINE COMPANY OF AMERICA
As of December 31,1931
Bonds- $23,000,000 (100%)
As of December 31,1937
Bonds- $21,250,000 (100%)
TEXOMA NATURAL GAS COMPANY

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Schedule No. 8
Page 1

Recent Financing by Companies Affiliated (Directly and Indirectly) with Natural Gas Pipeline Company of America and Texoma Natural Gas Company

Company	Date	Issue	Yield to Purchasers	
Standard Oil Company (N. J.)	May 1936	$30,000,000 Debentures 3%, 1961, sold at 98	3.12%	(1)
“ “ “ “	“ “	$55,000,000 Debentures 3%, 1961, sold at 98—Private sale to Rockefeller Foundations	3.12%	(1)
“ “ “ “	July 1938	$50,000,000 Debentures 2¾%, 1953, sold at 99	2.83%	(2)
“ “ “ “	“ “	$31,000,000 Serial Notes 1¾%-2½%, 1943-47, sold at 100	1.75- 2.50%	(2)
The Texas Corporation	June 1936	$60,000,000 Debentures 3½%, 1951, sold at 100	3.50%	(1)
“ “ “	April 1939	$40,000,000 Debentures 3%, 1959, sold at 101	2.93%	(3)
Consolidated Oil Corporation	June 1936	$50,000,000 Debentures 3½%, 1951, sold at 98	3.67%	(1)
“ “ “	Aug. 1938	$25,000,000 Debentures 3⅜%, 1950, sold privately at 100	3.38%	(4)
Public Service Company of Northern Illinois	Oct. 1938	$80,000,000 First Mtge. 3½%, 1968, sold at 103	3.34%	(5)
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Commonwealth Edison Company	June 1938	$33,000,000 First Mtge. I, 3½%, 1968, sold at 102.25	3.38%	(5)
“ “ “	Aug. 1938	$33,000,000 First Mtge. I, 3½%, 1968, sold at 103.50	3.31%	(5)
“ “ “	Nov. 1938	$34,000,000 First Mtge. I, 3½%, 1968, sold at 104	3.29%	(5)
“ “ “	June 1938	$39,083,195 Debentures, 3½%, 1958, sold at 100	3.50%	(5)
“ “ “	Aug. 1938	$39,250,000 Debentures, 3½%, 1958, sold at 100	3.50%	(5)
“ “ “	Dec. 1938	$24,896,900 Debentures, 3½%, 1958, sold at 100	3.50%	(5)
The Peoples Gas Light & Coke Company	May 1936	$22,000,000 First & Ref. Mtge. D, 4%, 1961, sold at 97.50	4.16%	(5)

The following in reference to recent short-term financing by The Peoples Gas Light & Coke Company, is from The Commercial and Financial Chronicle, April 22, 1939:

> “Peoples Gas Light & Coke Co. Notes—
>
> Company sold $2,500,000 of promissory notes to five Chicago banks on March 9, and used the proceeds together with other funds to retire $3,000,000 in promissory notes, maturing serially from May 31, 1940 to May 31, 1942, at 100¼. The new promissory notes include $500,000 bearing interest at 1½% and maturing May 31, 1940; $1,000,000 at 1¾%, due 1941; and $1,000,000 of 2% notes due 1942. The new notes are secured by pledge of $2,752,000 of Natural Gas Pipeline Company of America first mortgage pipeline and collateral 6% bonds, series A, due 1946, and are redeemable at any time on 30 days notice at 100¼ in multiples of $500,000. Upon retirement of $3,000,000 promissory notes, the banks released $3,312,000 of Natural Gas Pipeline Company of America 6% first mortgage pipeline and collateral bonds.”

Sources of Information:
(1) Moody's Industrials, 1938
(2) Moody's Industrials Supplement, July 9, 1938.
(3) Moody's Industrials Supplement, April 15, 1939.
(4) Moody's Industrials Supplement, September 28, 1938.
(5) Security Issues of Electric and Gas Utilities 1935-1936-1937-1938 (Issued by Securities and Exchange Commission)

EXHIBIT 187

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Comparative Statement of Combined Profit and Loss
For 5 Months Ended August 31, 1939 and 1938

Line No.		8 Months Ended Aug. 31, 1939	8 Months Ended Aug. 31, 1938	Increase or Decrease*
1	Gross Earnings from operations	$10,460,897.18	$9,457,471.97	$1,003,425.21
2	Operating Expenses	3,233,293.23	3,032,386.72	200,906.51
3	Net Earnings from Operation	$ 7,227,603.95	$6,425,085.25	$ 802,518.70
4	Non-Operating Income	677.76	12,877.82	12,200.06*
5	Net Earnings of Company	$ 7,228,281.71	$6,437,963.07	$ 790,318.64*
	Less: Other Charges			
6	Interest Expense	$ 1,819,056.36	$1,356,759.25	$ 137,702.89*
7	Amortization of Bond Discount and Expense	170,167.32	170,167.32	—
8	Depreciation	1,358,804.20	1,208,667.22	150,136.98
9	Depletion	189,549.89	165,598.40	23,951.49
10	Retirement Expense	205,920.14	680,971.50	475,051.36*
11	Total Other Charges	$ 3,743,497.91	$4,182,163.69	$ 438,665.78*
12	Net Earnings Available for Dividends	$ 3,484,783.80	$2,255,799.38	$1,228,984.42
13	Dividends	1,500,000.00	1,687,000.00	187,000.00*
14	Balance	$ 1,984,783.80	$ 568,799.38	$1,415,984.42

(*) Negative amounts.

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EXHIBIT 188.

Natural Gas Pipeline Company of America
and
Texoma Natural Gas Company
(Combined Companies)

Proforma Comparative Balance Sheets

Annually at December 31, from 1939 to 1954
and After Liquidation

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Natural Gas Pipeline Company of America
and
Texoma Natural Gas Company

Index.

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Assumptions.

A. Dividends: Cash dividends are to be paid each year at 25% of the stated value of the Capital Stock of Natural Gas Pipeline Company of America, outstanding January 1, 1939. No dividends are to be paid on the Capital Stock of Texoma Natural Gas Company until liquidation.

B. Other Net Current Assets: This caption reflects changes in Taxes Accrued resulting from the payment of Federal and State Income Taxes in the year following accrual and changes in Interest Payable based on assumptions of borrowings and repayments. Changes in current assets other than cash and changes in current liabilities other than Taxes Accrued and Interest Payable, have been assumed to be offsetting.

C. Salvage: This item was assumed to represent either cash value realized or materials reused during the year for which estimated.

D. Borowings: The borrowings were assumed to be made fifteen days in advance of the date on which the Company is obligated to make its sinking fund payments to retire bonds. Interest is assumed to be 6%, so that in effect the bonds due to be retired under the provisions of the [illegible]mpany's mortgage will be extended by the holders thereof for the additional period required. Interest on borrowings is assumed to be payable every six months. Repayments of borrowings are assumed to be made on the semi-annual date at which the recurring six months interest becomes due.

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

(Combined Companies)

COMPARATIVE BALANCE SHEETS
BASED ON ADMITTED EARNINGS AND AMORTIZATION OF CAPITAL
ASSETS ON ARBITRARY STRAIGHT LINE BASIS

		Assets					Liabilities and Net			
Line No.	December 31 (a)	Capital Assets (b)	Cash (c)	Other Net Current Assets (d)	Bond Discount And Expense (e)	Total Assets (f)	Debt Obligations (g)	Reserves for Amortization of Capital Assets (h)	Capital Stock (i)	Surpl (j)
1	1939	$59,951,447	$ 1,054,046	$ 538,304	$1,777,448	$63,321,245	$42,300,000	$16,190,548	$3,500,000	$ 1,330
2	1940	61,083,172	1,720,347	329,833	1,523,527	64,656,879	37,700,000	19,814,390	3,500,000	3,64
3	1941	62,176,407	1,970,038	296,679	1,269,606	65,712,730	32,700,000	23,428,723	3,500,000	6,084
4	1942	63,429,432	1,585,445	214,746	1,015,685	66,245,308	26,900,000	27,114,881	3,500,000	8,730
5	1943	64,215,755	1,747,282	188,223	761,764	66,913,024	21,100,000	30,781,427	3,500,000	11,53
6	1944	64,872,174	1,417,151	135,558	507,843	66,932,726	14,400,000	34,414,729	3,500,000	14,617
7	1945	65,615,784	1,127,310	61,505	253,922	67,058,521	7,700,000	37,930,946	3,500,000	17,927
8	1946	66,525,700	176,394	12,738		66,714,832	300,000	41,496,870	3,500,000	21,41
9	1947	67,247,761	6,712,897	111,463*		73,849,195		45,166,318	3,500,000	25,18
10	1948	67,817,611	13,567,832	122,093*		81,263,350		48,842,180	3,500,000	28,92
11	1949	68,277,667	20,478,639	126,936*		88,629,370		52,580,085	3,500,000	32,54
12	1950	68,742,765	27,374,534	122,219*		95,995,080		56,314,208	3,500,000	36,18
13	1951	69,079,883	34,369,269	138,065*		103,311,087		60,039,929	3,500,000	39,77
14	1952	69,158,033	41,304,307	126,651*		110,335,689		63,768,198	3,500,000	43,06
15	1953	69,177,875	46,123,306	273,803		115,574,984		67,532,191	3,500,000	44,54
16	1954	69,179,314	46,250,230	1,213,500		116,643,044		69,105,182	3,500,000	44,03
17			47,537,862			47,537,862			3,500,000	44,03
Source									Ex. 137 Pg. 1 L 21	
Data		Sch. 5, Col. g	Sch. 6a, Col. g	Sch. 7a, Col. e	Sch. 8, Col. c	Col. b+c+d+e	Sch. 9a, Col. e	Sch. 10a, Col. e		Sch. 1 Col.

* Negative amounts

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

(Combined Companies)

COMPARATIVE BALANCE SHEETS
BASED ON ADMITTED EARNINGS AND AMORTIZATION OF CAPITAL ASSETS ON ARBITRARY STRAIGHT LINE BASIS

Sch. 1

ts			Liabilities and Net Worth				
Other Net Current Assets (d)	Bond Discount And Expense (e)	Total Assets (f)	Debt Obligations (g)	Reserves for Amortization of Capital Assets (h)	Capital Stock (i)	Surplus (j)	Total Liabilities and Net Worth (k)
$ 538,304	$1,777,448	$63,321,245	$42,300,000	$16,190,548	$3,500,000	$ 1,330,697	$63,321,245
329,833	1,523,527	64,656,879	37,700,000	19,814,390	3,500,000	3,642,489	64,656,879
296,679	1,269,606	65,712,730	32,700,000	23,428,723	3,500,000	6,084,007	65,712,730
214,746	1,015,685	66,245,308	26,900,000	27,114,881	3,500,000	8,730,427	66,245,308
188,223	761,764	66,913,024	21,100,000	30,781,427	3,500,000	11,531,597	66,913,024
135,558	507,843	66,932,726	14,400,000	34,414,729	3,500,000	14,617,997	66,932,726
61,505	253,922	67,058,521	7,700,000	37,930,946	3,500,000	17,927,575	67,058,521
12,738		66,714,832	300,000	41,496,870	3,500,000	21,417,962	66,714,832
111,463*		73,849,195		45,166,318	3,500,000	25,182,877	73,849,195
122,097*		81,263,350		48,842,180	3,500,000	28,921,170	81,263,350
126,936*		88,629,370		52,580,085	3,500,000	32,549,285	88,629,370
122,219*		95,995,080		56,314,208	3,500,000	36,180,872	95,995,080
138,065*		103,311,087		60,039,929	3,500,000	39,771,158	103,311,087
126,651*		110,335,689		63,768,198	3,500,000	43,067,491	110,335,689
273,803		115,574,984		67,532,191	3,500,000	44,542,793	115,574,984
1,213,500		116,643,044		69,105,182	3,500,000	44,037,862	116,643,044
		47,537,862			3,500,000	44,037,862	47,537,862
Sch.7a,Col.e	Sch.8,Col.c	Col. b+c+d+e	Sch.9a,Col.e	Sch.10a, Col. e		Sch.11a, Col. e	Col. g+h+i+j

Ex. 137
Pg. 1
L 21

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

(Combined Companies)

COMPARATIVE BALANCE SHEETS
BASED ON ADMITTED EARNINGS AND AMORTIZATION OF CAPITAL ASSETS
ON ARBITRARY SINKING FUND BASIS

		Assets					Liabilities and Net Worth			
Line No.	December 31 (a)	Capital Assets (b)	Cash (c)	Other Net Current Assets (d)	Bond Discount and Expenses (e)	Total Assets (f)	Debt Obligations (g)	Reserves for Amortization of Capital Assets (h)	Capital Stock (i)	Surplus (j)
1	1939	$59,951,447	$1,054,046	$ 538,304	$1,777,448	$ 63,321,245	$42,300,000	$ 14,867,148	$3,500,000	$ 2,654,097
2	1940	61,083,172	1,720,347	329,833	1,523,527	64,656,879	37,700,000	17,318,370	3,500,000	6,138,509
3	1941	62,176,407	1,970,038	296,679	1,269,606	65,712,730	32,700,000	19,920,103	3,500,000	9,592,627
4	1942	63,429,432	1,585,445	214,746	1,015,685	66,245,308	26,900,000	22,763,431	3,500,000	13,081,877
5	1943	64,215,755	1,747,262	188,223	761,784	66,913,024	21,100,000	25,767,207	3,500,000	16,545,817
6	1944	64,872,174	1,417,151	135,558	507,843	66,932,726	14,400,000	28,928,809	3,500,000	20,103,917
7	1945	65,615,784	1,127,310	61,505	253,922	67,058,521	7,700,000	32,176,036	3,500,000	23,682,485
8	1946	66,525,700	176,394	12,738		66,714,832	300,000	35,688,010	3,500,000	27,226,822
9	1947	67,247,761	6,712,897	111,463*		73,849,195		39,531,628	3,500,000	30,817,567
10	1948	67,817,611	13,567,832	122,093*		81,263,350		43,623,700	3,500,000	34,139,650
11	1949	68,277,667	20,478,639	126,936*		88,629,370		48,034,555	3,500,000	37,094,815
12	1950	68,742,765	27,374,534	122,219*		95,995,080		52,714,058	3,500,000	39,781,022
13	1951	69,079,883	34,359,269	128,065*		103,311,087		57,674,119	3,500,000	42,136,968
14	1952	69,158,033	41,304,307	126,651*		110,335,689		62,943,358	3,500,000	43,892,331
15	1953	69,177,875	46,123,306	273,803		115,574,984		68,573,581	3,500,000	43,501,403
16	1954	69,179,314	46,250,230	1,213,500		116,643,044		69,105,182	3,500,000	44,037,862
17			47,537,862			47,537,862			3,500,000	44,037,862
SOURCE:									Ex.137, Pg.1,L.21	
DATA:		Sch. 5, Col. g	Sch. 6a, Col. g	Sch. 7a, Col. e	Sch. 8, Col. e	Col. b+c+d+e	Sch. 9a, Col. e	Sch. 10b Col. g		Sch. 11b, Col. f

(*) Negative amount.

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

(Combined Companies)

Sch. 2

COMPARATIVE BALANCE SHEETS
BASED ON ADMITTED EARNINGS AND AMORTIZATION OF CAPITAL ASSETS ON ARBITRARY SINKING FUND BASIS

Assets			Liabilities and Net Worth				
Other Net Current Assets (d)	Bond Discount and Expenses (e)	Total Assets (f)	Debt Obligations (g)	Reserves for Amortization of Capital Assets (h)	Capital Stock (i)	Surplus (j)	Total Liabilities and Net Worth (k)
$ 538,304	$1,777,448	$ 63,321,245	$42,300,000	$ 14,867,148	$3,500,000	$ 2,654,097	$ 63,321,245
329,833	1,523,527	64,656,879	37,700,000	17,318,370	3,500,000	6,138,509	64,656,879
296,679	1,269,606	65,712,730	32,700,000	19,920,103	3,500,000	9,592,627	65,712,730
214,746	1,015,685	66,245,308	26,900,000	22,763,431	3,500,000	13,081,877	66,245,308
188,223	761,764	66,913,024	21,100,000	25,767,207	3,500,000	16,545,817	66,913,024
135,558	507,843	66,932,726	14,400,000	28,928,809	3,500,000	20,103,917	66,932,726
61,505	253,922	67,058,521	7,700,000	32,176,036	3,500,000	23,682,485	67,058,521
12,738		66,714,832	300,000	35,688,010	3,500,000	27,226,822	66,714,832
111,463*		73,849,195		39,531,628	3,500,000	30,817,567	73,849,195
122,093*		81,263,350		43,623,700	3,500,000	34,139,650	81,263,350
126,336*		88,629,370		48,034,555	3,500,000	37,094,815	88,629,370
122,219*		95,995,080		52,714,058	3,500,000	39,781,022	95,995,080
138,065*		103,311,087		57,674,119	3,500,000	42,136,968	103,311,087
126,651*		110,335,639		62,943,358	3,500,000	43,892,331	110,335,689
273,803		115,574,984		68,573,581	3,500,000	43,501,403	115,574,984
1,213,500		116,643,044		69,105,182	3,500,000	44,037,862	116,643,044
		47,537,862			3,500,000	44,037,862	47,537,862
					Ex.137, pg.1, L.21		
Sch. 7a, Col. e	Sch. 8, Col. e	Col. b+c+d+e	Sch. 9a, Col. e	Sch. 10b Col. g		Sch. 11b, Col. f	Col. g+h+i+j

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NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

(Combined Companies)

Sch. 3

COMPARATIVE BALANCE SHEETS
BASED ON ADMITTED EARNINGS AFTER REFLECTING RATE REDUCTION OF $3,000,000 PER YEAR EFFECTIVE 1/1/40 AND AMORTIZATION OF CAPITAL ASSETS ON ARBITRARY STRAIGHT LINE BASIS

		Assets					Liabilities and Net Worth				
Line No.	December 31 (a)	Capital Assets (b)	Cash (c)	Other Net Current Assets (d)	Bond Discount and Expense (e)	Total Assets (f)	Debt Obligations (g)	Reserves for Amortization of Capital Assets (h)	Capital Stock (i)	Surplus (j)	Lia N
1	1939	$58,971,447	$2,034,046	$ 538,304	$1,777,448	$63,321,245	$42,300,000	$ 16,190,548	$3,500,000	$1,330,697	$63
2	1940	61,053,172	220,347	847,709	1,523,527	63,644,755	39,200,000	19,814,390	3,500,000	1,160,365	6
3	1941	62,275,407	263,414	856,672	1,269,606	64,665,099	36,600,000	23,428,723	3,500,000	1,037,376	6
4	1942	63,429,432	273,314	725,009	1,015,685	65,443,440	33,900,000	27,114,881	3,500,000	928,559	6
5	1943	64,215,755	215,414	780,670	761,764	65,973,303	30,300,000	30,782,427	3,500,000	892,376	6
6	1944	64,872,174	287,430	714,626	507,843	66,382,073	27,500,000	34,414,729	3,500,000	967,344	6
7	1945	65,655,784	259,157	550,703	253,922	66,719,566	24,300,000	37,930,946	3,500,000	1,083,620	6
8	1946	66,525,700	246,439	529,741		67,301,880	21,200,000	41,496,870	3,500,000	1,105,010	6
9	1947	67,247,761	283,445	575,249		68,106,455	18,000,000	45,165,339	3,500,000	1,440,137	6
10	1948	67,817,511	283,192	545,755		68,646,458	14,400,000	48,842,120	3,500,000	1,904,278	6
11	1949	68,277,667	320,747	519,362		69,117,776	10,600,000	52,580,085	3,500,000	2,437,891	6
12	1950	68,742,765	333,940	501,318		69,578,023	6,500,000	56,324,205	3,500,000	3,163,815	6
13	1951	69,079,885	345,212	460,905		69,886,002	2,300,000	60,079,928	3,500,000	4,048,073	6
14	1952	69,155,035	2,523,722	436,396		72,115,153		63,766,298	3,500,000	4,850,455	7
15	1953	69,177,875	4,906,270	826,754		74,910,899		67,532,191	3,500,000	3,878,708	7
16	1954	69,178,314	2,586,245	1,270,546		73,035,105		69,105,162	3,500,000	430,923	7
17			3,930,923			3,930,923			3,500,000	430,923	3
SOURCE:									Ex. 137; pg. 1, L. 21		
DATA:		Sch. 5, Col. g	Sch. 6, Col. g	Sch. 7b, Col. e	Sch. 8, Col. e	Col. b+c+d+e	Sch. 9b, Col. e	Sch. 10a, Col. a		Sch. 11c, Col. a	Col

Sch. 3

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

(Combined Companies)

COMPARATIVE BALANCE SHEETS
BASED ON ADMITTED EARNINGS AFTER REFLECTING RATE REDUCTION OF $3,000,000 PER YEAR EFFECTIVE 1/1/40 AND AMORTIZATION OF CAPITAL ASSETS ON ARBITRARY STRAIGHT LINE BASIS

Assets			Liabilities and Net Worth				
Other Net Current Assets (d)	Bond Discount and Expense (e)	Total Assets (f)	Debt Obligations (g)	Reserves for Amortization of Capital Assets (h)	Capital Stock (i)	Surplus (j)	Total Liabilities and Net Worth (k)
$ 536,304	$1,777,446	$63,321,245	$42,300,000	$ 16,190,548	$3,500,000	$1,330,697	$63,321,245
847,709	1,523,527	63,674,755	39,200,000	19,814,390	3,500,000	1,160,365	63,674,755
856,672	1,269,606	64,566,099	36,600,000	23,428,723	3,500,000	1,037,376	64,566,099
725,309	1,015,685	65,443,440	33,900,000	27,114,881	3,500,000	928,559	65,443,440
780,670	761,764	65,973,803	30,800,000	30,781,427	3,500,000	892,376	65,973,803
714,626	507,843	66,382,073	27,500,000	34,414,729	3,500,000	967,344	66,382,073
550,733	253,922	66,819,566	24,300,000	37,930,946	3,500,000	1,088,620	66,819,566
529,741		67,301,380	21,200,000	41,496,870	3,500,000	1,105,010	67,301,380
575,248		68,106,455	18,000,000	45,166,318	3,500,000	1,440,137	68,106,455
545,755		68,346,458	14,400,000	48,542,180	3,500,000	1,904,278	68,346,458
519,362		69,117,776	10,600,000	52,580,085	3,500,000	2,437,691	69,117,776
501,318		69,578,023	6,600,000	56,314,208	3,500,000	3,163,815	69,578,023
461,907		69,888,002	2,300,000	60,039,929	3,500,000	4,048,073	69,888,002
436,329		72,118,653		63,768,198	3,500,000	4,850,455	72,118,653
326,754		74,910,899		67,532,191	3,500,000	3,878,708	74,910,899
1,270,346		73,036,105		69,105,182	3,500,000	430,923	73,036,105
		3,930,923			3,500,000	430,923	3,930,923
					Ex. 137, pg. 1, L. 21		
Sch. 7b Col. e	Sch. 8 Col. c	Col. b+c+d+e	Sch. 9b, Col. e	Sch. 10a, Col. a		Sch. 11c, Col. a	Col. g+h+i+j

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

(Combined Companies)

COMPARATIVE BALANCE SHEETS
BASED ON ADJUSTED EARNINGS AFTER REFLECTING RATE REDUCTION OF
$3,000,000 PER YEAR EFFECTIVE 1/1/40 AND AMORTIZATION OF
CAPITAL ASSETS ON ARBITRARY SINKING FUND BASIS

		Assets					Liabilities and Net Worth				
Line No.	December 31 (a)	Capital Assets (b)	Cash (c)	Other Net Current Assets (d)	Bond Discount and Expense (e)	Total Assets (f)	Debt Obligations (g)	Reserves for Amortization of Capital Assets (h)	Capital Stock (i)	Surplus (j)	Tot Liabil an Net W (k
1	1939	$59,951,447	$1,054,046	538,304	1,777,448	$63,321,245	$42,300,000	$14,867,148	$3,500,000	$2,654,097	$63,32
2	1940	61,083,172	220,347	847,709	1,523,527	63,674,755	39,200,000	17,318,370	3,500,000	3,656,385	63,67
3	1941	62,176,407	263,414	856,672	1,269,506	64,566,099	36,600,000	19,920,103	3,500,000	4,545,996	64,56
4	1942	63,429,432	273,314	725,009	1,015,685	65,443,440	33,900,000	22,763,431	3,500,000	5,280,009	65,44
5	1943	64,215,755	215,414	780,870	761,764	65,973,803	30,800,000	25,767,207	3,500,000	5,906,596	65,97
6	1944	64,872,174	287,430	714,626	507,843	66,382,073	27,500,000	28,928,809	3,500,000	6,453,264	66,38
7	1945	65,615,784	299,157	650,703	253,922	66,819,566	24,300,000	32,176,036	3,500,000	6,843,530	66,81
8	1946	66,525,700	246,439	529,741		67,301,880	21,200,000	35,688,010	3,500,000	6,913,870	67,30
9	1947	67,247,761	283,445	575,249		68,106,455	18,000,000	39,531,628	3,500,000	7,074,827	68,10
10	1948	67,817,611	283,092	545,755		68,646,458	14,400,000	43,623,700	3,500,000	7,122,758	68,64
11	1949	68,277,667	320,747	519,362		69,117,776	10,600,000	48,034,555	3,500,000	6,983,221	69,11
12	1950	68,742,765	333,940	501,318		69,578,023	6,600,000	52,714,058	3,500,000	6,763,965	69,57
13	1951	69,079,883	346,212	461,907		69,888,002	2,300,000	57,674,119	3,500,000	6,413,883	69,88
14	1952	69,158,033	2,523,722	436,898		72,118,653		62,943,358	3,500,000	5,675,295	72,11
15	1953	69,177,875	4,905,270	826,754		74,910,899		68,573,581	3,500,000	2,837,318	74,91
16	1954	69,179,314	2,586,145	1,270,646		73,036,105		69,105,182	3,500,000	430,923	73,03
17			3,930,923			3,930,923			3,500,000	430,923	3,93
Source									Ex. 137 Pg. 1 L 21		
Data		Sch. 5 Col. g	Sch. 6b Col. g	Sch. 7b Col. e	Sch. 8 Col. c	Col. b+c+d+e	Sch. 9b Col. e	Sch. 10b Col. g		Sch. 11d Col. f	Col. g+h+

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

(Combined Companies)

COMPARATIVE BALANCE SHEETS
BASED ON ADJUSTED EARNINGS AFTER REFLECTING RATE REDUCTION OF $3,000,000 PER YEAR EFFECTIVE 1/1/40 AND AMORTIZATION OF CAPITAL ASSETS ON ARBITRARY SINKING FUND BASIS

Sch. 4

Other Non Current Assets (d)	Bond Discount and Expense (e)	Total Assets (f)	Liabilities and Net Worth Debt Obligations (g)	Reserves for Amortization of Capital Assets (h)	Capital Stock (i)	Surplus (j)	Total Liabilities and Net Worth (k)
538,304	1,777,448	$63,321,245	$42,300,000	$14,867,148	$3,500,000	$2,654,097	$63,321,245
847,709	1,523,527	63,674,755	39,200,000	17,318,370	3,500,000	3,656,385	63,674,755
856,672	1,269,506	64,566,099	36,600,000	19,920,103	3,500,000	4,545,996	64,566,099
725,009	1,015,685	65,443,440	33,900,000	22,763,431	3,500,000	5,280,009	65,443,440
780,870	761,764	65,973,803	30,800,000	25,767,207	3,500,000	5,906,596	65,973,803
714,626	507,843	66,382,073	27,500,000	28,928,809	3,500,000	6,453,264	66,382,073
650,703	253,922	66,819,566	24,300,000	32,176,036	3,500,000	6,843,530	66,819,566
529,741		67,301,880	21,200,000	35,688,010	3,500,000	6,913,870	67,301,880
575,249		68,106,455	18,000,000	39,531,628	3,500,000	7,074,827	68,106,455
545,755		68,646,458	14,400,000	43,623,700	3,500,000	7,122,758	68,646,458
519,362		69,117,776	10,600,000	48,034,555	3,500,000	6,983,221	69,117,775
501,318		69,578,023	6,600,000	52,714,058	3,500,000	6,763,965	69,578,023
461,907		69,888,002	2,300,000	57,674,119	3,500,000	6,413,883	69,888,002
436,898		72,118,653		62,943,358	3,500,000	5,675,295	72,118,653
826,754		74,910,899		68,573,581	3,500,000	2,837,318	74,910,899
1,270,646		73,036,105		69,105,182	3,500,000	430,923	73,036,105
		3,930,923			3,500,000	430,923	3,930,923
Sch. 7b Col. e	Sch. 8 Col. c	Col. b+c+d+e	Sch. 9b Col. e	Sch. 10b Col. g		Sch. 11d Col. f	Col. g+h+i+j

Ex. 137
Pg. 1
L 21

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

(Combined Companies)

CAPITAL ASSETS

Sch. 5

Line No.	Year (a)	Cost of Additional Property (b)	Capital Expenditure for Replacements (c)	Total Additional Capital Investment (d)	Book Cost of Property Retired (e)	Net Change In Capital Assets (f)	Balance at End of Year (g)
							$59,197,843A
1	1939	$ 856,558	$ 106,530	$ 963,088	$209,484	$ 753,604	59,951,447
2	1940	1,072,270	249,924	1,322,194	190,469	1,131,725	61,083,172
3	1941	926,064	389,053	1,315,117	221,882	1,093,235	62,176,407
4	1942	1,147,407	242,976	1,390,383	137,358	1,253,025	63,429,432
5	1943	620,660	317,879	938,539	152,216	786,323	64,215,755
6	1944	568,531	264,952	833,483	177,064	656,419	64,872,174
7	1945	663,226	380,794	1,044,020	300,410	743,610	65,615,784
8	1946	834,366	333,410	1,167,776	257,860	909,916	66,525,700
9	1947	729,454	144,261	873,715	151,654	722,061	67,247,761
10	1948	562,361	154,689	717,050	147,200	569,850	67,817,611
11	1949	458,461	84,763	543,224	83,168	460,056	68,277,667
12	1950	464,644	89,465	554,109	89,011	465,098	68,742,765
13	1951	338,580	92,890	431,470	94,352	337,118	69,079,883
14	1952	77,543	191,438	268,981	190,831	78,150	69,158,033
15	1953	18,858	55,840	74,698	54,856	19,842	69,177,875
16	1954	—	6,380	6,380	4,941	1,439	69,179,314
17					69,179,314	69,179,314*C	—
Source		Ex. 141 Pg. 2, L22	Ex. 141 Pg. 2, L14	Ex. 117 Pg. 1, L3	Ex. 117 Pg. 1, L6		
Data						d-e	B

*Negative amounts

A - Balance 1/1/39 - from Ex. 137, pg. 1, line 5, column 8
B - Computed by adding amounts in column f to balance at end of previous year
C- per Sch. 21a, L 3

Sch. 6a

CASH
BASED ON ADMITTED EARNINGS

		Expenditures					
Line No.	Year (a)	Expenditures for Capital Assets (b)	Net Change in Debt Obligations (c)	Dividends (d)	Net Cash from Profits (e)	Net Change in Cash (f)	Balance at End of Year (g)
							$ 163,962 A
1	1939	$ 920,948	$4,500,000	$750,000	$7,061,032	$ 890,084	1,054,046
2	1940	1,307,883	4,600,000	750,000	7,324,184	666,301	1,720,347
3	1941	1,278,902	5,000,000	750,000	7,278,593	249,691	1,970,038
4	1942	1,366,867	5,800,000	750,000	7,532,274	384,593*	1,585,445
5	1943	919,777	5,800,000	750,000	7,631,614	161,837	1,747,282
6	1944	823,117	6,700,000	750,000	7,942,986	330,131*	1,417,151
7	1945	1,027,393	6,700,000	750,000	8,187,552	289,841*	1,127,310
8	1946	1,143,992	7,400,000	750,000	8,343,076	950,916*	176,394
9	1947	852,613	300,000	750,000	8,439,116	6,536,503	6,712,897
10	1948	693,988		750,000	8,298,923	6,854,935	13,567,832
11	1949	522,151		750,000	8,182,958	6,910,807	20,478,639
12	1950	530,975		750,000	8,176,870	6,895,895	27,374,534
13	1951	411,397		750,000	8,156,132	6,994,735	34,369,269
14	1952	149,881		750,000	7,834,919	6,935,038	41,304,307
15	1953	55,849		750,000	5,624,848	4,818,999	46,123,306
16	1954	5,690		750,000	883,614	126,924	46,250,230
17						1,287,632 D	47,537,862
DATA:		Sch. 12, Col. d	Sch. 9a, Col. d	B	Sch. 16a Col. g	Col. e - (b+c+d)	C

*) Negative Amount

A - Balance January 1, 1939, Ex. 137, pg. 1, L.7

B - Assumed at 25% of stated value of Capital Stock of Natural Gas Pipeline Company of America outstanding January 1, 1939—see Assumption A attached.

C - Computed by adding amount in column f to balance at end of previous year (column g in line above).

D - Per Sch. 21a, L.2 - $457,452
Sch. 21a, L.5 - 830,180
Total $1,287,632

CASH
BASED ON ADMITTED EARNINGS AFTER REFLECTING RATE REDUCTION OF $3,000,000 PER YEAR EFFECTIVE 1/1/40

Sch. 6b

		Expenditures					
Line No.	Year (a)	Expenditures for Capital Assets (b)	Net Change in Debt Obligations (c)	Dividends (d)	Net Cash from Profits (e)	Net Change in Cash (f)	Balance End of Year (g)
							$ 163,962A
1	1939	$ 920,948	$4,500,000	$750,000	$7,061,032	$ 890,084	1,054,046
2	1940	1,307,883	3,100,000	750,000	4,324,184	833,699*	220,347
3	1941	1,278,902	2,600,000	750,000	4,671,969	43,067	263,414
4	1942	1,366,867	2,700,000	750,000	4,826,767	9,900	273,314
5	1943	919,777	3,100,000	750,000	4,711,877	57,900*	215,414
6	1944	823,117	3,300,000	750,000	4,945,133	72,016	287,430
7	1945	1,027,393	3,200,000	750,000	4,989,120	11,727	299,157
8	1946	1,143,992	3,100,000	750,000	4,941,274	52,718*	246,439
9	1947	852,613	3,200,000	750,000	4,839,619	37,006	283,445
10	1948	693,988	3,600,000	750,000	5,043,635	353*	283,092
11	1949	522,151	3,800,000	750,000	5,109,806	37,655	320,747
12	1950	530,975	4,000,000	750,000	5,294,168	13,193	333,940
13	1951	411,397	4,300,000	750,000	5,473,669	12,272	346,212
14	1952	149,881	2,300,000	750,000	5,377,391	2,177,510	2,523,722
15	1953	55,849		750,000	3,188,397	2,382,548	4,906,270
16	1954	6,690		750,000	1,563,435*	2,320,125*	2,586,145
17						1,344,778C	3,930,923
Data		Sch. 12 Col. d	Sch. 9b Col. d	D	Sch. 16b Col. f	Col. e-(b+c+d)	E

* Negative amounts

A - Balance 1/1/39 Ex. 137, Pg. 1, L7
B - See Note B Sch. 6a
C - Per Sch 21b, L2 -------- 457,452
    Per Sch 21b, L5 -------- 887,326
        Total 1,344,778
D - See Assumption A
E - Computed by adding amount in column f to balance at end of previous year

2754

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Other Net Current Assets
Based on Admitted Earnings

Sch. 7a

Net Change in Other Net Current Assets

Line No.	Year (a)	Interest Paid and Accrued (b)	Federal and State Income Tax (c)	Total (d)	Balance End of Year (e)
					$ 524,965A
1	1939	$10,500	$ 2,839	$ 13,339	538,304
2	1940	11,500	219,971*	208,471*	329,833
3	1941	12,500	45,654*	33,154*	296,679
4	1942	14,500	96,433*	81,933*	214,746
5	1943	14,500	41,023*	26,523*	188,223
6	1944	16,750	69,415*	52,665*	135,558
7	1945	16,750	90,803*	74,053*	61,505
8	1946	17,750	66,517*	48,767*	12,738
9	1947	1,500	125,701*	124,201*	111,463*
10	1948		10,630*	10,630*	122,093*
11	1949		4,843*	4,843*	126,936*
12	1950		4,717	4,717	122,219*
13	1951		15,846*	15,846*	138,065*
14	1952		11,414	11,414	126,651*
15	1953		400,454	400,454	273,803
16	1954		939,697	939,697	1,213,500
17				1,213,500*C	—
Data		Sch. 20a Col: h	Sch. 17a Col. f	Col b + c	B

*Negative amounts

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Footnotes To
Schedule 7a

A. Balance 1/1/39 from Ex. 137, Pg. 1 as follows:

		Other Current Assets	
Line	8	Gas Accounts Receivable	$1,242,878
	9	Gasoline Accounts Receivable	51,567
	10	Miscellaneous Accounts Receivable	5,582
	11	Notes Receivable	25,697
	12	Materials and Supplies	390,749
	13	Gas in Lines	27,906
	14	Interest Receivable	108
	15	Prepaid Expenses	75,767
		Total Other Current Assets	$1,820,254
		Other Current Liabilities	
	24	Wages and Salaries Payable	$ 32,646
	25	Gas Accounts Payable	95,996
	26	Royalties Payable	27,663
	27	Accounts Payable	96,033
	29	Taxes Accrued	926,701
	30	Interest Payable	116,250
		Total Other Current Liabilities	$1,295,289
		Net per above	$ 524,965

B. Computed by adding amount in column d to balance at end of previous year. See Assumption B.

C. Per Sch. 21a, line 6.

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Other Net Current Assets
Based on Admitted Earnings After Reflecting Rate Reduction of $3,000,000 per Year Effective 1/1/40

Sch. 7b

Net Change in Other Net Current Assets

Line No.	Year (a)	Interest Paid and Accrued (b)	Federal and State Income Tax (c)	Total (d)	Balance End of Year (e)
					$ 524,965A
1	1939	$10,560	$ 2,839	$ 13,339	538,304
2	1940	4,000	305,405	309,405	847,709
3	1941	500	8,463	8,963	856,672
4	1942	1,000*	130,663*	131,663*	725,009
5	1943	1,000	54,861	55,861	780,870
6	1944	250*	65,994*	66,244*	714,626
7	1945	750*	63,173*	63,923*	650,703
8	1946	3,750*	117,212*	120,962*	529,741
9	1947	16,000	29,508	45,508	575,249
10	1948	18,000	47,494*	29,494*	545,755
11	1949	19,000	45,393*	26,393*	519,362
12	1950	20,000	38,044*	18,044*	501,318
13	1951	21,500	60,911*	39,411*	461,907
14	1952	11,500	36,509*	25,009*	436,898
15	1953		389,856	389,856	826,754
16	1954		443,892	443,892	1,270,646
17				1,270,646*C	
Data		Sch. 20b Col. h	Sch. 17b Col. 1	Col. b+c	B

*Negative amount

A—See Note A Sch. 7a.

B—Computed by adding amount in column d to balance at end of previous year. See Assumption B.

C—Sch. 21b. L6.

2757

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Bond Discount and Expense Sch. 8

Line No.	Year (a)	Annual Reduction by Charge Against Earnings (b)	Balance End of Year (c)
			$2,031,369 A
1	1939	$253,921	1,777,448
2	1940	253,921	1,523,527
3	1941	253,921	1,269,606
4	1942	253,921	1,015,685
5	1943	253,921	761,764
6	1944	253,921	507,843
7	1945	253,921	253,922
8	1946	253,922	—
Data:		B	C

A—Balance January 1, 1939 from Exh. 137, pg. 1—L. 18.

B—Even annual installments per Company practice.

C—Computed by deducting amount in column b from balance at end of previous year.

Natural Gas Pipeline Company of America and Texoma Natural Gas Company

(Combined Companies)

Debt Obligations Based on Admitted Earnings

Sch. 9a

Line No.	Year	Bonds Paid Off	Borrowings* or Repayments	Net Change in Debt Obligations	Balance at End of Year
	(a)	(b)	(c)	(d)	(e)
					$ 46,800,000 A
1	1939	$ 4,200,000	$ 300,000	$ 4,500,000	42,300,000
2	1940	4,600,000		4,600,000	37,700,000
3	1941	5,000,000		5,000,000	32,700,000
4	1942	5,800,000		5,800,000	26,900,000
5	1943	5,800,000		5,800,000	21,100,000
6	1944	6,700,000		6,700,000	14,400,000
7	1945	6,700,000		6,700,000	7,700,000
8	1946	7,700,000	300,000*	7,400,000	300,000
9	1947		300,000	300,000	——
Data:		Sch. 15, Col. c.	Sch. 19a, Col. c	Col. b+c	B

(*) Negative amount.

A—Balance January 1, 1939, from Ex. 137, pg. 1, L. 22, Bonds Outstanding	$ 46,500,000
and Ex. 137, pg. 1, L. 28—Notes Payable Per above	300,000
	$ 46,800,000

B—Computed by deducting amount in column d from balance at end of previous year.

2759

Natural Gas Pipeline Company of America and Texoma Natural Gas Company

(Combined Companies)

Debt Obligations **Sch. 9b**

Based on Admitted Earnings after Reflecting Rate Reduction of $3,000,000 per Year Effective 1/1/40

Line No.	Year	Bonds Paid Off	Borrowings* or Repayments	Net Change in Debt Obligations	Balance End of Year
	(a)	(b)	(c)	(d)	(e)
					$ 46,800,000 A
1	1939	$ 4,200,000	$ 300,000	$ 4,500,000	42,300,000
2	1940	4,600,000	1,500,000*	3,100,000	39,200,000
3	1941	5,000,000	2,400,000*	2,600,000	36,600,000
4	1942	5,800,000	3,100,000*	2,700,000	33,900,000
5	1943	5,800,000	2,700,000*	3,100,000	30,800,000
6	1944	6,700,000	3,400,000*	3,300,000	27,500,000
7	1945	6,700,000	3,500,000*	3,200,000	24,300,000
8	1946	7,700,000	4,600,000*	3,100,000	21,200,000
9	1947		3,200,000	3,200,000	18,000,000
10	1948		3,600,000	3,600,000	14,400,000
11	1949		3,800,000	3,800,000	10,600,000
12	1950		4,000,000	4,000,000	6,600,000
13	1951		4,300,000	4,300,000	2,300,000
14	1952		2,300,000	2,300,000	—
15	1953				—
16	1954				—
Data:		Sch. 15, Col. c	Sch. 19b, Col. c	Col. b+c	B

A—See Note A, Sch. 9a.

B—Computed by subtracting amount in column d from Balance at end of previous year.

(*) Negative amounts.

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Reserves for Amortization of Property Arbitrary Straight Line Basis

Sch. 10a

Line No.	Year	Accrual for Year	Net Cost of Retirements	Net Change In Reserve	Balance at End of Year
	(a)	(b)	(c)	(d)	(e)
					$ 12,557,892 A
1	1939	$ 3,800,000	$ 167,344	$ 3,632,656	16,190,548
2	1940	3,800,000	176,158	3,623,842	19,814,390
3	1941	3,800,000	185,667	3,614,333	23,428,723
4	1942	3,800,000	113,842	3,686,158	27,114,881
5	1943	3,800,000	133,454	3,666,546	30,781,427
6	1944	3,800,000	166,698	3,633,302	34,414,729
7	1945	3,800,000	283,783	3,516,217	37,930,946
8	1946	3,800,000	234,076	3,565,924	41,496,870
9	1947	3,800,000	130,552	3,669,448	45,166,318
10	1948	3,800,000	124,138	3,675,862	48,842,180
11	1949	3,800,000	62,095	3,737,905	52,580,085
12	1950	3,800,000	65,877	3,734,123	56,314,208
13	1951	3,800,000	74,279	3,725,721	60,039,929
14	1952	3,800,000	71,731	3,728,269	63,768,198
15	1953	3,800,000	36,007	3,763,993	67,532,191
16	1954	1,578,242	5,251	1,572,991	69,105,182
17			69,105,182 C	69,105,182	—
Data:		B	Sch. 13—Col. f		

A—Balance January 1, 1939, from Ex. 137, pg. 1, L. 36, col. 8.

B—No determination of straight line depreciation or amortization has been made to verify the reasonableness of the annual increment of amortization used for this purpose. The amount used is arbitrary being based on a rounded out figure for 15 years, leaving an odd amount for the 16th year, but the amounts will provide a reserve sufficient to amortize the claimed investment in the property plus working capital less salvage

C—Par Sch. 21a, L. 1—	$68,721,862
Par Sch. 21a, L. 4—	383,320
Total	$69,105,182

2761 **Natural Gas Pipeline Company of America and Texoma Natural Gas Compan**

(Combined Companies)

Reserves for Amortization of Property
Arbitrary Sinking Fund Basis

		Accrual for Year					
Line No.	Year	Sinking Fund Payment	Interest on Sinking Fund	Total	Net Cost of Retirements	Net Change in Reserve	Bala End of
	(a)	(b)	(c)	(d)	(e)	(f)	(
							$12,55
	1939	$ 2,440,000	$ 36,600	$ 2,476,600	$ 167,344	$ 2,309,256	14,86
2	1940	2,440,000	187,380	2,627,380	176,158	2,451,222	17,31
3	1941	2,440,000	347,400	2,787,400	185,667	2,601,733	19,92
4	1942	2,440,000	517,170	2,957,170	113,842	2,843,328	22,76
5	1943	2,440,000	697,230	3,137,230	133,454	3,003,776	25,76
6	1944	2,440,000	888,300	3,328,300	166,698	3,161,602*	28,92
7	1945	2,440,000	1,091,010	3,531,010	283,783	3,247,227	32,17
8	1946	2,440,000	1,306,050	3,746,050	234,076	3,511,974	35,68
9	1947	2,440,000	1,534,170	3,974,170	130,552	3,843,618	39,53
10	1948	2,440,000	1,776,210	4,216,210	124,138	4,092,072	43,62
11	1949	2,440,000	2,032,950	4,472,950	62,095	4,410,855	48,03
12	1950	2,440,000	2,305,380	4,745,380	65,877	4,679,503	52,71
13	1951	2,440,000	2,594,340	5,034,340	74,279	4,960,061	57,67
14	1952	2,440,000	2,900,970	5,340,970	71,731	5,269,239	62,94
15	1953	2,440,000	3,226,230	5,666,230	36,007	5,630,223	68,57
16	1954	536,852	—	536,852	5,251	531,601	69,10
17					69,105,182D	69,205,182*	
Data:		B	C	Col. b+e	Sch. 13, Col. f	Col. d—e	

(*) Negative amounts.

A—Balance January 1, 1939, from Ex. 137, pg. 1, L. 36, col.18.

B—Arbitrary annual sinking fund payment.

C—6% interest on balance in Reserve Fund for year, plus 6% interest on one-half o
payment to Reserve Fund for one-half year assuming sinking fund payments a
in semi-annual installments on June 30 and December 31. All interest is comp
even multiples of $1000, assuming minor additional amounts are not bearing i

D—Per	Sch. 21, L. 1—	$68,721,862
	Sch. 21, L, 4—	383,320
	Total	$69,105,182

E—Computed by adding amounts in Column f to Balance at end of previous year.

Sch. 11a

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)
Surplus

Based on Admitted Earnings and Amortization of Capital Assets on Arbitrary Straight Line Basis

Line No.	Year	Net Profits from Earnings	Dividends	Net Change in Surplus	Balance at End of Year
	(a)	(b)	(c)	(d)	(e)
					$ 939,753*A
1	1939	$3,020,450	$750,000	$2,270,450	1,330,697
2	1940	3,061,792	750,000	2,311,792	3,642,489
3	1941	3,191,518	750,000	2,441,518	6,084,007
4	1942	3,396,420	750,000	2,646,420	8,730,427
5	1943	3,551,170	750,000	2,801,170	11,531,597
6	1944	3,836,400	750,000	3,086,400	14,617,997
7	1945	4,059,578	750,000	3,309,578	17,927,575
8	1946	4,240,387	750,000	3,490,387	21,417,962
9	1947	4,514,915	750,000	3,764,915	25,182,877
10	1948	4,488,293	750,000	3,738,293	28,921,170
11	1949	4,378,115	750,000	3,628,115	32,549,285
12	1950	4,381,587	750,000	3,631,587	36,180,872
13	1951	4,340,286	750,000	3,590,286	39,771,158
14	1952	4,046,333	750,000	3,296,333	43,067,491
15	1953	2,225,302	750,000	1,475,302	44,542,793
16	1954	245,069	750,000	504,931*	44,037,862
17					44,037,862
Data		Sch. 18a Col. g	Sch. 6a Col. d	Col. b–c	B

A—Balance as at 1/1/39 from Ex. 137, Pg. 1, L 37.

B—Computed by adding amount in column d to balance at end of previous year.

Exhibit No. 188.

Sch. 1

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Surplus

Based on Admitted Earnings and Amortization of Capital Assets on Arbitrary Sinking Fund Basis

Line No.	Year	Net Change in Surplus on Arbitrary Straight Line Basis	Annual Accrual on Straight Line Amortization	Annual Accrual on Sinking Fund Amortization	Net Change in Surplus on Arbitrary Sinking Fund Amortization	Balance End of Yea
	(a)	(b)	(c)	(d)	(c)	(f)
						$ 939,753*
1	1939	$ 2,270,450	$ 3,800,000	$ 2,476,600	$ 3,593,850	2,654,097
2	1940	2,311,792	3,800,000	2,627,380	3,484,412	6,138,509
3	1941	2,441,518	3,800,000	2,787,400	3,454,118	9,592,627
4	1942	2,646,420	3,800,000	2,957,170	3,489,250	13,081,877
5	1943	2,801,170	3,800,000	3,137,230	3,463,940	16,545,817
6	1944	3,086,400	3,800,000	3,328,300	3,558,100	20,103,917
7	1945	3,309,578	3,800,000	3,531,010	3,578,568	23,682,485
8	1946	3,490,387	3,800,000	3,746,050	3,544,337	27,226,822
9	1947	3,764,915	3,800,000	3,974,170	3,590,745	30,817,567
10	1948	3,738,293	3,800,000	4,216,210	3,322,083	34,139,650
11	1949	3,628,115	3,800,000	4,472,950	2,955,165	37,094,815
12	1950	3,631,587	3,800,000	4,745,380	2,686,207	39,781,022
13	1951	3,590,286	3,800,000	5,034,340	2,355,946	42,136,968
14	1952	3,296,333	3,800,000	5,340,970	1,755,363	43,892,331
15	1953	1,475,302	3,800,000	5,666,230	390,928*	43,501,403
16	1954	504,931*	1,578,242	536,852	536,459	44,037,862
17						44,037,862
Data:		Sch. 11a, Col. d	Sch. 10a, Col. b	Sch. 10b, Col. d	Col. b+c-d	B

A—Balance January 1, 1939, from Ex. 137, pg. 1, L. 37.

B—Computed by adding amount in column e to balance at end of previous year.

(*) Negative amoimts.

Exhibit No. 188.

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Sch. 11c

Surplus

Based on Admitted Earnings after Reflecting Rate Reduction of $3,000,000 Per Year Effective 1/1/40 and Amortization of Capital Assets on Arbitrary Straight Line Basis

Line No.	Year	Net Profits from Earnings	Dividends	Net Change in Surplus	Balance at End of Year
	(a)	(b)	(c)	(d)	(e)
					$ 939,753*A
1	1939	$3,020,450	$750,000	$2,270,450	1,330,697
2	1940	579,668	750,000	170,332*	1,160,365
3	1941	627,011	750,000	122,989*	1,037,376
4	1942	641,183	750,000	108,817*	928,559
5	1943	713,817	750,000	36,183*	892,376
6	1944	824,968	750,000	74,968	967,344
7	1945	871,276	750,000	121,276	1,088,620
8	1946	766,390	750,000	16,390	1,105,010
9	1947	1,085,127	750,000	335,127	1,440,137
10	1948	1,214,141	750,000	464,141	1,904,278
11	1949	1,283,413	750,000	533,413	2,437,691
12	1950	1,476,124	750,000	726,124	3,163,815
13	1951	1,634,258	750,000	884,258	4,048,073
14	1952	1,552,382	750,000	802,382	4,850,455
15	1953	221,747*	750,000	971,747*	3,878,708
16	1954	2,697,785*	750,000	3,447,785*	430,923
17					430,923
DATA:		Sch. 18b Col. h	C	Col. b-c	B

A—Balance January 1, 1939 from Ex. 137, Pg. 1, L. 37.

B—Computed by adding amount in column e to balance at end of previous year.

C—See Assumption A.

(*) Negative amounts.

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Sch.

Surplus

Based on Admitted Earnings After Reflecting Rate Reduction of $3,000,000 Per Year Effective 1/1/40 and Amortization of Capital Assets on Arbitrary Sinking Fund Basis

Line No:	Year	Net Change in Surplus on Arbitrary Straight Line Basis	Annual Accrual on Straight Line Amortization	Annual Accrual on Sinking Fund Amortization	Net Change in Surplus on Arbitrary Sinking Fund Amortization	Balance End of Year
	(a)	(b)	(c)	(d)	(e)	(f)
						$ 939,753
1	1939	$ 2,270,450	$ 3,800,000	$ 2,476,600	$ 3,593,850	2,654,097
2	1940	170,332*	3,800,000	2,627,380	1,002,288	3,656,385
3	1941	122,989*	3,800,000	2,787,400	889,611	4,545,996
4	1942	108,817*	3,800,000	2,957,170	734,013	5,280,009
5	1943	36,183*	3,800,000	3,187,230	626,587	5,906,596
6	1944	74,968	3,800,000	3,328,300	546,668	6,453,264
7	1945	121,276	3,800,000	3,531,010	390,266	6,843,530
8	1946	16,390	3,800,000	3,746,050	70,340	6,913,870
9	1947	335,127	3,800,000	3,974,170	160,957	7,074,827
10	1948	464,141	3,800,000	4,216,210	47,931	7,122,758
11	1949	533,413	3,800,000	4,472,950	139,537*	6,983,221
12	1950	726,124	3,800,000	4,745,380	219,256*	6,763,965
13	1951	884,258	3,800,000	5,034,340	350,082*	6,413,883
14	1952	802,382	3,800,000	5,340,970	738,588*	5,675,295
15	1953	971,747*	3,800,000	5,666,230	2,837,977*	2,837,318
16	1954	3,447,785*	1,578,242	536,852	2,406,395*	430,923
17						430,923
Data		Sch. 11c Col. d	Sch. 10a Col. b	Sch. 10b Col. d	Col. b+c-d	B

* Negative amounts

A—Balance 1/1/39 from Ex. 137, Pg. 1, L37

B—Computed by adding amount in column e to balance at end of previous year.

Sch. 12

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)
Expenditures for Capital Assets

Line No.	Year	Total Additional Capital Investment	Net of Salvage Over Removal Cost	Expenditures for Capital Assets
	(a)	(b)	(e)	(d)
1	1939	$ 963,088	$42,140	$ 920,948
2	1940	1,322,194	14,311	1,307,883
3	1941	1,315,117	36,215	1,278,902
4	1942	1,390,383	23,516	1,366,867
5	1943	938,539	28,762	919,777
6	1944	833,483	10,366	823,117
7	1945	1,044,020	16,627	1,027,393
8	1946	1,167,776	23,784	1,143,992
9	1947	873,715	21,102	852,613
10	1948	717,050	23,062	693,988
11	1949	543,224	21,073	522,151
12	1950	554,109	23,134	530,975
13	1951	431,470	20,072	411,397
14	1952	268,981	119,100	149,881
15	1953	74,698	18,849	55,849
16	1954	6,380	310*	6,690
Data:		Sch. 5—Col. d	Sch. 13—Col. d	Col. b-c

(*) Negative amount.

Exhibit No. 188.

2767

Sch. 13

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)
Net Cost of Retirements

Line No.	Year	Salvage Value of Retirements	Cost of Retiring Capital Replaced	Net of Salvage Over Removal Cost	Book Cost of Property Retired	Net Cost of Retirements
	(a)	(b)	(c)	(d)	(e)	(f)
1	1939	$50,832	$ 8,692	$42,140	$209,484	$167,344
2	1940	22,479	8,168	14,311	190,469	176,158
3	1941	53,903	17,688	36,215	221,882	185,667
4	1942	41,742	18,226	23,516	137,358	113,842
5	1943	32,178	13,416	18,762	152,216	133,454
6	1944	19,360	8.994	10,366	177,064	166,698
7	1945	31,073	14,446	16,627	300,410	283,783
8	1946	29,630	5,846	23,784	257,860	234,076
9	1947	23,359	2,257	21,102	151,654	130,552
10	1948	24,858	1,796	23,062	147,200	124,138
11	1949	21,707	634	21,073	83,168	62,095
12	1950	23,970	836	23,134	89,011	65,877
13	1951	21,250	1,177	20,073	94,352	74,279
14	1952	124,067	4,967	119,100	190,831	71,731
15	1953	19,891	1,042	18,849	54,856	36,007
16	1954	954	1,264	310*	4,941	5,251
SOURCE:		Ex. 141— Pg. 2-L. 16	Ex. 141— Pg. 2-L. 15		Ex. 117— Pg. 1-L. 6	
DATA:				Col. b–c		Col. e–d

(*) Negative amount.

Sch. 14

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Computation of Annual Accrual on Arbitrary Sinking Fund Basis

Line No.	Period	Semi-Annual Amortization	Interest at 6%	Total Semi-Annual Addition to Amortization Fund	Annual Amortization
	(a)	(b)	(c)	(d)	(e)
1	1	$1,220,000	—	$1,220,000	
2	2	1,220,000	$ 36,600	1,256,600	$2,476,600
3	3	1,220,000	74,280	1,294,280	
4	4	1,220,000	113,100	1,333,100	2,627,380
5	5	1,220,000	153,090	1,373,090	
6	6	1,220,000	194,310	1,414,310	2,787,400
7	7	1,220,000	236,730	1,456,730	
8	8	1,220,000	280,440	1,500,440	2,957,170
9	9	1,220,000	325,440	1,545,440	
10	10	1,220,000	371,790	1,591,790	3,137,230
11	11	1,220,000	419,550	1,639,550	
12	12	1,220,000	468,750	1,688,750	3,328,300
13	13	1,220,000	519,420	1,739,420	
14	14	1,220,000	571,590	1,791,590	3,531,010
15	15	1,220,000	625,350	1,845,350	
16	16	1,220,000	680,700	1,900,700	3,746,050
17	17	1,220,000	737,730	1,957,730	
18	18	1,220,000	796,440	2,016,440	3,974,170
19	19	1,220,000	856,950	2,076,950	
20	20	1,220,000	919,260	2,139,260	4,216,210
21	21	1,220,000	983,430	2,203,430	
22	22	1,220,000	1,049,520	2,269,520	4,472,950
23	23	1,220,000	1,117,620	2,337,620	
24	24	1,220,000	1,187,760	2,407,760	4,745,380
25	25	1,220,000	1,259,970	2,479,970	
26	26	1,220,000	1,334,370	2,554,370	5,034,340
27	27	1,220,000	1,411,020	2,631,020	
28	28	1,220,000	1,489,950	2,709,950	5,340,970
29	29	1,220,000	1,571,250	2,791,250	
30	30	1,220,000	1,654,980	2,874,980	5,666,230
		A	B	C	D

(A) Arbitrary amount.

(B) Interest on even thousand dollar accumulations at beginning of period at 6% per annum.

(C) Col. b + c.

(D) Addition of two items in col. d.

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

(Combined Companies)

BONDS AND INTEREST ON BONDS

Sch. 15

Line No.	Dates (a)	Bonds Outstanding at Beginning of Year (b)	Payments per Sinking Fund Requirements (c)	Balance After Repayments (d)	Interest Accrued (e)	Interest Paid (f)	Net Decrease in Current Liabilities (g)
1	1/1/39 to 6/15/39	$46,500,000A		$46,500,000	$1,278,750		
2	6/15/39		$2,100,000			$1,395,000	
3	6/15/39 to 12/15/39			44,400,000	1,332,000		
4	12/15/39		2,100,000			1,332,000	
5	12/15/39 to 12/31/39			42,300,000	105,750		
6	1939		4,200,000		2,716,500	2,727,000	$10,500
7	1/1/40 to 6/15/40	42,300,000		42,300,000	1,163,250		
8	6/15/40		2,300,000			1,269,000	
9	6/15/40 to 12/15/40			40,000,000	1,200,000		
10	12/15/40		2,300,000			1,200,000	
11	12/15/40 to 12/31/40			37,700,000	94,250		
12	1940		4,600,000		2,457,500	2,469,000	11,500
13	1/1/41 to 6/15/41	37,700,000		37,700,000	1,036,750		
14	6/15/41		2,500,000			1,131,000	
15	6/15/41 to 12/15/41			35,200,000	1,056,000		
16	12/15/41		2,500,000			1,056,000	
17	12/15/41 to 12/31/41			32,700,000	81,750		
18	1941		5,000,000		2,174,500	2,187,000	12,500
19	1/1/42 to 6/15/42	32,700,000		32,700,000	899,250		
20	6/15/42		2,900,000			981,000	
21	6/15/42 to 12/15/42			29,800,000	894,000		
22	12/15/42		2,900,000			894,000	
23	12/15/42 to 12/31/42			26,900,000	67,250		
24	1942		5,800,000		1,860,500	1,875,000	14,500
25	1/1/43 to 6/15/43	26,900,000		26,900,000	739,750		
26	6/15/43		2,900,000			807,000	
27	6/15/43 to 12/15/43			24,000,000	720,000		
28	12/15/43		2,900,000			720,000	
29	12/15/43 to 12/31/43			21,100,000	52,750		
30	1943		5,800,000		1,512,500	1,527,000	14,500
31	1/1/44 to 6/15/44	21,100,000		21,100,000	580,250		
32	6/15/44		3,350,000			633,000	
33	6/15/44 to 12/15/44			17,750,000	532,500		
34	12/15/44		3,350,000			532,500	
35	12/15/44 to 12/31/44			14,400,000	36,000		
36	1944		6,700,000		1,148,750	1,165,500	16,750

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

(Combined Companies)

BONDS AND INTEREST ON BONDS

Sch. 15 (Cont'd.)

Line No.	Dates (a)	Bonds Outstanding at Beginning of Year (b)	Payments per Sinking Fund Requirements (c)	Balance After Repayments (d)	Interest Accrued (e)	Interest Paid (f)	Net Decrease in Current Liabilities (g)
37	1/1/45 to 6/15/45	$14,400,000		$14,400,000	$396,000		
38	6/15/45		$3,350,000			$432,000	
39	6/15/45 to 12/15/45			11,050,000	331,500		
40	12/15/45		3,350,000			331,500	
41	12/15/45 to 12/31/45			7,700,000	19,250		
42	1945		6,700,000		746,750	763,500	$16,750
43	1/1/46 to 6/15/46	7,700,000		7,700,000	211,750		
44	6/15/46		3,350,000			231,000	
45	6/15/46 to 12/15/46			4,350,000	130,500		
46	12/15/46		4,350,000			130,500	
47	1946		7,700,000		342,250	361,500	19,250
		B	C	Computed	D	E	Col. f-e

A - Balance 1/1/39 per Ex. 137, Pg. 1, L22
B - Computed per last figure for previous year
C - Based on requirements in Company's mortgage indenture
D - 6% interest on amount in column d for period noted in column a
E - Payment computed to be due on date noted

Exhibit No. 188.

Sch. 16a

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)
Net Cash from Profits
Based on Admitted Earnings

					Payments		
Line No.	Year	Revenue Remaining for Replacements Amortization and Return	Federal and State Income Tax Accrued	Earnings Before Federal and State Income Tax	Federal and State Income Tax Paid	Interest Paid	Net Cash from Profits
	(a)	(b)	(c)	(d)	e	(f)	(g)
1	1939	$9,799,871	$ 626,592	$10,426,463	$ 629,431	$2,736,000	$7,061,032
2	1940	9,573,213	846,563	10,419,776	626,592	2,469,000	7,324,184
3	1941	9,419,939	892,217	10,312,156	846,563	2,187,000	7,278,593
4	1942	9,310,841	988,650	10,299,491	892,217	1,875,000	7,532,274
5	1943	9,117,591	1,029,673	10,147,264	988,650	1,527,000	7,631,614
6	1944	9,039,071	1,099,088	10,138,159	1,029,673	1,165,500	7,942,986
7	1945	8,860,249	1,189,891	10,050,140	1,099,088	763,500	8,187,552
8	1946	8,638,059	1,256,408	9,894,467	1,189,891	361,500	8,343,076
9	1947	8,322,415	1,382,109	9,704,524	1,256,408	9,000	8,439,116
10	1948	8,288,293	1,392,739	9,681,032	1,382,109		8,298,923
11	1949	8,178,115	1,397,582	9,575,697	1,392,739		8,182,958
12	1950	8,181,587	1,392,865	9,574,452	1,397,582		8,176,870
13	1951	8,140,286	1,408,711	9,548,997	1,392,865		8,156,132
14	1952	7,846,333	1,397,297	9,243,630	1,408,711		7,834,919
15	1953	6,025,302	996,843	7,022,145	1,397,297		5,624,848
16	1954	1,823,311	57,146	1,880,457	996,843		883,614
Source:		Ex. 141 Pg. 2 L. 13					
Data:			Sch. 17a Col. d	Col. b+c	Sch. 17a Col. e	Sch. 20a Col. d	Col. d–(e+f)

Sch. 16

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Net Cash from Profits
Based on Admitted Earnings after Reflecting Rate Reduction of $3,000,000 Per Year Effective 1/1/40

Line No.	Year	Earnings before Federal and State Income Tax	Rate Reduction	Federal and State Income Tax Paid	Interest Paid	Net Cash from Profits
	(a)	(b)	(c)	(d)	(e)	(f)
1	1939	$10,426,463		$629,431	$2,736,000	$7,061,032
2	1940	10,419,776	$3,000,000	626,592	2,469,000	4,324,184
3	1941	10,312,156	3,000,000	321,187	2,319,000	4,671,969
4	1942	10,299,491	3,000,000	312,724	2,160,000	4,826,767
5	1943	10,147,264	3,000,000	443,387	1,992,000	4,711,877
6	1944	10,138,159	3,000,000	388,526	1,804,500	4,945,133
7	1945	10,050,140	3,000,000	454,520	1,606,500	4,989,120
8	1946	9,894,467	3,000,000	517,693	1,435,500	4,941,274
9	1947	9,704,524	3,000,000	634,905	1,230,000	4,839,619
10	1948	9,681,032	3,000,000	605,397	1,032,000	5,043,635
11	1949	9,575,697	3,000,000	652,891	813,000	5,109,806
12	1950	9,574,452	3,000,000	698,284	582,000	5,294,169
13	1951	9,548,997	3,000,000	736,328	339,000	5,473,669
14	1952	9,243,630	3,000,000	797,239	69,000	5,377,391
15	1953	7,022,145	3,000,000	833,748		3,188,397
16	1954	1,880,457	3,000,000	443,892		1,563,435

(*) Negative amounts.

Data:		Sch. 16a Col. d	A	Sch. 17b Col. k	Sch. 20b Col. d	Col. b-(c+d+

A—Assumed rate reduction.

Sch. 17a

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Federal and State Income Tax
Based on Admitted Earnings

Line No.	Year	Claimed Income Tax Accrued: Natural Gas Pipeline Company of America	Claimed Income Tax Accrued: Texoma Natural Gas Company	Total	Paid	Net Change in Other Net Current Assets
	(a)	(b)	(c)	(d)	(e)	(f)
1	1939	$ 626,592	$	$ 626,592	$ 629,431	$ 2,839
2	1940	525,376	321,187	846,563	626,592	219,971*
3	1941	589,456	302,761	892,217	846,563	45,654*
4	1942	545,263	443,387	988,650	892,217	96,433*
5	1943	651,512	378,161	1,029,673	988,650	41,023*
6	1944	644,568	454,520	1,099,088	1,029,673	69,415*
7	1945	672,198	517,693	1,189,891	1,099,088	90,803*
8	1946	621,503	634,905	1,256,408	1,189,891	66,517*
9	1947	1,382,109		1,382,109	1,256,408	125,701*
10	1948	1,392,739		1,392,739	1,382,109	10,630*
11	1949	1,397,582		1,397,582	1,392,739	4,843*
12	1950	1,392,865		1,392,865	1,397,582	4,717
13	1951	1,408,711		1,408,711	1,392,865	15,846*
14	1952	1,397,297		1,397,297	1,408,711	11,414
15	1953	996,843		996,843	1,397,297	400,454
16	1954	57,146		57,146	996,843	939,697
Source:		Ex. 116 Pg. 4, L 10	Ex. 116 Pg. 3, L 9			
Data				Col. b+c	A	Col d-e

A—Payment of previous years accrual.

Sch. 17b

FEDERAL AND STATE INCOME TAX
BASED ON ADMITTED EARNINGS AFTER REFLECTING RATE REDUCTION OF $3,000,000 PER YEAR EFFECTIVE 1/1/40

NATURAL GAS PIPELINE COMPANY OF AMERICA

		Change in Taxable Net Income							Texoma Natural Gas Company			
			Interest Accrual									
Line No.	Year (a)	Rate Reduction (b)	Revised (c)	per Company (d)	Reduction in Taxable Net Income (e)	Reduction in Federal Income Tax (f)	Claimed Federal Income Tax (g)	Revised Federal Income Tax (h)	Claimed Federal and State Income Tax (i)	Total Accrued (j)	Paid (k)	Net Change in Other Net Current Assets (l)
1	1939		$2,725,500	$2,716,500	$ 9,000	$ — B	$ 626,592	$626,592	$ —	$626,592	$629,431	$ 2,839
2	1940	$3,000,000	2,465,000	2,457,500	3,007,500	525,376 C	525,376	...	321,187	321,187	626,592	305,405
3	1941	3,000,000	2,318,500	2,174,500	3,144,000	579,493 D	589,456	9,963	302,761	312,724	321,187	8,463
4	1942	3,000,000	2,161,000	1,860,500	3,300,500	545,263 C	545,263	—	443,387	443,387	312,724	130,663*
5	1943	3,000,000	1,991,000	1,512,500	3,478,500	641,147 D	651,512	10,365	378,161	388,526	443,387	54,861
6	1944	3,000,000	1,834,750	1,158,750	3,676,000	644,565 C	644,568	—	454,520	454,520	388,526	65,994*
7	1945	3,000,000	1,607,250	746,750	3,860,500	672,198 C	672,198	...	517,693	517,693	454,520	63,173*
8	1946	3,000,000	1,439,250	342,250	4,097,000	621,503 C	621,503	...	634,905	634,905	517,693	117,212*
9	1947	3,000,000	1,214,000		4,214,000	776,712 D	1,382,109	605,397		605,397	634,905	29,508
10	1948	3,000,000	1,014,000		4,014,000	739,848 D	1,392,739	652,891		652,891	605,397	47,494*
11	1949	3,000,000	794,000		3,794,000	699,298 D	1,397,582	698,284		698,284	652,891	45,393*
12	1950	3,000,000	562,000		3,562,000	656,537 D	1,392,865	736,328		736,328	698,284	38,044*
13	1951	3,000,000	317,500		3,317,500	611,472 D	1,408,711	797,239		797,239	736,328	60,911*
14	1952	3,000,000	57,500		3,057,500	563,549 D	1,397,297	833,748		833,748	797,239	36,509*
15	1953	3,000,000			3,000,000	552,951 D	996,843	443,892		443,892	833,748	389,856
16	1954	3,000,000			3,000,000	57,146 C	57,146	—		—	443,892	443,892
SOURCE:							Ex. 115 Pg. 4, L. 10		Ex. 116. Pg. 3. L. 9			
DATA:		A	Sch. 20b. Col. g	Sch. 15, Col. e	Col. b+c-d	D		Col. g-f		Col. h+i	E	Col. k-j

A - Assumed rate reduction.

B No change made for minor adjustment

C No tax payable.

D - 18.43175% of column e (the rate at which the Claimed Federal Income Tax is accrued)

E Payment of previous year's accrual

(*) Negative amounts.

275

Sch. 18a

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Net Profits from Earnings
Based on Admitted Earnings and on Amortization of Capital Assets on Arbitrary Straight Line Basis

Line No.	Year	Revenues Remaining for Replacements, Amortization and Return	Income Deductions				Net Profits from Earnings
			Interest Accrued	Amortization of Debt Discount	Amortization of Capital Assets	Total Income Deductions	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
1	1939	$9,799,871	$2,275,500	$253,921	$3,800,000	$6,779,421	$3,020,450
2	1940	9,573,213	2,457,500	253,921	3,800,000	6,511,421	3,061,792
3	1941	9,419,939	2,174,500	253,921	3,800,000	6,228,421	3,191,518
4	1942	9,310,841	1,860,500	253,921	3,800,000	5,914,421	3,396,420
5	1943	9,117,591	1,512,501	253,921	3,800,000	5,566,421	3,551,170
6	1944	9,039,071	1,148,750	253,921	3,800,000	5,202,671	3,836,400
7	1945	8,860,249	746,750	253,921	3,800,000	4,800,671	4,059,578
8	1946	8,638,059	343,750	253,922	3,800,000	4,397,672	4,240,387
9	1947	8,322,415	7,500		3,800,000	3,807,500	4,514,915
10	1948	8,288,293			3,800,000	3,800,000	4,488,293
11	1949	8,178,115			3,800,000	3,800,000	4,378,115
12	1950	8,181,587			3,800,000	3,800,000	4,381,587
13	1951	8,140,286			3,800,000	3,800,000	4,340,286
14	1952	7,846,333			3,800,000	3,800,000	4,046,333
15	1953	6,025,302			3,800,000	3,800,000	2,225,302
16	1954	1,823,311			1,578,242	1,578,242	245,069
SOURCE:		Ex. 141, pg. 2, L. 13					
DATA:			Sch. 20a, Col. g	Sch. 8, Col. b	Sch. 10a, Col. b	Col. c+d+e	Col. b-f

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND
TEXOMA NATURAL GAS COMPANY

(Combined Companies)

Sch. 15b

NET PROFITS FROM EARNINGS BASED ON ADMITTED EARNINGS AFTER REFLECTING RATE REDUCTION OF $3,000,000 PER YEAR EFFECTIVE 1/1/40 AND ON AMORTIZATION OF CAPITAL ASSETS ON ARBITRARY STRAIGHT LINE BASIS

Line No.	Year (a)	Earnings Before Federal and State Income Tax (b)	Rate Reduction (c)	Federal and State Income Tax Accrued (d)	Interest Accrued (e)	Amortization of Debt Discount (f)	Amortization of Capital Assets (g)	Net Profits from Earnings (h)
1	1939	$ 10,426,463	$	$ 626,592	$ 2,725,500	$ 253,921	$ 3,800,000	$ 3,020,450
2	1940	10,419,776	3,000,000	321,187	2,465,000	253,921	3,800,000	579,668
3	1941	10,312,156	3,000,000	312,724	2,318,500	253,921	3,800,000	627,011
4	1942	10,299,491	3,000,000	443,387	2,161,000	253,921	3,800,000	641,183
5	1943	10,147,264	3,000,000	388,526	1,991,000	253,921	3,800,000	713,817
6	1944	10,138,159	3,000,000	454,520	1,804,750	253,921	3,800,000	824,968
7	1945	10,050,140	3,000,000	477,693	1,647,250	253,921	3,800,000	871,276
8	1946	9,894,467	3,000,000	634,905	1,475,250	253,922	3,800,000	730,390
9	1947	9,704,524	3,000,000	605,397	1,214,000	—	3,800,000	1,085,127
10	1948	9,681,032	3,000,000	652,891	1,014,000	—	3,800,000	1,214,141
11	1949	9,575,697	3,000,000	698,284	794,000	—	3,800,000	1,283,413
12	1950	9,574,452	3,000,000	736,328	562,000	—	3,800,000	1,476,124
13	1951	9,548,997	3,000,000	797,239	317,500	—	3,800,000	1,634,258
14	1952	9,243,630	3,000,000	873,748	17,500	—	3,800,000	1,552,382
15	1953	7,022,145	3,000,000	443,892		—	3,800,000	221,747*
16	1954	1,880,457	3,000,000	—		—	1,578,242	2,697,785*
DATA:		Sch. 15a, Col. d	A	Sch. 17b Col. [illegible]	Sch. 20b Col. [illegible]	Sch. 8, Col. b	Sch. 19a Col. b	Col. b-(c+d+e+f+g)

A - Assumed rate reduction.

(*) Negative amounts.

Sch. 19a

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Borrowings and Interest on Borrowings Based on Admitted Earnings

Line No.	Dates	Debt Obligations at Beginning of Year	Borrowings* or Repayments*	Balance End of Period	Interest at 6% per Annum		Net Change in Other Net Current Assets
					Accrued	Paid	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
1	1/ 1/39 to 6/30/39	$ 300,000 A	$	$	$ 9,000	$	$
2	6/30/39		300,000 B			9,000	
3			$ 300,000		$9,000	$9,000	—
4	12/ 1/46		$ 300,000 *C				
5	12/ 1/46 to 12/31/46			300,000	1,500	—	
6			$ 300,000 *		1,500	—	1,500*
7	1/ 1/47 to 5/31/47	300,000			7,500		
8	5/31/47		300,000 D			9,000	
9			300,000		7,500	9,000	4,500
Data:		See Notes.	See Notes.	Col. b–c	E	F	Col. f–e

A—Balance as at January 1, 1939 from Ex. 137, pg. 1, L. 28.
B—Assumed to be paid on June 30, 1939.
C—Assumed to be borrowed on December 1, 1946.
D—Assumed to be paid on May 31, 1947.
E—Computed on amount in col. b for period in col. a.
F—Computed on balance at beginning of period for 6 months.

Exhibit No. 188.

Exhibit No. 188.

2778

Sch. 19b

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)
Borrowings and Interest on Borrowings
Based on Admitted Earnings after Reflecting Rate Reduction of $3,000,000 Per Year Effective 1/1/40

Line No.	Dates	Debt Obligation Outstanding	Borrowings or Repayments*	Interest at 6% per Annum Accrued	Interest at 6% per Annum Paid
	(a)	(b)	(c)	(d)	(e)
1	1/1/39 to 6/30/39	$ 300,000A		$ 9,000	
2	6/30/39		$ 300,000*		$ 9,000
3	1939		300,000*	9,000	9,000
4	12/1/40		1,500,000		
5	12/1/40 to 12/31/40			7,500	
6	1940		1,500,000	7,500	
7	1/1/41 to 6/1/41	1,500,000		37,500	
8	6/1/41		1,400,000		45,000
9	6/1/41 to 12/1/41	2,900,000		87,000	
10	12/1/41		1,000,000		87,000
11	12/1/41 to 12/31/41	3,900,000		19,500	
12	1941		2,400,000	144,000	132,000
13	1/1/42 to 6/1/42	3,900,000		97,500	
14	6/1/42		1,700,000		117,000
15	6/1/42 to 12/1/42	5,600,000		168,000	
16	12/1/42		1,400,000		168,000
17	12/1/42 to 12/31/42	7,000,000		35,000	
18	1942		3,100,000	300,500	285,000
19	1/1/43 to 6/1/43	7,000,000		175,000	
20	6/1/43		1,500,000		210,000
21	6/1/43 to 12/1/43	8,500,000		255,000	
22	12/1/43		1,200,000		255,000
23	12/1/43 to 12/31/43	9,700,000		48,500	
24	1943		2,700,000	478,500	465,000
25	1/1/44 to 6/1/44	9,700,000		242,500	
26	6/1/44		1,900,000		291,000
27	6/1/44 to 12/1/44	11,600,000		348,000	
28	12/1/44		1,500,000		348,000
29	12/1/44 to 12/31/44	13,100,000		65,500	
30	1944		3,400,000	656,000	639,000
31	1/1/45 to 6/1/45	13,100,000		327,509	
32	6/1/45		1,900,000		393,000
33	6/1/45 to 12/1/45	15,000,000		450,000	
34	12/1/45		1,600,000		450,000
35	12/1/45 to 12/31/45	16,600,000		83,000	
36	1945		3,500,000	860,500	843,000
37	1/1/46 to 6/1/46	16,600,000		415,000	
38	6/1/46		2,600,000		498,000
39	6/1/46 to 12/1/46	19,200,000		576,000	
40	12/1/46		2,000,000		576,000
41	12/1/46 to 12/31/46	21,200,000		106,000	
42	1946		4,600,000	1,097,000	1,074,000

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Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Sch. 19b
(Cont'd.)

Borrowings and Interest on Borrowings
Based on Admitted Earnings after Reflecting Rate Reduction of $3,000,000 Per Year Effective 1/1/40

Line No.	Dates	Debt Obligation Outstanding	Borrowings or Repayments*	Interest at 6% per Annum Accrued	Interest at 6% per Annum Paid
	(a)	(b)	(c)	(d)	(e)
43	1/1/47 to 6/1/47	$21,200,000		$ 530,000	
44	6/1/47		$1,400,000*		$ 636,000
45	6/1/47 to 12/1/47	19,800,000		594,000	
46	12/1/47		1,800,000*		594,000
47	12/1/47 to 12/31/47	18,000,000		90,000	
48	1947		3,200,000*	1,214,000	1,230,000
49	1/1/48 to 6/1/48	18,000,000		450,000	
50	6/1/48		1,600,000*		540,000
51	6/1/48 to 12/1/48	16,400,000		492,000	
52	12/1/48		2,000,000*		492,000
53	12/1/48 to 12/31/48	14,400,000		72,000	
54	1948		3,600,000*	1,014,000	1,032,000
55	1/1/49 to 6/1/49	14,400,000		360,000	
56	6/1/49		1,700,000*		432,000
57	6/1/49 to 12/1/49	12,700,000		381,000	
58	12/1/49		2,100,000*		381,000
59	12/1/49 to 12/31/49	10,600,000		53,000	
60	1949		3,800,000*	794,000	813,000
61	1/1/50 to 6/1/50	10,600,000		265,000	
62	6/1/50		1,800,000*		318,000
63	6/1/50 to 12/1/50	8,800,000		264,000	
64	12/1/50		2,200,000*		264,000
65	12/1/50 to 12/31/50	6,600,000		33,000	
66	1950		4,000,000*	562,000	582,000
67	1/1/51 to 6/1/51	6,600,000		165,000	
68	6/1/51		1,900,000*		198,000
69	6/1/51 to 12/1/51	4,700,000		141,000	
70	12/1/51		2,400,000*		141,000
71	12/1/51 to 12/31/51	2,300,000		11,500	
72	1951		4,300,000*	317,500	339,000
73	1/1/52 to 6/1/52	2,300,000		57,500	
74	6/1/52		2,300,000*		69,000
75	1952		2,300,000*	57,500	69,000
Data		B	C	D	E

2780 Natural Gas Pipeline Company of America

and

Texoma Natural Gas Company

(Combined Companies)

Footnotes to

Schedule 19b.

*—Negative amounts.

A—Balance as at January 1, 1939 from Ex. 137, pg. 1, L28.

B—Computed from Col. c.

C—Assumed see Assumption D.

D—Computed on amount in Col. b for period in Col. a.

E—Computed on balance at beginning of period for 6 months.

Exhibit No. 188.

Sch. 20a

Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Interest Paid and Accrued
Based on Admitted Earnings

Line No.	Year	Interest Paid			Interest Accrued			Net Change in Other Net Current Assets
		On Bonds	On Borrowings	Total	On Bonds	On Borrowings	Total	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1	1939	$2,727,000	$9,000	$2,736,000	$2,716,500	$9,000	$2,725,500	$ 10,500
2	1940	2,469,000		2,469,000	2,457,500		2,457,500	11,500
3	1941	2,187,000		2,187,000	2,174,500		2,174,500	12,500
4	1942	1,875,000		1,875,000	1,860,500		1,860,500	14,500
5	1943	1,527,000		1,527,000	1,512,500		1,512,500	14,500
6	1944	1,165,500		1,165,500	1,148,750		1,148,750	16,750
7	1945	763,500		763,500	746,750		746,750	16,750
8	1946	361,500		361,500	342,250	1,500	343,750	17,750
9	1947		9,000	9,000		7,500	7,500	1,500
Data:		Sch. 15—Col. f	Sch. 19a—Col. f	Col. b+c	Sch. 15—Col. e	Sch. 19a—Col. e	Col. e+f	Col. d-g

Exhibit No. 188.

(Combined Companies)

Interest Paid and Accrued Based on Admitted Earnings after Reflecting Rate Reduction of $3,000,000 Per Year Effective 1/1/40.

Line No.	Year	Interest Paid On Bonds	Interest Paid On Borrowings	Interest Paid Total	Interest Accrued On Bonds	Interest Accrued On Borrowings	Interest Accrued Total	Net Change in Other Net Current Assets
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1	1939	$ 2,727,000	$ 9,000	$ 2,736,000	$ 2,716,500	$ 9,000	$ 2,725,500	$ 10,500
2	1940	2,469,000	—	2,469,000	2,457,500	7,500	2,465,000	4,000
3	1941	2,187,000	132,000	2,319,000	2,174,500	144,000	2,318,005	500
4	1942	1,875,000	285,000	2,160,000	1,860,500	300,500	2,161,000	1,000*
5	1943	1,527,000	465,000	1,992,000	1,512,500	478,500	1,991,000	1,000
6	1944	1,165,500	639,000	1,804,500	1,148,750	656,000	1,804,750	250*
7	1945	763,500	843,000	1,606,500	746,750	860,500	1,607,250	750*
8	1946	361,500	1,074,000	1,435,500	342,250	1,097,000	1,439,250	3,750*
9	1947		1,230,000	1,230,000		1,214,000	1,214,000	16,000
10	1948		1,032,000	1,032,000		1,014,000	1,014,000	18,000
11	1949		813,000	813,000		794,000	794,000	19,000
12	1950		582,000	582,000		562,000	562,000	20,000
13	1951		339,000	339,000		317,500	317,500	21,500
14	1952		69,000	69,000		57,500	57,500	11,500
Data:		Sch. 15, Col. f	Sch. 19b, Col. e	Col. b+c	Sch. 15, Col. e	Sch. 19b, Col. d	Col. e+f	Col. d—g

(*) Negative amounts.

Natural Gas Pipeline Company of America and Texoma Natural Gas Company.

Sch. 21a

(Combined Companies)

Liquidation Assets

Exhibit No. 188.

Line No.					
1		Dr. Reserve for Amortization of Capital Assets	$ 68,721,862		
2		Dr. Cash	457,452		
3		To Capital Assets Cr. to record the final retirement of the plant.		$ 69,179,314	Ex. 141, pg. 1, L. 28
4		Dr. Reserve for Amortization of Capital Assets	383,320		Per line 11 below
5		Dr. Cash	830,180		Line 6–4
6		To Other Net Current Assets to record liquidation of working capital as follows:		1,213,500	Sch. 7a, Col. e L.16
7	$ 24,314	Liquidating Salvage Value of Warehouse Stocks			Ex. 141, pg. 1, L. 29
8	567,366	Do. Working Capital			Ex. 141, pg. 1, L. 30
9	$ 591,680	Total Liquidating Salvage Value			Line 7 + 8
10	975,000	Working Capital			Ex. 141, pg. 1, L. 24
11	$ 383,320	Loss on Liquidation			Line 10 – 9

Exhibit No. 188.

2784

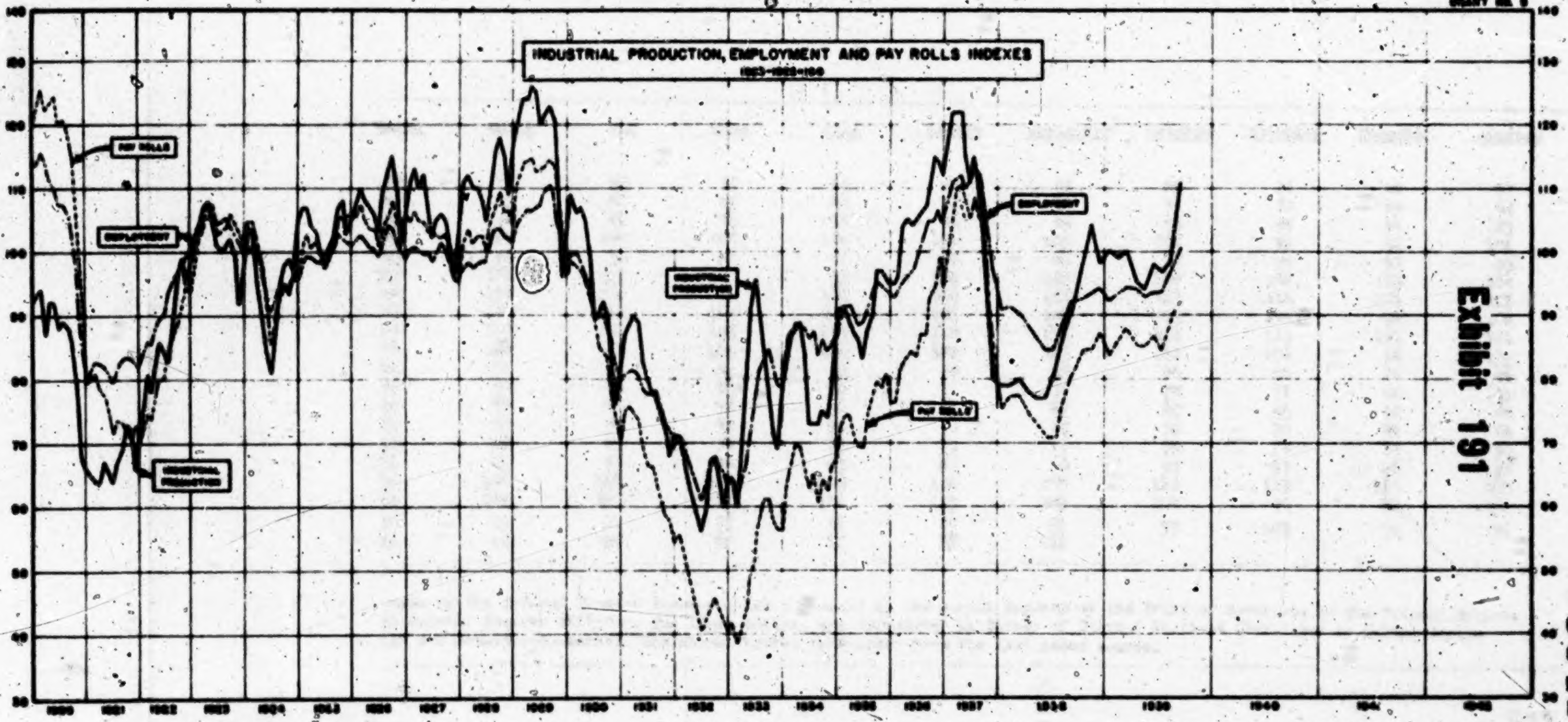
Natural Gas Pipeline Company of America
And
Texoma Natural Gas Company
(Combined Companies)

Sch. 21b

Liquidation Entries
Based on Admitted Earnings after Reflecting Rate Reduction of $3,000,000 Per Year Effective 1/1/40

Line No.				
1	Dr. Reserve for Amortization of Capital Assets...	$68,721,862		
2	Dr. Cash..................	457,452		Ex. 141, pg. 1, L. 28
3	To Capital Assets Cr. to record the final retirement of plant...........		$69,179,314	
4	Dr. Reserve for Amortization of Capital Assets...	383,320		Sch. 21a, L. 11
5	Dr. Cash..................	887,326		Line 6-line 4
6	To Other Net Current Assets to record Liquidation of working capital.......		1,270,646	Sch. 7b, Col. e, L. 16

Exhibit 191



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2786

INDUSTRIAL PRODUCTION, EMPLOYMENT AND PAY ROLLS INDEXES

1923-1925 = 100

INDUSTRIAL PRODUCTION

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	92	93	94	87	92	92	88	89	88	86	78	68	87
1921	66	65	64	64	67	66	64	67	69	73	72	66	67
1922	72	76	81	78	82	86	84	83	89	96	99	95	85
1923	99	101	105	107	108	105	101	100	101	102	99	92	101
1924	99	104	103	96	90	84	81	87	95	98	99	97	95
1925	105	107	107	104	103	100	99	101	102	107	108	105	104
1926	105	108	110	108	107	106	103	109	113	115	110	101	108
1927	106	111	113	110	112	107	102	105	106	105	101	96	106
1928	105	111	112	110	110	108	105	110	116	118	115	109	111
1929	117	121	124	124	126	125	120	122	123	121	108	96	119
1930	103	109	106	107	105	99	90	90	92	90	84	76	96
1931	82	87	89	90	89	83	80	78	77	75	72	68	81
1932	71	71	68	64	61	59	56	59	67	68	65	60	64
1933	64	64	60	67	79	91	96	90	85	78	72	69	76
1934	77	83	87	88	89	84	73	73	73	75	74	78	79
1935	88	91	91	89	87	86	83	87	90	97	97	96	90
1936	95	95	96	106	105	104	105	106	107	110	115	114	105
1937	112	117	122	122	122	115	111	115	108	102	90	80	110
1938	79	79	80	78	77	77	81	87	91	97	104	98	86
1939	100	99	100	95	94	98	97	99	111				

Source of data: The computations were made by the Federal Reserve Board, and are contained in the Annual Reports of the Board of Governors of The Federal Reserve System and in the monthly issues of the Federal Reserve Bulletin. The index numbers are reproduced in Survey of Current Business (Published by United States Department of Commerce, Bureau of Foreign and Domestic Commerce). The above figures were taken from the last named source.

SCHEDULE NO.12
PAGE 1
INDUSTRIAL
PRODUCTION
INDEX

3843

2787

INDUSTRIAL PRODUCTION, EMPLOYMENT AND PAY ROLLS INDEXES

1923-1925 = 100

EMPLOYMENT

Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	114.3	113.3	115.6	114.0	111.1	110.1	107.5	107.4	106.1	102.1	95.6	88.0	107.1
1921	79.6	81.7	82.9	82.3	82.0	81.2	79.7	81.1	83.0	83.7	83.7	82.7	82.0
1922	82.4	84.5	85.8	85.7	87.9	89.6	90.5	93.1	95.1	96.6	98.0	99.1	90.7
1923	100.2	102.4	104.6	105.1	105.2	105.7	104.6	104.8	105.3	104.0	102.8	101.1	103.8
24	100.1	101.7	101.9	100.1	96.8	93.8	90.6	92.0	94.2	95.0	94.5	96.1	96.4
25	96.6	98.3	99.2	99.1	98.6	98.4	98.3	100.0	101.9	102.6	102.2	101.8	99.8
1926	101.0	102.0	103.5	101.8	100.8	100.8	99.6	101.8	104.0	103.6	101.6	100.3	101.7
1927	98.6	100.2	100.9	100.3	99.6	99.7	98.6	99.9	101.2	100.2	98.0	96.5	99.5
1928	95.3	97.2	98.2	97.8	97.8	98.5	98.4	101.1	103.3	103.5	102.6	102.1	99.7
1929	101.7	104.1	105.4	106.7	106.5	106.8	107.3	109.2	110.3	109.0	104.6	100.7	106.0
1930	98.2	98.3	97.9	97.3	95.6	93.6	90.4	89.7	90.7	88.7	85.4	82.9	92.4
1931	80.1	80.8	81.2	81.7	80.6	78.8	77.7	77.9	78.3	75.5	72.7	72.0	78.1
1932	70.0	71.2	70.1	67.8	66.2	63.2	61.0	62.7	66.1	67.2	66.3	65.1	66.3
1933	63.3	64.7	62.3	63.9	68.8	71.6	76.2	81.3	85.0	84.6	81.2	79.5	73.4
1934	78.8	83.7	87.2	88.8	89.0	87.8	86.3	87.4	83.5	85.9	84.3	85.6	85.7
1935	86.7	89.6	91.0	91.2	89.9	88.3	88.7	91.7	93.9	95.2	94.6	94.2	91.3
1936	92.3	92.7	93.9	95.5	96.4	97.0	98.4	101.2	103.8	104.9	104.9	106.4	99.0
1937	104.7	107.6	110.1	111.3	111.5	110.3	110.9	112.3	112.3	110.3	104.1	97.4	108.6
1938	90.6	91.1	90.6	88.5	86.1	84.3	84.7	88.8	92.0	92.4	93.3	94.0	89.7
1939	92.2	93.6	94.3	94.1	93.0	93.4	93.5	96.4	100.1				

Source of data: The computations were made by the United States Bureau of Labor Statistics, and are contained in their publications. The Employment Indexes are reproduced in Survey of Current Business (Published by United States Department of Commerce, Bureau of Foreign and Domestic Commerce). The above figures were taken from the last named source.

3845

SCHEDULE NO. 12
PAGE 2
EMPLOYMENT
INDEX

INDUSTRIAL PRODUCTION, EMPLOYMENT AND PAY ROLLS INDEXES

1923-1925 = 100

PAY ROLLS

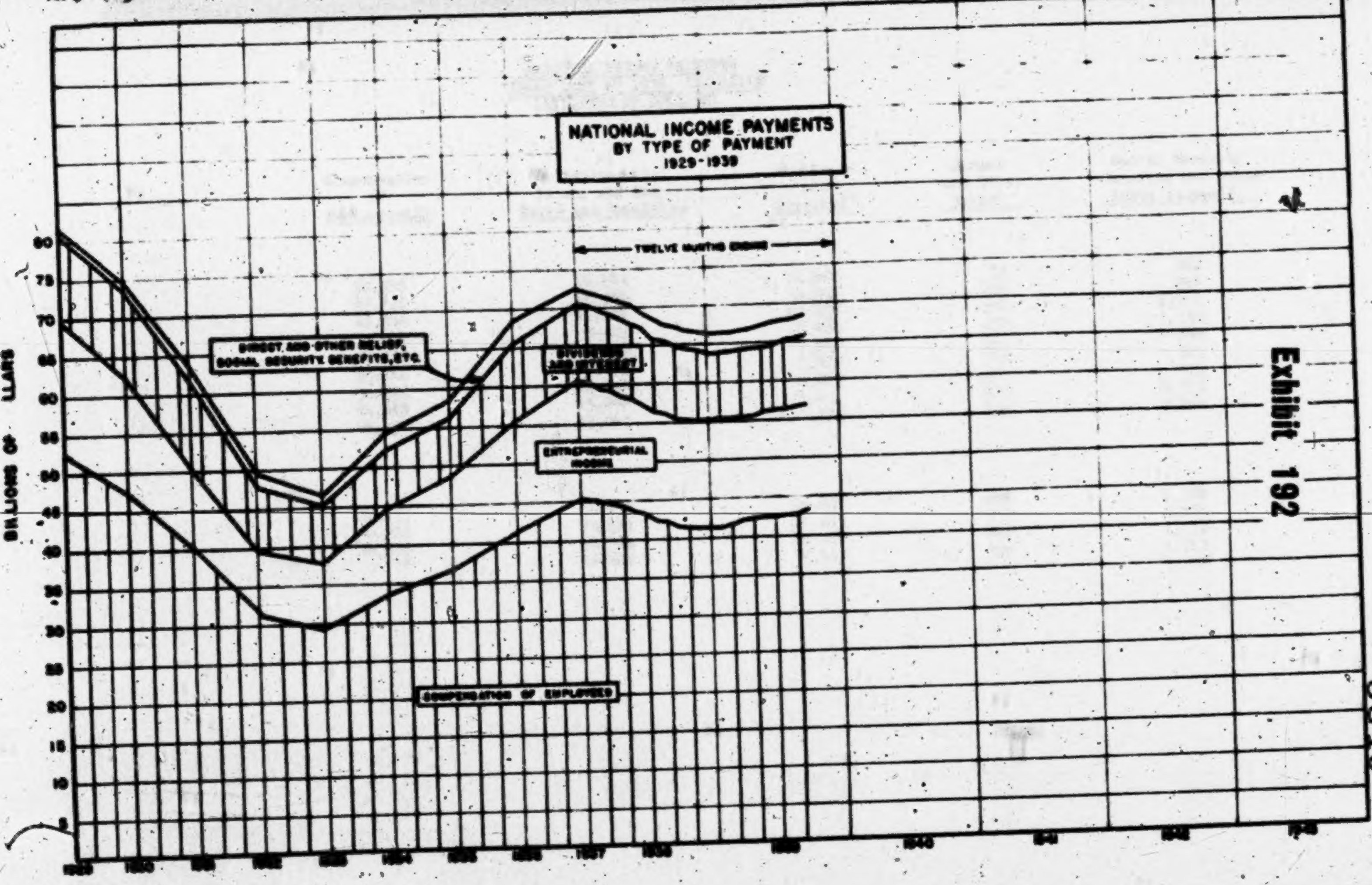
Year	January	February	March	April	May	June	July	August	September	October	November	December	Average
1920	119.1	117.4	125.4	122.5	123.0	124.4	120.0	120.6	116.9	114.4	105.0	95.5	117.2
1921	80.6	80.1	81.0	76.8	77.4	75.6	71.6	73.6	73.3	71.9	70.9	72.7	75.6
1922	69.6	72.5	76.4	73.6	77.0	80.0	80.2	84.1	87.0	88.7	92.2	94.5	81.2
1923	93.9	97.8	102.6	103.8	107.1	107.2	102.9	103.1	103.8	105.9	103.9	102.7	102.9
1924	98.9	104.5	104.9	102.0	97.6	91.6	85.3	89.1	92.4	94.6	93.1	97.6	96.0
1925	96.0	101.0	102.8	100.4	101.4	99.2	97.5	100.1	99.4	105.3	105.1	105.5	101.1
1926	101.6	105.7	107.2	104.9	103.5	103.7	99.4	103.8	105.1	108.0	104.3	103.6	104.7
1927	98.6	104.8	106.6	105.0	104.8	103.2	99.1	102.5	102.1	102.7	98.9	100.0	102.4
1928	96.6	102.0	103.5	101.3	102.3	102.7	100.2	104.6	106.2	[illegible]	106.2	106.9	103.5
1929	103.8	110.8	113.0	114.1	114.3	112.7	106.6	113.5	114.4	113.7	104.9	101.2	110.6
1930	94.5	95.6	95.7	95.5	94.1	92.9	85.0	83.8	84.8	82.9	77.3	75.4	89.4
1931	70.3	74.4	75.9	74.7	73.6	69.9	64.6	65.4	63.8	61.8	58.7	57.8	67.8
1932	50.0	53.4	53.6	49.6	46.8	43.7	40.4	41.4	44.0	45.8	43.7	42.4	46.7
1933	40.3	41.4	38.3	40.8	44.4	49.1	52.7	58.6	61.3	61.1	57.3	56.5	50.1
1934	56.1	62.9	67.2	69.6	69.7	67.4	62.8	65.1	60.8	64.0	62.5	66.2	64.5
1935	67.5	72.6	76.4	76.6	71.8	69.8	69.1	76.0	76.8	79.5	78.6	80.5	74.1
1936	76.9	76.6	80.5	82.6	84.0	84.2	83.5	87.3	87.2	92.9	94.4	99.2	85.8
1937	94.6	100.1	105.9	109.7	110.1	107.6	105.2	108.7	104.9	104.9	93.3	80.6	102.5
1938	75.3	77.5	77.8	74.9	73.2	71.1	71.1	77.3	81.6	84.2	86.4	87.1	77.9
1939	83.7	86.0	87.6	85.5	85.0	86.5	84.4	89.9	93.7				

Source of data: The computations were made by the United States Bureau of Labor Statistics, and are contained in their publications. The Pay Roll Indexes are reproduced in Survey of Current Business (Published by United States Department of Commerce, Bureau of Foreign and Domestic Commerce). The above figures were taken from the last annual SURVEY.

3847

SCHEDULE NO. 12
PAGE 3
PAY ROLLS
INDEX

CHART NO. 10



NATIONAL INCOME PAYMENTS
BY TYPE OF PAYMENT
1929-1939

Exhibit 192

3849

W-56-1580

NATIONAL INCOME PAYMENTS
YEARS 1929 TO 1939, INCLUSIVE
(MILLIONS OF DOLLARS)

Year or Period	Total Income Payments	Compensation of Employees(A)	Entrepreneurial Income and Net Rents and Royalties	Dividends and Interest	Direct and Other Relief	Social Security Benefits and Other Labor Income(B)
Year						
1929	81,660	52,356	16,848	11,520	72	854
1930	74,671	47,770	14,289	11,600	106	906
1931	63,397	40,044	11,126	10,156	170	1,901
1932	49,396	31,071	8,545	8,286	338	1,156
1933	46,777	29,082	8,826	7,366	554	949
1934	54,167	33,811	10,773	7,975	745	863
1935	58,572	36,513	12,141	8,005	1,001	912
1936	68,216	41,669	13,868	9,631	675	2,373
1937	72,449	45,258	15,013	10,225	841	1,112
12 Months Ended						
1938						
Jan. 31	72,237	45,077	14,956	10,237	859	1,108
Feb. 28	71,908	44,811	14,879	10,215	877	1,126
Mar. 31	71,261	44,449	14,728	10,021	892	1,171
Apr. 30	70,675	44,042	14,604	9,912	905	1,212
May 31	70,103	43,965	14,497	9,465	920	1,256
June 30	69,321	43,080	14,374	9,633	937	1,297
July 31	68,619	42,619	14,222	9,486	954	1,338
Aug. 31	67,902	42,206	14,049	9,286	969	1,392
Sept. 30	67,401	41,885	13,921	9,173	982	1,440
Oct. 31	66,957	41,624	13,814	9,045	993	1,481
Nov. 30	66,828	41,521	13,755	9,035	1,002	1,515
Dec. 31	66,271	41,557	13,686	8,476	1,007	1,545
1939						
Jan. 31	66,303	41,688	13,647	8,379	1,010	1,579
Feb. 28	66,424	41,834	13,633	8,343	1,013	1,601
Mar. 31	66,782	42,009	13,642	8,503	1,017	1,611
Apr. 30	66,912	42,144	13,660	8,473	1,022	1,613
May 31	67,158	42,329	13,706	8,474	1,028	1,621
June 30	67,519	42,580	13,719	8,559	1,033	1,628
July 31	67,731	42,798	13,697	8,569	1,038	1,629
Aug. 31	67,962	42,973	13,736	8,580	1,045	1,628
Sept. 30	68,326	43,149	13,837	8,662	1,053	1,625

See next page for Source of Data and Notes.

2791

National Income Payments

Years 1929 to 1939, Inclusive
(Millions of Dollars)

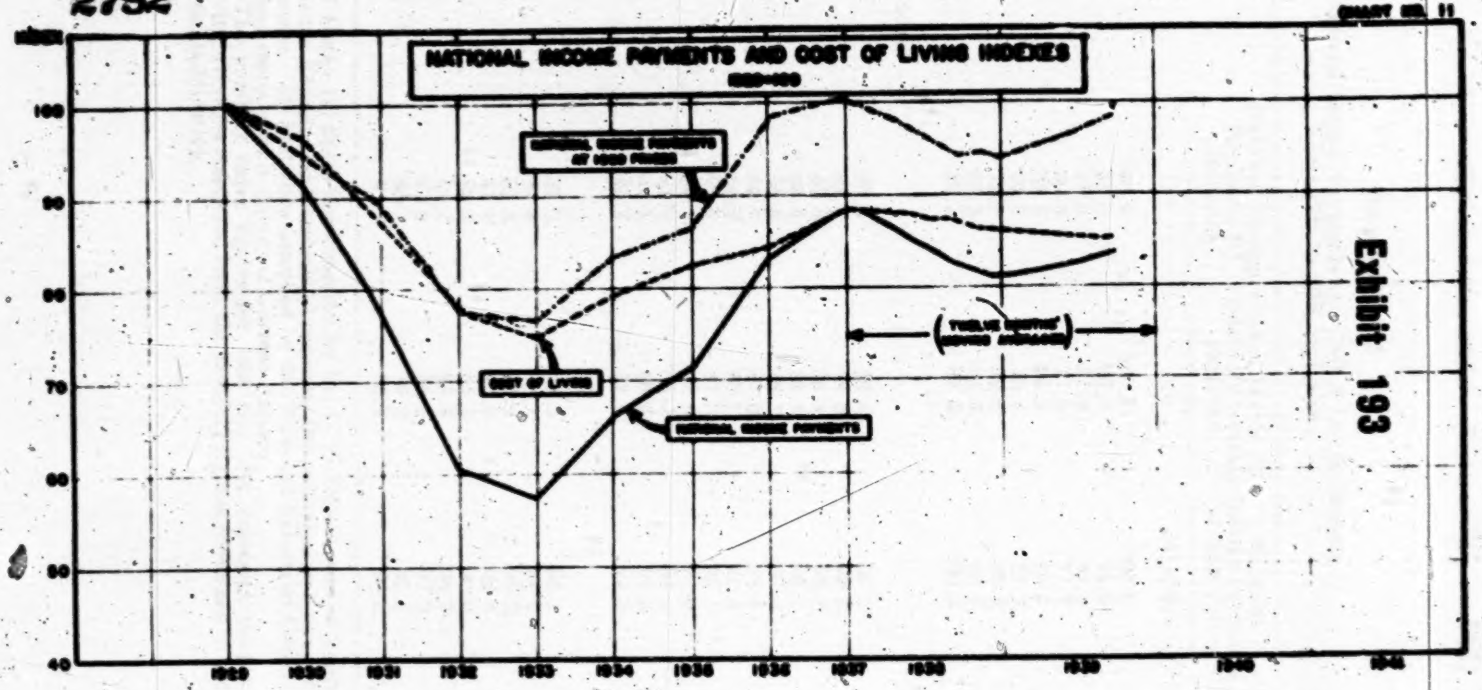
Source of Data: Statistics compiled by the U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, and published in Survey of Current Business. The above data for the years 1929 to 1937, inclusive, were taken from, and the twelve-months' totals for the years 1938 and 1939 are based on the monthly figures contained in the aforementioned publication.

Notes: (A) Includes income in kind as well as cash income.

(B) In addition to benefits payable under the Social Security program, this item includes pensions paid out by private industries and governmental agencies, compensation for industrial accidents, pensions to veterans, and also loans to World War veterans on their adjusted service certificates, and since June of 1936 adjusted service certificate payments less prior loans. These latter items account for the sharp rise in this type of income in 1931 and 1936.

Exhibit 193

2792



2793

Schedule No. 15

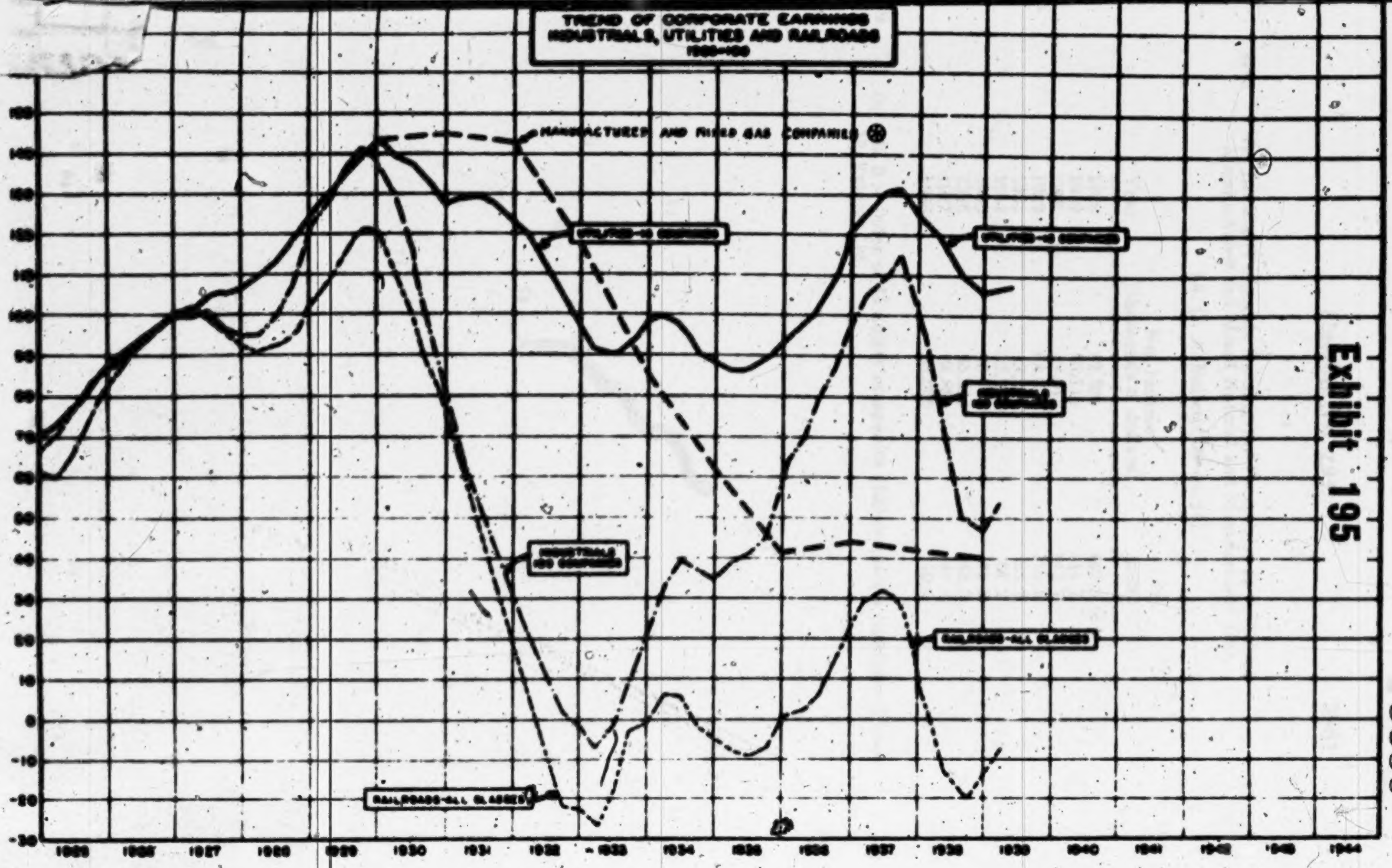
National Income Payments and Cost of Living Indexes
Years 1929 to 1939, Inclusive

Year or Period	National Income Payments (1) (1929=100)	Cost of Living (2) (Monthly Average 1923=100)	National Income Payments at 1929 Prices
(a)	(b)	(c)	(d)=(b) + (c)
Year			
1929	100.0	100.1	100.0
1930	91.4	96.7	94.5
1931	77.6	87.2	89.0
1932	60.5	77.9	77.7
1933	57.3	74.9	76.5
1934	66.3	79.4	83.5
1935	71.7	82.6	86.8
1936	83.5	84.8	98.5
1937	88.7	88.5	100.2
12 Months Ended			
1938			
Jan. 31	88.5	88.6	99.9
Feb. 28	88.1	88.5	99.5
Mar. 31	87.3	88.4	98.8
Apr. 30	86.6	88.3	98.1
May 31	85.8	88.1	97.4
June 30	84.9	87.9	96.6
July 31	84.0	87.7	95.8
Aug. 31	83.2	87.5	95.1
Sept. 30	82.5	87.2	94.6
Oct. 31	82.0	86.9	94.4
Nov. 30	81.8	86.6	94.5
Dec. 31	81.2	86.4	94.0
1939			
Jan. 31	81.2	86.2	94.2
Feb. 28	81.3	86.1	94.4
Mar. 31	81.8	85.9	95.2
Apr. 30	81.9	85.8	95.5
May 31	82.2	85.6	96.0
June 30	82.7	85.5	96.7
July 31	82.9	85.3	97.2
Aug. 31	83.2	85.2	97.7
Sept. 30	83.7	85.2	98.2

Source of Data: (1) Statistics compiled by the U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, and published in Survey of Current Business. (2) Statistics compiled by the National Industrial Conference Board and reproduced in Survey of Current Business.

Note: The monthly index figures for 1938 and 1939 represent twelve-months' moving averages computed from the monthly figures contained in the aforementioned publication.

Exhibit 195



⊛ FROM ANNUAL STATISTICS OF THE MANUFACTURED GAS INDUSTRY IN 1938. STATISTICAL BULLETIN Nº 36.

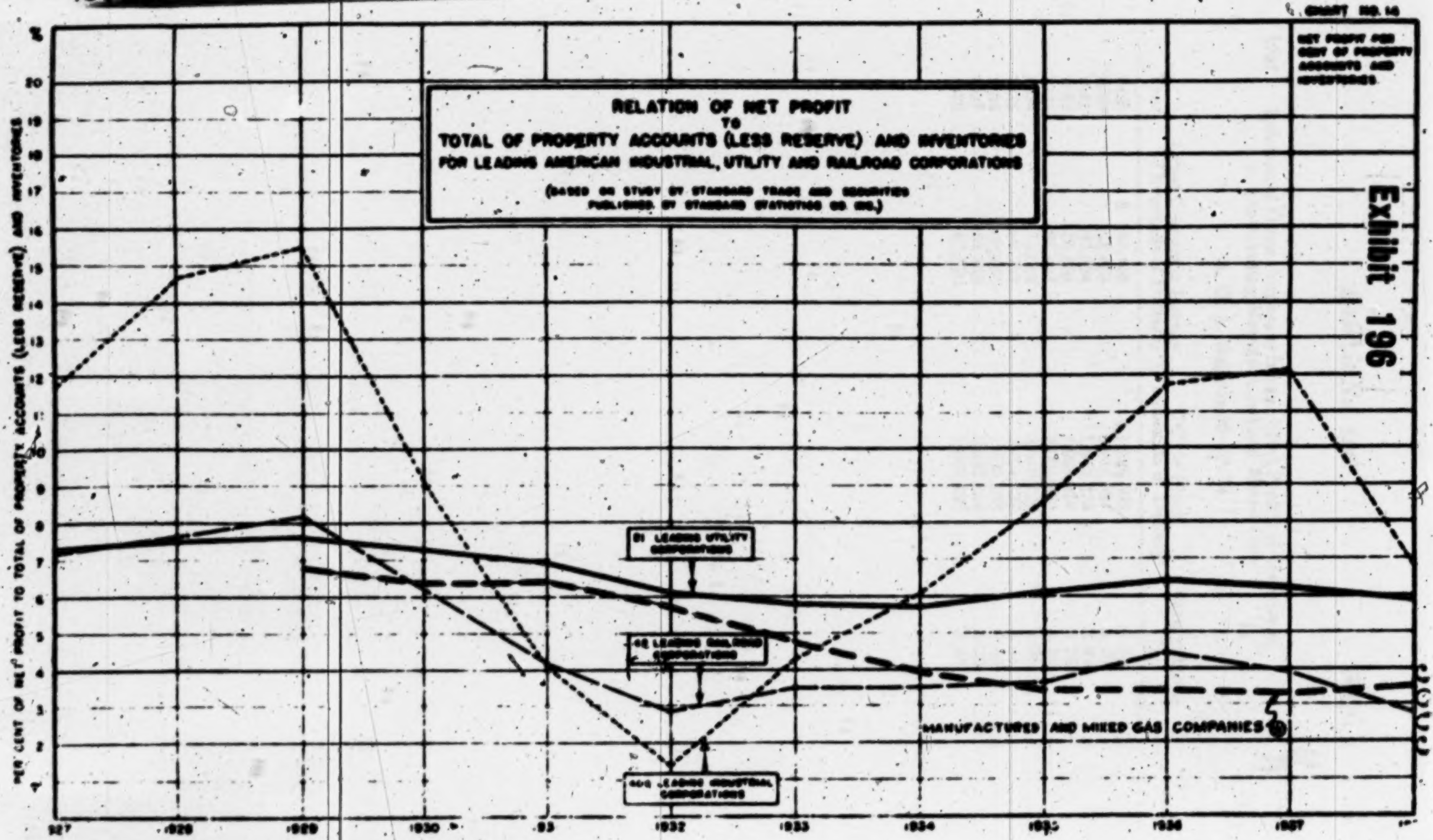
2795 Net Income (Corporate Earnings) of Companies Distributing Manufactured and Mixed Natural and Manufactured Gas.

(A. G. A. Bulletin 36—p. 14)

Year	Net Income (thousands of dollars)	Index
1929	82,204	142.5 (a)
1930	83,119	144.1
1931	82,342	142.7
1932	68,332	118.5
1933	49,136	85.2
1934	35,280	61.2
1935	23,769	41.2
1936	25,314	43.9
1937	23,858	41.4
1938	23,030	40.0

(a) 142.5 = index of 15 utility companies 1929 corporate earnings—Chart 12, Exhibit 185.

Exhibit 196



RELATION OF NET PROFIT
TO
TOTAL OF PROPERTY ACCOUNTS (LESS RESERVE) AND INVENTORIES
FOR LEADING AMERICAN INDUSTRIAL, UTILITY AND RAILROAD CORPORATIONS

(BASED ON STUDY BY STANDARD TRADE AND SECURITIES
PUBLISHED BY STANDARD STATISTICS CO. INC.)

① FROM ANNUAL STATISTICS OF THE MANUFACTURED GAS INDUSTRY IN 1938 STATISTICAL BULLETIN NO. 36 – RELATION OF NET PROFIT TO GROSS UTILITY PLANT NOT INCLUDING INVENTORIES.

2797 Relation of Gross Corporate Income (Net Profit) of Companies Distributing Manufactured and Mixed Gas.

A. G. A. Bulletin 36—P. 14

Year	Gross Corporate Income (Thousands of Dollars)	Utility Plant (Thousands of Dollars)	Return Ratio %
1929	$ 123,409	$ 1,825,503	6.76
1930	123,473	1,915,567	6.45
1931	127,304	1,962,823	6.49
1932	115,606	1,998,979	5.78
1933	95,897	2,004,525	4.78
1934	79,559	2,010,125	3.96
1935	68,292	2,001,133	3.41
1936	68,654	1,996,358	3.44
1937	66,323	1,997,534	3.32
1938	67,570	1,967,490	3.43

Exhibit 197

YIELD AT MARKET PRICES OF ELECTRIC OPERATING UTILITY PREFERRED STOCK
AND NUMBER OF TIMES DIVIDEND AND PRIOR REQUIREMENTS ARE EARNED
MARKET PRICES FOR WEEK ENDED NOVEMBER 17, 1939
INCOME FOR LATEST TWELVE MONTHS

AL P
Docket No.
Hearing Ex. No.

Identification Number	Name of Company	Rate	Twelve Months Ended*	Times Requirements Earned	Average Market Price Week Ended Nov.17.1939	Yield at Market Price	Character of Service Rendered
11	Bangor Hydro-Electric Company, The	6%	Sept.30	1.57	106 **	5.66	Electric
17	Central Hudson Gas & Electric Company	4½%	12/31/38	2.51	111 ***	4.05	Elec.& Gas
18	Central Illinois Light Company	4½%	Aug. 31	2.21	110½	4.07	Elec.& Gas
26	Cleveland Elec. Illuminating Co., The	$4.50	Sept. 30	3.42	112 5/8	4.00	Electric
28	Connecticut Light & Power Company, The	5½%	Sept. 30	2.40	117 **	4.70	Elec.& Gas
30	Consolidated Edison Company of N.Y.,Inc.	$5.00	Aug. 31	1.98	107 3/8	4.66	Elec. & Gas
37	Consumers Power Company	$4.50	Sept. 30	1.73	98 3/8	4.57	Electric
39	Dayton Power & Light Company, The	4½%	June 30	2.95	111	4.05	Elec.& Gas
42	Duquesne Light Company, 1st Pfd.	5%	Aug. 31	3.02	117	4.27	Electric
73	Metropolitan Edison Company, Prior Pfd.	$6.00	Sept. 30	2.18	108 1/4***	5.54	Electric
86	Nebraska Power Company	6%	Sept. 30	1.89	110 ***	5.45	Electric
102	Ohio Public Service Company, 1st Pfd.	5½%	June 30	1.79	100 1/4***	5.49	Electric
109	Pacific Gas & Electric Company, 1st Pfd.	5½%	June 30	1.86	29	4.74	Elec.& Gas
111	Pennsylvania Water & Power Company	$5.00	9Mos.9/30	2.76	114 **	4.39	Electric
112	Philadelphia Electric Company	$5.00	Sept.30	3.18	117½	4.26	Electric
118	Public Service Company of Colorado,1st Pfd.	6%	12/31/38	1.68	105 **	5.71	Elec.& Gas
125	Public Service Electric & Gas Company	$5.00	Aug. 31	3.31	115 1/4	4.34	Elec.& Gas
134	San Diego Consolidated Gas & Electric Co.	7%	Aug. 31	1.88	115 ***	6.09	Elec.& Gas
138	Southern California Edison Co.,Ltd.Series C	5½%	June 30	1.63	28 1/8	4.88	Electric
154	Virginia Electric & Power Company	$6.00	Aug. 31	1.87	118	5.08	Elec.& Gas
156	Washington Water Power Company	$6.00	Sept.30	2.40	105 1/4***	5.70	Electric

Source of Data: Moody's Public Utilities, 1939, and Supplements thereto.

Notes: 1. The above list includes all electric operating utility preferred stocks listed in Schedule 19 of "The Problem of the 'Rate of Return' in Public Utility Regulation" (Federal Communications Commission, June 15, 1938) for which preferred dividend and prior requirements were earned in excess of 1.50 times in 1938.

2. Quotations from Commercial and Financial Chronicle, November 18, 1939.

* Period ending in 1939, unless otherwise indicated.

** Bid quotation, October 31, 1939

*** Average of Bid and Ask Quotation, October 31, 1939.

Exhibit 198

EARNINGS - PRICE RATIOS OF ELECTRIC OPERATING UTILITY COMMON STOCKS AND PER CENT OF GROSS INCOME AVAILABLE FOR COMMON STOCKS

MARKET PRICES FOR WEEK ENDED NOVEMBER 17, 1939

ANNUAL INCOME PER LATEST QUARTERLY REPORTS

Identification Number	Name of Company	Average Market Price Week Ended Nov. 17, 1939	Earnings Per Share Amount	Earnings Per Share 12 Mos. Ended*	Earnings-Price Ratio	Per Cent of Gross Income Available for Common
5	Boston Edison Company	146 3/4	$ 9.92	Sept. 30	6.76%	76.14%
9	Central Hudson Gas & Elec. Corp.	14 1/4	0.85	12/31/38	5.96	60.12
11	Cleveland Electric Illum. Co., The	40 1/2	2.75	Sept. 30	6.79	70.78
13	Commonwealth Edison Company	31	2.41	Sept. 30	7.77	58.69
14	Connecticut Power Company, The	50 **	2.49	12/31/38	4.98	89.67
15	Consolidated Edison Co. of N.Y., Inc.	30 7/8	2.18	Sept. 30	7.06	45.68
16	Consolidated Gas Elec. Lt. and Power Company of Baltimore	79 5/8	4.70	Sept. 30	5.90	60.88
17	Detroit Edison Company, The	124	7.84	Sept. 30	6.32	62.79
18	Duke Power Company	72 1/2 **	4.23	12/31/38	5.83	72.78
19	Hartford Electric Light Co., The	65 1/2 **	2.95	12/31/38	4.50	97.26
27	Pacific Gas & Electric Company	32 1/8	2.74	June 30	8.53	40.95
30	Pennsylvania Water & Power Company	72	5.55	12/31/38	7.71	66.49
36	Southern California Edison Co., Ltd.	27	2.46	Sept. 30	9.11	39.72
38	Tampa Electric Company	31 3/8	2.40	Sept. 30	7.65	94.89

Source of Data: Moody's Public Utilities, 1939, and Supplements thereto.

Notes: (1) The above list includes all electric operating utility common stocks listed in Schedule 26 (1937 Earnings-March 1938 Prices) of "The Problem of the 'Rate of Return' in Public Utility Regulation" (Federal Communications Commission, June 15, 1938) which were not in excess of 95% owned by holding companies.

(2) Quotations from Commercial and Financial Chronicle, November 18, 1939.

* Period ending in 1939 unless otherwise indicated.

** Average of Bid and Ask Quotations - October 31, 1939.

Form G-17 10M 9-36 S.

FEDERAL POWER COMMISSION DOCKET NO.
EXHIBIT NO. Ex 201 (FOR IDENTIFICATION)

REQUEST FOR VOUCHER
ON

Natural Gas Pipe Line Company of America
NAME OF COMPANY

FEDERAL POWER COMMISSION
Docket No. G-102 & G-112
June 20
Hearing Ex. No. 201 193 8

6 21 38

KINDLY ISSUE CHECK AND VOUCHER PAYABLE TO:

NAME Ralph E. Davis, Inc., Engineers

CARE OF

AMOUNT

$ 5105.15

STREET 1710 Union Bank Building

CITY Pittsburgh, Pa.

FOR Services rendered to June 14: Texoma Natural Gas Co., Study of Natural Gas Supply and Value of Gas Producing Properties as of January 1, 1938----

Services:	Ralph E. Davis-----4 days @ $150. per day----------	$ 600.00
	Gail F. Moulton---38-13/15 days @100. per day---------	3886.71
	S. Cesco ---------21- 1/15 days @ 15. per day---------	316.00
		$4802.71
Expense:	Gail F. Mounton - travel--- $ 276.31	
	Telephone & Telegraph ----- 26.13	
	302.44	302.44
		$5105.15

CHARGE TO

2-50-R1

APPROVED:

6-21-38

SIGNED

Kindly return check to writer for transmittal.

800

Exhibit 201

3873

2801

VO.REG.NO. 55810 VO.DATE JUN 21 1938 CHECK REG.NO. 55810

NATURAL GAS PIPELINE COMPANY OF AMERICA
CHICAGO, ILL.

DATE	DESCRIPTION	AMOUNT BILLED	DEDUCTIONS FREIGHT	DEDUCTIONS DISCOUNT	DEDUCTIONS CORRECTIONS	NET AMOUNT PAID
6/14/38	Invoice	5,105.15 ✓				5,105.15 ✓
'1s	TOTAL					

H.K.

OFFICE COPY

PAYABLE AT
HARRIS TRUST & SAVINGS BANK
2-28 ✓ CHICAGO, ILLINOIS ✓

CHICAGO, ILL. JUN 21 1938 ✓

Five Thousand One Hundred Five and 15/100------------------------ DOLLARS $ 5,105.15

IN ACCOUNT WITH ✓

Ralph E. Davis, Inc., Engineers
1710 Union Bank Building
Pittsburgh, Pennsylvania

CORRECT

AUDITED WAYNE R. CALDWELL

APPROVED

2802

Natural Gas Pipe Line Company of
America,
20 North Wacker Drive,
Chicago, Illinois.

PITTSBURGH, PA., June 14th, 1938 3875

PAID
6 21 38

TO RALPH E. DAVIS, INC. DR.
ENGINEERS

GEOLOGICAL EXAMINATIONS
REPORTS—APPRAISALS
PETROLEUM AND NATURAL GAS

1710 UNION BANK BUILDING

On Account: Services Rendered to date:
Texoma Natural Gas Co. - Study of Natural Gas
Supply and Value of Gas Producing Properties as
of January 1, 1938:

Services:

Ralph E. Davis --------	4 days	@ $150 per day ---	$ 600.00 ✓
Gail F. Moulton -------	38-13/15 "	@ 100 per day ---	3886.71
S. Gosse --------------	21- 1/15 "	@ 15 per day ---	316.00 ✓
			$ 4802.71

Expense:

Gail F. Moulton - travel ---	$ 276.31	
Telephone & Telegraph ------	26.13	
	$ 302.44 ----------------	302.44 ✓
		$ 5105.15

H.H.

21
15
5
10
21
315

per day = 1.00

$\frac{9}{15}$ = .6

Year	Total	Domestic	Space Heating (1)	Commercial	Industrial (4)	Miscellaneous	Total	Domestic	Space Heating (1)	Commercial	Industrial
	Revenues From Sales To Consumers						**Average Annual Revenue Per Therm Of Gas Sales (Ce**				
1928	$35,138,694	$23,074,923	$1,132,843	$ 5,470,166	$ 3,680,041	$ 1,780,721	16.19	18.97	14.72	16.51	12.57
1929	36,514,642	23,320,722	1,438,444	5,537,313	4,040,078	2,178,085	15.46	18.74	14.63	15.60	11.87
1930	35,446,506	23,006,287	1,443,852	5,573,503	3,592,710	2,030,154	15.61	18.70	14.59	15.54	12.41
1931	33,185,585	21,926,794	1,234,948	4,873,130	3,118,593	2,032,120	14.11	18.53	14.24	15.40	7.25
1932	32,579,387	21,316,241	947,043	4,417,803	3,671,071	2,227,229	10.56	17.68	9.80	14.77	3.52
1933	29,621,609	19,789,702	1,132,815	4,119,157	2,343,866	2,236,069	11.93	17.58	7.80	14.62	4.63
1934	32,189,588	19,478,504	2,087,724	4,072,714	3,756,438	2,794,208	8.35	17.33	7.34	14.36	2.37
1935	33,844,736	19,488,554	2,695,624	3,953,243	4,697,712	3,009,603	7.78	17.30	7.34	14.31	2.34
1936	36,094,937	19,454,036	2,881,307	4,051,163	6,465,286	3,243,145	6.71	17.31	7.27	14.20	2.23
1937	36,225,513	19,450,234	2,761,628	4,062,813	7,023,957	2,926,881	6.59	17.36	7.30	14.12	2.27
1938 (a)	37,436,473	22,072,149	2,515,326	4,039,642	5,857,044	2,952,312	7.57	19.50	7.37	14.52	2.23
1938 (b)	34,769,102	19,404,778	2,515,326	4,039,642	5,857,044	2,952,312	7.03	17.14	7.37	14.52	2.23
	Gas Sales to Customers (Therms)						**Average Annual Gas Sales (Therms) Per Customer**				
1928	217,020,425	121,632,461	7,693,846	33,123,023	29,271,767	25,299,328	261.5	157.6	1,635.6	704.7	4,471.7
1929	236,136,953	124,471,930	9,834,415	35,504,700	34,015,215	32,310,693	281.1	159.3	1,847.5	757.3	5,171.8
1930	227,078,119	123,044,410	9,893,908	34,570,972	28,953,035	30,615,794	269.2	156.7	1,793.3	747.5	4,406.2
1931	235,192,308	118,356,809	8,672,385	31,643,703	43,031,436	33,487,975	283.7	153.3	1,610.8	701.7	6,819.6
1932	308,426,619	120,555,866	9,662,749	29,918,356	104,346,168	43,943,480	385.3	161.7	1,837.4	684.4	17,125.6
1933	252,595,500	112,578,873	14,356,120	28,165,476	50,672,112	46,822,919	325.1	155.5	2,068.6	659.2	8,597.2
1934	391,450,358	112,390,136	28,458,833	28,363,531	158,634,502	63,603,356	493.4	152.0	2,148.6	662.4	26,928.3
1935	441,481,977	112,633,627	36,718,198	27,627,483	200,735,217	63,767,452	550.1	150.7	1,852.3	653.1	34,561.8
1936	537,976,085	112,388,454	39,607,645	28,521,666	289,755,067	67,703,253	664.2	148.6	1,943.8	683.7	47,964.8
1937	549,346,248	112,040,439	37,835,097	28,771,711	308,944,320	61,754,681	657.5	143.2	1,821.2	702.79	49,502.4
1938	494,760,956	113,181,554	34,112,092	27,822,894	262,320,427	57,323,989	591.0	143.9	1,569.4	715.72	43,763.8
	Average Number of Customers During Year						**Average Annual Revenue Per Customer**				
1928	829,821	771,567	4,704	47,002	6,546	2	$42.34	$29.91	$240.83	$116.38	$562.18
1929	840,120	781,335	5,323	46,883	6,577	2	43.46	29.85	270.23	118.11	614.24
1930	843,396	785,057	5,517	46,249	6,571	2	42.03	29.31	261.71	116.19	546.75
1931	828,937	772,143	5,384	45,097	6,310	3	40.03	28.40	229.37	108.06	494.23
1932	800,542	745,470	5,259	43,717	6,093	3	40.70	28.59	180.08	101.05	602.51
1933	776,944 (3)	723,557	6,940	42,729	5,894	3	38.13	27.35	163.23	96.40	397.67
1934	793,349 (3)	739,312	13,245	42,820	5,891	3	40.57	26.35	157.62	95.11	637.66
1935	802,516 (3)	747,487	19,823	42,299	5,808	3	42.17	26.07	135.98	93.46	808.93
1936	810,002 (3)	756,242	20,376	41,719	6,041	2	44.56	25.72	141.41	97.11	1,070.23
1937	835,535 (3)	782,165	20,775	40,939	6,241	2	43.36	24.87	132.93	99.24	1,125.45
1938 (a)	837,201 (3)	786,253	21,736	38,874	5,994	2	44.72	28.07	115.72	103.92	977.15
1938 (b)							41.53	24.68	115.72	103.92	977.15

Notes:
(1) These figures include space heating only. The domestic consumption of these customers is included under domestic.
(2) These unit figures were not developed as they have no significance.
(3) Duplication in domestic and space heating customers has been eliminated in this total.
(4) Includes interruptible and firm industrial.
(a) Includes $2,667,371 arising from rate increase still in process of litigation.
(b) Excludes the item of $2,667,371.

Exhibit 202

(4) Industrial	Miscellaneous	Total	Domestic	Space Heating (1)	Commercial	Industrial	Miscellaneous
			Average Annual Revenue Per Therm Of Gas Sales (Cents)				
$ 3,680,041	$ 1,780,721	16.19	18.97	14.72	16.51	12.57	7.04
4,040,078	2,178,085	15.46	18.74	14.63	15.60	11.87	6.74
3,592,710	2,030,154	15.61	18.70	14.59	15.54	12.41	6.63
3,118,593	2,032,120	14.11	18.53	14.24	15.40	7.25	6.07
3,671,071	2,227,229	10.56	17.68	9.80	14.77	3.52	5.07
2,343,866	2,236,069	11.93	17.58	7.80	14.62	4.63	4.78
3,756,438	2,794,208	8.35	17.33	7.34	14.36	2.37	4.39
4,697,712	3,009,603	7.78	17.30	7.34	14.31	2.34	4.72
6,465,286	3,243,145	6.71	17.31	7.27	14.20	2.23	4.79
7,023,957	2,926,881	6.59	17.36	7.30	14.12	2.27	4.74
5,857,044	2,952,312	7.57	19.50	7.37	14.52	2.23	5.15
5,857,044	2,952,312	7.03	17.14	7.37	14.52	2.23	5.15
			Average Annual Gas Sales (Therms) Per Customer				
29,271,767	25,299,328	261.5	157.6	1,635.6	704.7	4,471.7	(2)
34,015,215	32,310,693	281.1	159.3	1,847.5	757.3	5,171.8	
28,953,035	30,615,794	269.2	156.7	1,793.3	747.5	4,406.2	
43,031,436	33,487,975	283.7	153.3	1,610.8	701.7	6,819.6	
104,346,168	43,943,480	385.3	161.7	1,837.4	684.4	17,125.6	
50,672,112	46,822,919	325.1	155.5	2,068.6	659.2	8,597.2	
158,634,502	63,603,356	493.4	152.0	2,148.6	662.4	26,928.3	
200,735,217	63,767,452	550.1	150.7	1,852.3	653.1	34,561.8	
289,755,067	67,703,253	664.2	148.6	1,943.8	683.7	47,964.8	
308,944,320	61,754,681	657.5	143.2	1,821.2	702.79	49,502.4	
262,320,427	57,323,989	591.0	143.9	1,569.4	715.72	43,763.8	
			Average Annual Revenue Per Customer				
6,546	2	$42.34	$29.91	$240.83	$116.38	$562.18	(2)
6,577	2	43.46	29.85	270.23	118.11	614.24	
6,571	2	42.03	29.31	261.71	116.19	546.75	
6,310	3	40.03	28.40	229.37	108.06	494.23	
6,093	3	40.70	28.59	180.08	101.05	602.51	
5,894	3	38.13	27.35	163.23	96.40	397.67	
5,891	3	40.57	26.35	157.62	95.11	637.66	
5,808	3	42.17	26.07	135.98	93.46	808.93	
6,041	2	44.56	25.72	141.41	97.11	1,070.23	
6,241	2	43.36	24.87	132.93	99.24	1,125.45	
5,994	2	44.72	28.07	115.72	103.92	977.15	
		41.53	24.68	115.72	103.92	977.15	

The domestic consumption of these customers is included under domestic.
they have no significance.
customers has been eliminated in this total.
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reaso still in process of litigation.

	Total	Domestic	Spaceheating (2)	Commercial	Industrial	Miscellaneous (3)	Total	Domestic	Spaceheating (2)	Commercial
			REVENUES FROM SALES TO CUSTOMERS					AVERAGE ANNUAL REVENUE PER THERM (Cents)		
1928	$3,747,149.70	$3,290,970.07	$ 118,506.17	$ 337,673.46(1)	$	$	24.1	25.4	17.3	17.7 (1)
29	4,078,552.98	3,486,150.98	178,103.38	414,298.62(1)			23.5	25.3	17.0	16.6 (1)
30	4,098,885.49	3,514,458.40	193,991.47	390,435.52(1)			23.7	25.3	17.0	17.3 (1)
31	3,918,419.24	3,369,619.88	189,863.75	356,094.94(1)		2,840.67	23.6	25.1	15.9	17.89(1)
32	3,717,320.52	3,214,367.57	191,201.34	201,257.40	108,659.21	1,835.00	21.5	24.0	12.3	17.6
33	3,493,749.18	2,869,678.61	295,629.77	198,950.77	126,662.80	2,827.23	17.8	23.8	9.9	16.2
24	3,796,819.94	2,657,060.56	673,805.90	199,341.81	265,351.25	1,260.40	11.1	23.5	8.7	15.9
35	4,121,946.35	2,628,306.82	939,656.55	201,432.78	351,537.68	1,012.52	9.8	23.3	8.7	16.0
36	4,227,741.68	2,627,079.00	1,000,866.61	212,077.32	383,874.19	3,842.56	9.6	22.9	8.5	15.9
37	4,164,230.87	2,679,730.51	958,173.01	213,702.81	310,176.13	2,446.41	10.9	22.4	8.6	16.0
38	4,208,572.58	2,702,943.86	896,716.79	213,413.82	393,434.13	2,063.98	9.7	22.0	8.9	16.1
			GAS SALES TO CONSUMERS (Therms)					AVERAGE ANNUAL SALES PER CUSTOMER (Therms)		
1928	15,572,052.96	12,981,210.24	685,153.92	1,905,688.80(1)			189.6	159.7	2,509.7	3,361.0(1)
29	17,340,739.68	13,795,270.88	1,044,670.56	2,499,798.24(1)			204.4	164.4	3,045.7	4,273.2(1)
30	17,296,032.00	13,896,627.36	1,142,600.16	2,256,804.48(1)			200.8	163.4	2,420.8	3,693.6(1)
31	16,625,660.84	13,427,899.14	1,192,269.94	1,990,500.86(1)		14,990.00	193.3	158.3	2,045.1	3,312.0(1)
32	17,372,048.78	13,391,726.11	1,560,277.08	1,145,477.35	1,264,415.91	10,152.33	211.8	165.5	2,737.3	2,512.0
33	20,741,570.65	12,056,163.73	2,983,385.34	1,231,716.89	4,449,135.37	21,169.32	255.4	155.0	1,018.6(5)	2,844.6
34	34,132,163.57	11,307,555.40	7,723,798.96	1,250,083.70	13,831,747.11	18,978.40	416.7	145.5	1,816.5(5)	2,976.4
35	42,066,536.10	11,301,951.77	10,859,214.28	1,256,149.43	18,634,194.82	15,025.80	503.7	144.2	2,363.8	2,754.7
36	44,136,252.58	11,495,324.11	11,752,294.28	1,332,641.79	19,512,812.00	43,180.40	517.3	142.7	2,728.0	3,497.7
37	38,338,683.05	11,945,346.48	11,142,653.11	1,334,146.47	13,888,272.19	27,762.80	437.0	144.6	2,404.0	3,060.0
38	43,218,110.00	12,293,810.00	10,123,585.00	1,321,916.00	19,458,244.00	20,555.00	485.9	147.2	2,059.3	3,038.9
			NUMBER OF CUSTOMERS					AVERAGE ANNUAL REVENUE PER CUSTOMER		
1928	82,136	81,296	273	567(1)		(4)	45.62	40.48	434.09	595.54(1)
29	84,825	83,897	343	585(1)			48.08	41.55	519.25	708.20(1)
30	86,154	85,071	472	611(1)			47.58	41.31	411.00	639.01(1)
31	86,013	84,929	583	601(1)			45.56	39.72	325.67	357.72(1)
32	82,022	80,934	570	456	62		45.32	39.72	335.44	441.35
33	81,216	77,797	2,929	433	57		43.02	36.89	100.93	459.47
34	81,905	77,166	4,252	420	67		46.36	34.43	158.47	474.62
35	83,510	78,386	4,594	456	74		49.36	33.53	204.54	441.74
36	85,325	80,575	4,308	381	61		49.55	32.60	232.33	556.63
37	87,736	82,591	4,635	436	74		47.46	32.45	205.73	490.14
38	88,941	83,512	4,916	435	78		47.32	32.37	182.41	490.61

Notes:- (1) Includes industrial also.
(2) This includes cooking and waterheating as well as spaceheating by those customers classified as spaceheating.
(3) Includes municipal only.
(4) No number of customers reported.
(5) Customers added during the year made these results low.

ial	(3) Miscellaneous	Total	Domestic	(2) Spaceheating	Commercial	Industrial
			AVERAGE ANNUAL REVENUE PER THERM (Cents)			
	$	24.1	25.4	17.3	17.7 (1)	
		23.5	25.3	17.0	16.6 (1)	
		23.7	25.3	17.0	17.3 (1)	
	2,840.67	23.6	25.1	15.9	17.89(1)	15.8
59.21	1,835.00	21.5	24.0	12.3	17.6	10.6
62.60	2,827.23	17.8	23.8	9.9	16.2	2.8
51.25	1,260.40	11.1	23.5	8.7	15.9	1.9
37.68	1,012.52	9.8	23.3	8.7	16.0	1.9
74.19	3,842.56	9.6	22.9	8.5	15.9	2.0
176.13	2,446.41	10.9	22.4	8.6	16.0	2.2
434.13	2,063.98	9.7	22.0	8.9	16.1	2.0
			AVERAGE ANNUAL SALES PER CUSTOMER (Therms)			
		189.6	159.7	2,509.7	3,361.0(1)	
		204.4	164.4	3,045.7	4,273.2(1)	
		200.8	163.4	2,420.8	3,693.6(1)	
	14,990.00	193.3	158.3	2,045.1	3,312.0(1)	
415.91	10,152.33	211.8	165.5	2,737.3	2,512.0	20,393.8
135.37	21,169.32	255.4	155.0	1,018.6(5)	2,844.6	78,055.0
747.11	18,978.40	416.7	145.5	1,816.5(5)	2,976.4	206,444.0
194.82	15,025.80	503.7	144.2	2,363.8	2,754.7	251,813.4
812.00	43,180.40	517.3	142.7	2,728.0	3,497.7	319,882.2
272.19	27,762.00	437.0	144.6	2,404.0	3,060.0	187,679.4
244.00	20,555.00	485.9	147.2	2,059.3	3,032.9	249,464.7
			AVERAGE ANNUAL REVENUE PER CUSTOMER			
	(4)	45.62	40.48	434.09	595.54(1)	
		48.08	41.55	519.25	708.20(1)	
		47.58	41.31	411.00	639.01(1)	
		45.56	39.72	325.67	357.72(1)	
62		45.32	39.72	335.44	441.35	1,752.57
57		43.02	36.09	100.93	459.47	2,222.15
67		46.36	34.48	158.47	474.62	3,960.47
74		49.36	33.53	204.54	441.74	4,750.51
61		49.55	32.60	232.33	556.63	6,293.02
74		47.46	32.45	206.73	490.14	4,191.60
78		47.32	32.37	182.41	490.61	5,044.03

aceheating by those customers classified as spaceheating.

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Exhibit No. 2

	Total	Domestic	Spaceheating(2)	Commercial	Industrial(4)	Miscellaneous(1)	Total	Domestic	Spaceheating(2)	Commercial	I
	REVENUES FROM SALES TO CUSTOMERS						**AVERAGE REVENUE PER THERM (CENTS)**				
1928	$ 6,447,296.59	$5,249,641.84	--	$ 546,458.47	522,516.34	128,679.94	19.14	21.23	--	18.25	
29	7,295,662.26	5,826,694.93	--	604,919.59	688,439.31	175,608.43	18.77	20.94	--	18.16	
30	7,400,787.91	5,991,513.92	--	639,600.79	620,954.01	148,719.19	18.98	20.97	--	18.36	
31	6,937,134.61	4,827,514.68	897,935.74	623,257.07	446,181.34	142,245.78	18.57	22.22	15.07	18.59	
32	6,577,692.95	4,698,818.57	833,680.59	592,405.86	331,779.42	121,008.51	17.21	21.57	11.69	17.41	
33	6,111,671.82	4,289,619.95	876,885.30	527,798.17	296,937.75	120,430.65	15.43	21.42	10.03	17.32	
34	6,424,406.19	3,966,589.12	1,460,161.63	506,442.52	360,593.02	130,619.90	13.03	21.29	8.54	17.07	
35	6,827,821.36	3,861,450.69	1,992,831.95	499,814.47	379,996.82	93,727.43	12.45	21.29	8.49	16.87	
36	7,208,547.81	3,877,500.98	2,255,419.67	532,296.44	458,629.54	84,701.18	11.86	21.34	8.36	16.83	
37	7,014,710.60	3,858,867.34	2,295,185.41	558,513.63	44,252.78	57,891.44	12.89	21.30	8.42	16.55	
38	6,735,894.10	3,755,503.17	2,146,336.67	575,711.35	15,254.58	43,088.33(5)	13.13	20.50	8.65	16.36	
	GAS SALES TO CONSUMERS (THERMS)						**ANNUAL SALES PER CUSTOMER (THERMS)**				
1928	33,686,038	24,724,862	--	2,994,028	4,239,746	1,727,402	298.4	230.6	--	548.5	37,
29	38,859,106	27,819,803	--	3,330,319	5,686,969	2,022,015	319.8	241.3	--	562.1	31,
30	38,998,167	28,572,918	--	3,482,925	5,022,960	1,919,364	314.4	237.4	--	536.7	25,
31	37,348,397	21,725,560	5,959,723	3,352,143	4,357,872	1,953,099	293.3	184.4	2,953.3	474.5	22,
32	38,220,627	21,779,576	7,129,614	3,403,429	3,792,712	2,115,296	305.1	188.0	3,447.6	495.1	20,
33	39,600,127	20,022,506	8,744,879	3,047,230	5,593,040	2,192,472	320.1	175.8	3,068.4	466.5	33,
34	49,314.967	18,628,057	17,101,001	2,966,603	7,987,290	2,632,016	386.7	163.0	2,642.3	467.5	44,
35	54,833,631	18,137,092	23,474,114	2,962,555	8,675,525	1,584,345	418.7	156.8	2,728.0	474.3	44,
36	60,763,053	18,173,730	26,990,310	3,162,046	11,052,477	1,384,490	445.8	151.2	2,945.3	493.5	54,
37	54,420,127	18,116,345	27,259,802	3,375,121	4,212,046	1,456,813	389.8	147.3	2,834.5	521.5	21,
38	51,315,321	18,317,115	24,799,464	3,519,830	3,313,839	1,365,073(5)	362.4	147.2	2,439.7	522.9	12,
	AVERAGE NUMBER OF CUSTOMERS						**ANNUAL REVENUE PER CUSTOMER (DOLLARS)**				
1928	112,909	107,206	--	5,459	114	130	57.10	48.97	--	100.10	4,
29	121,515	115,271	--	5,925	178	141	60.04	50.55	--	102.10	3,
30	127,227	120,358	—	6,489	198	182	58.17	49.78	--	98.57	3,
31	127,325	117,800	2,018	7,065	196	246	54.48	40.98	444.96	88.22	2,
32	125,254	115,866	2,068	6,874	184	262	52.51	40.55	403.13	86.18	1,
33	123,708	113,879	2,850	6,532	169	278	49.40	37.67	307.68	80.80	1,
34	127,541	114,265	6,472	6,346	179	279	50.37	34.71	225.61	79.80	2,
35	130,976	115,638	8,605	6,246	197	290	52.13	33.39	231.59	80.02	1,
36	136,294	120,210	9,164	6,407	204	309	52.89	32.26	246.12	83.08	2,
37	139,594	122,983	9,617	6,472	199	323	50.25	31.38	238.66	86.30	1,
38	141,602	124,434	10,165	6,732	265	6(5)	47.57	30.18	211.15	85.52	

Note:--(1) Includes municipal and other gas corporations.
(2) This includes cooking and waterheating as well as spaceheating used by those customers classified as spaceheating.
(3) This territory includes Evanston, Wilmette, Oak Park, Maywood, Berwyn, Blue Island, Etc.
(4) Does not include interruptible load.
(5) Starting with 1938 most of the municipal was reclassified as commercial.

rcial	Industrial(4)	Miscellaneous(1)	Total	Domestic	Spaceheating(2)	Commercial	Industrial	Miscellaneous(1)
$					AVERAGE REVENUE PER THERM (CENTS)			
8.47	522,516.34	128,679.94	19.14	21.23	--	18.25	12.32	7.45
19.59	688,439.31	175,608.43	18.77	20.94	--	18.16	12.11	8.68
0.79	620,954.01	148,719.19	18.98	20.97	--	18.36	12.36	7.75
7.07	446,181.34	142,245.78	18.57	22.22	15.07	18.59	10.24	7.28
5.86	331,779.42	121,008.51	17.21	21.57	11.69	17.41	8.75	5.72
8.17	296,937.75	120,430.65	15.43	21.42	10.03	17.32	5.31	5.49
2.52	360,593.02	130,619.90	13.03	21.29	8.54	17.07	4.51	4.96
4.47	379,996.82	93,727.43	12.45	21.29	8.49	16.87	4.38	5.92
6.44	458,629.54	84,701.18	11.86	21.34	8.36	16.83	4.15	6.12
3.63	44,252.78	57,891.44	12.89	21.30	8.42	16.55	5.80	3.97
1.35	15,254.58	43,088.33(5)	13.13	20.50	8.65	16.36	6.50	3.16(5)
					ANNUAL SALES PER CUSTOMER (THERMS)			
8	4,239,746	1,727,402	298.4	230.6	--	548.5	37,190.8	13,287.7
9	5,686,969	2,022,015	319.8	241.3	--	562.1	31,949.3	14,340.5
5	5,022,960	1,919,364	314.4	237.4	--	536.7	25,368.5	10,546.0
3	4,357,872	1,953,099	293.3	184.4	2,953.3	474.5	22,234.0	7,939.4
9	3,792,712	2,115,296	305.1	188.0	3,447.6	495.1	20,612.6	8,073.6
0	5,593,040	2,192,472	320.1	175.8	3,068.4	466.5	33,094.9	7,886.6
3	7,987,290	2,632,016	386.7	163.0	2,642.3	467.5	44,621.7	9,433.7
5	8,675,525	1,584,345	418.7	156.8	2,728.0	474.3	44,038.2	5,463.3
6	11,052,477	1,384,490	445.8	151.2	2,945.3	493.5	54,178.8	4,480.6
1	4,212,046	1,456,813	389.8	147.3	2,834.5	521.5	21,166.1	4,510.3
)	3,313,839	1,365,073(5)	362.4	147.2	2,439.7	522.9	12,505.1	227,512.2(5)
					ANNUAL REVENUE PER CUSTOMER (DOLLARS)			
)	114	130	57.10	48.97	--	100.10	4,583.48	989.85
5	178	141	60.04	50.55	--	102.10	3,867.64	1,245.45
)	198	182	58.17	49.78	--	98.57	3,136.13	817.14
5	196	246	54.48	40.98	444.96	88.22	2,276.44	578.23
4	184	262	52.51	40.55	403.13	86.18	1,803.15	461.86
2	169	278	49.40	37.67	307.68	80.80	1,757.03	433.20
3	179	279	50.37	34.71	225.61	79.80	2,014.49	468.17
3	197	290	52.13	33.39	231.59	80.02	1,928.92	323.20
7	204	309	52.89	32.26	246.12	83.08	2,248.18	274.11
2	199	323	50.25	31.38	238.66	86.30	1,227.40	179.23
2	265	6(5)	47.57	30.18	211.15	85.52	812.28	7,181.39(5)

rporations.
ing as well as spaceheating used by those customers classified as spaceheating.
ilmette, Oak Park, Maywood, Berwyn, Blue Island, Etc.

ipal was reclassified as commercial.

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	Total	Domestic	Spaceheating(2)	Commercial	Industrial	Miscellaneous(3)	Total	Domestic	Spaceheating(2)	Commercia
	REVENUE FROM SALES TO CUSTOMERS							AVERAGE ANNUAL REVENUE PER THERM (CENT		
1928	$ 497,700.18	$ 409,019.98	$ --	$ 74,243.53	$ 11,339.48	$ 3,097.19	23.5	24.1		21.7
29	540,102.60	424,930.94	--	69,047.43	43,187.66	2,936.57	21.7	24.0		20.0
30	544,528.02	428,698.59	--	65,018.99	47,786.13	3,024.31	21.1	23.9		19.1
31	531,761.03	419,634.96	1,967.02	66,009.02	40,554.44	3,595.59	20.5	23.6	14.7	18.9
32	503,112.10	402,380.81	4,370.57	58,821.33	33,825.29	3,714.10	19.2	21.9	12.4	17.7
33	489,437.73	363,484.52	11,839.67	54,895.61	55,862.01	3,355.92	13.8	21.8	9.5	17.4
34	725,096.33	346,528.90	32,756.58	52,186.01	290,096.46	3,528.38	4.2	21.6	8.9	17.0
35	943,418.20	352,744.32	44,344.18	54,002.19	488,699.08	3,628.43	3.1	21.6	8.6	16.9
36	1,177,510.02	354,997.45	55,269.70	57,640.00	705,880.63	3,722.24	2.6	21.6	8.5	16.7
37	2,009,339.78	366,753.51	52,974.31	61,178.31	1,524,797.14	3,636.51	2.4	21.2	8.6	16.5
38	1,791,646.08	377,929.94	47,932.44	64,622.35	1,301,161.35	--	2.6	21.0	9.0	16.4
	GAS SALES TO CONSUMERS(THERMS)							AVERAGE ANNUAL SALES PER CUSTOMER (TH		
1928	2,118,689	1,700,064	--	342,425	63,260	12,940	161.6	140.0		378.8
29	2,488,248	1,771,306	--	345,724	357,018	14,200	184.5	141.5		385.0
30	2,576,988	1,792,847	--	341,299	427,075	15,767	186.5	139.4		380.1
31	2,591,124	1,781,371	13,336	349,511	427,391	19,515	182.5	135.5	1,333.6	356.6
32	2,620,014	1,837,257	35,337	331,432	393,481	22,507	189.3	143.2	1,472.4	358.7
33	3,539,538	1,665,085	124,756	316,183	1,413,543	19,971	266.1	135.5	2,188.6	352.9
34	17,334,082	1,604,216	370,077	306,582	15,031,635	21,572	1,287.0	129.8	2,067.5	352.4
35	30,588,952	1,630,254	516,932	318,884	28,100,702	22,180	2,229.0	129.9	2,153.9	373.4
36	44,523,808	1,642,789	653,987	344,616	41,859,268	23,148	3,133.3	126.4	2,302.8	409.8
37	82,856,910	1,731,235	615,165	371,343	80,116,802	22,365	5,688.2	127.3	2,085.3	450.1
38	69,402,009	1,796,426	533,883	393,164	66,678,536	--	4,516.0	127.8	1,689.5	456.6
	AVERAGE NUMBER OF CUSTOMERS							AVERAGE ANNUAL REVENUE PER CUSTOMER (DO		
1928	13,110	12,142	--	904	34	30	37.96	33.69		82.13
29	13,484	12,521	--	898	35	30	40.06	33.94		76.89
30	13,817	12,859	--	898	29	31	39.41	33.34		72.40
31	14,199	13,148	10	980	26	35	37.45	31.92	196.70	67.36
32	13,840	12,831	24	924	24	37	36.35	31.36	182.11	63.66
33	13,303	12,289	57	896	24	37	36.79	29.58	207.71	61.27
34	13,469	12,355	179	870	26	39	53.83	28.05	183.00	59.98
35	13,723	12,551	240	854	35	43	68.75	28.10	184.77	63.23
36	14,210	12,999	284	841	42	44	82.86	27.31	194.61	68.54
37	14,827	13,602	295	825	60	45	135.52	26.96	179.57	74.16
38	15,368	14,061	316	861	130	--	116.58	26.88	151.68	75.05

Note:--(1) Includes Kankakee, Marseilles, Morris, Ottawa and Streator.
(2) Includes cooking and waterheating as well as spaceheating for those customers classified as spaceheating.
(3) Includes municipal and other corporations.

iscellaneous(3)	Total	Domestic	Spaceheating(2)	Commercial	Industrial
AVERAGE ANNUAL REVENUE PER THERM (CENTS)					
$ 3,097.19	23.5	24.1		21.7	17.9
2,936.57	21.7	24.0		20.0	12.1
3,024.31	21.1	23.9		19.1	11.2
3,595.59	20.5	23.6	14.7	18.9	11.5
3,714.10	19.2	21.9	12.4	17.7	8.6
3,355.92	13.8	21.8	9.5	17.4	4.0
3,528.38	4.2	21.6	8.9	17.0	1.9
3,628.43	3.1	21.6	8.6	16.9	1.7
3,722.24	2.6	21.6	8.5	16.7	1.7
3,636.51	2.4	21.2	8.6	16.5	1.9
--	2.6	21.0	9.0	16.4	2.0
AVERAGE ANNUAL SALES PER CUSTOMER (THERMS)					
12,940	161.6	140.0		378.8	1,860.6
14,200	184.5	141.5		385.0	10,200.5
15,767	186.5	139.4		380.1	14,726.7
19,515	182.5	135.5	1,333.6	356.6	16,438.1
22,507	189.3	143.2	1,472.4	358.7	16,395.0
19,971	266.1	135.5	2,188.6	352.9	58,897.6
21,572	1,287.0	129.8	2,067.5	352.4	578,139.6
22,180	2,229.0	129.9	2,153.9	373.4	802,877.2
23,148	3,133.3	126.4	2,302.8	409.8	996,649.2
22,365	5,688.2	127.3	2,085.3	450.1	1,335,280.0
--	4,516.0	127.8	1,689.5	456.6	512,911.8
AVERAGE ANNUAL REVENUE PER CUSTOMER (DOLLARS)					
30	37.96	33.69		82.13	333.51
30	40.06	33.94		76.89	1,233.93
31	39.41	33.34		72.40	1,647.80
35	37.45	31.92	196.70	67.36	1,559.79
37	36.35	31.36	182.11	63.66	1,409.39
37	36.79	29.58	207.71	61.27	2,327.58
39	53.83	28.05	183.00	59.98	11,157.56
43	68.75	28.10	184.77	63.23	13,962.83
44	82.86	27.31	194.61	68.54	16,806.68
45	135.52	26.96	179.57	74.16	25,413.29
--	116.58	26.88	151.68	75.05	10,008.93

or those customers classified as spaceheating.

2807

Federal Power Commission. Docket No.
Exhibit No. 203 (For Identification)
Federal Power Commission
Docket No. G-109 & G-112
Hearing Exhibit No. 203

Federal Power Commission
Dockets Nos. G-109 & G-112
Exhibit No. 203

Residential Electric Service in U. S.

Year	Number of Customers December 31	Average Annual Use K Whr.	Average Annual Bill
1929	19,569,606	499	$31.44
1930	19,880,329	543	32.58
1931	19,658,018	578	33.18
1932	19,140,287	597	33.25
1933	19,300,834	595	32.67
1934	19,866,008	624	33.07
1935	20,446,436	672	33.53
1936	20,987,440	727	33.81
1937	21,697,515	793	34.81
1938	22,110,403	845	35.57

Source—Edison Electric Institute Statistical Bulletin No. 6—Year 1938.

2808

Federal Power Commission. Docket No.
Exhibit No. 204 (For Identification)
Federal Power Commission.
Docket No. G-109 & G-112
Hearing Exhibit No. 204

Commonwealth Edison Company (a)

	Domestic Service					
				Per Customer		
Year	Customers at Dec. 31	Total Consumption K.W.H.	Total Revenue $.	Consumption K.W.H.	Revenue	Rate per K.W.H. ¢
1929	—	483,642,404	$22,853,279	—	—	5.60
1930	805,099	537,311,231	24,754,719	468	25.50	5.45
1931	789,733	560,578,841	25,418,493	519	27.40	5.28
1932	759,670	550,021,066	24,853,317	490	27.00	5.51
1933	779,500	538,833,350	24,281,921	437	24.80	5.67
1934	801,601	573,411,021	25,693,749	715	32.05	4.48
1935	807,556	604,209,282	26,807,051	748	33.20	4.44
1936	823,468	623,240,752	26,940,584	757	32.72	4.32
1937	836,810	688,372,487	27,009,763	823	32.28	3.92
1938	836,282	721,313,345	27,948,125	863	33.42	3.87

(a) Consolidated in 1938 (only) to include Commonwealth Subsidiary Corporation; also 1938 reflects operations for entire year of Super-Power Company of Illinois, a subsidiary liquidated at December 31, 1938.

2809

Federal Power Commission. Docket No.
Exhibit No. 205 (For Identification)

Federal Power Commission
Dockets Nos. G-109 & G-112
Exhibit No. 205
Federal Power Commission
Docket No. G-109 & G-112
Hearing Exhibit No. 205

All Mortgage Bonds of Domestic Electric and Gas Utility Companies Traded on New York Curb September 15, 1939

	Coupon Rate and Maturity	Price Sept. 15 1939	Approx. Yield to Maturity
Alabama Power Co.	5s, 1946	105	4.11%
" " "	5s, 1951	102-3/4	4.70
" " "	5s, 1968	101-1/2	4.90
" " "	4-1/2s, 1967	98-1/4	4.61
Appalachian Electric Power Co.	4s, 1963	105	3.69
Arkansas Louisiana Gas Co.	4s, 1951	101	3.89
Arkansas Power & Light Co.	5s, 1956	102-3/4	4.76
Atlanta Gas Light Co.	4-1/2s, 1955	100	4.50
Birmingham Electric Co.	4-1/2s, 1968	91-1/2	5.05
Birmingham Gas Co.	5s, 1959	89-1/4	5.93
Carolina Power & Light Co.	5s, 1956	104	4.66
Central States Pr. & Lt. Corp.	5-1/2s, 1953	69	9.57
Consol. Gas E L & Pr. Co. of Balt.	3-1/4s, 1971	102-1/2	3.12
Edison Elec. Ill. Co. Boston	3-1/2s, 1965	105-1/2	3.19
Empire District El. Co.	5s, 1952	102	4.79
Erie Lighting Co.	5s, 1967	107-1/2	4.52
Florida Pr. & Lt. Co.	5s, 1954	99	5.10
Georgia Power Co.	5s, 1967	103-3/4	4.76
Georgia Pr. & Lt. Co.	5s, 1978	67-1/4	7.65
Houston Lt. & Pr. Co.	3-1/2s, 1966	104-1/8	3.27
Idaho Power Co.	3-3/4s, 1967	103-1/2	3.55
Illinois Pr. & Lt. Corp.	5s, 1956	96-1/4	5.34
" " " "	5-1/2s, 1954	98-5/8	5.63
" " " "	6s, 1953	101	5.88
Indiana Hydro Elec. Pr. Co.	5s, 1958	94-3/4	5.42
Indiana Service Corp.	5s, 1950	64-1/8	10.42
" "	5s, 1963	64-1/2	8.49
Indianapolis Pr. & Lt. Co.	3-3/4s, 1968	102	3.64
Interstate Power Co.	5s, 1957	64-3/4	8.99
Interstate Public Service Co.	5s, 1956	94-1/2	5.50
" " " "	4-1/2s, 1958	92	5.17
Jersey Central Pr. & Lt. Co.	4-1/2s, 1961	104	4.21
" " " " "	5s, 1947	103-1/4	4.51
Kentucky Utilities Co.	6-1/2s, 1948	105	5.77
" " "	5s, 1969	95-3/4	5.29
" " "	5s, 1961	96	5.31
Louisiana Pr. & Lt. Co.	5s, 1957	105	4.59
Milwaukee Gas Light Co.	4-1/2s, 1967	99-1/2	4.53
Minnesota Pr. & Lt. Co.	4-1/2s, 1978	99-1/4	4.51
" " " "	5s, 1955	103-1/2	4.69
Mississippi Pr. & Lt. Co.	5s, 1957	97-3/8	5.23
Mississippi Power Co.	5s, 1955	93	5.67
Missouri Public Service Co.	5s, 1960	87-1/2	6.05

Page 2

	Coupon Rate and Maturity	Price Sept. 15 1939	Approx. Yield to Maturity
Nassau & Suffolk Lighting Co	5s, 1945	94-3/8	6.13%
Nevada-California Elec. Corp	5s, 1956	75-3/4	7.57
New York Pr. & Lt. Corp	4-1/2s, 1967	104-3/8	4.23
New York State El. & Gas Corp	4-1/2s, 1980	100	4.50
Northern Indiana P. S. Co	5s, 1969	104-1/2	4.72
" " " " "	5s, 1966	105-1/2	4.63
Northwestern Electric Co	6s, 1945	105-1/4	4.97
Ohio Power Co	3-1/4s, 1968	99-1/2	3.26
Ohio Public Service Co	4s, 1962	102-7/8	3.81
Oklahoma Power & Water Co	5s, 1948	100	5.00
Pacific Pr. & Lt. Co	5s, 1955	88-7/8	6.10
Penn. Cent. Lt. & Pr. Co	4-1/2s, 1977	96	4.73
Pennsylvania Electric Co	4s, 1971	97-1/2	4.13
" " "	5s, 1962	104-1/8	4.70
Peoples Gas Light & Coke Co	4s, 1981	94	4.31
" " " " "	4s, 1961	95-1/2	4.32
Phila. Electric Power Co	5-1/2s, 1972	112	4.77
Portland Gas & Coke Co. (1)	5s, 1940	72-1/2	....
Potomac Edison Co	5s, 1956	107	4.41
Puget Sound Pr. & Lt. Co	5-1/2s, 1949	90-3/4	6.79
" " " " "	5s, 1950	88-1/2	6.48
" " " " "	4-1/2s, 1950	84-1/2	6.49
Queens Borough Gas & El. Co	5-1/2s, 1952	88	6.91
Southern Carolina Pr. Co	5s, 1957	92-1/2	5.67
Southern Calif. Edison Co	3-3/4s, 1960	104-1/4	3.47
" " " " "B"	3-3/4s, 1960	104-3/4	3.43
Southern Counties Gas Co	4-1/2s, 1968	104-7/8	4.21
Southwestern Lt. & Pr. Co	5s, 1957	102-1/2	4.79
Texas Electric Service Co	5s, 1960	98-1/2	5.12
Texas Pr. & Lt. Co	5s, 1956	105-3/4	4.51
Tide Water Power Co	5s, 1979	94-3/4	5.31
Utah Pr. & Lt. Co	4-1/2s, 1944	93	6.13
Virginia Public Service Co	5-1/2s, 1946	96-1/2	6.13
" " " "	5s, 1950	92-1/4	5.97
Wisconsin Pr. & Lt. Co	4s, 1966	100-1/4	3.99
		Average yield	5.15%

(1). Excluded from averages.

2811

Federal Power Commission. Docket No.
Exhibit No. 206 (For Identification)

Federal Power Commission
Dockets Nos. G-109 & G-112
Exhibit No. 206

Federal Power Commission
Docket No. G-109 & G-112
Hearing Ex. No. 206

All Preferred Stocks of Domestic Electric and Gas Operating Utilities Paying Full Dividends Listed* N. Y. Curb (September 15, 1939, Prices
***Incl. unlisted trading privileges.**

Company	Dividend Rate	Price 9/15/39	Approx. Yield**
Alabama Pr. Co.	$7	97	7.2%
" " "	$6	86	7.0
Appalachian Elec. Pr. Co	$7	108-109-3/4	6.4
Carolina P. & L. Co.	$6	86-88	6.3
" " " "	$7	96-1/2- 98-1/2	7.1
Central Main Power Co.	7%	101-1/2-103-1/2	6.8
Central N. Y. Power Corp	5%	87-1/4	5.7
Central P. & L. Co.	7%	102-1/2	6.8
Con. Gas El. L. & Pr. Co. (Balt.)	4-1/2%	113-1/2	4.0
Georgia Power Co.	$6	94-96	6.3
" " "	$5	82-90	5.6
Gulf States Util. Co.	$6	107-1/8	5.6
" " " "	$5-1/2	106	5.2
Indianapolis P. & L. Co	6-1/2%	103-106	6.1
Jersey Central P. & L. Co	7%	100-1/2-103	6.8
" " " " "	6%	90-92	6.5
" " " " "	5-1/2%	84-87-1/2	6.3
Kansas G. & E. Co.	7%	111-1/2-116	6.0
Louisiana P. & L. Co.	$6	98	6.1
Metropolitan Edison Co	$6	98-101-1/2	5.9
Minnesota P. & L. Co	$7	85-93	7.5
Mississippi River Pr. Co	6%	108-114	5.3
Nebraska Power Co	7%	110-1/4-115	6.1
New York P & L. Corp.	7%	108-1/4-110	6.4
" " " " "	6%	102-1/2-105	5.7
Northern Indiana P. S. Co.	7%	95-1/4-101	6.9
" " " " "	6%	85-89	6.7
Ohio Edison Co	$6	101-1/2	5.9
Ohio Power Co	6%	111	5.4
Ohio Pub. Ser. Co.	7%	105-108-5/8	6.5
" " " "	6%	96-1/4-99	6.1
Pacific G. & E. Co.	6% (1)	30	5.0
" " " "	5-1/2% (1)	26-3/4	5.1
Pacific P. & L. Co	7%	80-82	8.5
Pennsylvania Edison Co	$2.8	36-40	7.0
" " "	$5	62-1/2-63	7.9
Pennsylvania P. & L. Co	$7	107-1/2	6.5
" " " "	$6	105-106	5.7
Philadelphia Electric Co	$5	163-7/8	4.3
Public Service Co. of Colorado	6%	104-1/2	5.7
" " " " " "	7%	110-1/4-114	6.1
Public Service Co. of Oklahoma Prior Lien	7%	104-108	6.5
Public Service Co. Okla. Prior Lien	6%	94-1/2-98	6.1
Rochester G. & E. Corp	6% Series "C"	99-102	5.9
" " " "	6% Series "D"	99-101	5.9

Exhibit No. 206.

Page 2

Company	Dividend Rate	Price 9/15/39	Approx. Yield **
Sioux City G. & E. Co.	7%	91–95	7.4%
Southern Cal. Edison Co. (par $25)	6% Series "B"	27–5/8–28	5.4
" " " " " "	5-1/2% " "C"	26	5.3
Texas Pr. & Lt. Co	7%	102–106	6.6
Toledo Edison Co.	7%	106–3/8–108	6.5
" " "	6%	100–101	5.9
West Texas Util. Co.	6%	89–1/2	6.7

** Yield computed on offering price where no sale was made (if none offered, bid price is used).

(1) Par $25.

GROSS OPERATING REVENUE AND TOTAL NET AVAILABLE FOR FIXED CHARGES AFTER DEPRECIATION
OF THE
GAS DEPARTMENTS OF THE THREE UTILITIES DISTRIBUTING GAS IN THE CHICAGO AREA

Exhibit 207

		Peoples Gas Light & Coke Company				Public Service Company of Northern Illinois (1)				Wester
		Gross Oper. Revenue		Net Available For Fixed Charges		Gross Oper. Revenue		Net Available For Fixed Charges		Gross
		Total	% of 1929-1931 Avg.	Total	% of 1929-31 Avg.	Total	% of 1929-31 Avg.	Total	% of 1929-31 Avg.	Total
1929		$37,874,360.94	104.1	$ 9,323,887.20	98.2	$7,894,442.38	101.5	$1,847,348.97	93.4	$
30		36,221,839.82	101.2	9,624,521.85	101.4	7,963,138.97	102.4	2,047,450.42	103.5	
31		33,896,144.94	94.7	9,554,171.32	100.4	7,469,373.54	96.1	2,038,724.86	103.1	
32		33,471,455.08	93.5	7,210,425.09	75.9	7,074,694.41	91.0	1,565,241.93	79.1	4,027,755
33		30,298,121.62	84.6	4,991,445.14	52.6	6,632,876.72	85.3	1,742,054.23	88.1	3,748,414
34		32,771,690.75	91.5	3,683,713.86	38.8	7,197,034.15	92.6	1,185,951.53	60.0	4,035,067
35		34,409,963.44	96.1	3,937,072.58	41.5	7,833,694.30	100.7	1,370,362.61	69.3	4,356,844
36		36,668,847.25	102.4	3,899,322.20	41.1	8,439,377.92	108.5	973,297.55	49.2	4,455,085
37		36,761,189.58	102.7	4,246,144.01	44.7	9,131,935.10	117.4	1,488,490.47	75.3	4,399,252
38	(a)	37,976,206.82	106.1	6,010,614.17	63.3	9,061,442.75	116.5	1,294,595.72	65.5	4,442,023
	(b)	35,308,835.82	98.6	3,870,313.17	40.8					

Notes:-

(1) Includes natural and mixed gas territories.
(2) Includes both northern and southern divisions.
(3) The Coal Products Manufacturing Company, a subsidiary supplying coalgas, was merged with Western United Gas and Electric Company on October 31, 1931. This means that comparative data on earnings can only be obtained from 1932 to date.
(a) Reflects the results of the rate increase.
(b) After deducting $2,667,371 from Gross Operating Revenue and $2,140,301 from Net Available for Fixed Charges as reported by the company to be the result of the rate increase.

Source of Data:-

Annual reports made by the companies to the Illinois Commerce Commission.

Exhibit 207

s Service Company of Northern Illinois (1)				Western United Gas & Electric Company (2) (3)			
Opor. Revenue		Net Available For Fixed Charges		Gross Oper. Revenue		Net Available For Fixed Charges	
al	% of 1929-31 Avg.	Total	% of 1939-31 Avg.	Total	% of 1932	Total	% of 1932
,442.32	101.5	$1,847,348.97	93.4	$		$	
,138.97	102.4	2,047,450.42	103.5				
,373.54	96.1	2,038,724.86	103.1				
,694.41	91.0	1,565,241.95	79.1	4,027,755.53	100.0	1,442,916.66	100.0
,876.72	85.3	1,742,054.23	88.1	3,748,414.15	93.1	1,251,714.09	86.7
,034.15	92.6	1,185,951.53	60.0	4,035,067.33	100.2	1,314,143.91	91.1
,694.30	100.7	1,370,362.81	69.3	4,356,844.14	108.2	1,214,254.92	84.2
,377.92	108.5	973,297.55	49.2	4,455,085.77	110.6	1,048,336.56	72.7
,935.10	117.4	1,488,490.47	75.3	4,399,262.55	109.2	1,047,678.93	72.6
,442.75	116.5	1,294,595.72	65.5	4,442,023.44	110.3	1,033,498.27	71.6

y supplying coalgas, was merged with
er 31, 1931. This means that comparative data on

ue and $2,140,301 from Net Available for Fixed
sult of the rate increase.

ommerce Commission.

Federal Power Commission. Docket No.
Exhibit No. 208 (For Identification)
2814
Federal Power Commission
Docket No. G-109 & G-112
Hearing Exhibit No. 208

Gas, Electric and Telephone Utility Companies Serving The City of Chicago. Total Net Available for Fixed Charges after Depreciation.

	Peoples Gas Light and Coke Company		Commonwealth Edison Company		Illinois Bell Telephone Company	
Year	Net (1)	% of 1929–31 Average	Net (1)	% of 1929–31 Average	Net (1)	% of 1929–31 Average
1929	$ 9,821,861	94.9	$25,494,813	98.7	$18,543,228	102.0
1930	10,238,445	99.0	26,567,248	102.9	18,587,069	102.3
1931	10,976,726	106.1	25,397,934	98.4	17,383,325	95.7
1932	8,800,364	85.1	19,783,645	76.6	14,517,103	79.9
1933	6,316,995	61.1	18,426,931	71.4	13,419,084	73.8
1934	4,904,054	47.4	19,889,846	77.0	13,880,200	76.4
1935	4,962,780	48.0	19,993,700	77.4	13,618,427	74.9
1936	5,817,062	56.2	20,153,281	78.1	14,693,555	80.9
1937	5,766,347	55.7	23,952,001	92.8	15,160,007	83.4
1938(a)	7,429,902	71.8	27,704,079	107.3	12,878,812	70.9
(b)	5,289,601	51.1				

Note:—(1) Net available for fixed charges after depreciation.
(a) Reflects the results of the rate increase.
(b) After deducting $2,140,301 reported by the company to be the result of rate increase.

Source of data:—Moody's Public Utilities Manual, 1934–1937–1939 editions.

BONDS, DEBENTURES AND NOTES OF NATURAL GAS COMPANIES HOLDINGS BY PUBLIC

Exhibit 209

Company	Issue	Total Outstanding	Interest	Earnings Available (1)	Times Earned	Fixed Capital i.e. Plant Account	% of Funded Debt to Fixed Capital	(7) Market 9/30/39	AP Ti Ma
Houston Gulf Gas Company	1st & Collateral 6%, 4/1/43	$4,238,000	$ 254,280	$ 770,145(5)	3.03	$ 18,236,807	23.24	$103.63	3-1
" " " "	Conv. Debs. 6-1/2%, 4/1/43	1,850,000	120,250		2.06		33.38	101.75	3-1
	All fixed charges		594,664		1.30		43.60		
Lone Star Gas Company	Mortgage Note		No earnings statement available						
Oklahoma Natural Gas Company	1st Mtg. B 3-3/4%, 8/1/58 (2)	17,000,000	637,500	2,891,810(2)	4.54	43,793,739(3)	38.80	102.50	16 Y
	All fixed charges		889,218		3.25		57.15		
Panhandle Eastern Pipe Line Co.	1st Mtg. A. 4%, 3/1/52	23,01x,000	935,258	5,164,715(4)	5.52	58,710,630	39.4	104.19	12-1
	All fixed charges		1,280,185		4.03		39.4		
Southern Natural Gas Co.	1st Mtg.S.F. 4-1/2%, 10/1/51	12,918,000	(607,050	(2,577,929(4)	4.24	30,282,281	(44.4	104.00	12 Y
" " " "	1st Mtg.S.F. 4-1/2%, 1952	572,000	(	(			(		
" " " "	Adjustment Mtg. 6%, 1/1/60	5,771,584	346,291		2.70		63.6	96.50	20-1
	All fixed charges		1,337,510		1.92				
Sub-Total		65,341,584		11,404,597		151,023,457			
	On 1st Mtg. issues		2,434,088		4.68				
	All fixed charges		4,101,575		2.78				
Southern California Gas Co.	1st Mtg. & Ref. 4%, 8/1/65	15,000,000	600,000	(7,682,578(4)	(6.60	129,654,410	(21.2	106.75	26 Y
" " " "	1st Mtg. & Ref. 4-1/2%, 3/1/61	12,500,000	562,500	(	(		(	107.13	20-1
	All fixed charges		1,400,482		5.48		21.2		
Southern Counties Gas Co.	1st Mtg. 4-1/2%, 5/1/68	11,500,000	517,500	2,082,587(4)	4.02	30,749,976	37.4	104.75	28-1
	All fixed charges		557,817		3.73		37.4		
Sub-Total		39,000,000		9,765,165		160,404,386			
	On 1st Mtg. issues		1,680,000		5.81				
	All fixed charges		1,958,299		4.98				
Total		104,341,584		21,169,762		311,427,843			
	On 1st Mtg. issues		4,114,088		5.10				
	All fixed charges		6,059,874		3.48				

(1) Latest earnings published prior to September 30, 1939.
(2) These bonds were issued in August, 1939. Earnings are based on Proforma earnings statement for 12 months ended August 31, 1939.
(3) Does not include Franchises carried at $13,357,475.
(4) Twelve months ended June 30, 1939.
(5) Twelve months ended December 31, 1938.
(6) Approximate yields to maturity in Sub-Total and Total lines has been weighted by using the outstanding amounts shown.
(7) Last sale price on 9/30/39 or if no sale on that day, the mean of the bid and ask prices on that day.

Exhibit 209

arnings ailable (1)	Times Earned	Fixed Capital i.e. Plant Account	% of Funded Debt to Fixed Capital	(7) Market 9/30/39	Approx. Time to Maturity	Approx. Yield to Maturity %
770,143(5)	3.03	$ 18,238,807	23.24	$103.63	3-1/2 Yrs.	4.85
	2.06		33.38	101.75	3-1/2 Yrs.	5.94
	1.30		43.80			
ings statement available						
2,891,210(2)	4.55	43,793,738(5)	38.20	102.50	16 Yrs.	3.55
	3.25		57.15			
5,164,715(4)	5.52	58,710,830	30.4	104.19	12-1/2 Yrs.	3.58
	4.05		30.4			
2,577,229(4)	4.24	50,282,281	(44.4	104.00	12 Yrs.	4.08
			(			
	2.70		63.6	96.50	20-1/4 Yrs.	6.31
	1.92					
1,404,597		171,025,656				4.03 (6)
	4.63					
	2.78					
7,682,578(4)	(6.60	129,654,610	(21.2	106.75	25 Yrs.	3.60
	(		(	107.13	20-1/2 Yrs.	3.99
	5.49		21.2			
2,082,567(4)	4.02	50,749,976	37.4	104.75	23-1/2 Yrs.	4.21
	3.73		37.4			
9,765,145		180,404,586				3.99 (6)
	5.21					
	4.96					
1,169,742		351,430,242				4.00 (6)
	5.10					
	3.48					

ment for 12 months ended August 31, 1939.

the outstanding amounts shown.
es on that day.

PREFERRED STOCKS OF NATURAL GAS COMPANIES
HOLDINGS BY PUBLIC

Exhibit 209

Company	Issue	Total Outstanding	Dividend Requirements	Earnings Available for Dividends(1)	Times Dividend Requirements Earned	Times Fixed Charges and Dividend Requirements Earned	Market 9/30/39(2)	Approximate Yield
El Paso Natural Gas Company	7% Cum. Pfd. Par $100	$ 1,479,700	$ 103,579	$ 2,365,841(3)	22.8	5.74	108(4)	6.48
Houston Gulf Gas Company	7% Cum. Pfd. Series A Par $100	806,300	56,441	(175,084(5)	(1.09	1.68	(6)	—
" " " "	7% Cum. Pfd. Series B Par $100	1,500,000	105,000	(	(			
Oklahoma Natural Gas Company	$5.50 Conv.Prior Pfd. Par $100	5,800,000	319,000	2,002,593(7)	6.28	2.39	105.25	5.23
" " " "	$3.00 Second Pfd. Par $50	4,552,500	273,150	1,683,593	6.15	1.96	42.88	7.00
		10,352,500	592,150	2,002,593	3.37	1.95		
Sub-Total		14,138,500	857,170	4,543,518	5.30	2.36		6.06
Southern California Gas Co.	6% Cum.Pfd. Par $25	3,998,900	239,934	(6,282,096	4.44	2.73	30.50	4.92
" " " "	6% Cum.Pfd. Series A Par $25.	19,575,800	1,174,548	(			30.50	4.92
		23,574,700	1,414,482	6,282,096	4.44	2.73		4.92
Total		37,713,200	2,271,652	10,825,614	4.76	2.54		5.35

Approximate yield figures on Sub-Total and Total lines have been weighted by the principal amounts outstanding.

(1) Latest earnings published prior to 9/30/39.
(2) Last sale on 9/30/39, or if no sale on that date the mean of the bid and ask prices.
(3) Twelve months ended July 31, 1939.
(4) Bid price - none offered.
(5) Twelve months ended December 31, 1938.
(6) All of these preferred stocks except $12,100 par amount are owned by the parent company and hence no quoted market prices are available.
(7) Proforma earnings and dividend requirements - Twelve months ended August 31, 1939.

2818

3899

COMMON STOCKS OF NATURAL GAS COMPANIES HOLDINGS BY PUBLIC

Company	Total Outstanding Shares	Total Outstanding Amount	Par Value	Latest Earnings Per Share(1)	Per Share Dividends Paid	Market Quotation 9/30/39 (2)	Percent Earnings to Latest Quotations
El Paso Natural Gas Company	600,342	$1,801,026	$ 3.00	$3.77 (3)	$2.00	$38.75	9.75
Houston Gulf Gas Company	517,008	5,170,080	No par	.05 (4)		(5)	—
Interstate Natural Gas Company	952,953	6,529,530	No par	2.13 (4)	1.75	24.50	8.70
Manufacturers Light & Heat Co.	450,608	22,530.400	50.00			(5)	—
Memphis Natural Gas Company	918,680	4,593,400	5.00	.55 (4)	.45	4.69	11.71
Mountain Fuel Supply Company	1,989.902	19,899,026	10.00	.38 (4)	.25	4.81	7.90
Oklahoma Natural Gas Company	549,986	8,249,790	15.00	2.56 (6) ✓	.75 (7)	15.50	16.50
Southern Natural Gas Company	691,970	5,189,775	7.50	1.79 (8)	.50 (9)	13.75	13.00
Sub-Total		73,963,027					10.45 (10)
Indian Territory Illuminating Oil Co.				(4)			
Class "A"	1,304,800	1,304,800	1.00	(03)	—	1.75	—
Class "B"	7,090,037	7,090,037	1.00	(03)	—	1.69	—
South Penn Oil Company	1,000,000	25,000,000	25.00	1.44 (4)	1.75	39.00	3.69
Sub-Total		33,394,837					3.69
Total		$107,357,864					~~10.34~~ 9.10 (10)

( ) Denotes deficit.

(1) Latest earnings published prior to 9/30/39.
(2) Last sale price on 9/30/39; or if no sale on that date, the mean of the bid and ask prices.
(3) Twelve months ended July 31, 1939.
(4) Twelve months ended December 31, 1938.
(5) Parent company owns all but very few shares - no market prices available.
(6) Proforma earnings - Twelve months ended August 31, 1939.
(7) Paid $0.25 quarterly Jan 1 to Sept. 30, 1939.
(8) Twelve months ended June 30, 1939.
(9) Initial dividend of $0.50 per share paid on new stock June 30, 1939.
(10) Weighted average based on total market value of shares and only on stocks with earnings.

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2819 (Revision of Pg. 1, Exhibit 141)

Federal Power Commission. Docket No.
Exhibit No. 210 (For Identification)

Natural Gas Pipeline Company of America and Texoma Natural Gas Company
(Combined)

Earnings Statement Based on Book Cost as of January 1, 1939.

Line Number		As of Jan. 1, 1939	Total 1938–1954	Average 1939–1954
	Revenue			
1	From Domestic Sales	$ —	$164,835,603	$ 10,302,225
2	From Industrial Sales	—	46,190,085	2,886,880
3	From Texoma Field Sales	—	256,591	16,037
4	Total Gas Sales	—	$211,282,279	$ 13,205,142
5	From Gasoline Sales	—	8,974,017	560,876
6	From Other Operating Income	—	193,531	12,096
7	Total Revenue	—	$220,449,827	$ 13,778,114
	Operation and Maintenance			
8	Operation Expenses	—	$ 80,994,386	$ 5,062,149
9	Company Used Gas (deduct)	—	6,272,871	392,054
10	Maintenance Expense	—	13,785,303	861,581
11	Maintenance Contingencies (10%)	—	1,378,533	86,158
12	Net Operation and Maintenance	—	$ 89,885,351	$ 5,617,834
13	Revenue Remaining for Replacements, Amortization and Return	—	$130,564,476	$ 8,160,280
	Reserve for Replacements			
14	Capital Expenditure for Replacements	—	$ 3,105,244	$ 194,078
15	Cost of Retiring Capital Replaced	—	109,449	6,841
16	Salvage Value of Retirements (deduct)	—	541,253	33,828
17	Replacement Contingencies (10%)	—	267,346	16,709
18	Total of Reserve for Replacements	—	$ 2,940,786	$ 183,800
19	Capital Expenditures per Books, excluding Gas Reserves	$ 49,830,479		
20	Viewed Depreciation (deduct)	2,485,079		
21	Cost of Gas Reserves less Depletion to January 1, 1939	12,402,884		
22	Cost of Additional Property	—	$ 9,338,983	—
23	Going Concern Value	8,500,000	—	—
24	Working Capital	975,000	—	—
25	Total	$ 69,223,284	$ 78,562,267	—
26	Total Rate Base	—	—	$ 75,305,459
27	Liquidating Salvage Value of			
28	(a) Capital Expenditure	—	$ 457,452	
29	(b) Warehouse Stocks	—	24,314	—
30	(c) Working Capital Cash	—	567,366	—
31	Total Liquidating Salvage Value	—	$ 1,049,132	—
32	Total to be Amortized	—	$ 77,513,135	—
33	Amortization Allowance	—	66,152,816	$ 4,134,551
	(Sinking fund, 2% interest compounded semi-annually)			
34	Revenue Remaining for Return	—	61,470,874	$ 3,841,929
35	Rate of Return			5.10%

Federal Power Commission
Docket No. G-109 & G-112
Hearing Exhibit No. 210

2820 Revision of p. 1 of Ex. 142

Federal Power Commission. Docket No.
Exhibit No. 211 (For Identification)

Federal Power Commission
Docket No. G-109 & G-112
Hearing Ex. No. 211

Natural Gas Pipeline Company of America and Texoma Natural Gas Company

(Combined)

Earnings Statement Based on Reproduction Cost New Less Existing Depreciation as of June 1, 1939

Line Number		As of June 1, 1939	Total 6-1-39 to 12-31-54 Inclusive	Average Yearly 6-1-39 to 12-31-54 Inclusive
	Revenue			
1	From Domestic Sales	$	$160,370,063	$ 10,291,127
2	From Industrial Sales		44,811,352	2,875,595
3	From Texoma Field Sales		247,567	15,887
4	Total Gas Sales		$205,428,982	$13,182,609
5	From Gasoline Sales		8,698,468	558,190
6	From Other Operating Income		190,161	12,203
7	Total Revenue		$214,317,611	$13,753,002
	Operation and Maintenance			
8	Operation Expense		$ 79,054,616	$ 5,073,023
9	Company Used Gas (deduct)		6,107,808	391,945
10	Maintenance Expense		13,536,004	868,620
11	Maintenance Contingencies (10%)		1,353,603	86,862
12	Net Operation and Maintenance		$ 87,836,415	$ 5,636,560
13	Revenue Remaining for Replacement, Amortization and Return		$126,481,196	$ 8,116,442
	Reserve for Replacements			
14	Capital Expenditure for Replacements		$ 3,086,671	$ 198,075
15	Cost of Retiring Capital Replaced		109,063	6,999
16	Salvage Value of Retirement (deduct)		531,642	34,116
17	Replacement Contingencies (10%)		266,411	17,096
18	Total of Reserve for Replacements		$ 2,980,503	$ 188,054
19	Reproduction Cost New Excluding Gas Reserves	$ 56,302,250	$ —	$ —
20	Viewed Depreciation (deduct)	2,866,758	—	—
21	Value of Gas Reserves	13,334,775	—	—
22	Cost of Additional Property	—	$ 9,145,083	—
23	Going Concern Value	8,500,000	—	—
24	Working Capital	975,000	—	—
25	Total	$ 76,245,267	$ 85,390,350	—
26	Total Rate Base	—	—	$ 82,291,553
27	Liquidating Salvage Value of			
28	(a) Capital Expenditure	—	$ 457,452	—
29	(b) Warehouse Stocks	—	24,314	—
30	(c) Working Capital Cash	—	567,363	—
31	Total Liquidating Salv. Value	$ —	$ 1,049,132	—
32	Total to be Amortized	$	$ 84,341,218	$ —
33	Amortization Allowance (Sinking fund, 2% interest compounded semi-annually)	—	$ 72,304,635	$ 4,639,909
34	Revenue Remaining for Return	—	$ 51,246,058	$ 3,288,119
35	Rate of Return			4.00%

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VOLUME VIII.

TRANSCRIPT OF RECORD

SUPREME COURT OF THE UNITED STATES

October Term, 1941

No. 265

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, PETITIONERS

vs.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY

No. 268

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, PETITIONERS

vs.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT

Petitions for certiorari filed July 12, 1941, July 14, 1941

Certiorari granted October 13, 1941

IN THE

United States Circuit Court of Appeals
For the Seventh Circuit

No. 7454

NATURAL GAS PIPELINE COMPANY OF AMERICA
AND TEXOMA NATURAL GAS COMPANY,
Petitioners,

vs.

FEDERAL POWER COMMISSION AND ILLINOIS
COMMERCE COMMISSION,
Respondents.

Petition for Review of Interim Order of the Federal
Power Commission.

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2821 UNITED STATES OF AMERICA. Filed Nov. 7, 1939.

FEDERAL POWER COMMISSION.

Illinois Commerce Commission,
Complainant,
vs.
Natural Gas Pipeline Company of America,
and
Texoma Natural Gas Company,
Defendants.
Docket No. G-109.

In the Matter of
Natural Gas Pipeline Company of America,
and
Texoma Natural Gas Company.
Docket No. G-112.

MOTION FOR AN IMMEDIATE ORDER REDUCING RATES.

Come now, John E. Cassidy, Attorney General of the State of Illinois, by Harry R. Booth, Assistant Attorney General, for and on behalf of the complainant, Illinois Commerce Commission, and George Slaff, of Counsel for the Federal Power Commission, with whom is D. A. Myse, in the above entitled cause, who respectfully represent as follows:

1. That on September 23, 1938 a petition was filed by the Illinois Commerce Commission praying that a citation be issued directing the defendants herein to show cause why the rates charged for natural gas in the State of Illinois should not be reduced and further that an order be entered setting fair, just and reasonable rates for such natural gas.

2. That on October 14, 1938 this Honorable Commission on its own motion ordered an investigation to enable the Commission to determine whether the rates and charges of the defendants are unjust or unreasonable and if so to fix by appropriate order or orders just and reasonable rates or charges.

3. That on November 16, 1938 the defendants filed their

answer to the petition denying that their rates or charges were unreasonable or unjust and also contesting the jurisdiction and power of this Commission to enter any order or orders such as to affect the rates or charges of the defendants.

2822 4. That on April 14, 1939 this Commission entered an order consolidating the two cases, G-109 and G-112, for the purpose of hearing, and fixing May 8, 1939, as the date of the first hearing.

5. That hearings were begun on May 8, 1939 at Chicago and have since continued for approximately 55 days during which a total of approximately 8000 pages of testimony has been taken, 37 witnesses have appeared for the defendants, who introduced 135 exhibits, and 6 witnesses, and approximately 45 exhibits have been introduced for the two Commissions.

6. That for the purpose of this proceeding, Natural Gas Pipeline Company of America and Texoma Natural Gas Company consider themselves, and are here treated, as a single enterprise and will hereafter collectively be referred to as "the Companies."

7. That from a consideration of all the evidence it appear:

I. Earnings 1932—1938.

a. That the evidence on behalf of the Companies shows total actual income available for return and for amortization of investment, after payment of operating expenses and taxes during the entire past period (seven years) of operation, to date of January 1, 1939, in the amount of at least $53,405,092 ("Revenue Remaining for Amortization and Return," Exhibit 140, p. 1, line 14); that during the same period a total of $19,558,810 was charged to operations for amortization of investment, consisting of $11,620,210 (Ex. 136) on account of depreciation, $1,457,278 on account of depletion, and in addition, $6,481,322 for retirements beyond what was charged against the depreciation and depletion reserves; and that deducting the total charges of $19,558,810 from the $53,405,092 of income leaves $33,846,282 for return on investment during the period or an average of $4,835,183 per annum, after all charges for depreciation, depletion and retirements. That, at the end of 1938 the Companies' depreciation and depletion reserve was $12,557,892 (Exhibit 137).

b. That the cost of the plant, including gas leaseholds, at the beginning and end of each of the seven years, as claimed by the Companies, is as follows (Ex. 137):

2823

	Beginning	End
1932	$ 61,113,958	$ 61,804,730
1933	61,804,730	59,632,173
1934	59,632,173	59,533,555
1935	59,533,555	60,029,067
1936	60,029,067	59,529,749
1937	59,529,749	59,436,823
1938	59,436,823	59,197,843
	$421,080,055	$419,163,940

7-Year Average	$60,017,428
Working Capital (Ex. 140)	975,000
	$60,992,428

c. That said average plant cost, together with working capital, amounted to approximately $61,000,000 for the 7-year period, which sum is subject to reduction on account of depreciation and depletion for which purpose the Companies have built up reserves and for which they themselves make deductions from the plant cost figures for the amount of depreciation and depletion that they admit has occurred (Ex. 141); that the $4,835,183 average annual return for the 7 years amounts to substantially 8 per cent per annum on $61,000,000, without any deductions from the latter amount; and that for the last year, 1938, the net earnings from operations ($9,884,745, Ex. 136), after depreciation charges of $1,978,408, depletion charges of $261,658, and retirements of $992,567, amounted to $6,652,112, or approximately 11 per cent on the plant cost, plus working capital, without deducting any part of the depreciation and depletion reserves of $12,557,892.

d. That the total net profit available to the stockholders after payment of bond interest and amortization of bond discount and expense was at least $8,244,436 (Ex. 136) for the 7 years, amounting to an average of $1,177,777 per annum, or an annual average return of 39.3 per cent on the $3,000,000 capital stock of the Natural Gas Pipeline Company of America.

e. That the bonds represent practically the entire investment, claimed by the Companies, aside from the depreciation and depletion reserves, as is shown by the following table:

Dec. 31	Bonds (1) (Ex. 137, p. 1)	Reserves (2) (Ex. 137, p. 1)	Total (1) & (2) (3)	Plant (Undepreciated) (4) (Ex. 137, p. 1)
1931	$59,999,000	—	$59,999,000	$61,113,958
1932	59,999,000	$ 1,582,988	61,581,988	61,804,730
1933	60,999,000	3,139,028	64,138,028	59,632,173
1934	58,999,000	4,800,408	63,799,408	59,533,555
1935	56,499,000	6,507,066	63,006,066	60,029,067
1936	52,599,000	8,233,048	60,832,048	59,529,749
1937	50,300,000	10,458,256	60,758,256	59,436,823
1938	46,500,000	12,557,892	59,057,892	59,197,843

2824 f. That from the above table it appears that on December 31, 1933 the total bonds outstanding stood at $60,999,000, or more than the total in the plant account; and that thereafter bonds have been retired, while depreciation and depletion reserves have been accumulated, so that the bondholders, who are also the stockholders, have been paid back a very substantial proportion of their capital out of depreciation and depletion funds.

g. That if the gross investment claimed by the two companies, without deductions for retirements or for accrued depreciation and depletion, be taken as a base for the purpose of entering an immediate order, operations should be charged with annual amortization on a sinking-fund basis.

h. That the minimum sinking-fund interest rate should be 6 per cent; that the interest rate on the Companies' bonds is 6 per cent; that the Companies are actually retiring their bonds; and that a portion of the amortization funds could properly be invested in additions to the property and credited with the rate of return which is to be earned on the property.

i. That the computation of the amortization annuity should be at least on the basis of semi-annual compounding of interest, as the bond interest is paid semi-annually and as semi-annual compounding is in accordance with the testimony of the Companies' witness Delafield (R. 5166).

j. That in accordance with the Companies' own estimate of the life of their property the minimum period for amortizing the investment is 23 years; that the annual amount required to amortize one dollar at the end of 23 years at 6 per cent interest compounded semi-annually is $0.020725.

k. That the gross investment, without deduction of any retirements, claimed by the Companies to have been theretofore made, and including working capital, stood at $67,173,761 at the end of 1938 (Ex. 140, p. 1, line 19); that $1,392,176 per annum ($67,173,761 x 0.020725) would amortize this amount over the 23-year life of the enterprise, disregarding salvage; and that the Companies' esti-
2825 mate of the total capital expenditures for the entire 23-year period, less salvage, which amounts to $78,284,009 (Ex. 140) could be amortized by an annual allowance of $1,622,436 ($78,284,009 x 0.020725) which amount, set aside annually for 23 years at 6 per cent interest compounded semi-annually, will accumulate the total of $78,284,009.

m. That taking this amount, $1,622,436, in lieu of the charges made by the Companies in the first 7 years for depreciation, depletion and retirements, the result is as follows:

Investment at 1/1/32 (Ex. 137)	$ 61,113,958
Plus working capital	975,000
	$ 62,088,958
Gross investment to 12/31/38 including working capital (Ex. 140)	67,173,761
	$129,262,719
Average Investment	$ 64,631,360
Average revenue remaining for amortization and return (Ex. 138, p. 1)	$ 7,629,299
Amortization	1,622,436
Amount available for return	$ 6,006,863
Per cent on average investment	9.3%

II. Estimated Earnings for 1939-1941 Inclusive.

a. That the amount of $1,622,436 is more than ample annual amortization provision for the 16 years following January 1, 1939, as compared with the 7 years prior to that date, because the Companies have actually provided for more amortization in the past 7 years than would have resulted from the above charge; that the sinking fund that would result from an annual charge of $1,622,436 for 7 years is $13,860,471, whereas the Companies have actually charged $19,558,810 against operations for depreciation, depletion and retirements, and still have made more than ample return as heretofore shown; and that the Companies in the past 7 years have retired $14,499,000 of their 6 per cent bonds, which amount is substantially greater than the sinking fund of $13,860,471 which would have resulted from the investment of $1,622,436 in the Companies' bonds for 7 years; and that in addition to retiring the above amount of bonds the Companies paid a total of $9,150,000 in dividends (Ex. 136) on $3,000,000 of capital stock.

2826 b. That based upon the annual amortization figure of $1,622,436, and using the Companies' estimates of earnings available for amortization and return, the income available for return in the years 1939 to 1941 inclusive, will be at least:

	1939	1940	1941
Total capital expenditure & working capital at beginning of year (Ex. 140)	$ 67,173,761	$ 68,091,587	$ 69,414,046
End of year (Ex. 140)	68,091,587	69,414,046	70,708,776
	135,265,348	137,505,633	140,122,822
Average	67,632,674	68,752,817	70,061,411
Revenue available for amortization & return (Ex. 140)	$ 9,790,310	$ 9,564,228	$ 9,400,483
Amortization	1,622,436	1,622,436	1,622,436
Income available for return	$ 8,167,874	$ 7,941,792	$ 7,778,047
Per cent on average gross investment (above)	12.1%	11.5%	11.1%
6% on average gross investment	$ 4,057,960	$ 4,125,169	$ 4,203,685
Excess over 6%	$ 4,109,914	$ 3,816,623	$ 3,574,362
Excess over 6½%	$ 3,771,750	$ 3,472,859	$ 3,224,055

c. That based upon the highest charges made by the Companies in any one year for depreciation ($2,034,754 in 1937, Ex. 136) and for depletion ($320,527, in 1937), and also charging against operations the entire amount of retirements, less salvage, estimated by the Companies for 1939 ($209,484, less salvage of $50,832, or $158,652, Ex. 117)—although a large but unknown part of the retirements would actually be charged against the depreciation reserve—the income for 1939 would be as follows:

Estimated revenue remaining for amortization and return (Ex. 140, p. 2, line 14)		$9,790,310
Less: Depreciation	$2,034,754	
Depletion	320,527	
Retirements	158,652	2,513,933
Income available for return		$7,276,377

d. That the cost of property as shown by the Companies' exhibits remaining at January 1, 1939, to wit, $59,197,843, plus working capital of $975,000, gives a total of
282 $60,172,843; that the charges made by the Companies in the past for depreciation and depletion, less retirements that have been charged to the reserve, have resulted in reserves of $12,557,892 at the same date; that a maximum investment rate base would be the difference between these amounts, or $47,614,951, which is approximately one million dollars more than the outstanding bonds; that this difference will diminish as the reserve accumulations grow; and that on the total of $60,172,843, without any deductions for depreciation or depletion, the net earnings for 1939, to wit, $7,276,377, as set forth in paragraph "C," just preceding, will be not less than 12.1 per cent, and that such earnings will produce a return of $3,666,006 more than 6 per cent or $3,365,142 over 6½ per cent on said total of $60,172,843.

e. That although the Companies estimated as recently as September 8, 1939 (Exs. 136, 140) that the net earnings for 1939 would be less than the net earnings for 1938, the books of the Companies disclose a substantial gain in both gross revenues and net earnings for the first 8 months of 1939 compared with the corresponding period in 1938, as is indicated by the following table:

	8 Months Ended Aug. 31, 1939	8 Months Ended Aug. 31, 1938	Increase or Decrease*
Gross Earnings from operations	$10,460,897.18	$9,457,471.97	$1,003,425.21
Operating Expenses	3,233,293.23	3,032,386.72	200,906.51
Net Earnings from Operation	$ 7,227,603.95	$6,425,085.25	$ 802,518.70
Non-Operating Income	677.76	12,877.82	12,200.06*
Net Earnings of Company	$ 7,228,281.71	$6,437,963.07	$ 790,318.64
Less: Other Charges			
Interest Expense	$ 1,819,056.36	$1,956,759.25	$ 137,702.89*
Amortization of Bond Discount and Expense	170,167.32	170,167.32	—
Depreciation	1,358,804.20	1,208,667.22	150,136.98
Depletion	189,549.89	165,598.40	23,951.49
Retirement Expense	205,920.14	680,971.50	475,051.36*
Total Other Charges	$ 3,743,497.91	$4,182,163.69	$ 438,665.78*
Net Earnings Available for Dividends	$ 3,484,783.80	$2,255,799.38	$1,228,984.42
Dividends	1,500,000.00	1,687,000.00	187,000.00*
Balance	$ 1,984,783.80	$ 568,799.38	$1,415,984.42

(*) Negative Amounts.

f. That included in the Companies' figures of property
cost at January 1, 1939 is the amount of $9,367,364 for cost
of gas leaseholds at that date, which amount is subject
2828 to deductions for depletion; that the Companies' wit-
ness, R. J. Wallace, testified to a present value of
the leaseholds, in their depleted condition, of $13,334,775
(Ex. 131, revised by Ex. 146); that if this figure be sub-
stituted for the investment figure of $9,367,364, and if only
the depreciation of $2,485,079 which defendants deduct
from the original cost of property, other than leaseholds
(Ex. 141), is deducted from the cost of such other property,
a total of $61,655,175 is obtained; and that the net earnings
of $7,276,377 for 1939 are 11.8 per cent of $61,655,175, or
$3,577,066 in excess of 6 per cent, or $3,268,791 in excess of
6½ per cent.

III. Return Based upon the Companies' Reproduction Cost Estimate.

a. That on the basis of their reproduction cost estimate the Companies will earn not less than $3,211,661 above a 6 per cent return for 1939, using the Companies' own charges for depreciation and depletion, charging also to operations the entire amount of retirements, less salvage, estimated by the companies for the current year 1939, and deducting from reproduction cost new only the "viewed" depreciation as testified to by Company witness, Biddison, amounting to $2,866,758 (Exs. 125, 142) as compared to the depreciation reserve of $11,405,038 (Ex. 137):

Reproduction Cost New, excluding Gas Reserves (Ex. 142)	$56,302,250
Less Viewed Depreciation	2,866,758
	$53,435,492
Gas Reserves (Ex. 146)	13,334,775
Working Capital (Ex. 125)	975,000
Reproduction Rate Base	$67,745,267

Income for Depreciation, Depletion and Return, 1939 (Estimated) (Ex. 140)			$ 9,790,310
Less: Depreciation		$2,034,754	
Depletion		320,527	
Retirements, total for 1939 (Ex. 117)	$209,484		
Less Salvage	50,832	158,652	2,513,933
			$ 7,276,377
Per Cent on Rate Base			10.7%
6 Per Cent on Rate Base			$ 4,064,716
Excess over 6 per cent			$ 3,211,661
Excess over 6½ per cent			$ 2,872,935

2829 b. That 6 per cent on the above rate base would cover the entire bond interest of $2,790,000 on the bonds outstanding at January 1, 1939 (which will be further reduced) and the annual amortization of bond discount and expense of $255,251 (Ex. 136) and still leave $1,019,465 for the stockholders or 34 per cent on the $3,000,000 stock of Natural Gas Pipeline Company.

c. That the net earnings available for return, with the annual amortization allowance of $1,622,436 sufficient to amortize the Companies' estimate of total investment of $78,284,009 over the life of the project, will show the following results, using an undepreciated reproduction cost rate base:

Reproduction cost new (excluding gas reserves)	$56,302,250
Gas reserves	13,334,775
Working capital	975,000
Rate base	$70,612,025
Income for depreciation, depletion and return	$ 9,790,310
Less amortization	1,622,436
	$ 8,167,874
Per cent on rate base	11.6%
6 per cent on rate base	$ 4,236,722
Excess over 6 per cent	$ 3,931,152
Excess over 6½ per cent	$ 3,578,092

d. That no separate allowance should be made for going value.

IV. Rate of Return.

a. That a fair rate of return for these Companies is not more than 6 to 6½ per cent.

V. Relationship of Gross Reduction to Reduction in Net Earnings.

a. That a reduction in gross revenue of $3,000,000, or any other amount, would not cause a similar reduction in net earnings since the net taxable income would be reduced, thus reducing Federal income taxes; that based upon the Federal income tax rate of 18 per cent under the Revenue Act of 1939 the tax saving due to a reduction of $3,000,000 in gross revenue without change in expenses would be $540,000, so that the net earnings would be reduced by only the difference, or $2,460,000.

2830 8. That Sections 4(a) and 5(a) of the Natural Gas Act provide as follows:

Section 4(a)—

"All rates and charges made, demanded, or received by any natural-gas company for or in connection with the transportation or sale of natural gas subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges, shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful."

Section 5(a)—

"Whenever the Commission, after a hearing * * * shall find that any rate * * * or * * * any * * * contract affecting such rate * * * is unjust, unreasonable, unduly discriminatory, or preferential, the Commission shall determine the just and reasonable rate, charge, classification, rule, regulation, practice, or contract to be thereafter observed and in force, and shall fix the same by order. * * *"

9. That the evidence before the Commission now clearly establishes that the present rates charged and collected by the Natural Gas Pipeline Company of America are unjust and unreasonable.

10. That the Companies have had a full and complete hearing; that counsel for the Companies stated on October 6th that their case on direct had been completed (R. 5974).

11. That cross examination of Companies' witnesses, the introduction of complainant's evidence and evidence on behalf of the Federal Power Commission, the taking of Companies' rebuttal evidence and cross examination thereon will consume much additional time so that the closing of this case will be delayed for a long time in the future.

12. That to aid the complainant materially in fixing fair and reasonable rates for gas sold to ultimate consumers in the State of Illinois it is necessary that an immediate interim order be entered reducing the rates and charges of Natural Gas Pipeline Company of America.

13. That nothing herein contained is to be taken as an admission of the accuracy or propriety of any of the claims made by the Companies or their witnesses.

2831 Wherefore, your petitioners pray that the Commission enter an immediate interim order fixing just and reasonable rates for gas sold by Natural Gas Pipeline Company of America.

John E. Cassidy,
Attorney General, State of Illinois,
Attorney for Illinois Commerce Commission, Complainant.

Harry R. Booth,
Assistant Attorney General,
of Counsel.

George Slaff,
Of Counsel for Federal Power Commission.

D. A. Myse,
Attorney.

Filed Dec. 18, 1939.

2832 December 18, 1939.

UNITED STATES OF AMERICA.

FEDERAL POWER COMMISSION.

* * (Caption—G-109 and G-112) * *

DEFENDANTS' PLEAS TO THE JURISDICTION OF THE COMMISSION IN REPLY TO MOTION FOR AN INTERIM ORDER REDUCING RATES.

Now come the defendants-respondents, hereinafter styled defendants, in response to the "Motion for an Immediate Order Reducing Rates" filed herein by John E. Cassidy, Attorney General of the State of Illinois, and Harry R. Booth, Assistant Attorney General, on behalf of the Illinois Commerce Commission, the latter hereinafter called complainant, and by George Slaff, of counsel for the Federal Power Commission, and D. A. Myse, attorney for the Federal Power Commission, the latter hereinafter styled the Commission, and present their several pleas to the jurisdiction of the Commission to grant said motion or to enter an interim order reducing the prices and charges of defendants for natural gas.

I.

2833 Defendants renew the plea to the jurisdiction of this Commission contained in Paragraphs 6 and 7 of their original answer to the complaint filed with the Commission by complainant, Docket G-109, and say that the Commission has no power or authority to enter any order attempting to change, modify or set aside any charge or price at which Natural Gas Pipeline Company of America is selling gas to Chicago District Pipeline Company or to other utilities in the State of Illinois or elsewhere, or to substitute and prescribe any different charges or prices for such commodity, or in any way to deprive defendants of their privileges under contracts entered into by defendants with those purchasing natural gas from them at wholesale prior to the enactment of the Natural Gas Act.

Defendants again show that they in legal effect and in fact constitute a single enterprise engaged in the business of owning natural gas leases or reserves in the State of Texas, developing such reserves, producing gas therefrom, and transporting their own gas through their own pipeline facilities to points in the States of Kansas, Nebraska, Iowa and Illinois, and selling such commodity at wholesale to selected distributors and industrial consumers under private contracts; that under the terms of said contracts, defendants, prior to the enactment of the Natural Gas Act, by agreement fixed the prices and charges at which their gas has been and is being sold at wholesale; that under the terms of said contracts, defendants, prior to the enactment of the Natural Gas Act, dedicated their
2834 reserves, their pipelines, and their facilities to the performance of their obligation to sell and deliver gas to the respective parties to such contracts; that the enterprise or business of defendants is of a strictly private character, not affected with a public interest in the sense that Congress would have jurisdiction or authority to enact legislation purporting to authorize the Commission to regulate the charges or prices for which their natural gas is sold; and the Natural Gas Act, in so far as it purports to confer on the Commission any jurisdiction, power or authority to regulate or change such prices, and any rules, regulations and orders of the Commission attempting to exercise any such purported jurisdiction, are null and void as against these defendants, because the inevita-

ble operation and effect thereof would be to deprive defendants of their property and liberty of contract without due process of law, in violation of the Fifth Amendment to the Constitution of the United States.

II.

The Commission has no jurisdiction under the Natural Gas Act to reduce the rates or prices at which defendants are selling natural gas, by interim order or otherwise, pending the final termination of the proceedings and hearings now being conducted and held by the Commission, through its Examiner, and not then unless and until, after the conclusion of the hearing and after defendants have had an opportunity to be heard in their briefs and argument on the facts presented by the record and the law applicable thereto, the Commission shall find that the rates and prices charged and collected by the de-
2835 fendants are unjust, unreasonable, unduly discriminatory or preferential.

In this connection defendants show that they and the other parties to said proceeding are in the midst of the hearing now being conducted and held in the consolidated proceedings under the above titles and docket numbers; that the hearing now in progress began on May 8, 1939, and has continued since that date, numerous sessions having been held in the city of Washington and in the city of Chicago. On October 6, 1939, defendants announced that they had completed their direct testimony; but defendants now have the right, which they propose to exercise, to examine their witnesses who have heretofore testified, after they shall have been examined by counsel for complainant and the Commission, for the purpose of developing such additional facts on redirect as may appear necessary and proper in the premises, to cross-examine the witnesses who shall be called to testify against defendants by complainant and by counsel for the Commission, to offer such explanation and clarification as they deem proper of any facts or circumstances which may be presented to the Examiner by complainant and counsel for the Commission in the course of the hearing as a result of the investigation now in progress, and to offer substantial original testimony in rebuttal.

Counsel for complainant and the Commission have both stated in open hearing that they have additional cross-

examination of defendants' witnesses and that they propose to offer testimony on the issues involved in this proceeding. Representatives of complainant and the
2836 Commission are now examining defendants' records and properties in an effort to develop additional testimony to support the contention of complainant and counsel for the Commission herein. The transcript of the oral testimony heretofore received in evidence now embraces approximately 10,000 pages, and more than 200 exhibits, some of which contain several hundred pages of data and material, have already been offered in evidence. Among the exhibits are numerous maps and charts which can only be understood after a careful analysis of the testimony of the witnesses in connection with whose testimony the exhibits were introduced.

Numerous issues of fact are presented by the record and on these issues there is sharp difference of opinion and contention between defendants on the one hand and complaint and counsel for the Commission on the other hand. Numerous important and serious questions of law are raised by the record. These issues of fact and of law cannot be resolved and determined by the Commission until after the hearing has been finally terminated and until defendants have had an opportunity by brief and argument to present their contentions on the issues both of law and of fact first to the Examiner and then, if necessary, to the Commission as a whole. The prices and charges of defendants for natural gas which complainant and counsel for the Commission seek to reduce by interim order were fixed by contracts negotiated and entered into by
2837 defendants and their several purchasers long prior to the enactment of the Natural Gas Act. The contracts under which such prices and charges were fixed have been filed with the Commission in pursuance of the Natural Gas Act, whereupon they became and now are legal and lawful rates, the reasonableness of which was established prima facie upon the filing of such contracts with the Commission.

Under the facts above stated the Commission is without jurisdiction to reduce the charges and prices fixed by defendants' contracts until, after hearing, it shall find from the evidence and record as a whole that such rates and charges are unjust, unreasonable, unduly discriminatory or preferential. Under the established law defendants are entitled not only to introduce their own direct testimony but to cross-examine the witnesses who appear against

them, to explain and clarify any facts or circumstances which complainant and counsel for the Commission seek to use against defendants, to interrogate their witnesses on redirect examination for the purpose of developing and elaborating upon the testimony of such witnesses on direct and cross examination, and to rebut by original testimony the testimony which may be offered through witnesses called by complainant or counsel for the Commission. Under the terms of the Natural Gas Act the Commission is without authority and jurisdiction at this stage of the proceeding to enter a finding or undertake to enter a finding that the existing charges and prices for which defendants sell their natural gas are unjust, unreasonable, unduly discriminatory or preferential, and it will have no juris-
2838 diction to make such a finding until defendants have
been heard by brief and oral argument on the entire record heretofore developed and to be developed on all of the issues bearing on the question of whether their prices and charges are unjust, unreasonable, unduly discriminatory or preferential.

In the proceedings to determine whether or not defendants' charges and prices are unjust, unreasonable, unduly discriminatory or preferential, the Commission is performing quasi judicial functions, and these functions must have been fully discharged upon the full record, and only in the event that the Commission shall then find that the charges and prices of defendants are unjust, unreasonable, unduly discriminatory or preferential would the Commission have jurisdiction and power under the Natural Gas Act to enter any order reducing the rates and charges fixed by the contracts under which defendants sell their natural gas.

III.

The Natural Gas Act confers upon the Commission no power or jurisdiction to enter an interim order pending the final termination of the hearing and an opportunity by defendants to be heard, by brief and by oral argument, on the law and the facts presented by the whole record, and in the absence of such statutory authority an interim order reducing defendants' rates and charges would be null and void for want of jurisdiction.

IV.

The Commission is without authority to entertain the motion for an interim order for the reason that there
2839 is a fatal defect of parties having authority to present and prosecute such motion. Complainant is a State board or commission created by statute enacted by the legislature of the State of Illinois, with its authority and powers limited to those expressly conferred under the terms of the statute. There is no law or statute of the State of Illinois conferring upon complainant any power or authority to appear as a litigant before the Federal Power Commission or any other Federal board or commission except the Interstate Commerce Commission. Messrs. George Slaff, of counsel for the Commission, and D. A. Myse, attorney for the Commission, appear in this record as counsel and attorney, respectively, for the Commission. Any act that they perform, therefore, is necessarily performed on behalf of the Commission, and this Commission, through its counsel or otherwise, cannot appear as a litigant or movant before itself sitting in its quasi judicial and quasi legislative capacity. Such a proceeding would constitute the Commission both the litigant and the judge, and such a proceeding would deny defendants due process of law, in violation of the due process clause of the Fourteenth Amendment to the Constitution of the United States, and any order entered in pursuance of such a proceeding would be null and void.

Wherefore, defendants pray that upon hearing their several pleas to the jurisdiction of the Commission be sustained and that the motion for an immediate order reducing rates be dismissed or denied.

2840
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Filed Dec. 18, 1939. 2841 December 18, 1939.

UNITED STATES OF AMERICA.

FEDERAL POWER COMMISSION.

* * (Caption—G-109 and G-112) * *

CONDITIONAL ANSWER OF DEFENDANTS TO THE MOTION FOR IMMEDIATE ORDER REDUCING RATES FILED BY COMPLAINANT AND COUNSEL FOR THE COMMISSION.

Without waiving their several pleas to the jurisdiction of the Commission to enter an interim order or any order reducing defendants' prices and charges for natural gas, but still insisting on each of said pleas, and subject only to a final order and judgment overruling each of said pleas to the jurisdiction, the defendants-respondents, hereinafter styled defendants, come now and file their answer and reply to the "Motion for an Immediate Order Reducing Rates" filed herein by John E. Cassidy, Attorney General of the State of Illinois, and Harry R. Booth, Assistant Attorney General, on behalf of Illinois Commerce Commission, the latter hereinafter called complainant, and by George 2842 Slaff, of counsel for the Federal Power Commission, and D. A. Myse, attorney for the Federal Power Commission, the latter hereinafter styled the Commission.

I.

The entry by the Commission of an interim order reducing defendants' rates and charges, as suggested in said motion, prior to the final conclusion of the hearing now pending and without a full consideration by the Commission of the complete record developed and to be developed at said hearing, including the exhibits heretofore offered in evidence and to be hereafter offered in evidence, would manifestly operate to violate the rights of defendants to a full hearing on the primary issue in this proceeding, namely, the question of whether or not the existing prices and charges of defendants for natural gas are unjust, unreasonable, unduly discriminatory or preferential, and to deprive defendants of due process of law.

The record of the hearing now in progress contains approximately 10,000 pages of oral testimony and more than 200 exhibits, consisting of maps, charts and tabulations, some of which contain several hundred pages and all of which must be read carefully in connection with the testimony of the witnesses through whom such exhibits were introduced. Only a few of the numerous witnesses who have testified for the defendants have been cross-examined, and complainant and counsel for the Commission have called to the witness stand only five or six witnesses whom defendants have had an opportunity to cross-examine.

Complainant and counsel for the Commission have 2843 both announced that they propose to cross-examine defendants' other witnesses and to themselves offer witnesses and exhibits against the contentions of the defendants in this cause. Defendants have a right to examine their own witnesses further on redirect after they are cross-examined by complainant and counsel for the Commission, to cross-examine the witnesses subsequently to be produced by complainant and counsel for the Commission, and to offer testimony in rebuttal of the testimony of the witnesses who testify against them. It is the purpose of defendants to exercise their right and to cross-examine the witnesses who will be called to testify against them, to re-examine their own witnesses after they have been cross-examined by complainant and counsel for the Commission, and to offer substantial rebuttal testimony. They have the right, which they expect to exercise, to offer such explanation and clarification as may be necessary to explain any facts or circumstances which may be developed as a result of the investigations now pending by representatives of complainant and the Commission into the records and affairs of defendants.

The evidence in these proceedings has been heard, and doubtless will be heard hereafter, by an Examiner designated by the Commission. There has been no closing of the evidence and no report of the Examiner with proper and reasonable opportunity to the defendants to lodge exceptions to the Examiner's report should they desire to do so. The members of the Commission have not read, and would find it utterly impracticable to read and undertake to digest, the voluminous testimony and exhibits 2844 which have been offered in this cause.

Defendants' prices and charges are based upon contracts executed prior to the enactment of the Natural

Gas Act, and no order affecting such prices and charges entered prior to a consideration in due order of proceedings of the entire record heretofore developed and to be hereafter developed would be authorized or valid, whether same be a final or an interim order.

II.

The proponents of the motion wholly disregard the various elements which must be considered by the Commission in forming a judgment with respect to the primary question of whether or not defendants' prices and charges are unjust, unreasonable, unduly discriminatory or preferential, and the entry of an order at this time, prior to a full and complete hearing on the record as it now stands and on the record as it shall hereafter be developed through the cross-examination of defendants' witnesses and through other witnesses to be offered by defendants and by complainant and counsel for the Commission, would be a violation of the rights of defendants under the process clause of the Fourteenth Amendment to the Constitution of the United States.

The proponents apparently assume that the Commission has authority to determine whether or not the prices and charges of defendants for natural gas are unjust, unreasonable, unduly discriminatory or preferential by merely showing that a reduction in the existing prices and charges would not result in confiscation of defendants' property.
2845 Defendants deny and challenge the contention of the proponents of the motion that any reduction in their prices and charges would not result in confiscation. However, the Commission is required to determine from all the evidence adduced at the hearing and to be hereafter adduced whether or not defendants' prices and charges are unjust, unreasonable, unduly discriminatory or preferential, and before it can enter any order changing such prices and charges there must first be a finding from all the evidence that the prices charged under defendants' contracts are, under all the circumstances, unjust, unreasonable, unduly discriminatory or preferential. The return to the defendants on the fair value of their property is only one element to be considered by the Commission in first determining whether or not such prices are unjust, unreasonable, unduly discriminatory or preferential. A

finding that such prices are unjust, unreasonable, unduly discriminatory or preferential must be made by the Commission after a full hearing to final conclusion on all the issues of fact and of law, and any interim order reducing defendants' prices and charges prior to such a finding would manifestly deprive defendants of due process of law, in violation of the Fourteenth Amendment.

III.

Defendants deny the conclusions contained in the fact allegations set out in the motion. They say that in making such allegations the proponents of the motion have
2846 wholly misconstrued defendants' evidence and contentions. They have improperly combined certain features of defendants' exhibits addressed to different angles of the case. They have wholly disregarded the existing law as to what constitutes the rate base upon which the rate of return regulated concerns are entitled to earn shall be calculated, and have wholly disregarded the testimony of numerous witnesses who have testified for defendants on the various facts and elements which the Commission must consider in arriving at a proper rate base and a proper rate of return. They have assumed a right in the Commission to enter an order, in the midst of a hearing the primary object of which is to determine whether or not defendants' prices and charges are unjust, unreasonable, unduly discriminatory or preferential, arbitrarily and prematurely reducing the prices and charges of defendants for natural gas.

IV.

The record as already made affirmatively presents sharp conflicts between defendants on the one hand and complainant and counsel for the Commission on the other hand as to numerous issues of fact and of law which the Commission can determine only after full hearing and after consideration of the entire record. Some, but not all, of these issues are those going to historical cost of defendants' properties, book cost of defendants' properties, book value of defendants' properties, reproduction cost new less viewed depreciation, fair value, depreciation, the allowance for amortization, the risks inherent in the business 2847 in which defendants are engaged, the peculiar risks confronting the particular enterprise of defendants, a fair rate of return and all of the elements and factors which must be considered in connection with arriving at a fair rate of return, the prices at which defendants' gas is sold for the various uses to which it is put, and the value of defendants' gas at the places which the same is marketed as compared with the prices charged by others selling natural gas at wholesale under similar circumstances. All of these issues present also serious and important questions of law which the Commission must weigh and consider before it can arrive at any finding or conclusions as to the primary issue, which it, in its quasi judicial capacity, must determine before it would have any authority to reduce the prices and charges of defendants for natural gas.

Defendants are entitled to a full and complete hearing on all of these questions, including the right to be heard on all the issues of fact and of law by brief and oral argument before the Examiner, to a report accompanied by recommendations by the Examiner to the Commission thereon, to the right to file exceptions to such report should they deem it proper and necessary to do so, and to present their exceptions by brief and oral argument to the Commission.

Premises considered, defendants pray that said motion be dismissed or in any event denied.

2848
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2849 UNITED STATES OF AMERICA

FEDERAL POWER COMMISSION.

Opinion No. 49.

* * (Caption—G-109 and G-112) * *

2850 Appearances:

For the Illinois Commerce Commission: John E. Cassidy, Esq., Harry R. Booth, Esq.

For the Natural Gas Pipeline Company of America and Texoma Natural Gas Company: Joseph J. Hedrick, Esq., S. A. L. Morgan, Esq., D. H. Culton, Esq., George P. Garver, Esq.

For the Federal Power Commission: George Slaff, Esq., Daryal A. Myse, Esq.

2851 UNITED STATES OF AMERICA

Filed July 23, 1940.

FEDERAL POWER COMMISSION.

Opinion No. 49.

* * (Caption—G-109 and G-112) * *

MEMORANDUM OPINION.

BY THE COMMISSION:

The Illinois Commerce Commission, on September 23, 1938, filed a petition with this Commission alleging that the rates and charges for natural gas charged by the above named defendants-respondents (operated as a single enterprise and so treated herein) were unjust and unreasonable and prayed that said companies be required to show cause why rates for natural gas sold by them in the State of Illinois should not be reduced and that an order be entered determining fair, just, and reasonable rates for the wholesale sale of natural gas sold by them. Copies of this complaint were duly served on defendants-respondents on October 14, 1938. On the same date this Commission, on its own motion, ordered an investigation to determine whether the rates of said companies were unjust and unreasonable and if so, fix just and reasonable rates therefor. The rates in question have a substantial effect on the cost of gas to ultimate consumers in Chicago and the surrounding area, as the bulk of the natural gas sold by defendants-respondents is delivered to the Chicago District Pipeline Company, which, in turn, supplies all the natural gas used by utilities serving the area.

On November 16, 1938, the defendant-respondent companies filed their answer to the complaint. On April 14, 1939, this Commission entered an order consolidating the complaint case and the investigation for purposes of hearing. Thereafter, hearings were begun on May 8, 1939, and continued from time to time until October 6, 1939, during which a total of approximately 6000 pages of testimony was taken. Fifty-seven witnesses appeared and testified for the defendants-respondents and offered in evidence 135 exhibits. On October 6, 1939, in response to a question by the Trial Examiner, counsel for the defendants-respondents stated of record that the companies had concluded direct testimony in support of their case. Thereafter, beginning on October 23, 1939, the witnesses of the companies who had testified on the specific subject of rate of return were cross-examined by counsel for the two commissions for a period of twelve days and testimony of two witnesses on the subject of rate of return was then presented by counsel to this Commission and testimony of two witnesses on the same subject was offered of record by counsel for the Illinois Commerce Commission.

2852 At the conclusion of the direct testimony on November 7, 1939, counsel to both commissions joined in filing a written motion for an interim order reducing the rates and charges of the defendant-respondent companies. Copies of said motion were duly served upon defendants-respondents. At that point in the proceedings the hearings had extended over fifty-five days, approximately 8000 pages of testimony had been taken, and, in addition to the witnesses and exhibits heretofore mentioned as being submitted on behalf of the companies, six witnesses had testified and approximately forty-five exhibits had been introduced of record by the Illinois Commerce Commission and the staff of this Commission.

Subsequent to the service of the motion for an interim order reducing rates upon defendant-respondent companies, hearings were held beginning November 27, 1939, and extending through December 12, 1939, during which period of time counsel for defendants-respondents cross-examined at length the witnesses of both commissions who had testified on the subject of rate of return and in addition there was presented redirect and rebuttal testimony by said companies.

On December 18, 1939, after notice upon all interested parties, oral argument on the motion for an interim order was held before the Commission sitting en banc. This argument occupied a full day and was participated in at length by counsel representing the defendants-respondents, the Illinois Commerce Commission, and this Commission. Thereafter, briefs were filed by counsel representing all parties interested in the proceedings.

On December 19, 1939, we entered an order reconvening these proceedings for hearing to be commenced on January 8, 1940, so that the defendant-respondent companies might have further opportunity to present additional rebuttal testimony dealing with the issue of a proper rate of return and also to afford them opportunity to cross-examine one of the Commission witnesses who had previously given redirect testimony. The order fixing this hearing also granted defendant-respondent companies twenty days after the conclusion thereof within which to file briefs. Hearings were held on January 8, 9, and 10, 1940, at which time defendant-respondent companies presented of record additional rebuttal and redirect testimony. Although briefs were due to be filed on January 30, 1940, counsel for said companies requested a thirty-day extension of time within which to file their briefs and by order of this Commission, dated January 23, 1940, an extension of time for the filing of defendant-respondent briefs was given to February 15, 1940.

It is not the purpose of this memorandum opinion to deal exhaustively with every minute question involved in these proceedings. Suffice it to say that this matter is presently before us on the joint motion of counsel to this
Commission and the Illinois Commerce Commission
2853 filed November 7, 1939, for an immediate interim
order fixing just and reasonable rates for the interstate sale of natural gas for resale made by defendants-respondents. The record now before us is over 10,000

pages in length and over 200 exhibits have been introduced therein.

The motion does not set out specifically the amount of reduction which is requested. It does, however, allege that a fair rate of return for the defendant-respondent companies is not more than 6 to 6½ per cent. It also sets out alleged net earnings of the companies on various bases which exceed a 6 per cent return by from approximately $3,250,000 to approximately $4,110,000 and which exceed a return of 6½ per cent by from $2,870,000 to approximately $3,770,000. The brief of the Illinois Commerce Commission requests an order reducing rates by not less than $3,500,000. The brief of counsel to this Commission requests that rates be reduced at least by an amount of from $3,370,000 to $3,725,000.

The motion for an interim order alleges that the evidence before the Commission now clearly establishes that the present rates of the defendant-respondent companies are unjust and unreasonable and it is prayed that an immediate order be entered fixing just and reasonable rates. The defendants-respondents have filed a plea to the jurisdiction of the Commission in reply to the motion and a conditional answer thereto. We observe that all counsel have dealt exhaustively with the problems here involved and their briefs have been of material assistance to us.

Contentions of the defendant-respondent companies may be summarized as follows: (a) that the companies are private in character; that this Commission has no jurisdiction to regulate them; and that the Natural Gas Act, in so far as it attempts to give this Commission power to regulate the companies, is unconstitutional; (b) that the Commission has no jurisdiction under the Natural Gas Act to enter the interim order sought by the motion now pending before us until all the companies' witnesses have been cross-examined by counsel to the Illinois commission and to this Commission and shall have been examined on redirect, and until this Commission and the Illinois commission shall have presented all their witnesses and such witnesses have been cross-examined and the companies have offered rebuttal testimony; (c) that the Natural Gas Act confers upon this Commission no power or jurisdiction to enter the order sought; and (d) that the Commission is without authority to entertain the motion for

an interim order since the Illinois commission has no power to appear before this Commission, and counsel to this Commission have no power to make the motion since their action in doing so places the Commission in the position of "litigant or movant before itself sitting in its quasi-judicial and quasi-legislative capacity," and any action taken by this Commission under such circum-
2854 stances would violate the rights of defendants-respondents under the Fourteenth Amendment to the United States Constitution.

In addition, the defendants-respondents state that a finding of unreasonableness of rates at this time would violate the companies' rights under the Fourteenth Amendment, deny the conclusions contained in the factual allegations set out in the motion for interim order (however, there is no denial at any place of the facts themselves which are set out in the motion), and conclude that there is sharp conflict as to numerous issues of fact and law which cannot be determined at this time.

Counsel to this Commission ask that for the purpose of disposing of the motion for an interim order we accept the following:

(1) *The companies' estimate* of the life of their source of supply, to-wit: 23 years, 1932 to 1954, inclusive.

(2) *The companies' claim* that they will go out of business when this specific source of supply is exhausted.

(3) *The companies' book figures* for capital expenditures to date.

(4) *The companies' estimate* of the total gross capital expenditures over the period 1932 to 1954, inclusive.

(5) The highest present rate base figure for the companies' actual properties *testified to by the companies' witnesses.*

(6) *The companies' estimate* of revenue and operating expenses for the next few years embracing the reasonably immediate future.

It is to be noted that counsel to this Commission state in their brief:

"With respect to each one of these basic matters, it is our position that evidence already in the record or yet to be introduced by Commission witnesses indi-

> cates facts much more favorable to the consumers of gas than the Companies' evidence on these points. Nevertheless, as stated, we propose that the Commission accept the foregoing matters exactly as testified to by the Companies' witnesses."

The motion presently before us poses the question: Can we, upon the record at this time, determine just and reasonable rates to be hereafter observed by defendant-respondent companies and fix the same by order?

The fundamental problem concerning our ability to fix just and reasonable rates upon the record now before us involves answers to these questions: (a) Has this Commission jurisdiction? (b) Have the constitutional requirements of due process been met, namely, has a full and fair hearing been afforded defendants-respondents? (c) Can we grant the relief prayed in the motion for an interim order at this interlocutory stage in the proceedings? (d) Assuming that (a), (b), and (c) are answered in the affirmative, from a substantive standpoint, upon the record before us, what are just and reasonable rates to be observed by defendants-respondents and to be fixed by order of this Commission?

2855 The Commission has Jurisdiction.

At the threshold of this discussion let us dispose of the claim of defendants-respondents that we are without authority to regulate the rates involved herein because their business is contractual and private in character. This contention is without merit. The companies are engaged in the interstate transmission and sale of natural gas for resale for ultimate public consumption. Congress has determined that such business is affected with a public interest. Moreover, in line with well-settled doctrine, we determined in our opinion in re *Mississippi River Fuel Corporation*, Docket No. G-150, that contracts such as here involved must yield to regulation.

Section 4(a) of the Natural gas Act provides:

> "All rates and charges made, demanded, or received by any natural-gas company for or in connection with the transportation or sale of natural gas subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges, shall be just and reasonable,

and any such rate or charge that is not just and reasonable is hereby declared to be unlawful."

This section requires that rates and charges be just and reasonable and declares that *any such rates that are not just and reasonable are unlawful.* Section 5(a) provides that:

> "Whenever the Commission, *after a hearing* * * * *shall find that any rate* * * * or contract affecting such rate * * * *is unjust, unreasonable,* unduly discriminatory, or preferential, *the Commission shall determine the just and reasonable rate,* charge, classification, rule, regulation, practice, or contract *to be thereafter observed* and in force, *and shall fix the same by order* * * *." (Emphasis supplied.)

Due Process has been Afforded Companies.

On reviewing the entire proceedings before us, it is obvious that defendants-respondents have had a full and fair hearing.[1] The record discloses the companies have been accorded and have properly taken advantage of every opportunity to present all reasonably essential evidence that they desired with respect to every factor bearing on both the jurisdictional and substantive aspects of the problem before us. Moreover, they have had full opportunity to present oral argument and file briefs and in fact have made unmistakably clear their position with respect to every single issue involved in these proceedings.

2856 It is quite apparent that the defendant-respondent companies have presented all evidence that they deemed pertinent upon the question of fairness and reasonableness of their rates. The record discloses that throughout the hearings the Trial Examiner was extremely liberal in permitting the introduction of evidence by the companies. Moreover, the companies have had a full opportunity, which they have exercised, to cross-examine all witnesses offered so far by counsel to either commission and to offer all rebuttal testimony in explanation and clarification which they desired with respect to the testimony of such witnesses. They have had full opportunity, which they have exercised, to develop whatever facts they chose on redirect examination of such of their witnesses as have been cross-examined. However, they cannot be heard to complain that they have not yet been able to examine on redirect their own witnesses who have not yet been cross-examined, nor is it essential to a full hearing on the motion before us that they be permitted to cross-examine or rebut witnesses who have not yet been offered by counsel for the commissions.

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[1] It is interesting to note that prior to the commencement of proceedings before this Commission the companies involved herein were engaged in substantially similar proceedings before the Illinois Commerce Commission. Some time during 1936 and 1937 the Illinois commission instituted an investigation against Chicago District Pipeline Company, which purchased substantially ninety per cent of the gas sold by the defendants-respondents. In February, 1938, the companies involved in this proceeding intervened in the proceeding before the Illinois Commerce Commission and participated in those proceedings although they did not offer affirmative evidence therein. During the pendency of the proceeding before the Illinois commission, the Natural Gas Act was passed. Thereafter, the Chicago District Pipeline Company and the companies involved herein, then interveners in the proceeding before the Illinois commission, moved that commission to suspend its proceedings on the ground that under the Natural Gas Act the jurisdiction to pass upon, and if necessary, regulate the prices and charges for natural gas sold at wholesale by the companies became vested exclusively in the Federal Power Commission.

The record amply supports our conclusion that the defendant-respondent companies have had a full and fair hearing. We are satisfied that the constitutional requirements of due process have been met. Our view finds complete support in the *New England Divisions Case*, 261 U. S. 184, wherein various western carriers asserted that the action of the Interstate Commerce Commission was void in increasing the divisions or shares of the New England carriers in joint through freight rates by fifteen per cent and, correlatively, decreasing the amounts received from the joint rates by carriers operating west of the Hudson River.[2] One of the principal grounds on which the western carriers rested their claim that the action of the Interstate Commerce Commission was void was stated by the Court as follows:

> "It is asserted that the order directs a transfer of revenues of the western carriers to the New England carriers, pending a decision in the matter of divisions; that Congress has not granted authority to take such provisional action; and that, hence, the

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[2] The applicable sections of the Transportation Act, Section 1(4) and Section 15(6), dealing with just and reasonable divisions of rates and the power of the Interstate Commerce Commission to prescribe just and reasonable divisions when, after full hearing, the existing divisions were unjust or unreasonable, closely parallel Sections 4(a) and 5(a) of the Natural Gas Act.

order is void. The argument is, that under Section 15(6), the Commission may prescribe divisions only when, upon full hearing, it is of opinion that those existing are, or will be, unjust unreasonable or inequitable; that in such event it shall prescribe divisions which are just, reasonable and equitable; and that the provisional character of the order demonstrates that the hearing has not been a full one. Whether a hearing was full, must be determined by the character of the hearing, not by that of the order entered thereon. A full hearing is one in which ample opportunity is afforded to all parties to make, by evidence and argument, a showing fairly adequate to establish the propriety or impropriety, from the standpoint of justice and law, of the step asked to be taken. The commission recognized, and observed, these essentials of a full hearing."

2857 The Supreme Court upheld completely the order of the Interstate Commerce Commission. Whether a full hearing was granted depended not on the order entered by the Commission but on the character of the hearing, the Court stating:

> "There was thus ample time for, and every carrier was, in fact, afforded the opportunity of, introducing any and all evidence it desired.
>
> * * * * *
>
> "A hearing may be a full one, although the evidence introduced does not enable the tribunal to dispose of the issues completely or permanently; and although the tribunal is convinced, when entering the order thereon, that, upon further investigation, some changes in it will have to be made."

We deal only briefly with the contention of defendant-respondent companies that we are without authority to entertain the motion because there is a fatal defect of parties having authority to present and prosecute the motion now before us. The Illinois Commerce Commission is a "State commission" as defined in Section 2(8) of the Natural Gas Act. As such, it is entitled, in our opinion, to file the complaint presently before us and to make the request set forth in the motion for interim order. To conclude that counsel to this Commission are unable to join in the motion would be to subscribe to a paralysis of the administrative process not consonant with the duties involved in the administration of the Act. Therefore, we cannot agree that there is a fatal defect of parties before us which precludes us from acting upon the motion.

Interim Order Justified.

Having found that the defendant-respondent companies have been afforded a full hearing, let us turn to the question: Are we without authority to grant the affirmative relief prayed for in the motion for an interim order? An examination of the motion and record before us discloses that the movants do not call upon us to exercise power similar or comparable to that granted by the New York and Pennsylvania statutes to the regulatory bodies in those States whereby they may prescribe temporary rates upon the basis of much less evidence than that deemed to be necessary for the determination of final rates and wherein each of those commissions is authorized to prescribe a return upon a rate base to yield not less than a specific per cent fixed by statute, namely, five per cent.[3] Under the New York and Pennsylvania statutes there is no necessity for a full hearing with respect to determination of a fair rate of return for the purpose of prescribing temporary rates. In contrast thereto, in the instant proceedings, there has been a full and fair hearing upon the issue of a fair rate of return and there is an acceptance by the movants, for the purpose of this motion, of the testimony of defendants-respondents of the *"highest present rate base figure for the Companies'* 2858 *actual properties testified to by the Companies' witnesses," together with the companies' estimates of revenue and operating expenses, the life of their source of supply of natural gas, book figures for capital expenditures to date, the total gross capital expenditures over the period 1932 to 1954, inclusive, and other factors essential in presently determining the problem before us.*

It is obvious, therefore, that we are not called upon to perform a function comparable to that delegated by the statutes of New York and Pennsylvania to the regulatory bodies of those States. We are, however, implored to recognize an unpalatable situation, and to apply thereto the affirmative grant of authority delegated to us by the

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[3] **Section 114 of the Public Service Law of New York and Section 310 of the Pennsylvania Utility Act.**

Congress under Sections 4(a) and 5(a) of the Natural Gas Act which plainly require that interstate wholesale rates and charges for natural gas be just and reasonable and declare that *any such rates that are not just and reasonable are unlawful.* In fact, there is a definite direction in Section 5(a) to the effect that if, after hearing, we find any rate or contract affecting a rate to be unjust or unreasonable, *we "shall determine the just and reasonable rate, charge," etc., "and shall fix the same by order."* Thus, the most casual reading of the Act, in the light of its broad purposes, negatives the idea that we are inhibited from granting the relief sought by the motion for an interim order and forcibly emphasizes the duty of this Commission to grant such relief when, as in the instant case, from a factual standpoint, the record is ripe for the application of the express provisions of the Act.

There are those who will be rendered unhappy by the frustration of their ambition to maintain the excessive rates presently charged by defendant-respondent companies. But to refuse a substantial reduction thereof would require us to sit, aloof from reality, and permit unlawful rates to exist without affording those suffering thereby any relief. Inaction on our part would indicate that we had fallen into a mental trap not in keeping with our responsibilities.

2859 The Assumed Rate Base.

The defendant-respondent companies claim a rate base computed as follows:

Reproduction Cost New exclusive of Gas Reserves	$56,302,250
Less "Viewed" Depreciation	2,866,758
Present Value of Physical Properties exclusive of Gas Reserves	$53,435,492
Present Value of Gas Reserves	$13,334,775
Allowance for Future Capital Expenditures	6,046,286
Going Value	8,500,000
Working Capital	975,000
Total	$82,291,553

For the purpose only of disposing of the problem presented by the motion before us, we reluctantly accept the companies' estimate of reproduction cost, their claimed present value of gas reserves, and also their claim for working capital. We cannot, however, even for the purpose of an interim order, accept the full claim for future capital expenditures or the amount sought for going value. It is our opinion, because of the use of the sinking fund method of amortizing the entire investment, which we are presently approving for the purpose of this motion, no deduction from the companies' estimate of reproduction cost new is being made for depreciation. It is generally agreed that where the sinking fund method of depreciation is employed (amortization of investment is used in the instant case in lieu of depreciation and depletion), an undepreciated rate base is proper.[4]

It is contended by the companies that during the period from June 1, 1939, to December 31, 1954, when they estimate their sources of gas supply will be exhausted, they will expend for capital improvements the total sum of $9,145,083. However, this entire sum is not claimed as a part of the rate base but only $6,046,286 thereof is sought by applying the principle of average investment. Obviously, the improvements have not yet been made. They are contemplated in the future. It is clear, therefore, that such improvements are not used and useful in the present and to a certain extent must be deemed conjectural. We agree that in fixing rates for the future reasonable estimates of property additions in the immediate future should be taken into consideration. We are of the opinion that the estimate of additions for the period June 1, 1939 to December 31, 1942, is ample for the purpose of disposing of the motion now before us. The companies' estimate for this period is $3,808,399. This amount we allow.

2860 The companies' claim of $8,500,000 for going concern value must be disallowed. The amount obviously is an arbitrary claim, not supported by substantial evidence warranting its allowance. Its allowance would mean the acceptance of a deceptive fiction, resulting in an unfair imposition upon consumers. We are convinced that we are allowing in our rate base more than an adequate amount to cover all elements of value.

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[4] See *Telephone and Railroad Depreciation Charges*, 177 I. C. C. 351, 410; *Los Angeles Gas and Electric Co. v. Railroad Commission of California*, 289 U. S. 287, 298.

In disposing of the motion for interim order, we are accepting at this time the companies' estimates of

Reproduction Cost New of Physical Properties (exclusive of Gas Reserves)	$56,302,250
Value of Gas Reserves	13,334,775
Capital additions for the period June 1, 1939 to December 31, 1942	3,808,399
Working capital	975,000
Total Rate Base	$74,420,424

The foregoing amount allowed as a rate base may be compared with book cost of properties, plus working capital of $975,000, as of December 31, 1939, totalling $60,952,279, and therefrom it is clearly disclosed that the rate base presently allowed herein is liberal. This appears especially true when the period of construction is taken into consideration.

Amortization.

The companies have introduced evidence relating to the amortization of the investment in, or claimed value of, their properties. Ordinarily, depletion and depreciation are recognized items of expense of natural gas producing and transmission companies, but because of the alleged very limited life of the gas supply in these proceedings, amortization is claimed, and is allowed, in lieu thereof. Evidence was introduced by the companies, as well as by counsel for the Commission, relative to the sinking fund method of amortization and, for our present purposes, we will accept that method.

The defendants-respondents claim that the present fair value, including estimated value of estimated future capital additions, should be amortized over the remaining estimated life of the gas reserves available to them. We believe that the total investment, in contradistinction to claimed fair value, should be amortized and that the amortization period should be the total estimated life of the business, namely twenty-three years, rather than the remaining life, fifteen years.

The amounts of amortization are recognized and treated as operating expenses. Operating expenses are stated on

the basis of cost. There is no more reason to compute amortization expense on the basis of the fair value or reproduction cost of property than there is to substitute fair value of reproduction cost for all other expenses, such as labor, materials and supplies, etc. In our opinion, the method allowed will, with proper management, return the companies their full and complete investment in their properties by the time their business is estimated to
2861 end, with adequate compensation on the claimed fair
value of the properties (less the disallowances mentioned above) in the interim. We refuse to make an allowance of amortization in excess of cost. To do so would not be the computation of a proper expense, but instead the allowance of additional profit over and above a fair return. Manifestly such an additional return would unjustly penalize consumers.

The amortizable investment is the total investment estimated to be made during the life of the companies, less the salvage value at the end thereof. For the purpose of disposing of the motion before us we accept the claim of the companies that this investment will amount to $78,284,009, inasmuch as the amount subject to amortization is the total investment during the life of the enterprises, it follows that the amortization period should be the same period, namely twenty-three years (from 1932 to 1954).

The record discloses that evidence was introduced showing the applicability of the sinking fund method of amortization to the facts herein. The companies claim the interest rate in the sinking fund formula should not exceed two per cent. However, we feel that 6½ per cent should be used. Where an interest rate lower than the allowed rate of return is used, unjust enrichment of the companies at the expense of the consumers is a most likely result. Under the sinking fund method, consumers are given no credit by way of a reduced rate base for the amortization expense

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Rate of Return.

The record before us clearly discloses that a great amount of testimony was devoted to the question of rate of return. There has been extensive and detailed cross-examination of all witnesses who testified specifically on the subject on behalf of the companies and both commissions. The defendants-respondents have also had a full opportunity, of which they have availed themselves, to present redirect and rebuttal testimony on this phase of the case. In addition, briefs of all counsel have dealt quite exhaustively with the subject.

It is, of course, beyond the practical scope of this opinion to analyze all the exhibits and testimony dealing with this subject. There is abundant evidence disclosing that we are today at a point where rates of return demanded are among the lowest that have ever existed. The exhibits put into evidence by practically every witness show that today over-all returns and yields are lower than before. Ample evidence of record indicates that the companies would have no difficulty in financing at a low cost if they restricted their securities to a proper amount, with reasonable ratio of bonds, preferred and common stock. There is substantial evidence of record indicating that the companies could finance on as favorable a basis, if not a more favorable basis, than any natural gas producing and transmission company in the United States. There is testimony of record indicating in this connection that with earnings of 6.2 per cent to 6.5 per cent a sound pipeline company could easily finance on a basis of 40 per cent bonds, 20 per cent preferred stock, and 40 per cent common stock, with yield or return to the public of 3.5 on the bonds, 5.75 per cent on the preferred and 8 per cent on the common stock. The cost of money to such company would be 3.75 per cent for the bonds, 6.10 per cent for the preferred, and 10 per cent cost of floating the common stock. On such basis of financing, the interest coverage would be 4.68 times.

From the law we know that we are required to fix rates which will permit the companies to earn a fair return. From an examination of the law we can also determine the essential basic general elements that we must consider in determining what is a fair rate of return. However, the application of these principles to a concrete case such as the matter before us requires the application of our judgment to all the facts as we find them in the record.

Fundamental statements respecting the general principles applicable in ascertaining what is a fair rate of return may be found in *Bluefield Waterworks & Improvement Co.* v. *Public Service Commission of West Virginia*, 262 U. S. 679, where the Court stated, at page 692:

> "What annual rate will constitute just compensation depends upon many circumstances and must be deter-

> mined by the exercise of a fair and enlightened judgment, having regard to all relevant facts. A public
> utility is entitled to such rates as will permit it to
> 2863 earn a return on the value of the property which it
> employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties. A rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market and business conditions generally."

It is interesting to note that the defendants-respondents do not ask that we find a *fair rate of return* but assert "a minimum of eight per cent should be allowed defendants as a just and reasonable return on the value of their property." An expert for the Illinois Commerce Commission testified that a fair return for these companies "did not exceed six per cent." The brief of counsel to this Commission states that "the fair rate of return is six per cent,—and in no event should it exceed 6½ per cent."

Suffice it to say that we have carefully considered the testimony of record relating to the problem of fixing a fair rate of return, contentions of all parties interested in these proceedings, and in the light of the Bluefield case conclude, for the purpose of disposing of the motion before us, that 6½ per cent is a fair annual rate of return upon the rate base allowed.

Conclusion.

The following table shows the results of our conclusions stated above:

Income available for amortization and return		$9,362,032
Less amortization		1,557,852
Income available for return		$7,804,180
Rate base	$74,420,424	
Rate of return	6.5%	
	$ 4,837,328	$4,837,328
Available for reduction in net revenues		$2,966,852
Consequent reduction in Federal Income Taxes		783,909
Total Available for Rate Reduction		$3,750,761

The record herein, in view of the foregoing, impels us to the further conclusion that rates and charges presently charged by the defendant-respondent companies are unjust, unreasonable, unlawful, and violative of the provisions of the Natural Gas Act. Therefore, until further order of this Commission, and in keeping with the requirements of Section 5(a) of the Act, we presently determine for the purpose of disposing of the motion before us that the just and reasonable rates, charges, etc., to be hereafter observed by said companies and fixed by order of this Commission shall reflect an immediate reduction of at least $3,750,000. The Commission feels that a reduction of this amount is conservative in view of the acceptance of the companies' estimates and the generous allowances made throughout.

Before concluding, it is to be noted that the acceptance by us, for the purpose of disposing of the motion for
2864 an interim order (and for that purpose only), of reproduction cost testimony presented by the defendant-respondent companies will not inhibit us from subsequently exercising our judgment as to how reproduction cost evidence shall be ultimately treated herein.

An appropriate order embodying its findings of fact will be entered in accordance with this opinion.

Leland Olds,
Chairman.
Claude L. Draper,
Commissioner.
Basil Manly,
Commissioner.
John W. Scott,
Commissioner.
Clyde L. Seavey,
Commissioner.

Dated at Washington, D. C., this 23rd day of July, 1940.

Leon M. Fuquay,
Secretary.

Entered July 23, 1940. 2865

UNITED STATES OF AMERICA.

Federal Power Commission.

Commissioners:

Leland Olds, Chairman; Claude L. Draper, Basil Manly, John W. Scott, Clyde L. Seavey.

July 23, 1940.

* * (Caption G-109 & G-112) * *

ORDER REDUCING RATES.

Having considered the complaint of the Illinois Commerce Commission against, the answer thereto by, and the order of this Commission instituting investigation of, the Natural Gas Pipeline Company of America and the Texoma Natural Gas Company, defendants-respondents herein, a motion of counsel for the Illinois Commerce Commission and counsel for this Commission for an immediate interim order reducing rates, the conditional answer and pleas to jurisdiction in reply thereto by defendants-respondents, the other orders previously entered herein, the evidence of record, the oral arguments presented before the Commission sitting en banc and the briefs filed herein, and having on this date made and entered its Memorandum Opinion

(Opinion No. 49) which is hereby referred to and made a part hereof by reference:

The Commission, for the purpose of disposing only of the joint motion before it for an immediate interim order reducing rates, in the above entitled matters, finds that:

(1) The Natural Gas Pipeline Company of America is a corporation organized and existing under the laws of Delaware; is engaged in the transportation of natural gas in interstate commerce by means of its 24-inch natural gas main transmission pipe line, approximating 900 miles in length, extending from a point in the State of Oklahoma known as Gray's Junction through the States of Kansas, Nebraska, and Iowa, and into the State of Illinois to a point near Joliet; is also engaged in the sale in interstate commerce of natural gas so transported to various purchasers for resale for ultimate public consumption for domestic, commercial, industrial, and other uses; and is a "natural-gas company" within the meaning of the Natural Gas Act;

(2) The major portion, approximating 90%, of the natural gas transported and sold by the Natural Gas Pipeline Company of America is sold to the Chicago District Pipeline Company, for resale for public consumption, delivery being made near Joliet, Illinois;

(3) The Texoma Natural Gas Company is a corporation organized and existing under the laws of Delaware; is engaged in the production and gathering of natural gas in the Texas Panhandle field; is engaged in the transportation of natural gas in interstate commerce by means of its 24-inch natural gas main transmission pipe line, approximating 75 miles in length, extending from its compressor station in the State of Texas near Fritch into the State of Oklahoma to its sales meter and connection, near Gray's Junction, with the system of the Natural Gas Pipeline Company of America; is also engaged in the sale in interstate commerce of gas so transported to the Natural Gas Pipeline Company of America for resale for ultimate public consumption for domestic, commercial, industrial, and other uses; and is a "natural-gas company" within the meaning of the Natural Gas Act;

(4) The major portion, approximating 90% of the natural gas so produced and gathered by the Texoma

Natural Gas Company, is transported and sold by it to the Natural Gas Pipeline Company of America at the aforesaid delivery point near Gray's Junction, Oklahoma;

(5) The Illinois Commerce Commission is a "State commission" within the meaning of the Natural Gas Act;

(6) The rates and charges, demanded, observed, charged, and collected by the Natural Gas Pipeline Company of America and the Texoma Natural Gas Company, defendants-respondents herein, for the transportation and the sales of natural gas in interstate commerce, set forth in findings Nos. (1) to (4), inclusive, together with the rules, regulations, practices, and contracts, affecting such rates and charges, are subject to the jurisdiction of this Commission;

2866 (7) The Natural Gas Pipeline Company of America and Texoma Natural Gas Company, defendants-respondents, are under substantially common control and ownership, are but arms of the same organization, being virtual departments of the same, and are in all substantial respects operated as a single enterprise, for the production, gathering, transportation, sale, and delivery of natural gas;

(8) Until further order of this Commission and for the purpose of disposing of the motion before us, a rate base composed of the Companies' estimates may be accepted, as follows:

Reproduction Cost New of Physical Properties (exclusive of gas reserves) as of June 1, 1939	$56,302,250
Value of Gas Reserves as of June 1, 1939	13,334,775
Capital Additions from June 1, 1939, to December 31, 1942	3,808,399
Working Capital	975,000
Rate Base	$74,420,424

(9) The total capital expenditures of the Companies through December 31, 1954, less salvage (including all capital expenditures to date), based upon the Companies' estimates, will be not more than $78,284,009, which is the amount on which provision for amortization should be calculated;

(10) The period over which the provision for amortization should be calculated is the entire life of the properties, estimated by the Companies to be 23 years, 1932-1954, inclusive;

(11) The annual allowance for amortization should be calculated on a sinking fund basis, with interest credited to the amortization reserve at the rate of 6½% per year, compounded annually;

(12) The required annual allowance for amortization is $1,557,852;

(13) The fair rate of return for the Companies is not more than 6½% per annum;

(14) The annual amount necessary for a fair return to the Companies is not more than $4,837,328, which, with the addition of the annual allowance of $1,557,852 for amortization in (12) above, amounts to a total of $6,395,180, for amortization and a fair return;

(15) The Companies' annual net revenues available for amortization and return, based upon the Companies' estimates, averaged for 1939 to 1942, inclusive, will be $9,511,454, which will be reduced to approximately $9,362,032 as a result of the calculated increase in Federal taxes under the 1940 Revenue Act;

(16) The Companies' annual net revenues (as found in (15) above) available for amortization and return, exceed the amount reasonably necessary as found in (14) above, by $2,966,852;

(17) A reduction in annual net revenues of $2,966,852, together with the consequent reduction in the applicable Federal Income Tax, would permit a reduction in rates (gross operating revenues) of $3,750,000;

(18) The rates and charges made, demanded, or received by defendants-respondents for or in connection with their transportation and sale of natural gas in interstate commerce for resale for ultimate public consumption are unjust, unreasonable and excessive;

(19) The rates and charges of defendants-respondents, after reflecting the reductions hereinafter ordered, will be just and reasonable;

Therefore, the Commission orders that:

(A) The rates and charges made, demanded, or received by defendants-respondents for or in connection with their transportation and sale of natural gas in interstate commerce for resale for ultimate public consumption shall be reduced to reflect a reduction of not less than $3,750,000 per annum in the operating revenues of Natural Gas Pipeline Company of America;

(B) Defendants-respondents shall file on or before August 15, 1940, new schedules of rates and charges for or in connection with their transportation and sale of natural gas in interstate commerce for resale for ultimate public consumption, which shall reflect the reduction in operating revenues ordered in paragraph (A) above, which new schedules of rates and charges shall be effective as to all bills regularly rendered on or after September 1, 1940;

2867 (C) The Commission reserves the right to reject all or any part of such new schedules and in lieu thereof to prescribe the same by further order;

(D) On and after the effective date of the new schedules of rates and charges filed and made effective in accordance with paragraph (B) above, defendants-respondents shall cease and desist from making, demanding, or receiving any rates and charges which do not reflect the reduction ordered in paragraph (A) above;

(E) The record herein shall remain open for such further proceedings as the Commission may deem necessary or desirable;

(F) The motion by defendants-respondents to dismiss the motion for immediate interim order reducig rates for want of jurisdiction be and the same is denied;

(G) The motion by defendants-respondents to dismiss the motion for immediate interim order reducing rates for want of sufficient evidence of record be and the same is denied;

(H) This order shall not be construed as an acquiescence by this Commission in any estimates or determinations of original cost, or any valuation of property, claimed or asserted by said defendants-respondents.

By the Commission.

Leon M. Fuquay,
Secretary.

2869 August 8, 1940. **Filed Aug. 8, 1940.**

UNITED STATES OF AMERICA.

Federal Power Commission.

* * (Caption—G-109 & G-112) * *

MOTION FOR A STAY OF THE COMMISSION'S ORDER OF JULY 23, 1940.

To the Honorable Federal Power Commission:

Now comes Natural Gas Pipeline Company of America and Texoma Natural Gas Company, defendants-respondents in the above entitled and numbered causes, and move the Commission to enter and issue an order staying and suspending the effective date and the operation of its order dated July 23, 1940, and served on defendants-respondents on August 1, 1940, ordering and directing defendants-respondents to file on or before August 15, 1940, new schedules of rates and charges for or in 2870 connection with their transportation and sale of natural gas in interstate commerce which shall reflect a reduction in operating revenues of Natural Gas Pipeline Company of America of not less than $3,750,000.00 per annum.

The grounds upon which this motion is based and presented follow.

I.

Defendants-respondents, in good faith and with diligence and expedition, are engaged in preparing a motion for rehearing on the issues decided adversely in the memorandum opinion of the Commission upon which said order dated July 23, 1940, is based, and in said order itself. Said motion for rehearing, in due course and within the time required under the Natural Gas Act, will be filed with the Commission and will be presented and urged in good faith before the Commission.

II.

Serious and substantial questions of law and of fact have been raised and presented by defendants-respondents

in the proceedings before the Examiner herein and in the pleadings and briefs filed and submitted in reply to the motion for interim order, in pursuance of which the Commission entered its said order dated July 23, 1940. Reference is here made to the transcript of the evidence in the above entitled and numbered causes and to the several exhibits offered and received in connection therewith; to the answer of defendants in said cause No. G-109 filed November 18, 1938; to defendants-respondents' pleas to the jurisdiction of the Commission dated December 18, 1939, in reply to said motion for an interim order; to the
2871 conditional answer of defendants-respondents dated
December 18, 1939, in reply to said motion for interim order filed by complainant and counsel for the Commission; to defendants-respondents' memorandum brief dated December 18, 1939, in support of their pleas to the jurisdiction of the Commission to enter an interim order pursuant to motion of complainant, Illinois Commerce Commission, and counsel for the Commission; and to defendants-respondents' memorandum brief dated February 15, 1940, in reply to briefs of complainant and counsel for the Commission. Said transcript, exhibits, pleadings and briefs are all on file with and in the hands of the Commission, and same are by reference expressly made a part of this motion. An examination of said transcript, exhibits, pleadings and briefs to which we have just referred discloses affirmatively that serious and substantial questions of law and of fact have been and are in good faith presented on behalf of defendants-respondents to the Commission, many of which issues have been by the Commission resolved adversely to the position and contention of the defendants-respondents thereon. Defendants-respondents in their motion for rehearing, to be filed in due course as aforesaid, will point out and assign the various errors committed by the Commission in its adverse ruling on said several issues of law and of fact.

III.

In their motion for rehearing defendants-respondents will point out and assign as error on the part of the Commission its holdings, rulings and findings on the several issues resolved adversely to the defendants-respondents by the Commission in its said opinion and order, including the following:

2872 1. In holding that defendants-respondents' business is affected wiht a public interest and is subject to regulation under the Natural Gas Act;

2. In holding that it has authority under the Natural Gas Act to enter an interim order pending the final conclusion of the hearing now pending before the Commission and its Examiner;

3. In holding that defendants-respondents have had a full and fair hearing within the meaning of the Natural Gas Act and the Fifth Amendment to the Constitution of the United States;

4. In holding that the claim of defendants-respondents for $8,500,000.00 for going concern value as a part of the rate base is an arbitrary claim not supported by substantial evidence warranting its allowance, and in refusing to allow such going concern value, which defendants-respondents insist is established by uncontradicted evidence;

5. In reducing the allowance in the rate base for future capital expenditures, which under the uncontradicted evidence must be incurred, from $9,145,083.00 to $3,808,399.00;

6. In holding that the rate base claimed by defendants-respondents in the amount of $82,291,553.00 should be reduced to $74,420,424.00;

7. In holding that the amount to be amortized should be reduced from $84,341,218.00, as claimed by defendants-respondents, to $78,284,009.00;

8. In holding that the amount to be amortized should be the investment cost and not the fair value of the property at the present time;

2873 9. In holding that the period over which provision for amortization should be calculated is the entire maximum life of the properties, namely, 23 years, beginning January 1, 1932, and ending sometime prior to December 31, 1954;

10. In not holding that the period over which provision for amortization should be calculated is the period beginning with the present time and extending over the remaining life of the properties;

11. In holding that the annual allowance for amortization should be calculated on a sinking fund basis, with interest credited to the annual allowance for amortization reserve at the rate of 6½% per annum, compounded annually;

12. In not holding that interest on the annual allowance

should be calculated at not more than 2%, compounded semi-annually, which, as shown by the uncontradicted evidence, is the most that defendants-respondents could earn by investing the annual accruals for amortization in the highest types of income-bearing securities;

13. In holding that if a rate of return of 6½% is fair and equitable for defendants-respondents, the same rate would be fair and equitable in computing the amortization to be charged as an operating expense under the sinking fund formula;

14. In holding that the required annual allowance for amortization is only $1,557,852.00;

15. In not holding that the required annual allowance for amortization is at least $4,849,620.00;

16. In finding that a fair rate of return for de-
2874 fendants-respondents on the present fair value of
their properties, erroneously fixed at the sum of
$74,420,424.00, is not more than 6½% per annum;

17. In not finding that the fair rate of return is at least 8% per annum;

18. In holding in effect that defendants-respondents are entitled to no more than the actual cost of refinancing their properties, with no compensation for the enterprise, skill in design and construction, and extraordinary management through which defendants-respondents' properties have been operated at extraordinarily high pressures and stresses and an extraordinarily high load factor, which enterprise, skill in design and construction and extraordinary management account for a very substantial portion of defendants-respondents' reveues and earnings;

19. In finding and holding that the annual amount necessary for a fair return to defendants-respondents is not more than $4,837,328.00;

20. In holding that the defendants-respondents' present annual revenues available for amortization and return exceed the amount reasonably necessary by the sum of $2,966,852.00;

21. In finding that the rates and charges received by defendants-respondents from the sale of natural gas in interstate commerce for resale for ultimate public consumption are unjust, unreasonable and excessive;

22. In finding that the rates and charges of defendants-respondents after reflecting the reductions ordered will be just and reasonable;

23. In not holding that the burden of proof rests 2875 upon complainant and counsel for the Commission to establish that defendants-respondents' existing charges are unjust and unreasonable, and that they have not discharged such burden;

24. In not holding that when and if complainant and counsel for the Commission discharge their burden of showing that defendants-respondents' rates and charges are unjust and unreasonable, the burden was then upon complainant and counsel for the Commission to show what rates would be just and reasonable, and that they have not discharged such second burden;

25. In denying the pleas of defendants-respondents to dismiss the motion for immediate interim order reducing rates for want of sufficient evidence;

26. In making no allowance in the annual expense and cost of operations to cover replacements of capital assets during the future life of defendants-respondents' business;

27. In ordering that the rates and charges by defendants-respondents for natural gas sold in interstate commerce for resale for ultimate public consumption be reduced to reflect a reduction of not less than $3,750,000.00 per annum in the operating revenues of Natural Gas Pipeline Company of America;

28. In ordering that defendants-respondents file on or before August 15, 1940, new schedules of rates and charges for and in connection with their transportation and sale of natural gas in interstate commerce for resale for ultimate public consumption which shall reflect a reduction in operating revenues of $3,750,000.00, which new sched-
2876 ules of rates and charges shall be effective as to all bills regularly rendered on and after September 1, 1940;

29. In ordering that on and after the effective date of the new schedule of rates and charges defendants-respondents shall cease and desist from making, demanding or receiving any rates and charges which do not reflect the reduction ordered as aforesaid.

By enumerating the above mentioned holdings, findings and orders of the Commission, defendants-respondents do not waive, but expressly reserve, the right to point out and assign as error other holdings, findings and orders of the Commission in the motion for rehearing which defendants-respondents will prepare and file in due course as aforesaid.

Defendants-respondents will not here undertake to present their arguments in support of their position and contention that the holdings, findings and orders above mentioned are erroneous. Their position has been made clear to the Commission in the transcript, exhibits, pleadings and briefs filed with the Commission and by reference made a part of this motion as aforesaid. The contentions and arguments of defendants-respondents on said several issues set forth in the transcript, in the exhibits, in the pleadings, and in the briefs above referred to are here adopted and by reference reiterated in all things as if repeated here.

IV.

Even if it be assumed that under the terms of the Natural Gas Act the Commission has authority to 2877 regulate and fix the charges of defendants-respondents for natural gas sold in interstate commerce under the circumstances reflected by the record herein, and if it be assumed that a full and fair hearing has been accorded defendants-respondents and that there is substantial evidence warranting a finding by the Commission that the existing rates charged by defendants-respondents for natural gas are unjust and unreasonable (all of which defendants-respondents deny), the Commission is without authority to reduce the existing rates, fixed by private contracts negotiated prior to the enactment of the Natural Gas Act, to a level which will not enable and permit defendants-respondents to recover, during the remaining life of defendants-respondents' business, the present fair value of defendants-respondents' property devoted to public use, together with a reasonable return thereon. Defendants-respondents do not concede that the rate base allowed by the Commission is proper, or that 6½% per annum on a proper rate base constitutes a fair and reasonable return to defendants-respondents, in the light of this record; but, if it be assumed that the rate base allowed is proper, and that 6½% per annum is a reasonable and fair rate of return, the Commission's order dated July 23, 1940, operates to confiscate and take defendants-respondents' property without due process of law, in violation of the Fifth Amendment to the Constitution of the United States, in that, under the operation of the order, defendants-respondents are precluded absolutely from ever

recovering, during the remaining life of their project, as found by the Commission for the purposes of this order, the present fair value of their property through the accumulation of adequate reserves for amortization,
2878 the accruals allowed by the Commission being entirely inadequate.

V.

Feeling themselves aggrieved and very substantially damaged by the operation of said order, defendants-respondents have the right, which they will exercise, of preparing and presenting to the Commission a motion for rehearing, to be filed within thirty days from the service on defendants-respondents of such order. After the filing of such motion for rehearing, the Commission has thirty days within which to consider such motion for rehearing and enter an order sustaining or denying it. Should the Commission deny such motion for rehearing and refuse to abrogate its order, defendants-respondents have the right, which they will exercise, to a review of such order by the Circuit Court of Appeals of the United States for the circuit wherein defendants-respondents have their principal place of business or by the United States Court of Appeals for the District of Columbia. In their petition for appeal defendants-respondents will seek a review of all the holdings, findings and orders of the Commission adverse to the contentions of defendants-respondents clearly set forth herein and in the transcript, exhibits, pleadings and briefs by reference made a part of this motion, and any other adverse holdings, findings and orders of the Commission not here specifically pointed out but which defendants-respondents shall present to the Commission in their motion for rehearing to be filed herein as aforesaid.

VI.

If the order dated July 23, 1940, be not stayed and
2879 its operation be not suspended pending the filing of defendants-respondents' motion for rehearing and the proceedings of the Commission on such motion and pending the review of the order by the courts, defendants-respondents will sustain serious, substantial and irreparable damages and losses in this:

1. The operation of the order will deprive defendants-

respondents of revenues aggregating $312,500.00 per month which defendants-respondents would otherwise receive if the present rates continue in force during such period pending the filing and disposition of the motion for rehearing and the review of the order on appeal. Should the order be abrogated by the Commission upon consideration of defendants-respondents' motion for rehearing or by the court upon its review in due course of such order, the revenues of which defendants-respondents will have been deprived up to the time of the abrogation of such order will have been forever lost to defendants. Neither the Commission nor the court could make provision for the recouping by or reimbursement to defendants-respondents of the very substantial losses which defendants-respondents will have sustained. No provision is contained in the Natural Gas Act authorizing the Commission or the court to order such recouping or reimbursement, and defendants-respondents would be without means of recovering or recouping such losses as a result of further rate proceedings or otherwise. Defendants-respondents, therefore, are without protection against the irrevocable loss of the amount represented by the reduced
2880 revenues, during the period pending consideration
by the Commission of the motion for rehearing and the review of the order by the courts, except by declining to observe the order during such period, in which event they might be prosecuted under the severe penal provisions of Section 21 of the Natural Gas Act. Said Section 21 provides that any person who wilfully and knowingly does, or causes, or suffers to be done, any act, matter or thing in the Natural Gas Act prohibited or declared to be unlawful shall, upon conviction thereof, be punished by a fine of not more than $5,000.00 or imprisonment for not more than two years, or both. It also provides that any person who wilfully or knowingly violates any rule, regulation, restriction, condition or order imposed by the Commission under authority of the Act shall, in addition to other penalties, be punished, upon conviction, by a fine of not exceeding $500.00 for each and every day during which such offense occurs. Without admitting that they would be subject to such severe penalties under the circumstances confronting them, defendants-respondents respectfully urge that they should not be put to the alternative of accepting the reduction of their revenues in a

very substantial amount each month as above pointed out, with no hope of recovery of their losses should the order be abrogated as the result of their motion for rehearing or their petition to the courts for review, or of defying the order of the Commission and thus taking the risk of becoming subject to the severe penalties in fines and imprisonment under the penal provisions above mentioned should the order ultimately be upheld.

2881 2. No express provision is contained in the Natural Gas Act for relief by appeal to any court for a stay of the operation of the order until after the denial of the motion for rehearing and the filing of a petition for review under Subdivision (b) of Section 19 of the Act. If the Natural Gas Act be construed as denying defendants-respondents the right to a review by a court of competent jurisdiction of the refusal of the Commission to stay the operation of its order dated July 23, 1940, and if the Natural Gas Act be construed as purporting to authorize the Commission to enforce said order pending the filing and disposition of the motion for rehearing, then the Natural Gas Act itself is null and void in so far as it purports to authorize the enforcement of the order during such period in that it would operate to deprive defendants-respondents of the right to a judicial review and to judicial relief against the injuries and damages they would sustain by reason of the operation of the order during the period pending the final disposition by the Commission of the motion for rehearing, in violation of the due process clause of the Fifth Amendment to the Constitution of the United States. Likewise, the order itself, for the same reasons, would be null and void in so far as it would operate to reduce the revenues of defendants-respondents during the period pending the filing and disposition of the motion for rehearing; and any effort by the Commission to enforce the provisions of the order requiring defendants-respondents to reduce their rates and charges during such period would result in an unconstitutional administration of the Natural Gas
2882 Act, in violation of the due process clause of the Fifth Amendment to the Constitution.

3. No such emergency exists as would justify subjecting defendants-respondents to the peril of losing their revenues in the substantial amounts above stated or of taking the risk of subjecting themselves to the severe

punishment and penalties under the provisions of Section 21 of the Natural Gas Act. In this connection defendants-respondents point out that in the complaint of the Illinois Commerce Commission filed herein and in the opinion of the Commission it was observed that the rates and charges of defendants-respondents have a substantial effect on the cost of gas to ultimate consumers who purchase gas from those to whom defendants sell gas at wholesale for resale; and it is manifest that the ultimate objective of the Commission and the underlying objective of the Congress in the enactment of the Natural Gas Act was and is to secure for the ultimate consumers fair and reasonable rates for natural gas. However, even if the order of the Commission ultimately be upheld, defendants-respondents point out to the Commission that no advantage can possibly accrue to such ultimate consumers by reason of enforcing the rates and charges set up by the order of the Commission dated July 23, 1940, during the period pending the disposition of defendants-respondents' motion for rehearing by the Commission and the review of the order by the courts. Until the motion be finally disposed of and, if the motion for rehearing be not granted, until the termination of the proceedings on appeal to the courts for a review of the Commission's order, no state commission or
2883 other regulatory body would be warranted in reducing rates to the ultimate consumers because of the reduced charges ordered by the Commission until it be finally determined that such reduced prices and charges are valid and enforcible. The practical effect, therefore, of the order and the reduction in defendants-respondents' revenues resulting from the operation of the order, pending the disposition of the motion for rehearing and the review by the court, would be to deprive defendants-respondents of the amount represented by the reduction in their prices and charges and transferring said sums, not to the ultimate consumers, but to the purchasers at wholesale from defendants-respondents under contracts approved and executed by such purchasers, none of whom is complaining of defendants-respondents' rates and charges.

4. No public interest will be served by requiring defendants-respondents to pay over sums aggregating $312,-500.00 a month during the period pending the disposition of the motion for rehearing by the Commission and the review of the order by the courts to the distributing com-

panies which purchase defendants-respondents' gas at wholesale and which are not here complaining that defendants-respondents' rates and charges are unjust and unreasonable.

Wherefore, defendants-respondents pray that the operation of the order dated July 23, 1940, be stayed and suspended pending the filing by defendants-respondents of their motion for rehearing and the disposition of such motion by the Commission and, in the event the motion for rehearing be denied, pending the review of said
2884 order by the courts on appeal.

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Attorneys for Defendants-respondents.

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Of Counsel.

State of Illinois }
County of Cook } ss.

Floyd C. Brown, being duly sworn, makes the following statement on oath: that he is the Vice President and General Manager of Natural Gas Pipeline Company of America and Texoma Natural Gas Company, defendants-respondents named in the above and foregoing motion; that he has read said motion and that the statements of fact therein contained are true.

Floyd C. Brown

Subscribed and sworn to before me this 7th day of August, 1940.

Esther M. Wilson,
(Seal) *Notary Public,*
Cook County, Illinois.

My commission expires May 27, 1943.

Filed Aug. 9, 1940. 2885

UNITED STATES OF AMERICA.

FEDERAL POWER COMMISSION.

* * (Caption—G-109 and G-112) * *

OBJECTIONS OF ILLINOIS COMMERCE COMMISSION TO GRANTING OF RESPONDENTS' MOTION FOR STAY OF COMMISSION'S ORDER OF JULY 23, 1940.

To the Honorable Federal Power Commission:

Now comes the Illinois Commerce Commission by its Attorney, John E. Cassidy, Attorney General of the State of Illinois, complainant in the above entitled cause, Docket Number G-109, and moves the Commission to deny the application of respondents for an order staying and suspending the effective date and operation of its order dated July 23, 1940.

2886

I.

Defendant-respondents are afforded ample opportunity to file their petition for rehearing before the effective date of the order on September 1, 1940.

II.

Defendant-respondents admit that their grounds for contending that the Commission's order of July 23, 1940 is invalid are already set forth in their briefs, pleadings, arguments and evidence filed with the Commission.

III.

Defendant-respondents' allegation that they will assign as error Points 1 to 30 contained on pages 4 to 8 inclusive of said motion afford no ground for the granting of a stay order since this paragraph in effect constitutes a petition for rehearing. Furthermore respondent states on page 8 that its position has already been made clear to the Commission in its affidavit, pleadings and briefs. As the Commission has rejected these contentions after a careful and deliberate consideration of these issues, no basis for granting respondents' motion for a stay has been made out.

IV.

Defendant-respondents' allegations that the Commission is without authority to reduce existing rates; that they do not concede that the rate base is proper; that 6½% does not constitute a fair and reasonable return; that defendant-respondents will be precluded from recovering the 2887 fair value of the property; that the order of July 23rd operates to confiscate and take respondents' property without due process of law; do not constitute any reason for granting a stay order as the Commission's order on its face demonstrates that respondents are assured of an adequate and fair return on a rate base in excess of their investment.

V.

Defendant-respondents' allegation that it proposes to seek a review of the Commission's order of July 23, 1940 in the Circuit Court of Appeals does not constitute ground for a stay order as it may apply to such court for a stay of the order of the Commission.

VI.

The allegation that the order will deprive respondents of $312,500.00 per month of revenues is not ground for granting of the stay order in view of the fact that the record shows that the respondents have been charging excessive and illegal rates in excess of those amounts for the past several years.

The order of the Commission sets forth in finding 15 that for the period of 1939 to 1942, the net revenues of the company available for amortization and return will average $9,362,032 annually; in finding 14, that the amount necessary for fair return and amortization is $6,395,180.00, such fair return being computed on the company's reproduction cost appraisal; in finding 16 that said net revenue will 2888 permit a reduction in net revenues of $2,966,852 or gross revenue of $3,750,000. If the Commission had used the Company's own investment as the rate base, or 6% as a fair return, the excessive return would have been found by the Commission to have aggregated much more than $3,750,000.00. The Commission itself has found that its order is conservative in view of the acceptance of the Company's estimates and the generous allowances made by the Commission throughout the order.

Wherefore, we pray that the application for a stay order be denied.

Illinois Commerce Commission,
By John E. Cassidy,
Attorney General.

Harry R. Booth,
Assistant of Counsel.

Entered Aug. 8, 1940. 2889

UNITED STATES OF AMERICA.

FEDERAL POWER COMMISSION.

Commissioners:

Leland Olds, Chairman; Claude L. Draper, Basil Manly.

John W. Scott and Clyde L. Seavey, not participating.

August 8, 1940.

• • (Caption—G-109 and G-112) • •

ORDER GRANTING IN PART AND DENYING IN PART A MOTION FOR A STAY OF THE COMMISSION'S ORDER OF JULY 23, 1940.

Upon application filed with the Commission on August 8, 1940, by Natural Gas Pipeline Company of America and Texoma Natural Gas Company, praying that the operation of the Commission's order dated July 23, 1940, in the above entitled matter, be stayed and suspended pending the filing of a motion for rehearing and the disposition of such motion and, in the event such motion be denied, pending the review of said order by the courts on appeal;

The Commission orders that:

(A) Paragraph (B) of the Commission's order adopted July 23, 1940, in this proceeding be and it is hereby amended to extend the time of filing of new schedules of rates and charges to on or before September 1, 1940;

(B) The application of Natural Gas Pipeline Company of America and Texoma Natural Gas Company, referred to above, be and it is hereby denied except as provided in paragraph (A) above.

By the Commission.

J. H. Gutride,
Acting Secretary.

2891 August 16, 1940. Filed Aug. 16, 1940.

UNITED STATES OF AMERICA.

FEDERAL POWER COMMISSION.

* * (Caption—G-109 & G-112) * *

APPLICATION FOR REHEARING.

To the Honorable Federal Power Commission:

Now come Natural Gas Pipeline Company of America and Texoma Natural Gas Company, defendants-respondents in the above entitled and numbered causes, hereinafter referred to as applicants, and apply for a rehearing on the order of the Commission dated July 23, 1940, and served on applicants on August 1, 1940, and for an order vacating and abrogating said order. The grounds upon which this application is based are stated specifically in the assignments of error, hereinafter set out, 2892 directed to certain rulings, holdings and findings in the proceedings leading up to the order, in the memorandum opinion on which the order is based, and in the order itself. Applicants insist that each of such assignments presents material error; and that the order based on such erroneous holdings, rulings and findings operates to deprive applicants of valuable and substantial rights and property, in violation of the due process clause of the Fifth Amendment to the Constitution of the United States, and of the Natural Gas Act, with the inevitable result that applicants will sustain damages aggregating many millions of dollars.

In their pleadings, their statements to the Examiner in the course of the hearing of evidence, their oral argument before the Commission, and their briefs heretofore filed with the Commission, applicants have fully presented to the Commission their positions and contentions on the issues raised by the assignments of error. The statement of applicants' counsel to the Examiner, Record pp. 30-43, the answer of defendants in cause No. G-109 filed November 18, 1938, defendants' pleas to the jurisdiction of the Commission dated December 18, 1939, defendants' conditional answer to the motion for interim order filed December 18, 1939, defendants' memorandum brief dated December 18, 1939, and defendants' reply brief dated February 15, 1940, all on file with the Commission, are by reference made a part of this application for rehearing. In the interest of brevity applicants will not repeat the arguments submitted orally and in their briefs or undertake to cite and discuss here the authorities sustaining the positions, contentions and arguments of applicants on the issues 2893 presented by the assignments of error, except in a few instances where applicants feel that some elaboration may assist in pointing out the effect of the error assigned. We wish to make it clear, however, that we are receding from our position on none of the issues presented by the assignments of error, but in support of the position of applicants on the issues raised by the assignments adopt and urge the arguments applicable to such issues heretofore presented by counsel for applicants in their oral arguments and in their briefs.

Assignments of Error.

First.

The Commission erred in holding that it has authority under the Natural Gas Act to change, modify or set aside the charges and prices at which applicants are selling natural gas in interstate commerce at wholesale, it appearing from the record without contradiction that applicants, constituting a single enterprise, are engaged in the business of owning natural gas reserves in the State of Texas, developing such reserves through the drilling and equipping of wells thereon, producing natural gas therefrom in quantities equal to three-fourths of their total market requirements, purchasing gas from others in quantities equal to one-fourth of their market requirements, transporting the gas so produced and purchased through their own pipelines and facilities to points in the States of Kansas, Nebraska, Iowa and Illinois, and selling such commodity at wholesale to selected distributors and industrial consumers under private contracts; that their business is of a strictly private character, not affected with a public interest in the sense that Congress would have jurisdiction, power or authority to enact legislation purporting to authorize the Commission to regulate the charges or prices for which such commodity is sold; and that the necessary operation of any order purporting to reduce, change or modify such charges would deprive applicants of their property and liberty of contract without due process of law, in violation of the Fifth Amendment to the Constitution of the United States. (Commission's memorandum opinion No. 49, p. 9; Commission's order reducing rates, finding No. 6, p. 3.).

2894 The point urged in the above assignment of error was raised in Paragraph 7 of defendants' answer in cause No. G-109 filed November 18, 1938, and again in Section I of defendants' pleas to the jurisdiction of the Commission dated December 18, 1939. However, the point was not discussed in the oral argument before the Commission or in the briefs filed with the Commission since it is directed at the Natural Gas Act itself in so far as said Act by its terms may be held to be an attempt to confer on the Commission authority to reduce the prices charged by applicants for natural gas sold at wholesale under private contracts. The Commission has no power or jurisdiction to decide an issue going to the constitutionality of an act of Congress, although it has undertaken to do so in its opinion and order to which this application is directed. The point was saved by applicants in their pleadings and in their briefs, to be presented, if necessary, to the courts, which have the exclusive jurisdiction to decide the issue raised.

Second.

The Commission erred in overruling defendants' second plea to the jurisdiction of the Commission dated December 18, 1939, and in holding that it has jurisdiction under the Natural Gas Act to reduce the prices at which applicants are selling natural gas, by interim order or otherwise, pending the final termination of the proceedings and hearing now pending before the Commission and its Examiner, and pending a finding by the Commission, after the conclusion of the hearing and after applicants have had an opportunity to be heard on their briefs and arguments on the facts presented by the whole record and the law applicable thereto, that the rates and prices charged and collected by applicants are unjust, unreasonable, unduly discriminatory or preferential. (Commission's memorandum opinion No. 49, pp. 10-13.)

2895 It will be noted that there is no formal finding among those contained in the order reducing rates going to the issue raised by this assignment. However, the

Commission, in its memorandum opinion, pp. 10-13, held contrary to the position urged by applicants in the assignment of error. Applicants raised the issue in Section II of defendants' pleas to the jurisdiction of the Commission dated December 18, 1939, and urged the point in their memorandum brief dated December 18, 1939, pp. 4-27, and in their reply brief dated February 15, 1940, pp. 32-43. The position of applicants in such pleas and in their briefs in substance was and now is that the rates and charges of applicants are prima facie valid and that the Commission is without jurisdiction to reduce such rates and charges until the hearing now pending before its Examiner shall have been finally completed and closed and until applicants have had an opportunity to be heard in their briefs and arguments on the facts presented by the whole record and the law applicable thereto and until the Commission shall then find that the rates and prices charged and collected by applicants are unjust and unreasonable.

We have pointed out that the motion for interim order was filed in the midst of the hearing then in progress before the Examiner. We point out now that we are still in the midst of that hearing. Thirty witnesses who testified for applicants have not been cross examined. The complainant and counsel for the Commission have offered no evidence except that going to the question of rate of return. Applicants have had an opportunity to cross examine the four witnesses who testified on behalf of complainant and the Commission on rate of return. Complainant and 2896 counsel for the Commission have stated that they will cross examine the other witnesses who testified for applicants and that they will present witnesses who will testify to facts going to the issues raised by the testimony submitted by applicants. Before applicants can be held to have had a hearing within the meaning of the Natural Gas Act the cross examination of applicants' witnesses must have been concluded; applicants must have been given an opportunity to offer redirect testimony by these same witnesses after they have been cross examined; applicants must have heard the testimony of those who will testify adversely and they must be given an opportunity to cross examine those witnesses; and applicants must be given an opportunity to offer rebuttal testimony in reply to the testimony of witnesses whom the complainant and counsel for the Commission will present at the hearing.

There is no contention by complainant or counsel for the Commission that the pending hearing has reached that stage where it can be closed. They have urged as a reason for an interim order the circumstance that many months will be required to complete the hearing. It is significant that the Commission in its memorandum opinion, page 11, states, "the companies have had a full opportunity, which they have exercised, to cross-examine all witnesses offered so far by counsel to either commission and to offer all rebuttal testimony in explanation and clarification which they desired with respect to the testimony of such witnesses." But a hearing within the meaning of the Natural Gas Act requires that applicants be given an opportunity to cross-examine all witnesses to be offered hereafter by counsel 2897 for either Commission and to rebut the testimony of such witnesses. Prospective delay in the orderly processes of justice is no justification for a denial of due process of law. Certainly the delay in this instance is not chargeable to applicants, who, an examination of this record will disclose, were required to present their testimony within a period much shorter than that ordinarily required for the presentation of such a volume of testimony of the character of that presented by this record. The complaint and investigation had been pending some fourteen or fifteen months when the last session of the hearing was concluded on January 10, 1940. Neither the complainant nor counsel for the Commission was ready to proceed with any testimony except that going to the question of a proper rate of return. Had counsel for the two Commissions been as diligent as were applicants in the preparation of their testimony, this hearing could have been completed and closed long prior to the expiration of the time required by the Commission to consider the application for interim order.

Third.

The Commission erred in holding that under the Natural Gas Act it has power and jurisdiction to enter an interim order pending the final termination of the hearing now pending and an opportunity by applicants to be heard by brief and oral argument on the law and the facts presented by the whole record, since no such power or jurisdiction is conferred upon the Commission by the Natural Gas Act, either in express terms or by necessary implication. (Commission's memorandum opinion No. 49, pp. 10-13.)

In Section III of defendants' pleas to the jurisdiction of the Commission dated December 18, 1939, applicants raised the point stated in the third assignment of error;
and in Points II, III, IV, V and VI of defendants'
2898 memorandum brief dated December 18, 1939, pp. 28-
82, and in defendants' reply to briefs and argument of complainant and counsel for the Commission dated February 15, 1940, pp. 32-43, applicants urged, and we think demonstrated, that there is no statutory authority empowering the Commission to enter an interim order pending the closing of the hearing now in progress, and in the absence of such statutory authority the Commission is without jurisdiction or power to enter such an order reducing applicants' rates. We demonstrated also that the jurisdiction and power to enter the interim order suggested in the motion cannot be read into the Act under the rule of contemporary construction; that the Commission has no power except that specifically conferred by the statute in express terms or by necessary implication; and that the words "after hearing" contained in the Natural Gas Act cannot be construed as authorizing the entering of any finding that prices and charges of applicants are unjust and unreasonable pending the final conclusion of the hearing now in progress.

Fourth.

The Commission erred in holding that in these proceedings applicants have had a hearing within the meaning of Section 5(a) of the Natural Gas Act, which provides that "whenever the Commission, after a hearing * * * shall find that any rate, charge, * * * is unjust, unreasonable, * * * the Commission shall determine the just and reasonable rate, charge, * * * and shall fix the same by order." (Commission's memorandum opinion No. 49, pp. 10-13.)

The issue presented by the fourth assignment is clearly raised in Sections II and III of defendants' pleas to the jurisdiction of the Commission dated December 18, 1939;
Section I of defendants' conditional answer dated
2899 December 18, 1939; and it is presented and urged in
Point VI of defendants' memorandum brief dated December 18, 1939, pp. 76-82, and in defendants' reply brief dated February 15, 1940, pp. 32-43. We remind the Commission that in their original brief counsel for complainant did not rely on the New England Divisions case

as authority for the interim order. On the other hand, they relied on cases arising in states in which there is special statutory provision for temporary orders with special provision for a recoupment of the difference in the temporary rate and the rate finally fixed should the rate finally fixed exceed the temporary rate. They also cited cases from the Oklahoma Supreme Court which, as we have already pointed out, are entirely out of line with the authorities in all other states. We demonstrated that the line of cases first cited in support of the motion for interim order are authority, not for the granting of the motion, but to the contrary. Counsel for the two Commissions then sought to fall back on the New England Divisions case and the Commission cites the latter case as authority for the order.

As we pointed out in our original memorandum brief (pp. 76-78) and in our reply brief (pp. 32-35), the New England Divisions case is not in point. If the hearing in the present case were now completed and if the oral arguments and briefs on the whole record, rather than half or less than half of it, had been presented, if the case had been submitted by all parties, and if the order were based on the whole record with a reservation that after further investigation in the light of the whole record the order might be changed or modified by the Commission, then the
New England Divisions case would be in point; but
2900 there is nothing in the New England Divisions case
warranting the conclusion that it is authority for the
procedure here, where the motion for interim order was entertained and the order entered in the very midst of the hearing.

Fifth.

The Commission erred in denying the request of applicants that the issues of fact and of law raised by the motion on which the Commission's order of July 23, 1940, is based and by the briefs in support thereof be referred to the Examiner for a very careful analysis and consideration after receiving briefs and oral argument from counsel for the interested parties, and that the Commission have the formal recommendations of the Examiner on the issues, both of fact and of law, and the exceptions of applicants thereto, if any, before the Commission should consider the entering of an interim order reducing applicants' revenues.

Applicants have repeatedly urged the point that the issues of fact and of law presented by the record should be referred to the Examiner, who heard the witnesses testify and observed the demeanor of the witnesses while on the witness stand, who was present when the statistical and technical exhibits were identified and explained by the witnesses, and who followed the explanations of the exhibits, many of which consisted of charts, graphs and drawings of a highly technical character and tabulations of figures which were practically meaningless unless accompanied by explanations by those who prepared the figures.

Applicants further urged that the Examiner prepare a report, accompanied by his recommendations, going to the issues of fact and of law presented by the record, and that applicants be furnished with a copy of the report in order that they might file and present their exceptions thereto before the Commission should consider the entering of an order based on such report and recommendations.

2901 Perhaps the Commission did refer the record to its Examiner. We do not know. Perhaps the Examiner did make a report accompanied by recommendations to the Commission. We do not know. Perhaps the Commission acted upon such recommendations and entered its order in pursuance thereof. We do not know. Perhaps it rejected the report and recommendations in whole or in part and entered an order inconsistent with such report and recommendations as a whole. We do not know. But applicants are entitled to know the facts concerning the procedure between the Commission and the Examiner. The denial by the Commission of applicants' request that the usual open procedure be followed is reversible error, if not indeed a denial of due process of law. It seems perfectly clear that the Commission would not be in position to accept or reject the Examiner's report in whole or in part without itself, through the personnel of the Commission and not through representatives, reading every line of the testimony reflected by the transcript and exhibits submitted in connection therewith. Perhaps the members of the Commission have discharged their responsibility in this connection by reading and studying every line of the testimony and the exhibits submitted in connection therewith and, without inviting any suggestion by applicants or offering applicants any opportunity to be heard on the Examiner's report or recommendations, have accepted or re-

jected such report and recommendations in whole or in part and proceeded on their own responsibility to make their findings and holdings set forth in the Commission's memorandum opinion and order reducing rates. Even if they have pursued that course, applicants have been denied due process of law. The testimony should be heard
2902 by the trier of the facts. This is of special importance in a proceeding of this character where it is so difficult to follow the testimony from a mere reading of the transcript.

Had the Commission followed the usual procedure and directed the Examiner to make a report accompanied by recommendations and caused a copy of such report and recommendations to be delivered to applicants, the issues to be determined by the Commission could have been narrowed down to those on which applicants disagreed with the report and recommendations of the Examiner. On these issues, after hearing counsel on arguments supporting their exceptions, the Commission could have examined the record and passed upon such exceptions in an orderly way which would have constituted due process. Valuable rights are involved here, and we respectfully urge that the process through which the Commission has arrived at the drastic results reflected by its order should have been made known to applicants prior to the entering of the order and that applicants should have been given reasonable opportunity to be heard prior to the entering of the order.

The Commission observes on page 10 of its memorandum opinion that applicants have had full opportunity to present oral argument and file briefs and have in fact made unmistakably clear their position with respect to every single issue involved in these proceedings. The fact is, this record shows that applicants have never been heard in oral argument on the facts involved in this proceeding. They appeared at Washington on December 18, 1939, at the only hearing held before the Commission itself during the entire progress of these proceedings. Their
2903 counsel announced that they were not prepared to present an oral argument on any questions except those involved in the several pleas to the jurisdiction of the Commission to enter an interim order. The reasons stated for their finding themselves in that position show clearly that they did not have an opportunity to present oral argument on the facts or on the law going to any other questions than those raised by the pleas to the

jurisdiction. It is true they were permitted to file a brief and that they did file a brief on February 15, 1940, embracing some 404 pages, in which they undertook to discuss the issues of fact and of law presented by the record. However, they were not given as much time as they stated to the Commission they would require in order properly to brief the questions involved, and even if they had had all the time they requested they could not have presented in their brief, with that clarity with which they could have presented their views before the Examiner, who had heard the witnesses testify and had followed them in their tedious explanations of the numerous exhibits presented in connection with their testimony, the arguments going to the question of a proper rate of return, which question the Commission, with no substantial evidence to sustain its finding, erroneously has resolved against applicants.

In applicants' memorandum brief and in their reply brief they have cited numerous authorities supporting the contention here made. These authorities include *Ohio Bell Telephone Co.* v. *Public Service Commission,* 301 U. S. 292, 81 L. E. 1093; *Morgan* v. *U. S.,* 298 U. S. 468, 80 L. E. 1288; *Morgan* v. *U. S.,* 304 U. S. 1, 82 L. E. 1129; and *Wisconsin Telephone Co.* v. *Public Service Commission,* 287 N. W. 122.

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Sixth.

The Commission erred in not holding that the burden of proof rests upon complainant and counsel for the Commission to establish that applicants' existing charges are unjust and unreasonable, and that such burden has not been discharged.

Seventh.

The Commission erred in not holding that when and if complainant and counsel for the Commission discharged their burden of showing that applicants' rates and charges are unjust and unreasonable, the burden was then upon complainant and counsel for the Commission to show what rates and charges would be just and reasonable, and that such second burden has not been discharged.

The Commission in its memorandum opinion and its order ignored the issues raised in the sixth and seventh assignments of error. In the very beginning of these proceedings applicants urged that the burden of proof rests upon the complainant and counsel for the Commission to establish that applicants' existing charges are unjust and unreasonable and that after they shall have discharged that burden, if they ever do, the burden will still rest upon them to show what rates and charges would be just and reasonable. That they have not discharged either of these burdens goes without saying, for they have made no attempt to discharge such burdens. We have presented this question in the oral statement of counsel shown at pages 30-42 of the transcript and in defendants' reply brief dated February 15, 1940, pp. 27, 43-96, and 378-391.

Eighth.

The Commission erred in finding that the rates and charges presently charged by applicants are unjust,
2905 unreasonable, unlawful and violative of the provisions of the Natural Gas Act. (Commission's memorandum opinion No. 49, p. 26; Commission's order reducing rates, finding No. 18, p. 4.)

Applicants have made their position on this point clear in their reply brief dated February 15, 1940, at pages 43-96, 378-391. We adopt the argument there presented. The succeeding assignments of error and the comments submitted in support of such assignments apply to and are adopted and urged in support of this assignment.

Ninth.

The Commission erred in establishing the following rate base:

Reproduction cost new of physical properties (exclusive of gas reserves as of June 1, 1939)	$56,302,250
Value of gas reserves as of June 1, 1939	13,334,775
Capital additions from June 1, 1939, to December 31, 1942	3,808,399
Working capital	975,000
Rate base	$74,420,424

(Commission's memorandum opinion No. 49, p. 19; Commission's order reducing rates, finding No. 8, p. 3.)

Tenth.

The Commission erred in not allowing as the proper rate base the items and amounts set out in defendants' reply brief dated February 15, 1940, p. 251, as follows:

2906 Reproduction cost new exclusive of gas reserves	$56,302,250
Less "viewed" depreciation	2,866,758
Present value of physical properties exclusive of gas reserves	$53,435,492
Present value of gas reserves	13,334,775
Allowance for future capital expenditures	6,046,286
Going concern value	8,500,000
Working capital	975,000
Rate base	$82,291,553

Eleventh.

The Commission erred in not holding that the proper rate base is the present value of the property, which, under the uncontradicted evidence, is made up of the reproduction cost new less viewed or actual depreciation of the depreciable properties, the value of the gas reserves, the going concern value, the working capital, and a proper allowance for future capital expenditures aggregating $82,291,553. (Defendants' reply brief dated February 15, 1940, p. 251.)

Twelfth.

The Commission erred in attempting to apply its own theory as to undepreciated rate base by placing on the gas reserves the present value of those reserves in their depleted condition. (Defendants' reply brief dated February 15, 1940, pp. 144-161.)

With reference to the ninth, tenth, eleventh and twelfth assignments of error we point out that applicants have
never made the contention that the reproduction cost
2907 new of the physical properties other than leaseholds
represents the present value of such properties. In
conformity with the rule declared in *Smyth* v. *Ames*, 159

U. S. 466, 42 L. E. 819, and uniformly reaffirmed thereafter by the Supreme Court of the United States and other courts of last resort, we urge that the proper rate base is the present value of the property, including going concern value and working capital, now devoted to applicants' business, plus a proper allowance for future capital expenditures which the evidence shows without contradiction will be required during the remaining life of applicants' gas reserves in order to continue their business. No logic would justify fixing the present value of the depreciable properties other than leaseholds at the reproduction cost new thereof, with no deduction for depreciation that has already occurred in the properties of the existing plant, and then fixing on the gas reserves a valuation which in effect applies past depletion to the reproduction cost of such gas reserves. Yet that is exactly what the Commission has done in its findings and in its order. In weighing the reproduction cost new of the present properties, the Commission was required under the law to give effect to past depreciation and depletion of the present properties. The Commission seems to have become confused in the application of the rule that if the sinking fund formula be applied in computing the allowance for depreciation or amortization, an undepreciated rate base will be allowed. As we have demonstrated in defendants' reply brief dated February 15, 1940, pp. 172-181, that rule has nothing to do with the present depreciated and depleted condition of applicants' properties or with the deduction of past 2908 depreciation and depletion from reproduction cost new in arriving at present value. The rule has to do with future depreciation. Applicants' complaint is that the Commission has failed to allow the proper rate base in that it has failed to consider observed depreciation of the depreciable properties in the past and in that it has denied any allowance for going concern value or for capital expenditures after the year 1942, which, under the uncontradicted evidence, it must allow in arriving at the present fair value of applicants' properties.

The errors of the Commission in denying any allowance for going concern value and in denying any allowance for capital expenditures made after the end of the year 1942 will be specifically presented in succeeding assignments of error.

Thirteenth.

The Commission erred in making no allowance for going concern value in fixing the rate base and in fixing the amount to be amortized. (Commission's memorandum opinion No. 49, p. 19.)

Fourteenth.

The Commission erred in holding that the sum of $8,500,000 claimed by applicants as going concern value is an arbitrary claim not supported by substantial evidence, it appearing from the uncontradicted evidence that said sum of money represents the aggregate of expenditures actually made and costs actually sustained in developing the market outlets for applicants' gas up to the normal capacity of the lines; that such expenditures and costs were reasonable; and that at least that amount would have to be expended in attaching business if applicants were now at the beginning of their operations. (Commission's memorandum opinion No. 49, p. 19.)

2909 Notwithstanding the observations of the Commission in its memorandum opinion, we submit and again urge that applicants' claim for an allowance of $8,500,000 as going concern value is not an arbitrary claim, nor would its allowance mean the acceptance of a "deceptive fiction." It is supported by substantial evidence which is uncontradicted. The Commission says its allowance would result in an unfair imposition upon consumers. Our position is that its denial results in an unfair imposition on applicants in that it operates to confiscate this very substantial element of value which applicants have acquired as a part of the total value of their property at an actual cost greater than the amount claimed.

In their reply brief applicants have demonstrated that the courts for nearly a half century have held uniformly that going concern value must be considered and allowed in arriving at the present value of properties in fixing the rate base and in fixing the amount to be amortized. Only in those instances where the evidence fails to show the presence of going concern value have the courts upheld regulatory bodies which have denied an allowance for going concern value. It is true that the proving of going concern value has been fraught with difficulties. The result is that it has become the practical rule that this element of value will be allowed only in the amount which the evidence shows definitely to be represented by actual costs to the regulated concern during the period of development. Every item claimed by applicants is amply supported by proof that the costs representing the item claimed were actually incurred. In every instance, 2910 except that dealing with actual depreciation during the first four years of applicants' operations, the evidence shows without contradiction that the money was actually paid out of pocket by applicants as interest on money invested in facilities provided in advance of load, in ad valorem taxes on such facilities during the period of load building, and in expenditures actually made in promotional activities in loading the line.

The claim for depreciation in connection with this item represents the actual depreciation on the facilities not yet in use during the load building period. The method of arriving at these values is not subject to question and the figures themselves are not subject to contradiction. An examination of the authorities submitted by applicants in their brief shows that the amount claimed is not out of line with amounts allowed for this item in many adjudicated cases. As already pointed out, the case of *Southwestern Bell Telephone Co.* v. *City of Fort Smith*, 294 Fed. 102, is direct authority sustaining this claim and the method of developing the evidence supporting it.

Fifteenth.

The Commission erred in reducing the amount allowed for future capital expenditures from $6,046,286, as claimed by applicants, to $3,808,399, thus eliminating from the amount allowed all future capital expenditures after December 1, 1942, it appearing from the uncontradicted evidence that the amounts claimed by applicants for capital expenditures after the date last mentioned will certainly and definitely be made and that the property acquired through such expenditures will be devoted to applicants' business. (Commission's memorandum opinion No. 49, pp. 17, 18 and 19; Commission's order reducing rates, finding No. 8, p. 3.)

2911 The Commission in its memorandum opinion observed that the improvements referred to in this assignment have not yet been made; that they are contemplated in the future; and it then asserted that such improvements are not used and useful in the present and to a certain extent must be deemed conjectural. As a matter of fact, the record shows without contradiction that substantial expenditures would have been made prior to the present time. It is true that the others are contemplated in the future. It is also true that those additional assets not yet acquired are not used and useful at the present; but we challenge the statement that these improvements even to a certain extent, to quote the Commission's language, are conjectural. The testimony is clear and unequivocal that these figures represent, not additional capital expenditures which may have to be made, but expenditures which must be made in order to carry on applicants' business through the year 1954. The testimony that applicants' gas wells are losing pressure from month to month and that with the decline in pressure there is even a more rapid decline in the productive capacity of the wells is uncontradicted. That testimony is not conjectural; it is in conformity with common knowledge concerning the behavior of gas wells. There is no conjecture in the uncontradicted testimony that additional wells will have to be drilled in large numbers to overcome the loss in productive capacity incident to the decline in pressures. There is no conjecture in the testimony that pipelines will have to be built to each of these new wells, and that meters and regulators will have to be installed at each of said wells. There is no conjecture in the uncontradicted
2912 testimony that as the pressures decline it will be necessary to install field compressor stations in order to deliver gas into the initial main line compressor station in such quantities as to keep applicants' pipeline loaded to its normal capacity. The drilling of new wells, the building of pipelines to these wells, the installing of meters and regulators at these wells, and the installing of field compressor stations to service all wells, drilled and to be drilled, constitute the major portion of the additional capital expenditures. Substantial portions of the remaining amounts claimed in this connection are directly related to the drilling, equipping and operation of new wells and the building and maintaining of the additional pipelines and

compressor station facilities. The other items are supported by positive testimony based on studies which the record shows were thorough to the last detail. The uncontradicted testimony further shows that the figures are conservative and that many additional capital outlays will be required to cover contingencies which the witnesses could not yet certainly foresee at the time they testified.

The Commission agrees that, in fixing rates for the future, reasonable estimates of property additions in the immediate future should be taken into consideration. Applicants' complaint is that in applying that principle, which was developed in connection with the regulation of continuing or perpetual utilities, the Commission failed to take into account the difference in the situation of applicants and such continuing or perpetual utilities. Applicants are engaged in an extractive industry. When their source of supply is exhausted they will of necessity go out of business. It is necessary, therefore, 2913 to look ahead and to make provision for additional capital costs to the end that applicants' rights be protected before it is too late to protect them. These expenditures are made from year to year—indeed, from month to month. It is utterly impractical to go back to the Commission each month or even each year and ask for additional allowances in the rate base to cover these capital expenditures which inevitably will have to be made. As observed by the Commission, applicants have not sought an allowance of the total of these capital expenditures in the rate base, but are asking an allowance of substantially less than the total under the principle of average investment over the period to be covered by the new rate. We have covered the subject thoroughly in defendants' reply brief dated February 15, 1940, pages 206-221.

Sixteenth.

The Commission erred in holding that the total investment, by which it manifestly means original cost, in contradistinction to claimed fair value, less the salvage value at the end of applicants' business, should be amortized. (Commission's memorandum opinion No. 49, pp. 20 and 21.)

Seventeenth.

The Commission erred in holding that the proper amount to be amortized is $78,284,009. (Commission's memorandum opinion No. 49, p. 21; Commission's order reducing rates, finding No. 9, p. 3.)

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Eighteenth.

The Commission erred in not holding that the proper amount to be amortized is $84,341,218, representing the present fair value of applicants' present properties, including going concern value and working capital, plus future expenditures for additional capital assets, less the liquidating salvage value at the end of the project's life. (Commission's memorandum opinion No. 49, pp. 20-22.)

Applicants have discussed the questions raised in the sixteenth, seventeenth and eighteenth assignments thoroughly in defendants' reply brief dated February 15, 1940, pages 97-226. There we presented squarely to the Commission the proposition that, whatever the rule may be as to ordinary public utilities or industries under regulation at the beginning of operations, an unregulated industry, upon being placed under regulation for the first time by the operation of a statute, is entitled to amortization of the full fair value of its properties subjected to public use as of the time it is overtaken with regulation, including cost in the future of additional facilities. The soundness of this proposition is not open to question, as we view it. The Commission made no comment on this question or on the authorities submitted in support of applicants' position in respect thereto. We urge upon the Commission, therefore, that it carefully reconsider its holding on this point and that it compare the situation of applicants with that of an owner whose property is condemned and actually acquired through the exercise of the right of eminent domain. It has been held universally that in condemning the property of a private owner for public uses the owner must be compensated in the amount of the fair value 2915 of the property condemned. It is true that the operation of the Natural Gas Act is not to take the title to applicants' properties; but it is manifest that the character of that title is radically and materially changed. Applicants no longer have a property devoted to their own private enterprise of producing, purchasing, transporting and selling natural gas at wholesale at prices on which they can agree with their purchasers; but, if the Natural Gas Act be upheld, they now have a property which, not they, but the Congress, has dedicated to a public use and which they must now own and operate under the regulation of the Federal Power Commission, delegated by Congress to carry out the provisions of the Act. It was not the original cost of applicant's properties in 1931, 1932, and subsequent years which Congress dedicated to a public use. On the other hand, it was the property which applicants owned and were utilizing in the operation of their business which Congress so dedicated. If it be assumed that Congress has the power to lay hold on property devoted to the character of business in which applicants are engaged and, without their consent, change the character and use of that property by impressing it with a public interest, then the Congress must provide for a reasonable return on the value of that property and for a return, over the future life of applicants' business, of the value, not the original cost, of such property at the time its character is changed.

Nineteenth.

The Commission erred in holding that the proper amortization period should be the total estimated life 2916 of the business, namely, 23 years from the beginning of 1932 to the end of 1954. (Commission's memorandum opinion No. 49, pp. 20-21; Commission's order reducing rates, finding No. 10, p. 3.)

Twentieth.

The Commission erred in not holding that the proper amortization period should be the period intervening from the present time to the end of the project's life, which, under the uncontradicted evidence, will be sometime prior to December 31, 1954. (Commission's memorandum opinion No. 49, p. 20.)

The issues presented by the nineteenth and twentieth assignments of error are of the utmost importance in that the drastic effect of the Commission's error in disposing of these questions will inevitably result in the confiscation of many millions of dollars of the present value of applicants' properties affected by the Natural Gas Act. We have presented the question in defendants' reply brief, pages 226-237. It is our view that there is no escape from the position presented there.

When applicants' pipelines were constructed in 1930 and 1931 and when their operations commenced on January 1, 1932, they were not subject to regulation by any national or state commission or tribunal. Their business was a private enterprise, and it continued to be a private enterprise until the enactment and approval of the Natural Gas Act near the middle of 1938. Even if the Natural Gas Act be valid, they were not actually overtaken with regulation until August 1, 1940, the effective date of the Commission's order reducing rates. Prior to the date last mentioned the rates fixed between applicants and their purchasers at wholesale by private contracts 2917 continued to be valid and binding on all parties. Their earnings prior to the issuance of the first order of regulation were their own, and the Commission is without authority to prescribe the application of their earnings prior to regulation. Yet, in thus directing that the period of amortization begin on January 1, 1932, the Commission is attempting to impose retroactive regulation upon applicants and applicants' business, not from the time its first order affecting applicants was issued, or indeed from the date the Act became effective, but for a long period prior to either of such dates. Not only did the Commission attempt to give retroactive effect to regulation in its treatment of the subject of amortization; but in that attempt the Commission failed to take into account the uncontradicted evidence showing that the total net revenues before amortization and return in each of the years 1932, 1933 and 1934 were less than the amount allowed in the order for amortization and return.

In ordering that the period of amortization should continue through the entire remaining life of the field the Commission ignored the fact, established by the uncontradicted evidence and accepted by the Commission as true, for the purposes of the interim order, that during the last two years of applicants' operations, 1953 and 1954, the total earnings available for amortization and return, without deducting the $3,750,000 as ordered by the Commis-

sion, will be substantially less than the entirely inadequate amount allowed by the Commission for amortization and return. Indeed, Exhibit 142, which the Commission has accepted for the purposes of this order, shows that
2918 after deducting this $3,750,000 annually from the net revenues available for amortization and return there will not be a single year from 1943 to 1954 inclusive when applicants will earn the amount allowed for amortization and return.

Twenty-First.

The Commission erred in hoding that the annual allowance for amortization should be calculated on a sinking fund basis, with interest credited to the amortization reserve at the rate of 6½% per annum, compounded annually. (Commission's memorandum opinion No. 49, pp. 21-22; Commission's order reducing rates, finding No. 11, p. 3.)

Twenty-Second.

The Commission erred in not holding, under the uncontradicted evidence, that the annual allowance for amortization should be calculated on a straight line basis, or in any event on a sinking fund basis with interest credited to the amortization reserve at the rate of 2% per annum, compounded semi-annually. (Commission's memorandum opinion No. 49, pp. 21-22.)

Twenty-Third.

The Commission erred in holding that it is fair and equitable, in computing the amortization to be charged as an operating expense under the sinking fund formula, to use an interest rate of 6½%, the allowed rate of return. (Commission's memorandum opinion No. 49, pp. 21-22.)

Twenty-Fourth.

The Commission erred in not holding that in computing the annual reserve for amortization an interest rate of not more than 2% per annum, compounded semi-annually, should be used. (Commission's memorandum opinion No. 49, pp. 21-22.)

The questions raised by the twenty-first, twenty-
2919 second, twenty-third and twenty-fourth assignments
of error were presented to the Commission by applicants in defendants' reply brief, pages 237-247. In holding that in computing the annual reserve to be allowed for amortization of the proper amount to be amortized an interest rate equal to the allowed rate of return should be used, the Commission has proceeded upon a new theory unsupported by authority of law. It has rejected the straight line method of computing the amortization reserve and has adopted an unsanctioned sinking fund method of computing the annual allowance for amortization. It has overlooked entirely the principle underlying the adoption of a sinking fund method of computing the annual allowance for amortization. The underlying reason for employing the sinking fund formula, through the operation of which less than the total amount to be amortized is paid back to the owners by the purchasers, is that an amount is returned each year which can be so managed and invested by the regulated company that at the end of the amortization period the amounts allowed from year to year together with the earnings on those amounts will aggregate the amount to be amortized. The Fifth Amendment to the Constitution requires that the full amount representing the value of applicants' properties be returned to applicants by the end of their operations. To deny them a return of all of the amount operates to confiscate their property, in violation of the due process clause. It is reasonable in computing the annual allowance for this purpose to charge the regulated company with interest on the amounts annually set aside at a rate which the owner of the funds can earn through its investment in outside securities of a character that will
2920 insure, as nearly as is possible, that both the principal and the interest will be available at the close of the owner's business. That underlying principle has been utterly overlooked, or, if not overlooked, ignored, by the Commission in its order at which this application is directed. It has fixed the compound interest rate to be used in computing the amortization reserves at 6½% per annum, the allowed rate of return.

The reason that it is proper to compute the return allowed on the value of applicants' property without depreciating the rate base over the period during which the

new rate will be effective is that, under any sinking fund method of computing the annual allowance for amortization, the full amount to be amortized is not paid by the purchasers; but only a portion thereof is paid. The sum of the annual installments is less than the total amount which must be returned. Applicants must look elsewhere than to their purchasers for a recovery of the difference between the sum of the amounts actually set aside from year to year and the total value of their properties. They cannot be required to put these annual installments to risk in the regulated business or a business of similar risks in order to procure a return to them of the full value of their property. They are entitled to put the reserve in the nearest to risk free investments obtainable. It is impossible to find investments which are risk free, as this record shows without contradiction. It is undisputed in the testimony that 2%, compounded semi-annually, is the highest return which applicants could be expected to earn through the sound investment of the annual allowances for amor-
2921 tization in the highest classes of securities available.

All the errors of which applicants complain are material in their effect upon the rights of applicants, and the effect of each of these errors is confiscation of applicants' property; but the Commission's errors in using the 6½% interest rate, compounded annually, rather than 2%, compounded semi-annually, in computing the allowance for amortization, like its errors in holding that the amortization period should begin in 1932 instead of the present time, are drastic in their results in that the effect of these errors will be to confiscate many millions of dollars of the amount representing the present value of applicants' properties. We shall have more to say on this point in our discussion of the succeeding assignments of error.

Twenty-Fifth.

The Commission erred in holding that as an annual reserve for amortization the sum of only $1,557,852 should be allowed. (Commission's memorandum opinion No. 49, pp. 22 and 26; Commission's order reducing rates, finding No. 12, p. 3, and finding No. 14, p. 4.)

Twenty-Sixth.

The Commission erred in not holding that the proper annual allowance for amortization is at least $5,100,732.

The errors of the Commission pointed out in the twenty-fifth and twenty-sixth assignments grow out of the Commission's errors pointed out in assignments sixteenth to twenty-fourth inclusive. The method by which the amount claimed by applicants as a proper annual allowance 2922 for amortization is calculated is set out in defendants' reply brief, pages 237-247.

We will now undertake to point out specifically the ultimate effect of the errors of the Commission in allowing only $1,557,852 annually as a reserve for amortization.

In the preceding assignments of error, out of which the last two assignments grew, we have pointed out that the proper amount to be amortized is $84,341,218; that the proper period of amortization is that beginning with the effective date of the order, namely, August 1, 1940, and ending with the life of applicants' gas reserves, which, under the uncontradicted evidence, will be exhausted sometime prior to the end of 1954. We have urged that the Commission should apply a safety factor and fix a shorter term for amortizing the value of applicants' property than the remaining life of the field; but, for the purpose of the figures we are about to submit, we will assume that applicants' business will continue through the year 1954, or a period of fourteen years, five months from the effective date of the order. We have pointed out that, if the sinking fund formula be employed in calculating the amortization reserve, the compound interest rate used must be not more than 2%. We have also pointed out that there is no authority for arbitrarily adopting the rate of return as the compound interest rate used in computing the annual allowance for amortization.

Since the proper amount to be amortized is $84,341,218, the holding of the Commission allowing as the amount to be amortized only $78,284,009 results in the confisca- 2923 tion of $6,057,209 of the amount which must be returned to applicants by the end of their project's life. Substantial as is the sum last mentioned, it seems small when compared with the amounts which would be confiscated as a result of the other errors of the Commission in calculating the allowances for amortization.

If $1,557,852 be set aside annually over fourteen years, five months from and after August 1, 1940, the total amount set aside by the end of 1954 will be only $22,459,034. Interest on the several installments, compounded semi-annually at the rate of 2%, will accumulate interest in the amount of $3,282,480. The total allowance, including interest, therefore, will aggregate at the end of the amortization period $25,741,514. Thus it appears that of the $84,341,218 which must be returned to applicants there will be a deficit over the period of $58,599,704, which amount will be absolutely confiscated by the operation of the order. Placing these figures on an annual basis, the amount confiscated each year under the operation of the order is $4,064,710. Even if $78,284,009 were the proper amount to be amortized, as the Commission erroneously found, there would be a total deficit of $52,542,495, or an annual deficit of $3,644,558, which would be confiscated under the operation of the order.

If the proper amortization period were 23 years, as the Commission erroneously found, the setting aside of $1,557,852 annually would accumulate during the 23 year period only $35,830,596. The interest on the annual installments, compounded semi-annually at 2%, would accumulate an additional $9,157,915, or a total accumulation of principal and interest of $44,988,511. Thus it appears that, even if the Commission were right in fixing 23
years as the amortization period, the accumulation
2924 would fall short of the $84,341,218 to which applicants
are entitled over the period by the sum of $39,352,707,
or an annual deficit of $1,710,987, which would be confiscated through the operation of the order. If the Commission were right also in fixing the proper amount to be amortized at $78,284,009, there would still be a deficit of $33,295,498 over the whole period, or an annual deficit of $1,447,630, which would be confiscated under the operation of the order.

Now let us test the order by assuming, contrary to law and the uncontradicted record, that 6½%, the allowed rate of return, should be used as the compound interest rate in computing the annual allowance for amortization. During the fourteen years, five months remaining of the life of applicants' business after the effective date of the order the amount allowed would accumulate $22,459,034. Interest on the annual installments at the rate of 6½% per annum, compounded annually, during the period would accumulate an additional $13,018,702, or a total of $35,-

477,736 as principal and interest. Thus it appears that of the $84,341,218 which must be returned to applicants there will be a deficit over the period of $48,863,482, or an annual deficit of $3,389,367, which would be confiscated under the operation of the order. Applying these figures to $78,284,009, erroneously fixed by the Commission as the amount to be amortized, there would be a deficit of $42,806,263 over the whole period, or an annual deficit of $2,963,381, which would be confiscated.

Even if it be assumed that the Commission did not err in fixing the amount to be amortized, in fixing the
2925 period of amortization, or in fixing the compound interest rate to be used in computing the annual allowance for amortization, the amount allowed is inadequate and results in confiscation in that the sum of the 23 annual allotments of $1,557,852 added to the interest on each annual allotment at 6½%, compounded annually, amounts to only $78,044,638, or $239,361 less than the amount erroneously allowed by the Commission.

Twenty-Seventh.

The Commission erred in eliminating from the allowance for operating expenses the items representing replacements of capital assets subsequent to August 1, 1940, in an amount averaging $188,054 per annum. The estimated cost of these items is included in the $78,284,009 erroneously allowed by the Commission as the proper amount for amortization. However, in estimating applicants' average income available for amortization and return for the period from August 1, 1940, to and including December 31, 1942, the Commission disregarded the estimated cost of replacements during that period. Applicants point out that the Commission failed to include such costs among the operating expenses, thus under its own theory arriving at an amount $188,054 greater than the correct amount available for amortization and return under such theory.

Applicants' position on this question is presented in defendants' reply brief, pages 247-249. The error of the Commission in including the cost of replacements in the erroneous amount allowed for amortization does not offset its error in failing to allow the average cost of replacements as an operating expense. Applicants are entitled to recoup these replacements as operating costs just as they are entitled to an allowance for the cost of items representing maintenance of the pipeline.

2926

Twenty-Eighth.

The Commission erred as a matter of law in finding that 6½% per annum on the rate base allowed is a fair rate of return for applicants, there being no substantial evidence to support the finding. The allowed rate of return purports to cover only the cost of capital, based on the testimony of an employee of the Commission whose conclusion on that point is not supported by his own factual premise. No allowance is made for efficiency and skill in design and engineering, through which applicants are able to operate their facilities under extraordinarily high stresses and to transport gas at extraordinarily high pressures, and efficiency in management in attaining and maintaining an average load factor more than 30% higher than that ordinarily attained by other pipelines, which efficiency and skill account for at least $1,200,000 of applicants' annual revenues, according to the uncontradicted testimony. (Commission's memorandum opinion No. 49, pp. 23-26; Commission's order reducing rates, finding No. 13, p. 3.)

Twenty-Ninth.

The Commission erred in not finding that the fair rate of return for applicants is not less than 8%.

The subject of a proper rate of return consumes a very substantial portion of the entire record, including numerous exhibits dealing with the cost of capital and other statistical subjects. In their reply brief, pages 278-391, applicants devoted more than 100 pages to a discussion of the evidence and the authorities going to this subject. We adopt and again urge all that we presented in the brief on this question. It is not practical, of course, for us to undertake here to go into an analysis of the testimony. Suffice it to say we still insist that there was no factual support in his own figures for the conclusions stated by the witness Smith that earnings of 6.2% to 6.5% would enable applicants to refinance even on the basis of 40% bonds, 20%
preferred stock, and 40% common stock. The very
2927 figures set out on page 24 of the Commission's memo-
randum opinion show a cost of refinancing in excess
of 6.5%. The Commission says, "The cost of money to such company would be 3.75 per cent for the bonds, 6.10

per cent for the preferred, and 10 per cent cost of floating the common stock." Had the Commission analyzed these figures it would have found that the total overall cost would amount to 6.72%, or 22/100 of 1% in excess of the earnings allowed. As demonstrated by Exhibit 209 and pointed out specifically in defendants' reply brief, pages 299-303, the exhibits submitted by the witness Smith, when supplemented by essential facts not shown in such exhibits, show that the cost of capital to natural gas pipeline companies would amount, on Smith's division of 40% to bonds, 20% to preferred stock, and 40% to common stock, to 7.71%; but all witnesses agreed that practically no preferred stock has been floated during the past several years by natural gas pipeline companies, for very good reasons reflected by the uncontradicted testimony. If the bonded indebtedness be increased to 50% and the common stock represent the other 50%, the same figures show that the overall cost would be in excess of 8%.

It is true that Smith testified that applicants could finance on as favorable a basis, if not a more favorable basis, than any natural gas producing and transmission company in the United States; but that conclusion by the witness is not sustained by the factual evidence brought in by the same witness through his exhibits. He admits that he knows substantially nothing about the particular risks confronting applicants, or, for that matter, the risks confronting the other pipeline companies with which he deals in his exhibits. His statement on that
2928 point is entitled to no more dignity than that of a mere guess.

As to the witness Kleinman, who is the only witness who testified that less than 8% would be a reasonable and proper rate of return, we have demonstrated in defendants' reply brief, pages 306-316, that the witness is utterly unqualified from a standpoint of experience, if not disqualified by reason of bias and prejudice. He admitted that his conclusion that 6% is a proper rate of return for applicants was based on his judgment that applicants were entitled to a lower rate of return than electric and gas distributing companies, on the theory that applicants are confronted with fewer risks than such distributing companies. He had already admitted that the Illinois Commerce Commission had recently allowed an electric utility a return of 6.3%. The abandon with which the witness approached his final conclusion, as pointed out on pages 313-314 of defendants' reply brief, should prompt the Commission utterly to disregard his testimony.

The Commission observes that there is abundant evidence disclosing that we are today at a point where rates of return demanded are among the lowest that have ever existed. We challenge that statement. The testimony is that the interest rates for short term loans of the very highest order and the yields on bonds of the very highest order are lower than at any time during the period covered by the exhibits. The evidence does not show that rates of return demanded are the lowest which ever existed. The testimony is exclusively to the effect that capital is staying out of industry and enterprise to an alarming degree, due to the circumstance that its owners are not willing to invest it at the prevailing rates obtainable. 2929

The Commission says that the exhibits put into evidence by practically every witness show that today overall returns are lower than before. Let that be granted; but these exhibits uniformly show that there is a wider margin between the yields on high grade bonds and the compensation demanded for risk than has ever obtained during the period covered by the exhibits. There is no showing that the overall returns and yields in the natural gas business over the past several years and at the time the exhibits were prepared were as low as 8%, not to speak of 6½%, the rate allowed by the Commission.

The Commission makes no pretense of allowing anything but cost of financing in the rate of return fixed, and, as already pointed out, it failed to allow the overall cost of refinancing as reflected by its own figures. No allowance whatever is made in the rate fixed for the circumstance that by reason of their enterprise, their engineering skill in designing and constructing the facilities employed, and the unusually efficient management of applicants in operating the line and marketing their products, applicants operate their facilities at the highest stresses and pressures ever attained by any pipeline company, with the result that they are able to transport, and do transport and market through their facilities, substantially higher volumes of gas than the quantities normally transported through pipelines of the same diameter by other companies. No allowance is made for the circumstance that by the exercise of extreme and sustained diligence, applicants have been able to build up and maintain an annual load factor of 92% of the maximum pipeline capacity, as compared with 70% ordinarily attained by other pipeline companies. No allowance is made for the circumstance that this skill, efficiency, diligence and man- 2930 agement account for at least $1,200,000 annually of applicants' revenues.

It is inconceivable that the Commission would consciously attempt to cut the allowed return down to the point where it could barely escape the test of confiscation. The rate allowed does not meet that test; for it does not cover the actual cost of refinancing, much less any additional compensation for other elements which must be allowed applicants if the rate of return is to be fair and reasonable. In the light of the record, a finding that a rate of return of 6½% per annum is fair and reasonable presents a question of law, for there is no substantial evidence to support it. Only if the rate allowed were 8% or in excess of 8% could the finding of the Commission be upheld under the rule that its findings on the facts are conclusive. There is a difference of opinion among the witnesses qualified to testify on this point as to whether the rate of return should be 8% or some higher rate; but there is no evidence of probative force that would justify fixing the rate of return at less than 8%.

Thirtieth.

The Commission erred in holding that the annual amount necessary for a fair return to applicants is not more than $4,837,328 and that the proper allowance for amortization is $1,557,852, or a total of $6,395,180 for fair return and amortization. (Commission's memorandum opinion No. 49, p. 26; Commission's order reducing rates, finding No. 14, p. 4.)

Thirty-First.

The Commission erred in finding that applicants' 2931 annual net revenues available for amortization and return exceed the amount reasonably necessary by $2,966,852. (Commission's memorandum opinion No. 49, p. 26; Commission's order reducing rates, finding No. 16, p. 4.)

Thirty-Second.

The Commission erred in ordering that the rates and charges made, demanded or received by applicants in connection with their transportation and sale of natural gas shall be reduced to reflect a reduction of not less than $3,750,000 per annum in the operating revenues of Natural Gas Pipeline Company of America. (Commission's memorandum opinion No. 49, p. 26; Commission's order reducing rates, paragraph (A), p. 4.)

Thirty-Third.

The Commission erred in finding that the rates and charges after reflecting the reductions ordered will be just and reasonable. (Commission's order reducing rates, finding No. 19, p. 4.)

The errors pointed out in the last four assignments naturally follow the errors pointed out in the preceding assignments, and the same observations presented above in connection with the preceding assignments and in the briefs and oral arguments are applicable to and are here adopted and urged in support of the last four assignments.

Thirty-Fourth.

The Commission erred in ordering that applicants file new schedules of rates and charges to reflect a reduction of not less than $3,750,000 per annum in the operating revenues of Natural Gas Pipeline Company of America effective as to all bills regularly rendered on or after September 1, 1940. (Commission's order reducing rates, paragraph (B), p. 4; Commission's order dated August 8, 1940, paragraph (A).)

Thirty-Fifth.

The Commission erred in ordering that from and after
the effective date of the new schedules ordered to be filed
applicants shall cease and desist from making, de-
2932 manding or receiving any rates and charges which
do not reflect the reduction ordered in Paragraph
(A) of the Commission's order reducing rates. (Commis-
sion's order reducing rates, Paragraph (D), p. 5.)

Thirty-Sixth.

The Commission erred in denying applicants' application for a stay of the Commission's order dated July 23, 1940, pending the filing of an application for rehearing and the disposition of such application, and, in the event such application be denied, pending the review of said order by the courts on appeal. (Defendants-respondents' motion for stay filed August 8, 1940; Commission's order denying in part the motion for stay, dated August 8, 1940, Paragraph (B).)

The result of the Commission's order directing that the new rates prescribed in the order be effective immediately is an unconstitutional application of the Natural Gas Act. Under the express terms of the Natural Gas Act, applicants are not permitted to file a petition for judicial review of the Commission's order until after action upon an application to the Commission for a rehearing, or the lapse of thirty days after the filing of such application. Applicants are denied a free and untrammeled court review of said order, as guaranteed by the Constitution of the United States, and are put to the choice of submitting to said order and giving up substantial sums of money each month which they can never recoup, or defying the order and thus subjecting themselves to the risk of being prosecuted under the severe penal provisions of the Natural Gas Act, without opportunity for judicial review of the order during the period pending the filing of the application for rehearing and the disposition thereof by the Commission.

2933 Wherefore, applicants pray that they be granted a rehearing herein and that the Commission enter an order abrogating and setting aside its order reducing rates dated July 23, 1940.

J. J. Hedrick,
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Amarillo, Texas,
Of Counsel.

2934 Docket No. G109-112.

State of Illinois, }
County of Cook. }

S. A. L. Morgan, being duly sworn, on oath states that he is one of counsel for applicants, Natural Gas Pipeline Company of America and Texoma Natural Gas Company, in the above entitled causes; that the assignments of error contained in the foregoing application for rehearing are made in good faith, are relied upon, and are in his opinion well grounded; and that all statements of fact made in said application for rehearing are true.

S. A. L. Morgan.

Subscribed and sworn to before me this 22nd day of August, 1940.

Mary Barkyoumb,
(Seal) *Notary Public, Cook County, Illinois.*

My Commission Expires June 17, 1944.

2935 UNITED STATES OF AMERICA.

Entered Sept. 6, 1940.

FEDERAL POWER COMMISSION.

Commissioners: Leland Olds, Chairman, Basil Manly, John W. Scott and Clyde L. Seavey. Claude L. Draper not participating.

September 6, 1940.

• • (Caption—G-109 and G-112) • •

ORDER DENYING APPLICATION FOR REHEARING.

Upon consideration of the application of Natural Gas Pipeline Company of America and Texoma Natural Gas Company filed August 19, 1940, for rehearing with respect to the Commission's Order Reducing Rates of Natural Gas Pipeline Company of America entered on July 23, 1940, and the Commission's Opinion No. 49;

The Commission finds that:

No new facts have been presented or alleged in the application for rehearing which would justify a reversal or revision of the Commission's said Order and said Opinion

No. 49, entered July 23, 1940, and no principles of law are stated in the application for rehearing which were not fully considered by the Commission before it rendered said Order and said Opinion;

Now, therefore, the Commission orders that:

The application for rehearing be and it is hereby denied.

By the Commission.

Leon M. Fuquay,
Secretary.

2936 IN THE UNITED STATES CIRCUIT COURT OF APPEALS

For the Seventh Circuit.

October Term, 1940.

Natural Gas Pipeline Company of America and Texoma Natural Gas Company, *Petitioners,* *vs.* Federal Power Commission and Illinois Commerce Commission, *Respondents.*	No. 7454.

I, Leon M. Fuquay, Secretary of the Federal Power Commission and official custodian of the records of said Commission, do hereby certify that the attached are true copies of:

1. Complaint of Illinois Commerce Commission filed in Docket No. G-109 on September 23, 1938;
2. Order instituting investigation entered October 14, 1938, in Docket No. G-112;
3. Answer of Defendants' filed on November 16, 1938, in Docket No. G-109;
4. Order fixing date of hearing for May 8, 1939, and consolidating Docket Nos. G-109 and G-112 for purposes of hearing entered April 14, 1939;
5. Designation of Examiner Frank M. Durrance to preside at hearing set for May 8, 1939, filed April 18, 1939;
6. Transcript of hearings held May 8 and 9, 1939;
7. Designation of Examiner Ewing G. Simpson to preside at hearing to be resumed May 22, 1939, filed May 17, 1939;

2937 8. Transcript of hearings held May 22, 23, 24, 25,
26, 29, 30, 31; June 1, 2, 26, 27, 28, 29, 30; July 24, 25,
26, 27, 28, 29, 31; August 1, 2, 3 and 4, 1939;

9. Notice postponing hearing to August 28, 1939 filed August 16, 1939;

10. Transcript of hearings held August 28, 29, 30, 31; September 1, 5, 6, 7, 8; October 2, 3, 4, 5, 6, 23, 24, 25, 26, 27, 28, 30, 31; November 1, 2, 3, 4, 6 and 7, 1939;

11. Motion for an immediate order reducing rates filed November 7, 1939;

12. Order fixing date for hearing for December 11, 1939, on motion for interim rate order entered November 15, 1939;

13. Transcript of hearings held November 27, 28, 29, 30; December 1, 2, 4 and 5, 1939;

14. Order postponing date for hearing to December 18, 1939, on motion for interim rate order entered December 5, 1939;

15. Transcript of hearings held December 6, 7, 12, 13, 14, 1939;

16. Defendants' pleas to the jurisdiction of the Commission in reply to motion for an interim order reducing rates filed December 18, 1939;

17. Conditional answer of Defendants to the motion for immediate order reducing rates filed by Complainant and Counsel for the Federal Power Commission, filed December 18, 1939;

18. Transcript of oral argument heard by the Commission en banc on December 18, 1939;

19. Order fixing date for resumption of hearing on January 8, 1940, and vacating direction in regard to filing briefs entered December 19, 1939;

20. Transcript of hearings held January 8, 9, 10, 1940;

21. Exhibits Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31,
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2938 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65,
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181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, and 211, introduced into evidence at the hearings held on the dates indicated in items 6, 8, 10, 13, 15, 18, and 20 shown above.

(Exhibit No. 108 is a sample of a 6"x 6" steel cutting from corroded pipe of the 24" line which was introduced in evidence at the hearing held August 1, 1939. This physical exhibit is not included under this certificate);

22. Contract between Natural Gas Pipeline Company of America and Texoma Natural Gas Company dated October 15, 1931, introduced in evidence by reference at hearing held May 8, 1939 (T. 88);

23. Contracts and agreements of Natural Gas Pipeline Company of America set forth in Exhibit No. 11 introduced in evidence by reference at the hearing held May 8, 1939 (T. 96);

24. Response to Order No. 51 filed by Natural Gas Pipeline Company of America and Texoma Natural Gas Company introduced in evidence by reference at the hearing held May 9, 1939 (T. 125);

25. Contract between Colorado Interstate Gas Company and Natural Gas Pipeline Company of America dated October 15, 1931, introduced in evidence by reference at the hearing held June 29, 1939 (T. 2151-2);

2939 26. Trial examiner's ruling re offer in evidence at hearing held January 10, 1940 (T. 10390-4), allowing exception to the ruling and allowing exception of Counsel for Illinois Commerce Commission and Federal Power Commission on ruling relative to Exhibit No. 212;

27. Opinion No. 49 and order reducing rates entered and filed July 23, 1940;

28. Motion for a stay of the Commission's order of July 23, 1940, filed August 8, 1940;

29. Order granting in part and denying in part a motion for a stay of the Commission's order of July 23, 1940, entered August 8, 1940;

30. Objections of Illinois Commerce Commission to granting of Respondents' motion for a stay of Commission's order of July 23, 1940, filed August 10, 1940;

31. Application for rehearing filed August 19, 1940;

32. Verification to application last above filed August 23, 1940;

33. Order denying application for rehearing entered September 6, 1940;

all of which constitute the record before the Federal Power Commission in the matter of *Illinois Commerce Commission, Complainant*, v. *Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Defendants*, Docket No. G-109, and in the matter of *Natural Gas Pipeline Company of America and Texoma Natural Gas Company*, Docket No. G-112.

In witness whereof I have hereunto subscribed my name and caused the seal of the Federal Power Commission to be affixed this 24th day of October, 1940, at Washington, D. C.

Leon M. Fuquay,
Secretary.

(Seal)

2940 IN THE UNITED STATES CIRCUIT COURT OF APPEALS

Filed Sept. 11, 1940.

For the Seventh Circuit.

October Term, 1940.

Natural Gas Pipeline Company of America and Texoma Natural Gas Company,
Petitioners,
vs.
Federal Power Commission and Illinois Commerce Commission,
Respondents.

No. 7454

PETITION FOR REVIEW OF INTERIM RATE ORDER OF FEDERAL POWER COMMISSION.

To Said Honorable Court:

Natural Gas Pipeline Company of America, a corporation, and Texoma Natural Gas Company, a corporation, hereinafter called petitioners, respectfully show:

I.

Each of petitioners is a private corporation organized and existing under and by virtue of the laws of the State of Delaware, and each is located and has its principal place of business at 20 North Wacker Drive, in the City of Chicago, State of Illinois, within the Seventh Circuit.

II.

Respondent Federal Power Commission is a Government commission created by an act of Congress, having its principal office and place of business in the City of Washington, District of Columbia.

Respondent Illinois Commerce Commission is a state
commission created by an act of the Legislature of Illinois,
having its principal office and place of business at
2941 Springfield, Illinois, and also an office in Chicago,
Illinois, both Springfield and Chicago being within the
Seventh Circuit.

III.

Petitioners seek a review of a so-called interim order directing petitioners to file a new schedule of rates and charges to effect a reduction in their operating revenues in the amount of $3,750,000 a year, entered and issued by respondent Federal Power Commission on July 23, 1940, and amended by supplemental order dated August 8, 1940, under purported authority of the Natural Gas Act (15 U. S. C., Chapter 15B). The jurisdiction of this Court is invoked under Section 19(b) of the Natural Gas Act (15 U.S.C. 717r(b)).

IV.

Since about January 1, 1932, petitioners have been, and they are at this time, engaged in the business of producing and purchasing natural gas and in transporting and selling at wholesale such natural gas in interstate commerce. Petitioner Texoma Natural Gas Company owns large reserves of gas in what is commonly known as the Panhandle gas field, in the State of Texas, which reserves underlie a great number of gas leases acquired, consolidated, developed and held by said petitioner. On its leases said petitioner has drilled many wells, from which it produces natural gas into a pipeline gathering system by it constructed, owned and operated, through which it transports such gas to its compressor station near the town of Fritch, in the State of Texas, and thence through its main pipe-

The interim order,[2] complained of, was entered by the Commission, July 23, 1940, accompanied by a detailed memorandum showing the basis for the order. There were also specific findings. It was made upon a motion by respondent, Illinois Commerce Commission, for an "immediate order." This motion was followed by petitioners' plea to the jurisdiction and an answer. The motion for the interim order was made before termination of a complete investigation, but after fifty-five days of hearing. The order was entered six months later.

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domestic, commercial, industrial, or any other use, and to natural-gas companies engaged in such transportation or sale * * *.

SECTION 4. (a) All rates and charges * * * shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful.

SECTION 5. (a) Whenever the Commission, after a hearing had upon its own motion or upon complaint of any State * * * commission, * * * shall find that any rate, charge, or classification demanded, observed, charged, or collected by any natural gas company * * * or that any rule, regulation, practice, or contract affecting such rate, charge, or classification is unjust, unreasonable, unduly discriminatory, or preferential, the Commission shall determine the just and reasonable rate, charge, classification * * * or contract to be thereafter observed and in force, and shall fix the same by order: Provided, however, That * * * the Commission may order a decrease where existing rates are unjust, unduly discriminatory, preferential, otherwise unlawful, or are not the lowest reasonable rates.

[2] The Commission * * * finds that:

"(1) The * * * Pipeline Co. * * * is engaged in the transportation of natural gas in interstate commerce by means of its 24-inch natural gas main transmission pipe line, approximating 900 miles in length, extending from * * * Okla. * * * through Kansas, Nebr., and Iowa, and into * * * Ill. * * * near Joliet; is also engaged in the sale in interstate commerce of natural gas so transported to various purchasers for resale for ultimate public consumption for domestic, commercial, industrial * * * uses; and is a 'natural gas company' within the meaning of the Natural Gas Act;

"(2) * * * approximately 90% of the natural gas transported and sold by * * * Pipeline Co. * * * is sold to the Chicago Dist. Pipeline Co., for resale for public consumption, delivery being made near Joliet, * * *.

"(3) The Texoma * * * Co. * * * is engaged in the production * * * of natural gas in the Texas Panhandle field; * * * in the transportation of natural gas * * * by means of its 24-inch * * * pipe line, * * * 75 miles in length * * * from its compressor station in * * * Texas * * * into * * * Okla. * * * to its sales meter and connection, near Gray's Junction, with the system of the * * Pipeline Co. * * *; is also engaged in the sale * * * of gas * * * for resale for ultimate public consumption for domestic, commercial, industrial, * * * and is a 'natural-gas company' within * * * the Act;

"(4) * * * approximately 90% of the natural gas so produced * * * by the Texoma Co. * * * is * * * sold by it to the Pipeline Co. * * * at the aforesaid delivery point (in) * * * Okla.;

"(5) The Ill. Com. Com. is a 'State commission' within the * * * Act;

"(6) The rates * * * charged, * * * by Pipeline Co. * * * for * * * the sales of natural gas * * * are subject to the jurisdiction of this Commission;

"(7) The * * * defendants * * * are * * * operated as a single enterprise * * *;

"(8) Until further order of this Commission and for the purpose of disposing of the motion before us, a rate base composed of the Companies' estimates may be accepted, as follows:

"Reproduction Cost New of Physical Properties (exclusive of gas reserves) as of June 1, 1939	$56, 302, 250
"Value of Gas Reserves as of June 1, 1939	13, 334, 775
"Capital Additions from June 1, 1939, to December 31, 1942	3, 808, 399
"Working Capital	975, 000
Rate Base	74, 420, 424

"(9) The total capital expenditures of the Companies through December 31, 1954, less salvage (including all capital expenditures to date), based upon the Companies' estimates, will be not more than $78,284,009, which is the amount on which provision for amortization should be calculated;

"(10) The period over which the provision for amortization should be calculated is the entire life of the properties, estimated by the Companies to be 23 years, 1932–1954, inclusive;

"(11) * * * amortization should be calculated on a sinking fund basis, with interest * * * at the rate of 6½% per year, compounded annually;

Briefly stated, the Commission ordered the $3,750,000 reduction in revenues on the following fact that assumptions:

Investment for rate base purposes (this was made up of reproduction cost, value of gas reserves, capital additions, and working capital)	$74,420,424
A return of 6½% was allowed	6½
	4,837,328
Annual amortization was added. (The amount allowed for amortization covered a period of 23 years, from 1932 to 1954)	1,557,852
Total deductions	6,395,180
The adjusted average annual net income was	9,362,032
The above determined required amount was	6,395,180
Excess	2,966,852

The lessening of petitioners' income by this amount would result in an income tax saving. Hence the total reduction ordered was increased from $2,966,852 to $3,750,000.

A many sided attack on the order is made by the petitioners.

First, they challenge the Commission's jurisdiction to enter this order because:

(a) The only authority given by the Act is to enter a final order.

"(12) The required annual allowance for amortization is $1,557,852;

"(13) The fair rate of return for the Companies is not more than 6½% per annum;

"(14) The annual amount necessary for a fair return to the Companies is not more than $4,837,328, which, with * * * $1,557,852 for amortization * * * amounts to a total of $6,395,180, for amortization and a fair return.

"(15) The Companies' annual net revenues * * * based upon the Companies' estimates, averaged for 1939 to 1942, inclusive, will be $9,511,454, which will be reduced to approximately $9,362,032 as a result of the calculated increase in Federal taxes under the 1940 Revenue Act;

"(16) The Companies' annual net revenues * * * exceed the amount reasonably necessary * * * by $2,966,852;

"(17) A reduction in annual net revenues of $2,966,852, together with the consequent reduction in the applicable Federal Income Tax, would permit a reduction in rates (gross operative revenues) of $3,750,000;

"(18) The rates and charges made * * * by defendants * * * are unjust, unreasonable, and excessive;

"(19) The rates and charges of defendants * * * after reflecting the reductions hereinafter ordered, will be just and reasonable:

"Therefore, the Commission orders that:

"(A) The rates and charges made * * * by defendants * * * shall be reduced to reflect a reduction of not less than $3,750,000 per annum in the operating revenues of * * * Pipeline Co. * * *

"(B) Defendants * * * shall file on or before August 15, 1940, new schedules of rates and charges * * * which shall reflect the reduction in operating revenues ordered in paragraph (A) above, which new schedules * * * shall be effective as to all bills regularly rendered on or after September 1, 1940;

"(C) The Commission reserves the right to reject all or any part of such new schedules and in lieu thereof to prescribe the same by further order;

* * * * *

"(E) The record herein shall remain open for such further proceedings as the Commission may deem necessary or desirable;

"(F) The motion by defendants * * * to dismiss the motion for immediate interim order reducing rates for want of jurisdiction * * * is denied;

"(G) The motion by defendants * * * to dismiss the motion for immediate interim order * * * for want of sufficient evidence of record be and the same is denied;

"(H) This order shall not be construed as an acquiescence by this Commission in any estimates or determinations of original cost, or any valuation of property, claimed or asserted by said defendants * * *."

(b) There is only authority to enter orders determining rates (Sec. 5) whereas here the order directed reduction of income and left the company to determine the rates, which burden is doubled because they have contracts with varying rates, and they are not instructed how to apportion the reduction.

(c) The constitutionality of the Act is attacked because the companies' business is a private business and this Act, contrary to the Fifth Amendment, makes it subject to regulation as a public utility, and they have not even an opportunity to withdraw from business.

(d) The companies are not the kind of companies meant to be covered by the Act.

(e) There has been a denial of due process because there has been no full hearing.

(f) Since the companies' existing rates are presumably reasonable, the Commission has the burden of showing the contrary, and it has not sustained its burden. It has merely provided for a return, barely nonconfiscatory, rather than reasonable, and ignored the fact that the profits arose from the operator's engineering skill and the fact that the profits accruing are but a reasonable reward for the risk involved.

(g) The Illinois Commerce Commission has no legislative authority to move for such an order, and the Federal Power Commission in moving for such order is acting as prosecutor and court.

Second, they challenge the interim order of the Commission on its accounting theories:

(a) The "base" taken by the Commission is wrong because it excluded the item of going concern value of $8,500,000; it permitted only $3,808,399, instead of $6,046,286, for future capital expenditures, and it refused to exclude from the base, $2,866,758, for "viewed" depreciation. So, the base taken by the Commission ($74,420,424) was $7,771,129 less than the base contended for by the companies—i. e., $82,291,553.

(b) The 6½% return used by the Commission was unreasonably insufficient, and unsupported by the evidence. Not less than an 8% return should have been allowed.

(c) The period taken for amortization was wrong, namely, it should have started from the effective date of the Act, and not from the beginning of the companies' business.

(d) The base used for amortization, i. e., $78,284,009, was too low; it should have been $84,341,218.

(e) The amortization reserve should have been figured on a straight line basis with the interest at the rate of 2% semiannually, instead of on the sinking fund basis with interest at 6½%, compounded annually. The annual amortization allowance should have been $5,100,732, instead of $1,557,852.

I. Constitutionality of Act as applied to petitioners. The argument supporting this view runs like this: (a) Petitioners are not in fact, or law,[3] a public utility, and the legislative declaration that they are, is unconstitutional[4] and ineffective to make them such. They do not sell to the public. 98% of their product is sold to wholesale customers. The price they charge has small effect on the consumer's cost because the service company's fixed charges are the dominant factor in ultimate cost to the public. Their gas is but an element in the product the public purchases, which also contains artificial gas. The fact that gas is widely used by the public is not important, for, they argue, so are meat, groceries, and many other unregulated commodities.[5] (b) The Act changes an existing, wholly private industry into a public utility, burdened with many iron-bound mandates—all this without giving petitioners a right to withdraw from the harshness of such supervision, and is therefore a violation of the Fifth Amendment.[6] They cite the fact that the Act delegates to the Power Commission the power to choose their customers for them (Sec. 7) and prohibits their dropping a customer—unsatisfactory though he may be.

We conclude, without much doubt, that the Natural Gas Act is constitutional. It falls within the Commerce Clause of the Federal Constitution. The necessity for its enactment was legislatively declared in Sec. 1 (a) (above quoted), and "it may not be annulled unless palpably in excess of legislative power.[7] Condemnation on this last-named ground lacks factual support in the instant case.

We appreciate, and may concede, the force of petitioners' factual distinction of the Nebbia, the Sunshine, and Appalachian Cases. They all involved, it is true, critical, economic conditions which demanded legislative solution, and such critical condition and urgent necessity of immediate control are here absent. But, where a legislative determination is based upon a very extended administrative investigation, which concluded that an industry was

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[3] Union Falls Power Co. v. City of Oconto Falls, 265 N. W. 722 (Wis.).

[4] Michigan Public Utilities Com. v. Duke, 266 U. S. 570; U. S. v. Ohio Oil Co., 234 U. S. 548; Producers Transp. Co. v. Rd. Commission, 251 U. S. 228.

[5] Tyson v. Banton, 273 U. S. 418; New State Ice Co. v. Liebmann, 295 U. S. 262; Williams v. Standard Oil Co., 278 U. S. 235; Wilff v. Ct. of Industrial Relations, 262 U. S. 522.

[6] Wolff v. Ct. of Industrial Relations, 262 U. S. 522.

[7] Nebbia v. N. Y., 291 U. S. 502; Sunshine Coal Co. v. Adkins, 310 U. S. 381; U. S. v. Appalachian Electric Pow. Co., decided Dec. 16, 1940.

Nebbia v. N. Y.:

"Thus has this court from the early days affirmed that the power to promote the general welfare is inherent in Government. * * * These correlative rights, that of the citizen to exercise exclusive dominion over property and freely to contract about his affairs, and that of the state to regulate the use of property and the conduct of business, are always in collision. * * * But subject only to constitutional restraint the private right must yield to the public need. * * * The Fifth affected with a public interest and that Federal regulation thereof was necessary and that said business or industry is producing and transporting natural gas to be sold to gas companies engaged in public utility businesses in cities and villages, there exists no basis for a successful attack on such determination.

The natural gas industry controls the source of a commodity of great public importance and widespread consumption, and therefore its regulation by Congress may well be required. At least, Congress, in its wisdom, may so conclude. Courts cannot, and should not, assume a greater wisdom than Congress, and find otherwise. The court's function, at most, would be limited to an inquiry as to the existence of facts which would support legislative determination.

II. Form of Order, i. e., ordering a reduction of income of a designated amount, and not determining precise rates to be charged. Petitioners challenge, and respondents do not discuss the challenge, that the Commission's authority is only to "determine the just and reasonable rate * * * and shall fix the same by order." (Sec. 5; Title 15 U. S. C. A. Sec. 717d.)

The order of the Commission found the existing rates unreasonable and excessive, and ordered that they be reduced to reflect a decrease of $3,750,000 in operating revenues. This order did not "determine" the rates. But it evidenced the conclusion that the existing rates were too high and should be lowered such an amount as would reflect a specific reduction in profits.

Amendment, in the field of federal activity, * * * do not prohibit governmental regulation for the public welfare. They merely condition the exertion of the admitted power, by securing that the end shall be accomplished by methods consistent with due process.

"The Constitution does not guarantee the unrestricted privilege to engage in a business or to conduct it as one pleases. Certain kinds of business may be prohibited; and the right to conduct a business, or to pursue a calling, may be conditioned. Regulations of a business to prevent waste of the state's resources may be justified. And statutes prescribing the terms upon which those conducting certain businesses may contract, or imposing terms if they do enter into agreements, are within the state's competency.

"We may as well say at once that the dairy industry is not, in the accepted sense of the phrase, a public utility. We think the appellant is also right in asserting that there is in this case no suggestion of any monopoly or monopolistic practice. It goes without saying that those engaged in the business are in no way dependent upon public grants or franchises for the privilege of conducting their activities. But if, as must be conceded, the industry is subject to regulation in the public interest, what constitutional principle bars the state from correcting maladjustments by legislation touching prices? We think there is no such principle. * * * This court concluded (In Munn v. Illinois, 94 U. S. 113) the circumstances justified the legislation as an exercise of the governmental right to control the business in the public interest; that is, as an exercise of the police power. * * * 'Property does become clothed with a public interest when used in a manner to make it of public consequence, and affect the community at large' * * *. Thus understood, 'affected with a public interest' is the equivalent of 'subject to the exercise of the police power'; * * * The statement that one has dedicated his property to a public use is, therefore, merely another way of saying that if one embarks in a business which public interest demands shall be regulated, he must know regulation will ensue. * * *

"Many other decisions show that the private character of a business does not necessarily remove it from the realm of regulation of charges or prices * * *. * * * Private contract carriers who do not operate under a franchise, and have no monopoly of the carriage of the goods or passengers, may, since they use the highways to compete with railroads, be compelled to charge rates not lower than those of public carriers * * *.

"It is clear that there is no closed class or category of businesses affected with a public interest, and the function of courts in the application of the Fifth and Four-

The resulting rate might vary, depending upon which class of purchasers should be favored. It failed to name the customer (the utility, the commercial, or the industrial purchasers) and the degree of reduction to be allocated inter se. The Commission determined the underlying factors determinative of a rate sufficient to produce a fair and reasonable profit. The order left the companies free to apportion the reduction among the customers.

This action, while irregular and unusual, we believe, in rate determining commissions, was in no way harmful or prejudicial to the companies. In fact, it was favorable to them. It lodges a discretion—or play—in them whereby they might adjust the rates in the various classifications as may to them seem meet. Doubtless they will have some difficulty convincing their customers of the fairness of the reduction. But the difficulty is present, whether the regulating commission or the utility makes the adjustment. The fact that the rate is lessened, rather than increased, should not be overlooked.

We are convinced, and so hold, that petitioners to successfully attack an order of the Commission, must show they are aggrieved by the part of the order assailed. We find no prejudice to petitioners in the form which the order took.

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teenth Amendments is to determine in each case whether circumstances vindicate the challenged regulation as a reasonable exertion of governmental authority or condemn it as arbitrary or discriminatory.

"So far as the requirement of due process is concerned, and in the absence of other constitutional restriction, a state is free to adopt whatever economic policy may reasonably be deemed to promote public welfare, and to enforce that policy by legislation adapted to its purpose. The courts are without authority either to declare such policy, or, when it is declared by the legislature; to override it. If the laws passed are seen to have a reasonable relation to a proper legislative purpose, and are neither arbitrary nor discriminatory, the requirements of due process are satisfied, and judicial determination to that effect renders a court functus officio.

"Times without number we have said that the legislature is primarily the judge of the necessity of such an enactment, that every possible presumption is in favor of its validity, and that though the court may hold views inconsistent with the wisdom of the law, it may not be annulled unless palpably in excess of legislative power."

Sunshine Coal Co. v., Adkins, 310 U. S. 391:

"Nor does the Act violate the Fifth Amendment. Price control is one of the means available to the state * * * and to the Congress in their respective domains * * * for the protection and promotion of the public welfare of the economy. But appellant claims that this Act is not an appropriate exercise of the Congressional power. It urges that the nature and use of bituminous coal in no wise endangers the health and morals of the populace; that no question of conservation is involved; that the ills of the industry are attributable to overproduction * * *. Those matters, however, relate to questions of policy, to the wisdom of the legislation, and to the appropriateness of the remedy chosen—matters which are not our concern. If we endeavored to appraise them we would be trespassing on the legislative domain. And if we undertook to narrow the scope of federal intervention in this field, as suggested by appellant, we would be blind to at least thirty years of history. * * *

"It was the judgment of Congress that price-fixing and the elimination of unfair competitive practices were appropriate methods for prevention of the financial ruin. * * * in this industry. * * * To invalidate this Act we would have to deny the existence of power on the part of Congress under the commerce clause to deal directly and specifically with those forces which in its judgment should not be permitted to dislocate an important segment of our economy and to disrupt and burden interstate channels of trade. * * * The commerce clause empowers it to undertake stabilization of an interstate industry through a process of price-fixing which safeguards the public interest by placing price control in the hands of its administrative representative."

U. S. v. Appalachian Elec. Power Company, decided Dec. 16, 1940.

"In truth the authority of the United States is the regulation of commerce on its waters. * * * That authority is as broad as the needs of commerce. * * * The Congressional authority under the commerce clause is complete unless limited by the Fifth Amendment."

III. Existence of Substantial Evidence to support Commission's finding that present rates are unreasonable.

This query bring us to the merits of this appeal—to the heart of the controversy.

The statute (Sec. 19; Title 15, U. S. C. A., Sec. 717 r) provides:

"The finding of the Commission as to facts, if supported by substantial evidence, shall be conclusive."

It also provides that,

"No objection to the order of the Commission shall be considered by the court unless such objection shall have been urged before the Commission in the application for rehearing, unless there is reasonable ground for failure so to do."

Petitioners contend that the record is absolutely wanting in any evidence that their existing charges are unreasonable, "unless it be the circumstance that their earnings exceed a 6½% rate of return * * *," and they further contend that returns must be 'enormously disproportionate' before they are even 'some' evidence that the charge yielding the return may be excessive."

They present an amazingly interesting picture of the difficulties of long distance transportation of natural gas, of the tremendous effort, skill, and risk taken by these companies, of the extraordinary improvements necessary in pipe construction and other apparatus, of economic management of business—securing fill-in contracts in slack periods, and maintaining high loads in pipe lines, without which petitioners' business would be on the rocks (or invoking Sec. 77B of the Bankruptcy Act) instead of perplexing commissions and courts with questions arising out of large profits.

They most urgently point out that a profit which exceeds a barely non-confiscatory return is not ipso facto an unreasonable or illegal return.[8] Therefore, the Commission's reduction of profit based solely on a finding of unreasonableness because the profit exceeded said barely non-confiscatory return is without evidentiary support, and the Commission's order must fall.

The Commission answers this argument by pointing out the precedents announced in the Labor Act Cases, specifically the Link Belt Labor Case, decided January 6, 1941, and other Federal Acts involving review of action taken by administrative boards, by courts, and say, if there be any evidence to support the finding, it must stand. In fact, it is then removed from the field of judicial inquiry and review.

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[8] Banton v. Belt Line Corp., 268 U. S. 413.

"A commission or other legislative body, in its discretion, may determine to be reasonable and just a rate that is substantially higher than one merely sufficient to justify a finding in a confiscation case that it is high enough to yield a just and reasonable return on the value of the property used to perform the service covered by the rate. The mere fact that a rate is nonconfiscatory does not indicate that it must be deemed to be just and reasonable. It is well known that rates substantially higher than the line between validity and unconstitutionality properly may be deemed to be just and reasonable, and not excessive or extortionate."

The Commission also points out that the companies nowhere raised the point of lack of substantial evidence, and so are now (by virtue of the statutory provision in review, above quoted) precluded from so objecting. A complete answer to the contention that the companies failed to object to the substantiality of the evidence to support the finding is to be found in petitioners' assignment of error in their petition for rehearing—

"The Commission erred in finding that the rates and charges presently charged by petitioners are unjust, unreasonable, unlawful and violative of the provisions of the Natural Gas Act."

While the assignment is broad, it is supplemented by others which make it clear, what must have been obvious throughout the many days when testimony was being taken, that petitioners were denying, as a matter of fact, the unreasonableness of the rates in force. Other assignments of error, in the petition for rehearing before the Commission, complained of related points, to-wit:

"The Commission erred in not holding that the proper rate base is the present value of the property, which, under the uncontradicted evidence, is made up of * * *."

Also,

"The Commission erred in holding that the sum of $8,500,000 claimed by applicants as going concern value is an arbitrary claim not supported by substantial evidence.

"It is supported by substantial evidence which is uncontradicted."

Petitioners attack the order because "The Commission is without power and jurisdiction to enter an interim order."

The fatal weakness of this contention lies in counsel's failure to choose a true perspective—make a proper approach to the policy of governmental regulation (as evidenced by this legislation), of the natural gas industry, which includes its production, transportation, and distribution. Like other legislation of this character, it should be liberally construed and interpreted, so as to embrace, within its scope, the implied powers necessary to an exercise of the expressly granted powers. In petitioners' argument, there is a tendency, which is somewhat characteristic of arguments in cases which attack powers of Congress and the procedure of the regulating commission, to observe, "I do not find it written in the bond."

There can be no question that the Act confers upon the Commission the power to make a final order. Had the Commission closed its hearing and then made the order in question, it would have come within its expressly delegated powers.

We take it that this argument goes so far as to deny to the Commission, authority to do anything else; that it could not make an interim order even upon consent of the parties. In other words, if we accept this contention, a hearing might proceed to a point where all the petitioners' testimony was received, and they had rested their case; upon which showing it was conceded an order reducing charges should be made; that the utility's consent thereto was formally given—even then the Commission would be powerless to make an order, because perchance it wished to inquire further into certain practices and charges which affected rates only indirectly, which matters the petitioners were particularly anxious to have settled. Such a holding would do violence to the purpose and object of the legislation.

While the practice and construction of powers of a court of equity are not necessarily controlling, they supply a lamp to guide courts in determining the extent to which they may imply powers from the grant of express powers. Not seriously would it be argued that a court of equity given jurisdiction of a subject and granted the express power to make a final order to fix rates was powerless, on a proper showing, to make an interim order limiting profits.

We must, and do, hold that upon a proper showing, and when the hearing has reached a stage where the Commission may determine that a reduction (or an increase) of rates should be made, it may (and should) make such order, even though the hearing be not completed.

Rate of Return.—Petitioners advance three propositions in respect to the findings and the deductions from said findings of the Commission upon the rate of return. The Commission found a return of 6½% was fair and reasonable. Petitioners say: (a) Their earnings, which exceeded this rate, do not evidence unreasonableness; (b) reasonableness of rates is determined "not by what profit it is reasonable to make, but what it is reasonable to charge for the services rendered;" (c) the rate of return fixed by the Commission at 6½% was, in view of the facts of this case, grossly inadequate.

We reject, without extended discussion, the contentions (a) and (b). They ignore the well-established holdings, backed by reason and experience, to the effect that a fair rate of return, on a fairly established rate base, supplies the correct test of reasonableness.[9] The value of the service to users is neither a reasonable rule, nor supported by judicial decisions.

This seems too elementary to require elaboration or supporting argument. Likewise, it must be apparent, on this theory of correct rate making, that the rate of return not only may, but, in a utility rate case, must be, the largely determinative factor of reasonableness.

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[9] Los Angeles Gas Corp. v. Rd. Com., 289 U. S. 287.

(c) The reasonableness of a 6½% rate of return presents a question altogether different from (a) and (b). It is perplexing and incapable of determination with certainty, in view of the peculiar facts of this case. Out of the mass of decisions pertaining thereto, a rule may be stated with comparative ease, but its application is quite as difficult as the statement is easy.

A fair return is to be largely measured by the usual returns in like investments in the same vicinity over the same period of time.

What are like investments? What are the years we must use to ascertain the going rate of return for said like investment? Relativity seems to be highly present both in the term "like investment" and in the years for which fair earnings must be ascertained.

Ignoring, for the moment, the kind of investment involved, and looking only to rate of return, as such, on investments only, we take judicial notice of the fact that interest rates in most fields have declined in the last decade as much as 75%. For example, call money rates in New York dropped from 8% in 1929 to ⅛–¼ of 1%. Interest rates on Class AAA bonds have dropped enormously. Secure, but less highly rated, bonds have shown a like lowering of interest return.

What years should be chosen to determine the fair rate of yield? More uncertain still, what will the thirteen future years bring forth? Will the rise in rate of return be as great and as rapid as has been the decline during the last decade?

But, if there be doubt and uncertainty as to the correct dates and rates, past and future, for interest charge determination on safe investments, they are inconsequential as compared to the variance in returns on well secured, as compared to returns on highly speculative investments.

The demanded rate of return, since the crash of '29 and the bank failure period immediately following it, has been almost fatal to speculative investments. The investing public has emphasized safety, and shied from the speculative. That the investment in petitioners' enterprise in '32 was highly speculative, can not be successfully gainsaid. A "fair rate of return," on this highly speculative investment, should not be affected by the extraordinary success which has marked its record for the latter part of its existence. The ascertainment of a fair return should be approached as of the year 1932, with the trier looking forward, rather than from the seat in the reviewing stand erected in 1940 and looking backward to 1931.

Even today, with a splendid record of current success behind it, the investment belongs in the speculative class.

This enterprise is based on a deposit of natural gas some four thousand feet beneath the surface of the earth. It is in Texas, some one thousand miles from the consumer. Its successful operation necessitated a capital of from seventy-five to eighty-four million dollars. Its life is limited to the time when the wells will be exhausted. This would be in 1954. At least a tenth of the period was devoted to construction, during which time there was no income.

Upon such a fact statement, and notwithstanding confidence in the expert opinion of geologists, scientists, and engineers may be great, there are factors which necessitate the use of a question mark after many a fact statement or opinion.

The case was one which hardly permitted of enlightenment from expert witnesses, who gave their opinions to the Board (and to us) respecting a fair rate of return. They were overwilling, and the indifference of some of them to opinions expressed by them on other occasions lessened the weight of their evidence.

Moreover, their opinions showed differences were unavoidable and traceable to the varying influences of different factors.

Bearing in mind that our function is to review, not to make, findings of fact, and also keeping to the front the current low rates of return on all investments, and also bearing in mind that the future may bring changes by the Commission in its finding of 6½% as a fair rate of return, we conclude that there is substantial evidence to support the Commission's finding.[10]

Rate Basis.—We now approach petitioners' several contentions respecting the Commission's failure—

(a) to include a sum for going value,
(b) to fix the proper period for amortization,
(c) to make adequate allowance for future capital additions,
(d) to take 2% instead of 6½% interest on the sinking fund.

We need only discuss the first two contentions. If we accept either of them, the order must fall.

The facts are not much in dispute. Petitioners place the lowest figure for going value at $8,500,000. The Commission refused any sum for this factor.

Petitioners contend the amortization period should be fourteen years and five months. The amount to be amortized was $84,341,218. The Commission fixed the amortization period at twenty-three years and the amount to be amortized at $74.420,424.

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[10] United Gas Public Serv. Co. v. Texas, 303 U. S. 123; West Ohio Gas Co. v. Public Utilities Com., 294 U. S. 63; Driscoll v. Edison Light Co., 307 U. S. 104; Smith v. Ill. Bell Tel. Co., 282 U. S. 133; United Fuel Co. v. Rd. Com., 278 U. S. 300; Dayton Pow. & Light Co. v. Public Utilities Com., 292 U. S. 290; West v. Chesapeake Tel. Co., 295 U. S. 662.

We are persuaded of the soundness of both of petitioners' contentions, (a) and (b).

(a) Going value.—An allowance for going value is necessitated, due to facts peculiar to this case. In the ordinary public utility case, with no unusual fact or circumstance to affect a court's consideration of it, we assume that going value, as a properly includable item in the rate base, should and would be rejected. Driscoll v. Edison Co., 307 U. S. 104, 117. Our duty, to follow the Supreme Court rulings on this and all other questions, necessitates our making all the turns in the road, both left and right, which the teaching of experience has caused our guide to blaze through new and untraveled fields of regulation of quasi-public businesses.

The factors present in the instant case, not found in the old and well-established field of public utility regulation, which affect (b) as well as (a), are: The period of petitioners' life is fixed and rather short; the natural gas field will be exhausted in '54 (the date and the fact are not in dispute). Distinguishably different is the electric light and power field where the life of the enterprise has, in some instances, already exceeded five decades and may go on growing in strength and stability indefinitely. Moreover, great uncertainty marks this 13-year period and the constancy of petitioners' natural gas wells.

Another difference is to be found in the fact that Congress had not declared its public policy to regulate petitioners' business when it started this enterprise. Nor did Congress act until one-third of petitioners' life had expired. During that period, their business was built on the theory that they must find and satisfy their customers—must act on the assumption that rates and volume of business must depend upon and find justification in the future, rather than in the present, business.

Still another difference, however, was the newness of natural gas in Chicago, and therefore the uncertainty of customers and business. Then, too, there were the difficulties incident to the engineering problems, which arose from the task of conveying natural gas one thousand miles over mountains and under rivers to unknown prospective customers. The successful and satisfactory mixing of natural with artificial gas presented, in 1932, problems which the well-established gas companies and their engineers viewed with deepest doubt and dire misgivings.

The losses of the first years supplied persuasive evidence that the investment was highly speculative and an adequate return on the capital invested depended largely upon the business acumen, the engineering skill, and administrative efficiency of their officers, to overcome these losses and develop a profit in this newly regulated industry. Under such circumstances it seems that fairness necessitates the capitalization and inclusion of such skill—aye, and hazards—as legitimately as the cost of pipes. The natural gas was valueless as it lay in the Texas wells, four thousand feet beneath the surface of the earth, over one thousand miles from Chicago. What gave it value? Not alone pipes to carry it, nor pumps to pump it. It was the courage of the investors, and their willingness to take a chance in a speculative venture, the vision to see and to forecast, the integrity of management, and the knowledge of geologists, etc., which gave to the enterprise its life; and the product of these combined factors made for a going value, which, in the realities of the business world, is justly recognized as part of the value of the investment. It is the existing fact situation peculiar to this case which calls loudly for the inclusion of a sum for going value, as such. Nor can we fairly apply the law save as we first study the facts, and get the proper setting of the natural gas industry in the utility field. The Commission has not included its equivalent in any of the items which went to make up its rate base. If allowable at all, there can be no serious objection to fixing the sum, as the petitioners contend, at $8,500,000.

The Commission argues that in fixing the value of the rate base as high as $74,420,424, it gave full recognition to petitioners' business as a going business concern. This statement is contrary to the memorandum filed by the Commission with its findings. The $74,420,424 was made up of—

Reproduction Cost New of Physical Properties	$56,302,250
Value of Gas Reserves	13,334,775
Capital additions for the period June 1, 1939 to December 31, 1942	3,808,399
Working Capital	975,000
Total Rate Base	74,420,424

The total is the amount which the Commission adopted as its rate base. It does not include going value.

Moreover, in its opinion, the Commission said, "The Companies' claim of $8,500,000 for going concern value must be disallowed. The amount obviously is an arbitrary claim, not supported by substantial evidence warranting its allowance. Its allowance would mean the acceptance of a deceptive fiction resulting in an unfair imposition upon consumers."

In the face of this statement we must assume that the Commission did not allow any sum for going value.

Period of Amortization.—Here, again, we find of dominating importance the newness and lack of precedent among the conditions similar to those found in this industry. In ascertaining petitioners' profits, the amount deducted for amortization is most important. Petitioners assert the period should be fourteen years five months—the difference between the date of these proceedings and the date when the gas will be exhausted. Respondents, on the other hand, begin their period in 1932. In other words, the Commission adopted a twenty-three year period; whereas petitioners figured on a fourteen year five month period.

In addition to the reasons for our conclusions respecting contention (a), the significance of the date when the business enterprise became subject to governmental regulation is of dominant significance. It is important, too, as bearing on the rate making power of Congress. Avoidance of conflicts with the Fifth Amendment of the Constitution is involved. Petitioners' position avoids the conflicts; respondents' creates an unavoidable clash.

Before Congress enacted this legislation in '38, petitioners were free to contract and did contract with customers on a basis which they deemed wise. After that Act passed, their business, and particularly their rates, were subject to regulation and fixation by respondents. The size of their profits depends upon their earnings for the next thirteen years. These, in turn, depend largely upon the sums allowed for amortization of the value of the property as it then existed and was then valued. Petitioners assert an annual amortization sum of $5,100,732. Respondents fixed the sum at $1,557,852.

The position we take in no wise reflects upon the wisdom of the new legislation. That legislation looks to the future protection of the public. It deals with conditions which existed at the time the legislation was enacted. It neither gave, nor took away, value to going concerns, whose lives were short and limited by fact conditions which neither the producer nor the consumer could change. For these reasons, we conclude the amortization period, for rate making purposes, should be fourteen years, five months, instead of the period of twenty-three years adopted by the Commission.

As was said in United Railways v. West, 280 U. S. 234, "It is the settled rule of this court that the rate base is present value."

See also Brooks-Scanlon Co. v. U. S., 265 U. S. 106, 123; United Fuel Gas Co. v. Railroad Com., 278 U. S. 300.

It would seem to follow logically that if the rate base is determined as of the date of the hearing the amortization period would be for the life of the property from that same date. All the cases dealing with this subject are distinguishable in at least one respect. In the instant case, the end of the period is fixed by the exhaustion of the natural gas wells. In other words, the end is near. In the ordinary electric light, gas, or water rate case, the amortization period is long—covering the life of the pipes—well-nigh a century.

In the absence of authority, it would seem fair and reasonable to fix the amortization period not earlier than the date when Congress subjected the industry to regulation.

Other attacks upon the orders are presented by the petitioners, which we believe it unnecessary to pass upon. The hearing is not completed and some findings of fact may be changed, and the proof may be so conclusive that no attack will then be made.

All such evidence will, of course, be heard and passed upon by the Commission before entering its final order.

The order of the Commission is vacated and set aside.

A true Copy:

Teste:

Clerk of the United States Circuit Court
of Appeals for the Seventh Circuit.

And on the same day, to wit: On the fourteenth day of April 1941, the following further proceedings were had and entered of record, to wit:

Monday, April 14, 1941

Court met pursuant to adjournment

Before Hon. Evan A. Evans, Circuit Judge; Hon. William M. Sparks, Circuit Judge; Hon. Walter C. Lindley, District Judge.

No. 7454

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, PETITIONERS

vs.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, RESPONDENTS

Petition for Review of Interim Order of the Federal Power Commission

This cause came on to be heard on the petition of Natural Gas Pipeline Company of America and Texoma Natural Gas Company for review of an interim rate order of the Federal Power Commission, and on the transcript of the record from the Federal Power Commission, and was argued by counsel.

On consideration whereof: It is ordered and adjudged by this Court that the Order of the Federal Power Commission entered in this cause on July 23, 1940, be, and it is hereby, vacated and set aside, and that this cause be, and it is hereby, remanded to the said Federal Power Commission for further proceedings in conformity with the Opinion of this Court.

United States Circuit Court of Appeals for the Seventh Circuit

I, Kenneth J. Carrick, Clerk of the United States Circuit Court of Appeals for the Seventh Circuit, do hereby certify that the foregoing typewritten pages contain a true copy of order entered on the first day of November 1940, the Opinion filed April 14, 1941, and the Judgment entered on the same date in Cause No. 7454, Natural Gas Pipeline Company of America and Texoma Natural Gas Company, petitioners vs. Federal Power Commission and Illinois Commerce Commission, respondents, as the same remains upon the files and records of the United States Circuit Court of Appeals for the Seventh Circuit.

In testimony whereof I hereunto subscribe my name and affix the seal of said United States Circuit Court of Appeals for the Seventh Circuit, at the City of Chicago, this 12th day of June A. D. 1941.

[SEAL]

KENNETH J. CARRICK,
Clerk of the United States Circuit Court
of Appeals for the Seventh Circuit.

U. S. GOVERNMENT PRINTING OFFICE: 1941

Supreme Court of the United States

No. 265, October Term, 1941

Order allowing certiorari

Filed October 13, 1941

The petition herein for a writ of certiorari to the United States Circuit Court of Appeals for the Seventh Circuit is granted.

And it is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ.

Supreme Court of the United States

No. 268, October Term, 1941

Order allowing certiorari

Filed October 13, 1941

The petition herein for a writ of certiorari to the United States Circuit Court of Appeals for the Seventh Circuit is granted.

And it is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ.

U. S. GOVERNMENT PRINTING OFFICE: 1941

At a regular term of the United States Circuit Court of Appeals for the Seventh Circuit held in the City of Chicago and begun on the first day of October, in the year of our Lord one thousand nine hundred and forty, and of our Independence the one hundred and sixty-fifth.

No. 7454

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, PETITIONERS

vs.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, RESPONDENTS

Petition for Review of Interim Order of the Federal Power Commission

And, to wit: On the first day of November 1940, the following further proceedings were had and entered of record, to wit:

Friday, November 1, 1940

Court met pursuant to adjournment

Before Hon. WILLIAM M. SPARKS, Circuit Judge; Hon. J. EARL MAJOR, Circuit Judge; Hon. WALTER E. TREANOR, Circuit Judge.

No. 7439—No. 7454

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, PETITIONERS

vs.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, RESPONDENTS

Petition for Review of Interim Order of the Federal Power Commission

The Federal Power Commission having overruled petitioners' petition for a rehearing of this cause; and petitioners, within sixty days of that ruling having filed a written petition in this Court praying that the order of the Commission be modified or set aside in whole or in part—it is therefore ordered by this Court that the order of the Commission herein be stayed until the further order of this Court, under Section 19 of the Natural Gas Act, 15 U. S. C. 717r (c).

It is further ordered that the temporary restraining, or stay, order, pending petitioners' application for rehearing before the Federal Power Commission, issued August 30, 1940, in cause No. 7439, be and the same is hereby dissolved.

And afterwards, to wit: On the fourteenth day of April 1941, there was filed in the office of the Clerk of this Court, the Opinion of the Court, which said Opinion is in the words and figures following, to wit:

In the United States Circuit Court of Appeals for the Seventh Circuit

No. 7454—October Term, 1940, April Session, 1941

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, PETITIONERS

vs.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, RESPONDENTS

Petition for Review of Interim Order of the Federal Power Commission

April 14, 1941

Before EVANS and SPARKS, Circuit Judges, and LINDLEY, District Judge.

EVANS, Circuit Judge. Presented for review is an interim order of the Federal Power Commission, directing the petitioners to reduce their rates on natural gas, so as to reflect an annual reduction in their operating revenues of not less than $3,750,000.

Petitioners own natural gas reserves in Texas. They produce the natural gas and transport it through their own pipe lines to the State of Illinois, where it is sold wholesale—90% to one customer. They produce 75% of the gas they sell and purchase the remaining 25% from another producer. They were in business for nearly eight years before the Natural Gas Act (15 U. S. C. A. Sec. 717, et seq.[1]) became effective, June 21, 1938.

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[1] SECTION 1. (a) As disclosed in reports of the Federal Trade Commission * * * it is hereby declared that the business of transporting and selling natural gas for ultimate distribution to the public is affected with a public interest, and that Federal regulation in matters relating to the transportation of natural gas and the sale thereof in interstate and foreign commerce is necessary in the public interest.

(b) * * * this Act shall apply to the transportation of natural gas * * *, to the sale * * * of natural gas for resale for ultimate public consumption for

line to a point near Gray Junction, Oklahoma, where it sells and delivers such natural gas to petitioner Natural Gas Pipeline Company of America. At such point near Gray Junction, Oklahoma, the petitioner last named receives and purchases from petitioner Texoma Natural Gas Company three-fourths of its total market requirements and from Colorado-Interstate Gas Company one-fourth of its total market requirements, and transports such gas in interstate commerce along and through its 24 inch pipeline to Joliet, Illinois, and intermediate points, at which it sells and delivers 98% of such natural gas at wholesale to utilities which in turn resell the same to the public for
2942 domestic, commercial and industrial uses. The remaining 2% of such natural gas the petitioner last named sells directly to industrial users along its pipeline. Petitioners are operated as a single enterprise, and all the profits of the combined operations of petitioners accrue to petitioner Natural Gas Pipeline Company of America, petitioner Texoma Natural Gas Company being operated on a non-profit basis.

V.

Following the enactment of the Natural Gas Act, approved June 21, 1938, respondent Illinois Commerce Commission, purporting to act under Section 13 of the Natural Gas Act (15 U.S.C. 717 1), on or about September 23, 1938, filed with respondent Federal Power Commission a complaint alleging that the rates and charges of petitioners for natural gas sold in the State of Illinois were unjust and unreasonable, requesting that an order be entered directing petitioners to appear and show cause why the rates charged by petitioner Natural Gas Pipeline Company of America to utilities in Illinois should not be reduced, and requesting that an order be entered setting fair, just and reasonable rates for natural gas sold by said petitioner in the State of Illinois.

Respondent Federal Power Commission did not issue a rule on petitioners to show cause why their rates and charges for gas sold in the State of Illinois should not be reduced; but on or about October 14, 1938, it entered an order reciting the filing of the above mentioned complaint and instituting an investigation of petitioners to determine with respect to each of them whether their rates and charges in connection with the transportation and sale of natural gas subject to the jurisdiction of the Federal Power Commission were unjust, unreasonable, unduly discriminatory or preferential, and, in the event it should find any such rates and charges to be unjust and unreasonable, to determine and fix, by appropriate order or orders, reasonable and non-discriminatory rates and charges.

On November 16, 1938, petitioners filed an answer to said complaint of respondent Illinois Commerce Commis-
2943 sion, in which they denied that the rates or charges
for natural gas sold by petitioner Natural Gas Pipeline Company of America to utilities in the State of Illinois are unjust and unreasonable, and denied also other allegations contained in the complaint. In said answer they denied and challenged any jurisdiction, power or authority of respondent Federal Power Commission to enter any order attempting to change, modify or set aside any charge or price for natural gas sold by petitioners to utilities in the State of Illinois or elsewhere, or to substitute or prescribe any different charges or prices therefor, on the ground that petitioners constitute a single enterprise engaged in the business of owning natural gas reserves, developing same through the drilling and equipping of wells thereon, producing natural gas therefrom, transporting same through their own pipelines and facilities to points in the States of Kansas, Nebraska, Iowa and Illinois, and selling such commodity at wholesale to selected distributors and industrial consumers under private contracts; that petitioners' enterprise is of a strictly private character, not affected with a public interest in the sense that Congress would have jurisdiction, power or authority to enact legislation purporting to authorize respondent Federal Power Commission to regulate the prices and charges for which their commodity is sold. Petitioners also alleged that the Natural Gas Act, in so far as it purports to confer on respondent Federal Power Commission jurisdiction or power to change, modify or set aside the charges or prices at which petitioners sell natural gas at wholesale to distributors or to authorize it to set up and prescribe different charges or prices for such commodity, is invalid, and that any rules, regulations or orders promulgated by respondent Federal Power Commission with a view of attempting to exercise any such purported jurisdiction are null and void and unenforcible as against petitioners because the inevitable operation and effect thereof will be to deprive petitioners of their prop-

erty and liberty of contract without due process of law, in violation of the Fifth Amendment to the Constitution of the United States.

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VI.

On or about April 14, 1939, respondent Federal Power Commission entered an order consolidating for purposes of hearing the complaint and investigation above mentioned and setting a public hearing in the proceedings, to be held before a trial examiner, commencing on May 8, 1939.

VII.

At the opening session of the hearing beginning on May 8, 1939, counsel for respondents called to the stand two witnesses who testified concerning some of the geological, engineering and accounting issues involved. At subsequent sessions of the hearing held from time to time through the summer and fall of 1939, petitioners offered their direct testimony, calling a total of 37 witnesses. Some of these witnesses testified to the facts concerning the history and operation of petitioners' business, the enterprise and pioneering of petitioners in the planning, designing and construction of their pipelines and other facilities, the extraordinarily high stresses and pressures under which petitioners' facilities have been and are operated, the unusually high annual load factor developed and maintained by petitioners in the operation of their business, the extent of their reserves, the geological and engineering conditions under which they produce and will produce their gas through the future life of the field, the effect of the pressures and other geological conditions in the field on the productive capacity of the wells, and the additional capital outlays which petitioners must incur in the drilling and equipping of wells and in the building of field gathering lines, field compressor stations, and other facilities during the future life of the field.

Other witnesses testified to past capital outlays and replacement costs, ultimate salvage values, maintenance and operating expenses, and other necessary and proper expenses incurred and to be incurred in connection with the operation of petitioners' business, and to the sales and earnings by petitioners since the beginning of their

operations and the probable sales and earnings by
2945 petitioners in their operations in the future. Experts
testified concerning the cost of reproducing new at the present time the depreciable physical facilities now used by petitioners, the state of depreciation of the existing depreciable facilities, the net figures showing the reproduction cost new less observed depreciation, and the present fair value of petitioners' gas reserves in their depleted condition.

Experts testified to the going concern value of petitioners' properties, to the actual cost of acquiring such going concern value, and to the cost of reproducing it at the present time.

Several witnesses testified to various mechanical risks and hazards inherent in the natural gas business and to those special hazards confronting petitioners by reason of the operation of their facilities under the extremely high pressures and tensions and the topography of the country traversed by petitioners' lines. Other risks and hazards confronting generally those engaged in the natural gas business, and petitioners in particular, were pointed out in the testimony.

Other witnesses testified to the proper method of handling a sinking fund looking to its ultimate return with interest to petitioners at the time their reserves shall be exhausted, and pointed out the types of securities available for such investment and the yields which could be obtained through the investment of funds in such securities.

Petitioners caused an exhibit to be prepared and offered in evidence, summarizing the figures showing the total amount invested and to be invested, the total charges for maintenance, operations and other costs, including taxes incurred and to be incurred, the revenues received and to be received over the entire life of the project, beginning on January 1, 1932, and ending with the year 1954, the latest year through which petitioners will have gas available from their reserves under the most favorable circumstances, from which it appeared that over the whole period petitioners will have earned an amount which, after returning to them their total investment and all operating costs and
expenses, will yield them a return on their average
2946 investment of only 6.39% per annum. This exhibit
was offered as showing that, over the whole period covered by the limited life of petitioners' business, peti-

tioners' prices and charges for natural gas are not unjust and unreasonable.

Petitioners offered another exhibit, summarizing the figures showing the reproduction cost new less observed depreciation of the physical properties other than gas reserves, the present fair value of the gas reserves, the going concern value of petitioners' properties, the cost of future additional capital assets and of capital replacements, the ultimate salvage value of the properties, the necessary working capital, the expense of maintaining and operating petitioners' facilities and conducting their business in the past and in the future, the past and prospective revenues, and other pertinent figures, from which it appeared that petitioners probably will earn over the future life of their reserves, after a proper allowance for the amortization of the present value of their properties, a return on the proper rate base of 4% per annum.

Petitioners offered another exhibit showing substantially the same figures as the exhibit last described except that, as pointing to the present fair value of petitioners' properties, they showed the original cost of the present properties instead of the reproduction cost new less observed depreciation of the properties other than gas reserves and the present fair value of the gas reserves. The figures used as a basis of this exhibit show that, after setting aside an amount each year sufficient to return the present value of the properties by the time petitioners' reserves of gas are exhausted, petitioners will receive an annual return on the proper rate base of 5.1% per annum.

These exhibits, in so far as they deal with the future, were based on figures developed through the testimony of experts who testified concerning the necessary expenditures and the probable revenues during the future life of petitioners' reserves. The figures dealing with going concern value were those developed by the witnesses who testified on that subject. The annual allowance for amortization was calculated on a sinking fund formula, using the
2947 compound interest rate to which the witnesses testified as the return which petitioners could reasonably expect from the investment of their sinking fund allowances in the highest types of securities.

Four expert witnesses were called by petitioners to testify on the subject of rate of return. These witnesses, after testifying at great length and after producing and introducing a large number of statistical tabulations, graphs and charts, and after testifying at length concerning the risks involved in petitioners' business and the reaction of the investing public to such risks as shown by the figures, charts and graphs contained in the exhibits produced by the witnesses, arrived at the opinion that a minimum of 8% per annum would be a fair and reasonable return to petitioners on the fair value of their property. Two of these witnesses testified that 8% would not be an adequate return and expressed their judgment that a higher rate of return would be required.

VIII.

On October 6, 1939, petitioners announced that they had concluded their direct testimony. Thereafter counsel for respondents, after cross examining seven of petitioners' witnesses, including the four experts who had testified on rate of return, called to the stand four witnesses, two of whom were employees of respondent Federal Power Commission and the other two employees of respondent Illinois Commerce Commission, who testified to statistics and produced statistical exhibits dealing with interest rates, cost of financing through issuance of securities, and other matters ordinarily offered in connection with rate of return studies. Two of these witnesses confined their testimony to statistical facts without undertaking to appraise or analyze their testimony and apply it to the subject of rate of return. Another testified to his conclusion as to the cost of refinancing petitioners' properties. The fourth witness, an employee of respondent Illinois Commerce Commission, testified to a conclusion that 6% per annum on the present fair value of petitioners' properties would be a reasonable return. These four witnesses were later cross examined by
petitioners at a session of the hearing concluded on
2948 December 14, 1939, at which session petitioners also
offered some testimony on redirect examination of two of their witnesses on rate of return. Subsequently, at a session of the hearing held on January 8, 9 and 10, 1940, petitioners offered redirect testimony by two of their witnesses on rate of return and some testimony in rebuttal of the testimony offered by respondents on that subject.

IX.

On November 7, 1939, at the conclusion of the direct examination by counsel for respondents of their four witnesses who testified on the subject of rate of return, but prior to the cross-examination of such witnesses by petitioners and prior to the offering of any redirect or rebuttal testimony by petitioners on the subject of rate of return, counsel for respondents filed with the Examiner as a part of the record a motion for an immediate interim order by respondent Federal Power Commission setting up rates and charges that would operate to reduce the revenues of petitioners by a sum of $3,000,000 to $3,500,000 annually. At the time such motion was offered, counsel for respondents announced that they were not resting their case. In the motion counsel for respondents stated that the cross-examination of petitioners' witnesses, the introduction of respondents' evidence, the taking of petitioners' rebuttal evidence and cross-examination thereon will consume much additional time, so that the closing of the case will be delayed for a long time in the future.

X.

Pursuant to the direction of respondent Federal Power Commission, said motion for interim order was set for argument before respondent Federal Power Commission as a whole on December 18, 1939, on which date petitioners appeared and filed pleas to the jurisdiction of respondent Federal Power Commission to enter an interim order, and also a conditional answer in reply to said motion for interim order. Respondent Federal Power Commission denied a request by petitioners that they be permitted to present their pleas to the jurisdiction before the hearing on the motion and that they be allowed to open and 2949 close the argument on such pleas. In that connection counsel for petitioners pointed out to said respondent that they had had no opportunity to prepare themselves for argument on the merits of the motion, due to the circumstance that they had been continuously engaged in preparing and offering their testimony before the Examiner from the time said motion was filed. Counsel for respondents presented their arguments in support of the motion for interim order and petitioners were heard in reply on their pleas to the jurisdiction. On the same date petitioners filed their brief in support of their pleas to the jurisdiction.

Later counsel for respondents filed their briefs in support of the motion and petitioners filed their brief in reply.

No further proceedings were had in the hearing subsequent to January 10, 1940, until July 23, 1940, on which date respondent Federal Power Commission issued a written opinion and an interim order, which it caused to be served on petitioners on August 1, 1940, the effect of which was to direct petitioners, prior to August 15, 1940, to file new schedules of rates and charges for gas sold at wholesale which would operate to reduce petitioners' net revenues available for amortization and return by the sum of at least $3,750,000 per annum, which new rates and charges should be effective as to all bills regularly rendered on or after September 1, 1940. Prior to the issuance of such opinion and order petitioners had no notice of the contents or effect thereof, no report of the Examiner to respondent Federal Power Commission on the issues of law or of fact ever having been submitted to petitioners.

XI.

On August 8, 1940, petitioners filed with respondent Federal Power Commission their verified motion for a stay of the order of said respondent dated July 23, 1940, pending the filing of petitioners' motion for rehearing and the action of said respondent thereon. On the same date said respondent entered an order denying said petition in all things except that the time for the filing of new schedules of rates and charges was extended to on or before September 1, 1940.

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XII.

On August 19, 1940, petitioners filed with respondent Federal Power Commission their application for rehearing, in which they set forth specifically the grounds upon which said application was based.

XIII.

On the 6th day of September, 1940, said respondent entered an order denying petitioners' application for rehearing, which order was served on petitioners on September 9, 1940.

XIV.

Pursuant to Section 19(b) of the Natural Gas Act (15 U. S. C. 717r(b)), petitioners present their petition for a review of said order of respondent Federal Power Commission issued July 23, 1940, as modified by the order of said respondent dated August 8, 1940, together with a statement of the points upon which petitioners rely as grounds for a decree of this Court reversing, setting aside and annulling said order of respondent Federal Power Commission. All the points submitted herewith as grounds for reversing, setting aside and annulling said order were urged before respondent Federal Power Commission in the application for rehearing submitted by petitioners to said respondent as aforesaid. Reference is here made to the statement of points attached hereto, which is made a part of this petition.

XV.

For the reasons expressly set forth in the statement of points attached hereto, said order of respondent Federal Power Commission, as modified, is erroneous and operates, and will continue to operate, to confiscate petitioners' property, property rights and revenues and to take petitioners' property, property rights and revenues without due process of law, in violation of the due process clause of the Fifth Amendment to the Constitution of the United States; and, for the reasons set forth in said statement of points, said order, as modified, should be reversed, set aside and held for naught.

2951 Wherefore petitioners pray:

(a) That a copy of this petition forthwith be served upon some member of respondent Federal Power Commission in pursuance of Section 19(b) of the Natural Gas Act (15 U. S. C. 717r(b)), and upon respondent Illinois Commerce Commission;

(b) That respondent Federal Power Commission be required, in conformity with the Natural Gas Act, to certify and file with the Court a transcript of the record upon which the order complained of in this petition was entered, including the testimony, evidence and exhibits admitted, pleadings, opinion, findings, conclusions, and orders of said respondent in the proceedings above referred to;

(c) That this Honorable Court review the proceedings, including the testimony, evidence and exhibits admitted, pleadings, opinion, findings, conclusions and orders in the proceedings out of which the said order of July 23, 1940, issued;

(d) That said order of July 23, 1940, in so far as it purports to direct that the rates and charges made, demanded or received by petitioners for or in connection with their transportation and sale of natural gas in interstate commerce for resale for ultimate public consumption shall be reduced to reflect a reduction of not less than $3,750,000 per annum in the operating revenues of petitioner Natural Gas Pipeline Company of America, and in so far as it, as modified, directs that petitioners shall file on or before September 1, 1940, new schedules of rates and charges which shall reflect such reduction in operating revenues, be reversed, set aside and held for naught;

(e) That this Honorable Court exercise its jurisdiction over the parties and subject matter of this petition and grant to petitioners such other and further relief in the premises as the rights and equities of the cause may show to be necessary and proper.

2952 Natural Gas Pipeline Company of America
and Texoma Natural Gas Company,
Petitioners,
By J. J. Hedrick,
20 North Wacker Drive, Chicago, Ill.,
George I. Haight,
209 South LaSalle St., Chicago, Ill.,
S. A. L. Morgan,
20 North Wacker Drive, Chicago, Ill.,
Attorneys for Petitioners.

Haight, Goldstein & Hobbs,
209 South LaSalle St.,
Chicago, Ill.,
Morgan, Culton, Morgan & Britain,
Amarillo, Texas,
Of Counsel.

State of Illinois, }
County of Cook: }

Floyd C. Brown, being duly sworn, makes the following statement on oath: that he is the Vice President and General Manager of Natural Gas Pipeline Company of America and Texoma Natural Gas Company, petitioners named in the above and foregoing petition; that he has read said petition and that the statements of fact therein contained are true.

Floyd C. Brown.

Subscribed and sworn to before me this 11th day of September, 1940.

Esther M. Wilson,
(Seal) *Notary Public, Cook County, Illinois.*
My Commission Expires May 27, 1943.

2953 In the United States Circuit Court of Appeals

For the Seventh Circuit,

October Term, 1940.

Natural Gas Pipeline Company of America and Texoma Natural Gas Company,
Petitioners,
vs.
Federal Power Commission and Illinois Commerce Commission,
Respondents.

No. ....

STATEMENT OF POINTS.

To Said Honorable Court:

Pursuant to Paragraph 3 of Rule 36 of this Court, petitioners, Natural Gas Pipeline Company of America and Texoma Natural Gas Company, in connection with their petition for review of an order of respondent Federal Power Commission dated July 23, 1940, as modified by an order dated August 8, 1940, file the following statement of points on which they rely as grounds for reversing and setting aside said order. These points, numbered consecutively from 1 to 37, inclusive, were all urged in the same order as objections or assignments of error before respondent Federal Power Commission in petitioners' application for rehearing filed with said respondent on August 19, 1940.

Respondent Federal Power Commission will be referred to hereafter as the Commission; and respondent Illinois Commerce Commission will be referred to as complainant.

2954

Point 1.

The Commission erred in holding that it has authority under the Natural Gas Act to change, modify or set aside the charges and prices at which petitioners are selling natural gas in interstate commerce at wholesale, it appearing from the record without contradiction that petitioners, constituting a single enterprise, are engaged in the business of owning natural gas reserves in the State of Texas, developing such reserves through the drilling and equipping of wells thereon, producing natural gas therefrom in quantities equal to three-fourths of their total market requirements, purchasing gas from others in quantities equal to one-fourth of their market requirements, transporting the gas so produced and purchased through their own pipelines and facilities to points in the States of Kansas, Nebraska, Iowa and Illinois, and selling such commodity at wholesale to selected distributors and industrial consumers under private contracts; that their business is of a strictly private character, not affected with a public interest in the sense that Congress would have jurisdiction, power or authority to enact legislation purporting to authorize the Commission to regulate the charges or prices for which such commodity is sold; and that the necessary operation of any order purporting to reduce, change or modify such charges would deprive petitioners of their property and liberty of contract without due process of law, in violation of the Fifth Amendment to the Constitution of the United States. (Commission's memorandum opinion No. 49, p. 9; Commission's order reducing rates, finding No. 6, p. 3.)

Point 2.

The Commission erred in overruling petitioners' second plea to the jurisdiction of the Commission dated December 18, 1939, and in holding that it has jurisdiction under the Natural Gas Act to reduce the prices at which petitioners are selling natural gas, by interim order or otherwise, pending the final termination of the proceedings and hearing now pending before the Commission and its Examiner, and pending a finding by the Commission, after the conclusion of the hearing and after petitioners have had an opportunity to be heard on their briefs and arguments on the facts presented by the whole record and the law applicable thereto, that the rates and prices charged and collected by petitioners are unjust, unreasonable, unduly discriminatory or preferential. (Commission's memorandum opinion No. 49, pp. 10-13.)

Point 3.

The Commission erred in holding that under the Natural Gas Act it has power and jurisdiction to enter an interim order pending the final termination of the hearing now pending and an opportunity by petitioners to be heard by brief and oral argument on the law and the facts presented by the whole record, since no such power or jurisdiction is conferred upon the Commission by the Natural Gas Act, either in express terms or by necessary implication. (Commission's memorandum opinion No. 49, pp. 10-13.)

2955

Point 4.

The Commission erred in holding that in these proceedings petitioners have had a hearing within the meaning of Section 5(a) of the Natural Gas Act (15 U.S.C., 717d(a)), which provides that "whenever the Commission, after a hearing * * * shall find that any rate, charge, * * * is unjust, unreasonable, * * * the Commission shall determine the just and reasonable rate, charge, * * * and shall fix the same by order." (Commission's memorandum opinion No. 49, pp. 10-13.)

Point 5.

The Commission erred in denying the request of petitioners that the issues of fact and of law raised by the motion on which the Commission's order of July 23, 1940, is based and by the briefs in support thereof be referred to the Examiner for a very careful analysis and consideration after receiving briefs and oral argument from counsel for the interested parties, and that the Commission have the formal recommendations of the Examiner on the issues, both of fact and of law, and the exceptions of petitioners thereto, if any, before the Commission should consider the entering of an interim order reducing petitioners' revenues.

Point 6.

The Commission erred in not holding that the burden of proof rests upon complainant and counsel for the Commission to establish that petitioners' existing charges are unjust and unreasonable, and that such burden has not been discharged.

Point 7.

The Commission erred in not holding that when and if complainant and counsel for the Commission discharged their burden of showing that petitioners' rates and charges are unjust and unreasonable, the burden was then upon complainant and counsel for the Commission to show what rates and charges would be just and reasonable, and that such second burden has not been discharged.

Point 8.

The Commission erred in finding that the rates and charges presently charged by petitioners are unjust, unreasonable, unlawful and violative of the provisions of the Natural Gas Act. (Commission's memorandum opinion No. 49, p. 26; Commission's order reducing rates, finding No. 18, p. 4.)

Point 9.

The Commission erred in establishing the following rate base:

2956	Reproduction cost new of physical properties (exclusive of gas reserves as of June 1, 1939)	$56,302,250
	Value of gas reserves as of June 1, 1939	13,334,775
	Capital additions from June 1, 1939, to December 31, 1942	3,808,399
	Working capital	975,000
	Rate base	$74,420,424

(Commission's memorandum opinion No. 49, p. 19; Commission's order reducing rates, finding No. 8, p. 3.)

Point 10.

The Commission erred in not allowing as the proper rate base the items and amounts set out in petitioners' reply brief dated February 15, 1940, p. 251, as follows:

Reproduction cost new exclusive of gas reserves	$56,302,250
Less "viewed" depreciation	2,866,758
Present value of physical properties exclusive of gas reserves	$53,435,492
Present value of gas reserves	13,334,775
Allowance for future capital expenditures	6,046,286
Going concern value	8,500,000
Working capital	975,000
Rate base	$82,291,553

Point 11.

The Commission erred in not holding that the proper rate base is the present value of the property, which, under the uncontradicted evidence, is made up of the reproduction cost new less viewed or actual depreciation of the depreciable properties, the value of the gas reserves, the going concern value, the working capital, and a proper allowance for future capital expenditures aggregating $82,291,553. (Defendants' reply brief dated February 15, 1940, p. 251.)

Point 12.

The Commission erred in attempting to apply its own theory as to undepreciated rate base by placing on the gas reserves the present value of those reserves in their depleted condition. (Defendants' reply brief dated February 15, 1940, pp. 144-161.)

2957

Point 13.

The Commission erred in making no allowance for going concern value in fixing the rate base and in fixing the amount to be amortized. (Commission's memorandum opinion No. 49, p. 19.)

Point 14.

The Commission erred in holding that the sum of $8,500,000 claimed by petitioners as going concern value is an arbitrary claim not supported by substantial evidence, it appearing from the uncontradicted evidence that said sum of money represents the aggregate of expenditures actually made and costs actually sustained in developing the market outlets for petitioners' gas up to the normal capacity of the lines; that such expenditures and costs were reasonable; and that at least that amount would have to be expended in attaching business if petitioners were now at the beginning of their operations. (Commission's memorandum opinion No. 49, p. 19.)

Point 15.

The Commission erred in reducing the amount allowed for future capital expenditures from $6,046,286, as claimed by petitioners, to $3,808,399, thus eliminating from the amount allowed all future capital expenditures after December 1, 1942, it appearing from the uncontradicted evidence that the amounts claimed by petitioners for capital expenditures after the date last mentioned certainly and definitely will be made and that the property acquired through such expenditures will be devoted to petitioners' business. (Commission's memorandum opinion No. 49, pp. 17, 18 and 19; Commission's order reducing rates, finding No. 8, p. 3.)

Point 16.

The Commission erred in holding that the total investment, by which it manifestly means original cost, in contradistinction to fair value, less the salvage value at the end of petitioners' business, should be amortized. (Commission's memorandum opinion No. 49, pp. 20 and 21.)

Point 17.

The Commission erred in holding that the proper amount to be amortized is $78,284,009. (Commission's memorandum opinion No. 49, p. 21; Commission's order reducing rates, finding No. 9, p. 3.)

Point 18.

The Commission erred in not holding that the proper amount to be amortized is $84,341,218, representing the present fair value of petitioners' present properties, including going concern value and working capital, plus future expenditures for additional capital assets, less the liquidating salvage value at the end of the project's life. (Commission's memorandum opinion No. 49, pp. 20-22.)

2958

Point 19.

The Commission erred in holding that the proper amortization period should be the total estimated life of the business, namely, 23 years from the beginning of 1932 to the end of 1954. (Commission's memorandum opinion No. 49, pp. 20-21; Commission's order reducing rates, finding No. 10, p. 3.)

Point 20.

The Commission erred in not holding that the proper amortization period should be the period intervening from the present time to the end of the project's life, which, under the uncontradicted evidence, will be sometime prior to December 31, 1954. (Commission's memorandum opinion No. 49, p. 20.)

Point 21.

The Commission erred in holding that the annual allowance for amortization should be calculated on a sinking fund basis, with interest credited to the amortization reserve at the rate of 6½% per annum, compounded annually. (Commission's memorandum opinion No. 49, pp. 21-22; Commission's order reducing rates, finding No. 11, p. 3.)

Point 22.

The Commission erred in not holding, under the uncontradicted evidence, that the annual allowance for amortization should be calculated on a straight line basis, or in any event on a sinking fund basis with interest credited to the amortization reserve at the rate of 2% per annum, compounded semi-annually. (Commission's memorandum opinion No. 49, pp. 21-22.)

Point 23.

The Commission erred in holding that it is fair and equitable, in computing the amortization to be charged as an operating expense under the sinking fund of formula, to use an interest rate of 6½%, the allowed rate of return. (Commission's memorandum opinion No. 49, pp. 21-22.)

Point 24.

The Commission erred in not holding that in computing the annual reserve for amortization an interest rate of not more than 2% per annum, compounded semi-annually, should be used. (Commission's memorandum opinion No. 49, pp. 21-22.)

Point 25.

The Commission erred in holding that as an annual reserve for amortization the sum of only $1,557,852 should be allowed. (Commission's memorandum opinion No. 49, pp. 22 and 26; Commission's order reducing rates, finding No. 12, p. 3, and finding No. 14, p. 4.)

2959

Point 26.

The Commission erred in not holding that the proper annual allowance for amortization is at least $5,100,732.

Point 27.

The Commission erred in eliminating from the allowance for operating expenses the items representing replacements of capital assets subsequent to August 1, 1940, in an amount averaging $188,054 per annum. The estimated cost of these items is included in the $78,284,009 erroneously allowed by the Commission as the proper amount for amortization. However, in estimating petitioners' average income available for amortization and return for the period from August 1, 1940, to and including December 31, 1942, the Commission disregarded the estimated cost of replacements during that period. Petitioners point out that the Commission failed to include such costs among the operating expenses, thus under its own theory arriving at an amount $188,054 greater than the correct amount available for amortization and return under such theory.

Point 28.

The Commission erred as a matter of law in finding that 6½% per annum on the rate base allowed is a fair rate of return for petitioners, there being no substantial evidence to support the finding. The allowed rate of return purports to cover only the cost of capital, based on the testimony of an employee of the Commission whose conclusion on that point is not supported by his own factual premise. No allowance is made for efficiency and skill in design and engineering, through which petitioners are able to operate their facilities under extraordinarily high stresses and to transport gas at extraordinarily high pressures, and efficiency in management in attaining and maintaining an average load factor more than 30% higher than that ordinarily attained by other pipelines, which efficiency and skill account for at least $1,200,000 of petitioners" annual revenues, according to the uncontradicted testimony. (Commission's memorandum opinion No. 49, pp. 23-26; Commission's order reducing rates, finding No. 13, p. 3.)

Point 29.

The Commission erred in not finding that the fair rate of return for petitioners is not less than 8%.

Point 30.

The Commission erred in holding that the annual amount necessary for a fair return to petitioners is not more than $4,837,328 and that the proper allowance for amortization is $1,557,852, or a total of $6,395,180 for fair return and amortization. (Commission's memorandum opinion No. 49, p. 26; Commission's order reducing rates, finding No. 14, p. 4.)

2960

Point 31.

The Commission erred in finding that petitioners' annual net revenues available for amortization and return exceed the amount reasonably necessary by $2,966,852. (Commission's memorandum opinion No. 49, p. 26; Commission's order reducing rates, finding No. 16, p. 4.)

Point 32.

The Commission erred in ordering that the rates and charges made, demanded or received by petitioners in connection with their transportation and sale of natural gas shall be reduced to reflect a reduction of not less than $3,750,000 per annum in the operating revenues of Natural Gas Pipeline Company of America. (Commission's memorandum opinion No. 49, p. 26; Commission's order reducing rates, paragraph (A), p. 4.)

Point 33.

The Commission erred in finding that the rates and charges after reflecting the reductions ordered will be just and reasonable. (Commission's order reducing rates, finding No. 19, p. 4.)

Point 34.

The Commission erred in ordering that petitioners file new schedules of rates and charges to reflect a reduction of not less than $3,750,000 per annum in the operating revenues of Natural Gas Pipeline Company of America effective as to all bills regularly rendered on or after September 1, 1940. (Commission's order reducing rates, paragraph (B), p. 4; Commission's order dated August 8, 1940, paragraph (A).)

Point 35.

The Commission erred in ordering that from and after the effective date of the new schedules ordered to be filed petitioners shall cease and desist from making, demanding or receiving any rates and charges which do not reflect the reduction ordered in Paragraph (A) of the Commission's order reducing rates. (Commission's order reducing rates, Paragraph (D), p. 5.)

Point 36.

The Commission erred in denying petitioners' application for a stay of the Commission's order dated July 23, 1940, pending the filing of an application for rehearing and the disposition of such application, and, in the event such application be denied, pending the review of said order by the courts on appeal. (Defendants-respondents' motion for stay filed August 8, 1940; Commission's order denying in part the motion for stay, dated August 8, 1940, Paragraph (b).)

Point 37.

The Commission erred in denying petitioners' application for rehearing. (Commission's order dated September 6, 1940.)

2961 Respectfully submitted,

Natural Gas Pipeline Company of America and
Texoma Natural Gas Company,
Petitioners,

By J. J. Hedrick,
20 North Wacker Drive, Chicago, Ill.
George I. Haight,
209 South LaSalle St., Chicago, Ill.
S. A. L. Morgan,
20 North Wacker Drive, Chicago, Ill.
Attorneys for Petitioners.

Haight, Goldstein & Hobbs,
209 South LaSalle St.,
Chicago, Ill.
Morgan, Coulton, Morgan & Britain,
Amarillo, Texas,
Of Counsel.

Endorsed: Filed Sep. 11, 1940. Kenneth J. Carrick, Clerk.

Filed
Nov. 5,
1940.

IN THE UNITED STATES CIRCUIT COURT OF APPEALS.

* * (Caption—7454) * *

STIPULATION FOR PRINTED RECORD.

Now come Natural Gas Pipeline Company of America and Texoma Natural Gas Company, petitioners, and the Federal Power Commission and Illinois Commerce Commission, respondents, and stipulate as follows:

The following documents shall be included in the printed record:

1. Pages 3 to the end of line 1 on page 64 of the official stenographer's report before the Federal Power Commission in Docket Nos. G-109 and G-112, now on file with this Court.

2. Pages 1 to 899, inclusive, of the narrative statement captioned "Abstract of Testimony."

3. Pages 4243, beginning with line 18, to page 4266, ending with line 6, of the official stenographer's report referred to in Paragraph 1 above.

4. Pages 900 to 1533, ending with line 20, of the narrative statement referred to in Paragraph 2 above.

5. Pages 8077, beginning with line 10, to page 8084, ending with line 2, of the official stenographer's report referred to in Paragraph 1 above.

6. Pages 1534 to 1816, ending with line 13, of the narrative statement referred to in Paragraph 2 above.

7. Pages 9736, beginning with line 12, to page 9740, ending with line 13, and pages 9890, beginning with line 21, to page 9892, ending with line 18, of the official stenographer's report referred to in Paragraph 1 above.

8. Pages 1816, beginning with line 14, to page 1922, inclusive, of the narrative statement referred to in Paragraph 2 above.

9. Pages 10390, beginning with line 14, to page 10394, ending with line 2, of the official stenographer's report referred to in Paragraph 1 above.

10. The letter dated January 20, 1940, by the Examiner sustaining the objection of counsel for the Commission and complainant to petitioners' (defendants') offer in evidence of the material shown at pages 10390 to 10394 of the official stenographer's report.

11. Pages 1923 to 1936, inclusive, of the narrative statement referred to in Paragraph 2 above.

12. Motion for interim order filed with the Commission by counsel for complainant and the Commission on November 7, 1939.

13. Pleas to the jurisdiction of the Commission filed by petitioners (defendants) with the Commission on December 18, 1939.

14. Conditional answer to motion for interim order filed with the Commission by petitioners (defendants) on December 18, 1939.

15. Opinion and order of the Commission dated July 23, 1940.

16. Motion for stay filed by petitioners (defendants) with the Commission on August 8, 1940.

17. Objections of Illinois Commerce Commission to granting of respondent's motion for a stay of the Commission's order of July 23, 1940, filed August 23, 1940.

18. Order of the Commission dated August 8, 1940.

19. Application for rehearing filed by petitioners (defendants) with the Commission on August 19, 1940, including verification filed August 23, 1940.

20. Order of the Commission overruling application for rehearing entered September 6, 1940.

21. Petition for review filed in this court on September 11, 1940, in cause No. 7454.

22. Exhibits Nos. 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 28, 36, 41, 43, 44, 53, 54, 78, 79, 84, 85, 86, 92, 114, 116, 117, 122, 123, 124, pages 1, 2 and 3 of 125, 129, 130, summary sheet of 131, 132, 133, 134, 136, 137, 138, 140, 141, 142, 145, 146, 147, 148, 149, 150, 151, 152, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 167, 168, 169, 170, 171, 172, 173, 174, 176, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 191, 192, 193, 195, 196, 197, 198, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, and 211.

23. This stipulation.

It is expressly stipulated that in the event any of the parties hereto shall find it necessary or proper to appeal to the official transcript filed with the Court by the Commission, the filing of this stipulation and the printed record in pursuance hereof shall in no wise prejudice its right to do so. In the event of controversy as to construction of any part of the narrative included in the record to be printed, it is expressly stipulated that the official transcript shall govern.

Natural Gas Pipeline Company of America and
Texoma Natural Gas Company, Petitioners,
By J. J. Hedrick,
Geo. I. Haight,
S. A. L. Morgan,
Attorneys,
Federal Power Commission,
By Wm. S. Youngman, Jr.,
General Counsel,
Richard J. Connor,
Assistant General Counsel,
George Slaff,
Attorney,
Daryal A. Myse,
Attorney,
Illinois Commerce Commission,
By John E. Cassidy,
Attorney General of Illinois,
Harry R. Booth,
Assistant Attorney General,
Respondents.

Approved: Sparks, C. J.
Nov. 7, 1940.

Endorsed: In the United States Circuit Court of Appeals. * * (Caption—7454) * * Stipulation for Printed Record. Filed Nov. 5, 1940. Kenneth J. Carrick, Clerk.

EXHIBIT NO. 5.

In the United States Circuit Court of Appeals.

* * (Caption—7454) * *

SUPPLEMENTAL STIPULATION FOR PRINTED RECORD.

Now come Natural Gas Pipeline Company of America and Texoma Natural Gas Company, petitioners, and the Federal Power Commission and Illinois Commerce Commission, respondents, and stipulate that the following portions of the Exhibits to be printed pursuant to the Stipulation for Printed Record filed in this court on November 6, 1940, shall be omitted:

1. Picture and name and all material except the lower

half of columns 2 and 3, beginning with printed matter entitled, "Expanding Markets for Gas Industry Make Investments Sound" in Exhibit No. 170.

2. All of column 1, page 3 (numbered 37) in Exhibit No. 171.

3. The picture and name on page 1; the lower half of columns 1 and 2 beginning with title "Transparent Kitchen To Use Gas," the paragraph in column 2 entitled, "Name Change", and all of column 3 including the picture, on page 2 in Exhibit No. 172.

4. All of page 3 except article continued on lower half of column 3 entitled, "A Stock Broker Analyzes The Natural Gas Industry," in Exhibit No. 173.

5. Picture and name on page 1 and all of material in columns 2 and 3 under title of "Plumber-Utility Cooperative Sales in Connecticut Drop in 1938," in Exhibit No. 176.

6. All of page 2 (numbered 33) except the article continued in the lower half of columns 2 and 3 under the title of "Investment Opportunities," in Exhibit No. 178.

Natural Gas Pipeline Company of America and
Texoma Natural Gas Company,
Petitioners,
By J. J. Hedrick,
Geo. I. Haight,
S. A. L. Morgan,
Attorneys.

Federal Power Commission,
By Wm. S. Youngman, Jr.,
Richard J. Connor,
Assistant General Counsel.
George Slaff,
Attorney.
Daryal A. Myse,
Attorney,

Illinois Commerce Commission,
By John E. Cassidy,
Attorney General of Illinois,
Harry R. Booth,
Assistant Attorney General.
Respondents.

Endorsed: In the United States Circuit Court of Appeals. • • (Caption—7454) • • Supplemental Stipulation for Printed Record. U. S. C. C. A.—7 Filed Nov 13 1940 Kenneth J. Carrick, Clerk.

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CLERK

No. 265

In the Supreme Court of the United States

OCTOBER TERM, 1941

FEDERAL POWER COMMISSION AND ILLINOIS
COMMERCE COMMISSION, PETITIONERS
v.
NATURAL GAS PIPELINE COMPANY OF AMERICA AND
TEXOMA NATURAL GAS COMPANY

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT

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In the Supreme Court of the United States

OCTOBER TERM, 1941

No. ——

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, PETITIONERS

v.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT

The Solicitor General, on behalf of the Federal Power Commission, and the Attorney General of Illinois, on behalf of the Illinois Commerce Commission, pray that a writ of certiorari issue to review the judgment of the United States Circuit Court of Appeals for the Seventh Circuit, entered in this case on April 14, 1941, vacating and setting aside an order of the Federal Power Commission reducing the rates charged by the respondents.

OPINIONS BELOW

The opinion of the Circuit Court of Appeals (R. 4026–4041) is not yet reported. The memorandum opinion of the Federal Power Commission is found at R. 3925-3942.

JURISDICTION

The judgment of the Circuit Court of Appeals was entered on April 14, 1941 (R. 4041). The jurisdiction of this Court is invoked under Section 240 (a) of the Judicial Code, as amended by the Act of February 13, 1925.

QUESTIONS PRESENTED

1. Whether, in issuing a rate order under the Natural Gas Act, the Federal Power Commission is required to include within the rate base a separate allowance for "going-concern value."

2. Whether, in determining the annual allowance for amortization, the Commission may compute the allowance on the basis of the entire service life of the capital assets or only on the basis of the remaining life from the date of the passage of the Natural Gas Act of June 21, 1938, or from the date of the rate order.[1]

---

[1] A third question, which is reserved for argument on the merits if this petition be granted, is whether, on judicial review of a rate order of the Commission under Section 19 (a) of the Natural Gas Act, the order may be vacated for failure to make an allowance or adequate allowance for certain items of value or cost, in the absence of a finding that the rates permitted by the order are confiscatory, unjust, or unreasonable.

STATUTE INVOLVED

The pertinent provisions of the Natural Gas Act of 1938, c. 556, 52 Stat. 821, 15 U. S. C., Supp. V, §§ 717–717w, are set forth in the Appendix.

STATEMENT

The respondent companies are operated as a single enterprise (R. 11, 3999). They own and operate, and originally constructed, a natural gas pipe line, running from Texas and Oklahoma to Illinois (R. 3998). Three-quarters of the gas transported through the pipe line is produced from the respondents' own gas reserves in the Texas Panhandle, and one-quarter, produced in the same field, is purchased from a third company (R. 3998–3999). This gas is transported through the pipe line in interstate commerce, and 98% of it is sold at wholesale to utility companies which resell to the public for domestic, commercial, and industrial use (R. 3998–3999).[2] The respondents have their principal places of business in Chicago, Illinois (R. 1, 9). There is no dispute as to these facts and no question is raised that respondents are engaged in interstate commerce (cf. R. 4010).

The Natural Gas Act of 1938 declares that the "business of transporting and selling natural gas for ultimate distribution to the public is affected with a public interest," and that federal regulation of interstate commerce in gas is "necessary in the public interest" (Sec. 1 (a)). The Act requires that all rates and charges in connection with the transportation or sale of gas subject to the Act must be "just and reasonable," and declares any rate or charge that is not just and reasonable to be unlawful (Sec. 4 (a)). The Federal Power Commission, on its own motion or on the complaint of a state, municipality, state commission, or gas distributing company, is empowered to investigate the rates charged, and to determine just and reasonable rates; the Commission "may order a decrease where existing rates are unjust, unduly discriminatory, preferential, otherwise unlawful, or are not the lowest reasonable rates" (Sec. 5 (a)).

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[2] About 90% of the gas is sold to an affiliated pipe line company in Illinois which resells to affiliated utility companies (R. 2–3, 9).

On September 23, 1938, the Illinois Commerce Commission, pursuant to sections 5 (a) and 13 of the Act, filed with the Federal Power Commission a complaint charging the respondent gas companies with exacting unjust and unreasonable rates and praying for an order determining fair, just, and reasonable rates (R. 1–6). On October 14, 1938, the Federal Power Commission itself instituted an investigation of respondent's rates (R. 6–9). After answer denying most of the material allegations of the complaint (R. 9–12) the two proceedings were consolidated for hearing (R. 13–14).

Hearings were begun on May 8, 1939, and continued intermittently for over five months, sessions being held on some 56 days (R. 3994–3995). Respondents fully presented their case, producing 37 witnesses (R. ii–iii; 187–1976) who testified on every phase of the business. On October 6, 1939, counsel for respondents announced that they had concluded their direct testimony (R. 4004). Thereafter seven of their witnesses were cross-examined and reexamined, and counsel for the two commissions presented four witnesses, who testified largely on the proper rate of return (R. 4004). On November 7, 1939, counsel for the two commissions jointly moved, on the evidence then of record, and without closing their case, for an immediate interim order reducing the rates (R. 3903–3914). Thereafter hearings were held at which respondents cross-examined the Commission's witnesses, and presented redirect and rebuttal testimony of their own, also mainly on the rate of return (R. 4004–4005, 3927). The final record before the Commission comprised 211 exhibits and over 10,500 pages of transcript of testimony. Oral argument on the motion was had before the full Commission and respondents filed pleas to the jurisdiction of the Commission to enter the requested order (R. 3914–3919), as well as an answer on the merits (R. 3920–3924), and briefs on both points (R. 3927, 4006).

On July 23, 1940, the Commission issued its memorandum opinion (R. 3925–3942) and an interim order reducing rates (R. 3942–3946). After making subsidiary and ultimate findings, including a finding that the companies' rates were "unjust, unreasonable and excessive" (R. 3945), the Commission ordered the respondents to reduce their rates sufficiently to reflect a reduction of at least $3,750,000 per annum in operating revenues, and to file new schedules of rates carrying into effect this reduction (R. 3945–3946). The order also provided that the record was to "remain open for such further proceedings as the Commission may deem necessary or desirable" (R. 3946).

For the purposes of the interim order, the Commission "reluctantly" accepted (R. 3936) the following estimates presented by respondents' own witnesses:

Reproduction Cost New of Physical Properties (exclusive of Gas Reserves)	$56, 302, 250
Value of Gas Reserves as of June 1, 1939	13, 334, 775
Capital Additions from June 1, 1939, to December 31, 1942	3, 808, 399
Working Capital	975, 000

These items total $74,420,424, which the Commission adopted as the rate base (R. 3937, 3944). The rate base urged by the companies was $82,291,553 (R. 3935). The companies' own recorded book cost of the properties, plus working capital, in existence as of December 31, 1939, was $60,952,279 (R. 3937).

The Commission refused to include in the rate base two items urged by the respondents: $8,500,000 for "going concern" value and $2,237,887 for average future capital expenditures from 1943 to 1954, the date claimed by the respondents for the exhaustion of their gas reserves and the termination of their business. The Commission characterized the claim for an allowance for "going concern" value as "arbitrary" and a "deceptive fiction", and added that it was convinced that it was allowing in the rate base "more than an adequate amount to cover all elements of value", and that the rate base allowed was "liberal" (R. 3936–3937).

The Commission fixed 6½% as the fair rate of return (R. 3938–3940).

The Commission accepted the companies' own estimate of the life of their business, 23 years (1932–1954), and their figures for total past and future capital expenditures, less salvage, $78,284,009 (Exh. 140, R. 3021).[3] From this it calculated the annual allowance for amortization to be $1,557,852, using the sinking fund method, with interest at 6½% per year, compounded annually (R. 3937–3938). The term "amortization allowance" was used to mean the allowance for depreciation, depletion, and retirement expense (R. 3937).

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[3] This total may be reconciled with the recorded book cost of the companies' properties plus working capital, in the sum of $60,952,279 as of December 31, 1939, as follows (in round figures):

Book cost of existing properties plus working capital at December 31, 1939	$60,950,000	(R. 3937)
Retirements actually made (1932–1939)	6,650,000	(R. 2959, 2821)
Future capital additions (1940–1954) per companies' estimates	8,535,000	(R. 3025, 2821)
Future capital replacements and contingencies (1940–1954) per companies' estimates	3,200,000	(R. 3027, 3021)
Total	79,335,000	
Less salvage, per companies' estimate	1,050,000	(R. 3021)
	78,285,000	

Pursuant to section 19 (a) of the Act, the companies filed an application for a rehearing (R. 3961–3993). Upon the denial of this application (R. 3993–3994), respondents petitioned the Circuit Court of Appeals for the Seventh Circuit for a review of the Commission's order (R. 3997–4009). The Circuit Court of Appeals upheld (1) the validity of the Natural Gas Act under the Fifth Amendment, (2) the authority of the Commission to issue an interim order reducing rates, (3) the propriety of setting 6½% as the fair rate of return, and (4) the propriety of putting the initial burden of setting up the rate schedules upon the companies. The court below vacated the Commission's order, however, on the sole grounds (a) that a separate allowance for "going concern value" of $8,500,000 should have been included in the rate base, and (b) that the period of amortization chosen should not have been the entire life of the business, but rather either the period beginning with the passage of the Act or the period commencing with the date of the rate reduction order. The court made no finding that the reduction would result in unjust, unreasonable, or confiscatory rates.[4]

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[4] The court found it unnecessary to consider two other grounds of attack urged by respondents: (i) that capital additions from 1943 to 1954 should have been included in the rate base, (ii) that 2% instead of 6½% interest should have been used in calculating the amortization allowance.

REASONS FOR GRANTING THE WRIT

1. The decision below requiring a separate allowance of $8,500,000 for going-concern value is in conflict with the decisions of this Court. This Court has repeatedly held that a separate allowance for going-concern value is not required in a rate valuation where, as here, the physical assets have been appraised "as part of an assembled whole." *Columbus Gas & Fuel Co.* v. *Public Utilities Commission,* 292 U. S. 398, 411; *Driscoll* v. *Edison Co.,* 307 U. S. 104, 117; *Denver Union Stock Yard Co.* v. *United States,* 304 U. S. 471, 478–480; *St. Joseph Stock Yards Co.* v. *United States,* 298 U. S. 38, 62–4; *Dayton Power & Light Co.* v. *Public Utilities Commission,* 292 U. S. 290, 308–9; *Los Angeles Gas & Electric Corp.* v. *R. R. Comm'n,* 289 U. S. 287, 313–319; *Galveston Elec. Co.* v. *Galveston,* 258 U. S. 388, 393–7; *Des Moines Gas Co.* v. *Des Moines,* 238 U. S. 153.[5] Moreover, the going-

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[5] Ample evidence that the rate base adopted did and was intended to reflect the value of the physical property "as part of an assembled whole" is found in the Commission's adoption, as its basis of valuation, of respondents' estimate of reproduction cost, which was $13,500,000 in excess of the original investment (R. 3937) and which included, in addition to labor and material costs, large allowances for overheads, such as interest, taxes, and administrative, legal, supervisory and "preliminary operations" (R. 1224–1231, 1234), and the Commission's declaration, in rejecting the companies' claim for a separate allowance for "going concern value," that the rate base included "more than an adequate amount to cover all elements of value" (R. 3936–3937). The opinion below states (R. 4039) that the Commission did

concern allowance approved by the court below was calculated on the basis of interest and return assumed to have been unearned in the past and other deficiencies in past earnings, previously included in operating expenses, during the period of business development (R. 1276–1282; 1327–1337; 2943–2947), a method which this Court has specifically condemned. *Galveston Elec. Co.* v. *Galveston,* 258 U. S. 388, 393–397; *Columbus Gas & Fuel Co.* v. *Public Utilities Commission,* 292 U. S. 398, 411–413.

The court below correctly assumed that, under the decisions of this Court, going concern value need not be included as an item in the rate base "in the ordinary public utility case" (R. 4038). It distinguished the instant case upon the grounds that the life of respondent's business is fixed and rather short, that the investment is speculative, and that in the early years respondent had not been subjected to federal regulation (R. 4038–4039). The distinctions are without substance. The life span of the business and its speculative nature are relevant only to the period to be used as a basis in the determination of the annual amortization allowance, and to the fair rate of return (see *Galveston Elec. Co.* v. *Galveston,* 258 U. S.

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not include going value, as shown by the Commission's findings as to the composition of the rate base and the reasons which it assigned for rejecting the companies' claim for a separate allowance for "going-concern value." Quite evidently, however, this means only that the Commission failed to make a separate allowance for going-concern value.

388, 395–396), and the absence of federal regulation prior to the passage of the Natural Gas Act has no conceivable relation to the valuation of the physical assets, whether the appraisal be based on "present value" or investment.

The question whether a separate allowance must be made for going concern value is one of substantial importance in the administration of the Natural Gas Act of 1938. This is the first rate proceeding under the Act to reach the courts. There are now pending before the Federal Power Commission natural gas rate cases, in various stages of investigation and hearing, involving companies with properties valued at about one billion dollars, and whose annual revenues total several hundred million dollars, and other proceedings will no doubt be instituted in the future. The weight to be given the element of going concern value must necessarily be determined in every case. The Commission has assumed that, under the decisions of this Court, an appraisal of the property as "part of an assembled whole" was sufficient. The court below has now held that these decisions are limited to the "old and well-established field of public utility regulation" (R. 4038). In concluding that a different result was required in the case of respondent, the court below deemed it necessary to "blaze through new and untraveled fields of regulation of quasi-public businesses" (R. 4038) in view of the "newness and lack of precedent among the conditions similar to those found in this industry" (R. 4039). The factors which were thought to require this conclusion, the life span of respondent's business, its speculative character and the absence of federal regulation in the early years, may be found in similar measure in the case of substantially all utilities subject to the Natural Gas Act. Whether such a far-reaching departure from the principles heretofore established in other fields of utility regulation is required in the case of the natural gas industry is a question which should be authoritatively determined by this court.

2. The decision of the court below (R. 4039-4041) that the period used as one of the bases in determining the annual amortization allowance must not include the years prior to the enactment of the Natural Gas Act likewise presents a novel question of vital importance in the administration of the Act. With immaterial exceptions, the utilities subject to the Act had all been engaged in the natural gas business for a number of years prior to the passage of the statute in 1938. If allowance must be made, in the years remaining after that date, for the amortization of the total capital investment theretofore made and the cost of past service thus charged to present consumers, effective rate regulation of the natural gas industry will be virtually nullified.

It is not clear why the court below condemned the amortization allowance. The decision perhaps was placed upon the ground that it was based on "original investment" rather than "present value" (see R. 4040), and perhaps on the ground that an amortization allowance which assumed the maintenance of reserves prior to regulation was retroactive legislation (see R. 4040–4041). In either case, these are considerations which would apply in every rate proceeding under the Natural Gas Act.

The effect of the decision, whatever its basis, is to require a method of determining amortization or depreciation allowance which is in conflict with the prevailing practice of the industry and of the regulatory bodies[6] and which would gravely impair the effectiveness of utility regulation under the Natural Gas Act. The decision presents in aggravated form the occasion for the salutary principle that the courts "are not required to enter a debatable field of fact and to choose and prescribe an invariable method of computation." *Clark's Ferry Bridge Co.* v. *Public Service Commission,* 291 U. S. 227, 240. So far as *United Railways* v. *West,* 280 U. S. 234, is deemed to support the decision below it can no longer be regarded as controlling.[7]

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[6] *Clarksburg Light & Heat Co.* v. *Public Service Commission,* 84 W. Va. 638, 100 S. E. 551, PUR 1920A 639, 649–653; *Re Ashtabula Gas Co.* (Ohio) PUR 1917D 790, 796–7; *Fuhrmann* v. *Iroquois Natural Gas Co.* (N. Y.) PUR 1919D 76, 93.

[7] As indicated above (*supra,* p. 2), the Government will urge, in the event this petition is granted, that the Commission's order did not require the establishment of rates

CONCLUSION

For the foregoing reasons it is respectfully submitted that the petition for a writ of certiorari should be granted.

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Acting Solicitor General.
GEORGE F. BARRETT,
Attorney General of Illinois.

JULY 1941.

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below "the lowest reasonable rates" and that the finding of the Commission that the rates permitted by the order are just and reasonable is supported by substantial evidence, with the consequence that the court below, under Sections 5 (a) and 19 (b) of the Natural Gas Act, was without authority to set aside the order of the Commission.

APPENDIX

The Natural Gas Act of 1938, C. 556, 52 Stat. 821, 15 U. S. C. Supp. V, §§ 717–717w, provides:

> SEC. 1. (a) As disclosed in reports of the Federal Trade Commission made pursuant to S. Res. 83 (Seventieth Congress, first session) and other reports made pursuant to the authority of Congress, it is hereby declared that the business of transporting and selling natural gas for ultimate distribution to the public is affected with a public interest, and that Federal regulation in matters relating to the transportation of natural gas and the sale thereof in interstate and foreign commerce is necessary in the public interest. (P. 821.)
>
> * * * * *
>
> SEC. 4. (a) All rates and charges made, demanded, or received by any natural-gas company for or in connection with the transportation or sale of natural gas subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges, shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful. (P. 822.)
>
> SEC. 5. (a) Whenever the Commission, after a hearing had upon its own motion or upon complaint of any State, municipality, State commission, or gas distributing company, shall find that any rate, charge, or classification demanded, observed, charged, or collected by any natural gas company in

connection with any transportation or sale of natural gas, subject to the jurisdiction of the Commission, or that any rule, regulation, practice, or contract affecting such rate, charge, or classification is unjust, unreasonable, unduly discriminatory, or preferential, the Commission shall determine the just and reasonable rate, charge, classification, rule, regulation, practice, or contract to be thereafter observed and in force, and shall fix the same by order: *Provided, however,* That the Commission shall have no power to order any increase in any rate contained in the currently effective schedule of such natural gas company on file with the Commission, unless such increase is in accordance with a new schedule filed by such natural gas company; but the Commission may order a decrease where existing rates are unjust, unduly discriminatory, preferential, otherwise unlawful, or are not the lowest reasonable rates. (Pp. 823–824.)

* * * * *

SEC. 6. (a) The Commission may investigate and ascertain the actual legitimate cost of the property of every natural-gas company, the depreciation therein, and, when found necessary for rate-making purposes, other facts which bear on the determination of such cost or depreciation and the fair value of such property.

(b) Every natural-gas company upon request shall file with the Commisison an inventory of all or any part of its property and a statement of the original cost thereof, and shall keep the Commission informed regarding the cost of all additions, betterments, extensions, and new construction. (P. 824.)

* * * * *

SEC. 9. (a) The Commission may, after hearing, require natural-gas companies to carry proper and adequate depreciation and amortization accounts in accordance with such rules, regulations, and forms of account as the Commission may prescribe. The Commission may from time to time ascertain and determine, and by order fix, the proper and adequate rates of depreciation and amortization of the several classes of property of each natural-gas company used or useful in the production, transportation, or sale of natural gas. Each natural-gas company shall conform its depreciation and amortization accounts to the rates so ascertained, determined, and fixed. * * * (P. 826.)

* * * * *

SEC. 13. Any State, municipality, or State Commission complaining of anything done or omitted to be done by any natural-gas company in contravention of the provisions of this Act may apply to the Commission by petition, which shall briefly state the facts, whereupon a statement of the complaint thus made shall be forwarded by the Commission to such natural-gas company, which shall be called upon to satisfy the complaint or to answer the same in writing within a reasonable time to be specified by The Commission. (P. 827.)

* * * * *

SEC. 19. (a) Any person, State, municipality, or State commission aggrieved by an order issued by the Commission in a proceeding under this Act to which such person, State, municipality, or State commission is a party may apply for a rehearing within thirty days after the issuance of such order. The application for rehearing shall set forth specifically the ground or grounds upon which such application is based. Upon such application the Commission shall have power to grant or deny rehearing or to abrogate or modify its order without further hearing. Unless the Commission acts upon the application for rehearing within thirty days after it is filed, such application may be deemed to have been denied. No proceeding to review any order of the Commission shall be brought by any person unless such person shall have made application to the Commission for a rehearing thereon.

(b) Any party to a proceeding under this Act aggrieved by an order issued by the Commission in such proceeding may obtain a review of such order in the circuit court of appeals of the United States for any circuit wherein the natural-gas company to which the order relates is located or has its principal place of business, or in the United States Court of Appeals for the District of Columbia, by filing in such court, within sixty days after the order of the Commission upon the application for rehearing, a written petition praying that the order of the Commission be modified or set aside in whole or in part. * * * No objection to the order of the Commission shall be considered by the court unless such objection shall have been urged before the Commission in the application for rehearing unless there is reasonable ground for failure so to do. The finding of the Commission as to the facts, if supported by substantial evidence, shall be conclusive. If any party shall apply to the court for leave to adduce additional evidence, and shall show to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for failure to adduce such evidence in the proceedings before the Commission, the court may order such additional evidence to be taken before the Commission, and to be adduced upon the hearing in such manner and upon such terms and conditions as to the court may seem proper. The Commission may modify its findings as to the facts by reason of the additional evidence so taken, and it shall file with the court such modified or new findings, which if supported by substantial evidence, shall be conclusive, and its recommendation, if any, for the modification or setting aside of the original order. The judgment and decree of the court, affirming, modifying, or setting aside, in whole or in part, any such order of the Commission, shall be final, subject to review by the Supreme Court of the United States upon certiorari or certification as provided in sections 239 and 240 of the Judicial Code, as amended (U. S. C., title 28, secs. 346 and 347). (Pp. 831–832.)

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Nos. 265 and 268

In the Supreme Court of the United States

October Term, 1941

Federal Power Commission and Illinois Commerce Commission, petitioners

v.

Natural Gas Pipeline Company of America, and Texoma Natural Gas Company

Natural Gas Pipeline Company of America and Texoma Natural Gas Company, petitioners

v.

Federal Power Commission and Illinois Commerce Commission

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT

BRIEF FOR THE FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION

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In the Supreme Court of the United States

OCTOBER TERM, 1941

Nos. 265 and 268

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, PETITIONERS

v.

NATURAL GAS PIPELINE COMPANY OF AMERICA, AND TEXOMA NATURAL GAS COMPANY

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, PETITIONERS

v.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT

BRIEF FOR THE FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION

OPINIONS BELOW

The opinion of the Circuit Court of Appeals (R. 4026-4041) is reported in 120 F. (2d) 625. The memorandum opinion of the Federal Power Commission appears at R. 3925-3942.

JURISDICTION

The judgment of the Circuit Court of Appeals was entered on April 14, 1941 (R. 4041). The petition and cross-petition were filed on July 12 and July 14, 1941, respectively, and were granted on October 13, 1941. The jurisdiction of this Court is invoked under Section 240 (a) of the Judicial Code, as amended by the Act of February 13, 1925.

QUESTIONS PRESENTED

1. Whether the Natural Gas Act of 1938 is a valid regulation of interstate commerce as applied to the companies here involved.

2. Whether the Commission is authorized under the Act to enter an interim order after hearing all of the companies' evidence.

3. Whether the Commission is authorized under the Act to enter an order directing the companies to file a new schedule of rates reflecting a prescribed reduction in operating revenues.

4. Whether the Commission's refusal to make a separate allowance for going concern value in fixing the rate base makes its order either confiscatory or unreasonable.

5. Whether the allowance made by the Commission for amortization makes its order either confiscatory or unreasonable, either because (a) the Commission provided for amortization of only the investment in the property, (b) it fixed the amortization period as the entire life of the enter-

prise, or (c) it used a 6½% compound interest rate to compute the allowance.

6. Whether the 6½% rate of return allowed by the Commission makes the order either confiscatory or unreasonable.

7. Whether, in determining the validity of the Commission's rate order, the Constitution is to be interpreted as requiring a fair return on the present fair value of the companies' properties or only as requiring a fair return on the companies' investment in the properties.

STATUTE INVOLVED

The pertinent provisions of the Natural Gas Act of 1938, c. 556, 52 Stat. 821, 15 U. S. C., Supp. V, §§ 717–717w, are set forth in Appendix A, *infra*, pp. 134–138.

STATEMENT

The Natural Gas Act of 1938 declares that the "business of transporting and selling natural gas for ultimate distribution to the public is affected with a public interest," and that federal regulation of interstate commerce in natural gas "is necessary in the public interest" (Sec. 1 (a)). The Act requires *inter alia* that all rates and charges in connection with the transportation or sale of natural gas subject to the jurisdiction of the Commission shall be "just and reasonable," and declares any rate or charge that is not just and reasonable to be unlawful (Sec. 4 (a)). The

Federal Power Commission, on its own motion, or on complaint of a state, municipality, state commission, or gas distributing company, is empowered to investigate the rates charged by any natural gas company in connection with any transportation or sale of natural gas, subject to the jurisdiction of the Commission, and to determine just and reasonable rates, and "may order a decrease where existing rates are unjust, unduly discriminatory, preferential, otherwise unlawful, or are not the lowest reasonable rates" (Sec. 5 (a)).

A. PROCEEDINGS BEFORE THE COMMISSION

On September 23, 1938, shortly after the effective date of the Natural Gas Act,[1] the Illinois Commerce Commission, pursuant to Sections 5 (a) and 13 of the Act, filed with the Federal Power Commission a complaint charging the Natural Gas Pipeline Company of America and the Texoma Natural Gas Company (hereinafter referred to as "the companies") with exacting unjust and unreasonable rates and praying for an order "setting fair, reasonable, and just rates" (R. 1–6). On October 14, 1938, the Federal Power Commission, on its own motion, instituted an investigation of the companies' rates (R. 6–9). After answer denying most of the material allegations of the complaint (R. 9–12), the two proceedings were consolidated for hearing (R. 13–14).

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[1] The Act was approved June 21, 1938, 52 Stat. 833.

Hearings were begun on May 8, 1939, and continued intermittently for over five months, sessions being held on some 56 days (R. 3994–3995). After preliminary testimony concerning the companies' gas reserves and their sales and rates by the Principal Gas Engineer of the Federal Power Commission (R. 35), and the presentation of earnings and expense data by an accountant employed by the Illinois Commerce Commission (R. 57), the companies complied with the direction of the Power Commission's examiner that they present their evidence first (R. 64). The companies presented 37 witnesses (R. 187–1976) who testified fully on their behalf. On October 6, 1939, the companies announced to the examiner that they had concluded their direct testimony in support of their case (R. 4004). Thereafter, seven of their witnesses were cross-examined, reëxamined, and recross-examined, and counsel for the two commissions presented four witnesses who testified largely on the subject of rate of return (R. 4004). On November 7, 1939, counsel for the two commissions joined in filing a motion on the basis of the evidence then of record, for an immediate interim order reducing the companies' alleged excessive and unlawful rates and charges (R. 2098–2100, 3903–3914). Thereafter, additional hearings were held at which the companies cross-examined the witnesses produced by the two commissions and later presented evidence on redirect and in rebuttal, also mainly on the rate of return (R. 4004–4005, 3929). Oral argument on the motion was had before the full Commission on December 18, 1939 (R. 2557, 3927), and the companies filed pleas to the jurisdiction of the Commission to enter the requested order (R. 3914–3919) as well as an answer on the merits (R. 3920–3924), and a brief on the jurisdictional issue (R. 3927, 4006). Thereafter, at the request of the companies, additional hearings were held to afford them further opportunity to present additional rebuttal testimony dealing with the issue of a proper rate of return and also to afford them opportunity to cross-examine one of the Commission witnesses who had previously given redirect testimony (R. 3927). The companies' brief on the merits was filed on February 15, 1940 (R. 3927). On July 23, 1940, the Commission issued a memorandum opinion (R. 3925–3942) and an interim order reducing rates (R. 3942–3946). That interim order is the order now under review. Its precise nature is discussed below (*infra*, pp. 11–15). A petition for rehearing filed by the companies (R. 3961–3993) was denied by the Commission (R. 3993–3994).

B. BUSINESS OF THE COMPANIES

The companies are Delaware corporations and their principal place of business is in Chicago, Illinois (R. 1). Conducted as a single enterprise (R. 11, 3944), they are engaged in producing and purchasing natural gas, transporting it in interstate commerce, and then selling it at wholesale (R. 11). Three-fourths of their market requirements are produced from their own reserves in the Panhandle gas field of Texas and one-fourth, produced in the same field, is purchased from the Colorado-Interstate Gas Company (R. 576). The companies transport their gas through their own pipeline which extends from Texas to Illinois (R. 37, 38).

About 98% of the gas transported through the pipeline is sold at wholesale to utilities which in turn resell the gas to the public for domestic, commercial, and industrial uses. The remaining 2% is sold directly to industrial users along the line (R. 2683). About 90% of the gas is sold, under contract, to an affiliated pipeline company, the Chicago District Pipeline Company, which in turn sells to affiliated utility companies (R. 2683, 2691). This contract, entered into on September 25, 1931, is to run for fifteen years and is renewable for a period of five years at the option of the Natural Gas Pipeline Company of America. The Chicago District Pipeline Company resells the gas which it purchases from the companies to the Peoples Gas Light and Coke Company, Public Service Company of Northern Illinois and Western United Gas & Electric Company. These public utilities distribute the natural gas, in most cases with a mixture of artificial gas, in the Chicago metropolitan area and northern Illinois (R. 3). They have guaranteed the contract of the Chicago District Pipeline Company with the Natural Gas Pipeline Company of America (R. 3). Several smaller distributing utilities also purchase gas from the companies for resale (R. 2683).

The construction of the companies' pipe line was commenced in 1930 and completed near the end of 1931 (R. 518, 560) and operating records were set up as of January 1, 1932 (R. 561).

Witnesses for the companies testified that the economic life of their natural gas reserves would be 23 years—1932 to 1954, inclusive—and that at the end of that period the companies would be forced to discontinue business because of exhaustion of the supply (R. 1400). For purposes of the interim order here under review, the Commission assumed that the companies' business would continue only until December 31, 1954 (R. 3938).[2]

C. FINANCIAL HISTORY OF THE COMPANIES

At the beginning of operations, the companies' capital structure consisted of \$60,000,000 of 6% bonds and \$3,500,000 of common stock. Of this \$3,500,000 of common stock, \$500,000 represents stock issued by Texoma, which is a non-profit corporation and which consequently pays no dividends on its stock (R. 3712). By December 31, 1933 the bond figure was increased to $60,999,000 (R. 2991). All of the bonds are held by six large corporations,[3] which also hold all of the stock of the companies; the bonds held by each of the six stockholder corporations are in proportion to the stock held by each (R. 3781).

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[2] There was evidence in the record, however, that the life of the companies would be considerably longer (R. 54, 3374, 3401, 3408).

During the first seven years of operations ending on December 31, 1938, the companies built up a reserve for depreciation and depletion amounting to $12,557,892, and in addition charged $6,481,322 as operating expenses for retirements beyond the amount charged against the depreciation and depletion reserves (R. 2959). The sum thus made available was used in part to retire $14,499,000 of the bonds (R 2991). The companies also declared dividends of $9,150,000 during the first seven years (Ex. 15, R. 2749). Even allowing for book deficits in the first two years, the net income available for dividends and surplus, during the first seven years, was $8,224,436, per the books (Ex. 136, R. 2959) or an annual average of 39.3% on the capital stock of Natural Gas Pipeline Company of America. For the first eight months of 1939 that company paid $1,500,000 on its $3,000,000 stock (Ex. 187, R. 3784).

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[3] Standard Oil Company of New Jersey, The Texas Corporation, Columbian Carbon Company, Southwestern Development Company, Cities Service Company, and Natural Gas Investment Company. The last-mentioned company is in turn owned by The Peoples Gas Light and Coke Company and Commonwealth Edison Company (Chart 4, Exhibit 186, R. 3781).

More specifically, the total actual income available for return and for amortization of investment, according to the companies' exhibits, after payment of operating expenses and taxes, during the years from 1932 to 1938, inclusive, was $53,405,092 (Ex. 136, R. 2959). During the same period a total of $19,558,810 was charged to operations for amortization of investment, consisting of $11,620,210 on account of depreciation, $1,457,278 on account of depletion, and in addition, $6,481,322 for retirements beyond the amount charged against the depreciation and depletion reserves (Ex. 136, R. 2959). Deducting the total charges of $19,558,810 from the $53,405,092 of income leaves $33,846,282 for return on investment during the period, which is an average of $4,835,183 per annum, after all actual charges made by the companies for depreciation, depletion, and retirements.

The book cost of the properties existing each year, according to the companies' balance sheets, averaged slightly more than $60,000,000 during this period, or slightly less than $61,000,000 if the companies' estimate for working capital is included (Ex. 137, R. 2991).

At the end of the period the companies had accumulated reserves of $12,557,892 for depreciation and depletion applicable to the properties in service (Ex. 137, R. 2991). If we take this figure as the companies' measure of the loss in the existing properties that occurred in the seven years by reason of depreciation and depletion, and deduct one-half of it from the undepreciated figure of $61,000,000, the average depreciated investment for the period is found to be approximately $54,720,000. The average annual income of $4,835,183 during the seven-year period was more than 8.8% of that investment (Ex. 137, R. 2993).

For the year 1938, the net earnings from operations ($9,884,745) (Ex. 136, R. 2959), after depreciation charges of $1,978,408, depletion charges of $261,658, and retirements of $992,567, as per the companies' books, amounted to $6,652,112. The actual book cost of the existing properties as of December 31, 1938, $59,197,842 (R. 2991), together with working capital as claimed by the companies of $975,000 (R. 3901), amounted to $60,172,842, or $47,614,950 after deduction of the depreciation and depletion reserves of $12,557,892 applicable to the existing properties (Ex. 136, R. 2959). The net earnings on the depreciated investment were thus almost 14% in 1938. Even without any deduction of the depreciation and depletion reserves, the return was approximately 11%. The earnings of the companies for the first eight months of 1939 were substantially larger than the corresponding earnings for 1938 (Ex. 187, R. 3784).

D. OPINION AND ORDER OF THE COMMISSION

On July 23, 1940, the Federal Power Commission issued its memorandum opinion (R. 3925-3942) and an interim order reducing rates (R. 3942-3946). After making subsidiary and ultimate findings, including a finding that the companies' rates were "unjust, unreasonable, and excessive" (R. 3945), the Commission ordered the companies to file new schedules of rates and charges reflecting a reduction of at least $3,750,000 per annum in operating revenues; these new schedules were to be effective as to all bills regularly rendered on or after September 1, 1940 (R. 3945–3946). The order also provided that the record should "remain open for such further proceedings as the Commission may deem necessary or desirable" (R. 3946).

For the purpose of the interim order the Commission "reluctantly" accepted (R. 3936) the following estimates presented by the companies' own witnesses:

Reproduction Cost New of Physical Properties (exclusive of Gas Reserves)[4]	$56,302,250
Value of Gas Reserves as of June 1, 1939	13,334,775
Capital Additions from June 1, 1939, to December 31, 1942	3,808,399
Working Capital	975,000

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[4] Although the Commission accepted the companies' estimate of reproduction cost new for purposes of its interim order, it seems clear from the record that that estimate is excessive. The very fact that the reproduction cost depreciated exceeds the actual cost new casts great doubt upon the reproduction figures since the property was constructed in 1930 and 1931; most of the contracts must therefore have been let in 1930 or before, a high price period. The estimate of $13,334,775 for the present market value of the leaseholds (Exs. 131, 146, R. 2949, 3069) appears plainly excessive when it is compared with the actual cost of those leases appearing in defendants' books as of December 31, 1938; the book figure for the then existing leases is $9,367,364 (Ex. 137, R. 2993) and it is subject to substantial reduction for depletion, the companies themselves having accrued a depletion reserve of $1,152,854 (Ex. 137, R. 2991).

These items total $74,420,424, which sum the Commission adopted as the rate base (R. 3937, 3944). The companies' own recorded book cost of the properties plus working capital, in existence as of December 31, 1939, was $60,952,279 (R. 3937).

The companies urged, on the other hand, a rate base of $82,291,553, computed as follows (R. 3935):

Reproduction Cost New exclusive of Gas Reserves	$56, 302, 250
Less "Viewed" Depreciation	2, 866, 758
Present Value of Physical Properties exclusive of Gas Reserves	53, 435, 492
Present Value of Gas Reserves	13, 334, 775
Allowance for Future Capital Expenditures	6, 046, 286
Going Value	8, 500, 000
Working Capital	975, 000
Total	82, 291, 553

The Commission refused to include in the rate base the companies' claim of $8,500,000 as a separate allowance for "going concern" value and $2,237,887 for average future capital expenditures from 1943 to 1954, the date claimed by the companies for the exhaustion of their gas reserves and the termination of their business. The claim for "going concern" value was characterized by the Commission as "arbitrary" and a "deceptive fiction"; it stated in its opinion that it was convinced that it was allowing in the rate base "more than an adequate amount to cover all elements of value," and that the rate base allowed was "liberal" (R. 3936–3937). The claim for future capital expenditures from 1943 to 1954 was not included because "it is clear * * * that such improvements are not used and useful in the present and to a certain extent must be deemed conjectural" (R. 3936).

The Commission fixed 6½% as the fair rate of return on the above-mentioned rate base (R. 3938–3940).

The Commission accepted the companies' own estimate of 23 years (1932–1954) as the life of their business, and their figures, $78,284,009, for total past and future investment, less salvage (R. 3938; see Ex. 140, R. 3021).[5] From this it calculated that "the annual amortization expense on an investment of $78,284,009 for a period of 23 years, at the 6½ percent sinking fund rate, is $1,557,852. We allow that amount" (R. 3938).[6]

The Commission also accepted for the purpose of the present order the companies' statement of income available for amortization and return for 1939 to 1942, inclusive (R. 3938), the average income for such years being $9,511,454 (Ex. 140, R. 3023). The Commission noted, however, the in-

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[5] This figure is computed as follows:

Book cost of existing properties at December 31, 1938 (R. 2991)	$59, 197, 843
Retirements actually made (1932–1938) (R. 2991, 3021)	7, 000, 918
Future capital additions, replacements, and contingencies (1939–1954) (R. 3021)	12, 159, 380
Working capital (R. 3021)	975, 000
Total	79, 333, 141
Less salvage (R. 3021)	1, 049, 132
	78, 284, 009

[6] The term amortization was used to mean an allowance for depreciation and depletion (R. 3937).

crease in federal income taxes provided by the Revenue Act of 1940, and estimated that the income available for amortization and return would be decreased to $9,362,032 (R. 3938). The Commission then concluded that the fair return, $4,837,328 (6½% of $74,420,424), exceeded the companies' estimate of return less the allowed amortization allowance ($9,362,032 less $1,557,852) by $2,966,852, which sum was available for reduction in net revenues. Because of the consequent reduction of $783,909 in federal income taxes, the order reduced the rates by $3,750,000 (R. 3941).

The Commission felt that the reduction was "conservative in view of the acceptance of the companies' estimates and the generous allowances" (R. 3941), and noted that the acceptance of reproduction cost testimony for the purpose of the order would not prevent the Commission from subsequently exercising its judgment "as to how reproduction cost evidence shall be ultimately treated * * *" (R. 3941).

E. ACTION OF THE COURT BELOW

Pursuant to Section 19 (b) of the Act, the companies petitioned the Circuit Court of Appeals for the Seventh Circuit for a review of the Commission's order (R. 3997–4009). The Circuit Court of Appeals upheld (1) the validity of the Natural Gas Act, (2) the authority of the Commission to issue an interim order reducing rates, (3) the propriety of setting 6½% as the fair rate of return, and (4) the propriety of requiring the companies to file new rate schedules reflecting the amount of the reduction ordered. The court below vacated the Commission's order, however, on the sole grounds (1) that a separate allowance for "going-concern value" of $8,500,000 should have been included in the rate base, and (2) that the period of amortization chosen should not have been the entire life of the business, but rather either the period beginning with the passage of the Act or the period commencing with the date of the rate reduction order. The court made no finding that the reduction would result in unjust, unreasonable, or confiscatory rates.[7]

F. CONTENTIONS OF THE PARTIES

The Federal Power Commission and the Illinois Commerce Commission, petitioners in No. 265, challenge the holding of the court below that a separate allowance for "going concern" value should have been included in the rate base and that the period of amortization should not have been spread over the entire life of the business. The companies, petitioners in No. 268, challenge the constitutionality of the Natural Gas Act, and in addition assert that under Section 5 (a) of the Act, the Commission must actually set rates and not merely limit profits, that the finding that the companies' present rates are unreasonable is not supported by substantial evidence, that the finding that 6½% per annum is a fair return is not supported by substantial evidence, that the Commission erred in computing the amortization allowance on the same rate of interest as allowed as a fair return, that the Commission had no authority to enter the "interim" order, that the order operates to confiscate the companies' property in violation of the due process clause of the Constitution, and that the companies did not have a fair hearing within the meaning of the Natural Gas Act.

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[7] The court found it unnecessary to consider two other grounds of attack urged by the companies: (1) that capital additions from 1943 to 1954 should have been included in the rate base, and (2) that 2% instead of 6½% interest should have been used in calculating the amortization allowance.

SPECIFICATION OF ERRORS TO BE URGED IN NO. 265

The court below erred:

1. In holding that the Federal Power Commission was required to include in the rate base a separate allowance for going concern value.

2. In holding that, in computing the amortization allowance, the Commission should have taken as the period of amortization either the period beginning with the passage of the Natural Gas Act or the period beginning with the date of the rate order.

3. ~~In vacating and setting aside the Commission's~~ order.

SUMMARY OF ARGUMENT

I

The Natural Gas Act of 1938 is a valid regulation of interstate commerce as applied to these companies.

II

The procedure adopted by the Commission in entering an interim order directing the companies to file a new schedule of rates reflecting a $3,750,000 reduction in annual earnings was authorized by the Act. The companies had a full hearing on every aspect of the case, including both the jurisdictional and substantive issues, and the statutory requirement that an order be entered "after a hearing" was consequently satisfied.

The fact that the Commission did not itself fix a detailed rate schedule does not render its order invalid. The practice followed by the Commission in this case is a familiar one in rate regulation. It is impliedly authorized by Section 5 of the Act, which empowers the Commission to fix reasonable rates, and expressly authorized by Section 16, which empowers the Commission to issue "such orders as it may find necessary or appropriate to carry out the provisions of this Act."

III

On the merits of the Commission's order, two issues are before the Court. The first is whether the rates prescribed are confiscatory. The second is whether the Commission exceeded its statutory power to determine "reasonable rates" upon finding that the existing rates are "unreasonable." In principle the constitutional and statutory questions are separate and distinct, for the legislature may command the use of one method of rate making whereas the Fifth Amendment may permit use of a different test in determining whether the prescribed rates are confiscatory. In deciding the constitutional issue, it is not material that the Commission did in fact adopt the present fair value test. The Court must determine for itself whether the Constitution protects the present fair value of the property or only the investment in the property and then must test the validity of the Commission's order in the light of the proper constitutional principle.

IV

The reduction in rates ordered by the Commission does not violate the companies' constitutional rights. The Commission properly refused to make a separate allowance in the rate base for "going concern" value, properly computed the amortization allowance, and fixed a generous rate of return.

A. The claim for going concern value is, on precedent, plainly untenable. It is settled by the decisions of this Court that a separate allowance need not be made where the physical assets have been appraised "as part of an assembled whole" and that a valuation based on reproduction cost includes a sufficient allowance for going concern value notwithstanding that the reproduction cost estimate is exclusively attributable to physical assets. The rationale of the decisions is that, when a valuation is made on a reproduction cost basis, the result in itself reflects a going concern, for if properties were not actually a going concern they would have only a scrap value, much less than reproduction cost less depreciation. Moreover, this Court has specifically condemned the particular method of calculating going concern value adopted by the companies in this case. *Galveston Elec. Co.* v. *Galveston,* 258 U. S. 388.

On principle, the inclusion in the rate base of an allowance for going concern value is not required by the Constitution under any permissible theory of rate regulation.

B. The Commission made a proper allowance for amortization.

1. The Commission properly based its depreciation allowance on the cost rather than the fair value of the properties. This is entirely clear if, as we urge, the Constitution protects only the investment and not the fair value of the property. It is equally clear even if *Smyth* v. *Ames,* 169 U. S. 466, enunciates the applicable constitutional principle.

It is almost universal business practice to base the depreciation charge on cost in the computation of net earnings. The net earnings, so computed, of unregulated enterprises and the yield upon their securities, which in turn is based upon such net earnings, form the basis upon which the rate of return allowed to a utility is determined. To base the annual depreciation allowance upon fair value in the case of a utility would result in an additional profit over and above a fair return.

2. The Commission also properly fixed the depreciation period as the entire life of the property. Depreciation is simply an operating expense representing the annual diminution of the service capacity of the property. Manifestly, some of the service capacity of the property was consumed in the eight and a half years which elapsed prior to the entry of the order.

Under the sinking fund method used by the Commission, the amount of depreciation, measured in terms of original cost, attributable to the period prior to the date of the rate order is less than the actual accrued depreciation and is less than the amount which, under proper accounting practice, the companies should have charged and in fact did charge for depreciation during this period. Therefore, whether the Constitution is deemed to protect the property or the investment, the Commission's action in this respect was valid.

3. The Commission properly concluded that the rate of interest to be used in computing the annual amount necessary to amortize the total in-

vestment should be the same as the rate of return. This is so because, under the sinking fund method, by allowing a 6½% return on the full rate base without any deduction for amortization, the Commission in effect allowed a 6½% return on both the unamortized portion of the rate base and on the amortization reserve. The use of a 2% interest rate in computing the amortization allowance, as the companies urge, would result in an excessive return to the companies because, in applying the rate of return to the undepreciated rate base as provided by the sinking fund method, the 6½% interest rate thus in effect applied to the amortization reserve is 4½% higher than the 2% rate of interest used in computing the amortization allowance.

C. The record amply supports the Commission's finding that 6½% is a fair rate of return.

V

The Commission's findings that the companies' existing rates are unreasonable and that the level of rates fixed by the Commission is reasonable are supported by substantial evidence. The companies' contention to the contrary proceeds on the assumption that the reasonableness of rates must be determined by the value and benefit of the service rendered, and that the fact that the existing rates yield millions in excess of a fair return on the value of the property is not sufficient evidence to support a finding of unreasonableness. The contention is obviously without merit. The reasonableness of the rates must be measured either by a fair return on fair value or by a fair return on investment, and not by the value of the service to the consumer. And there can be no doubt that, under either the investment or fair value test, the rates charged by the companies were "unreasonable" and that the rates fixed by the Commission are "reasonable" in the statutory sense.

VI

The rule of *Smyth* v. *Ames,* 169 U. S. 466, which requires a fair return on the fair value of the property, is unsound and the case should now be overruled. The rule is based on the eminent domain principle of "just compensation" for a "taking" of property. The regulation of rates, however, is not a "taking" of property; it is simply the exercise of the legislative power to fix prices in the public interest. The sole question of validity, therefore, as in any other case of price regulation, is whether the regulation is reasonable.

The regulation of rates on the investment basis is clearly reasonable, although regulatory agencies may be free to adopt other methods warranted by business practice. On the basis of long experience, almost all informed opinion is agreed that effective rate regulation on a fair value basis is a practical impossibility, and that the investment standard is sound and workable, is just to the utilities and will attract sufficient capital to secure adequate service.

ARGUMENT

I

THE NATURAL GAS ACT OF 1938 IS A VALID REGULATION OF INTERSTATE COMMERCE

The court below concluded "without much doubt" that the Natural Gas Act is constitutional (R. 4030). Its conclusion is plainly correct.

The sale, transportation, and delivery of natural gas from one state to distributors in any other state constitutes interstate comerce subject to regulation by Congress. *State Commission* v. *Wichita Gas Co.*, 290 U. S. 561, 563; *Public Utility Commission* v. *Attleboro Co.*, 273 U. S. 83, 90; *Peoples Gas Co.* v. *Public Service Commission*, 270 U. S. 550, 554; *Missouri* v. *Kansas Gas Co.*, 265 U. S. 298, 303. Admittedly the companies are engaged in that business.

The fixing of rates charged by the companies does not contravene the Fifth Amendment. In the field of interstate commerce, Congress may provide for administrative regulation of rates and charges without regard as to whether the business regulated is a "public utility," provided that the fixing of rates bears a reasonable relation to a proper legislative purpose. ***Sunshine Anthracite Coal Co.*** v. ***Adkins***, 310 U. S. 381, 393–397. See also ***Olsen*** v. ***Nebraska***, 313 U. S. 236; ***United States*** v. ***Darby***, 312 U. S. 100; ***United States*** v. ***Rock***

Royal Cooperative, 307 U. S. 533, 569; *Nebbia* v. *New York,* 291 U. S. 502. To protect the public against unreasonable charges for gas, light, and heat has traditionally been an appropriate legislative purpose. And regulation of the rates charged to the local distributor by gas pipeline companies is plainly a reasonable if not an essential step toward that end. Indeed, the extensive character of the investigation on which Congress based its findings that regulation of the business of transporting and selling natural gas for ultimate distribution to the public "is necessary in the public interest," is sufficient to rebut any charge of arbitrary and capricious action.

The question whether Section 7 of the Act is unconstitutional because it prohibits a company from withdrawing from the business is not before this Court. Quite apart from Section 7, the Act sets up a separable and workable system of rate regulation. The order appealed from fixes only rates. The companies have filed no application with the Commission for leave to withdraw from business and therefore cannot complain of any injury from this provision of the Act. Since the Act contains a separability clause in Section 23 and would be workable without Section 7, the Court need not now consider the constitutionality of Section 7. *Electric Bond & Share Company* v. *Securities & Exchange Commission,* 303 U. S. 419, 439.

In any event there can be little doubt that Section 7 is constitutional. Continued operation by gas pipeline companies which are chief suppliers to local distributing utilities may often be necessary to the public convenience, for an essential supplier of a distributing utility stands in this respect in the same position *vis a vis* the public as the distributor itself. Consequently it is a reasonable regulation, except in cases of confiscation, to require such a corporation to show before it ceases operations that discontinuance of the service will not injure the public which the corporation has brought to rely upon it. Cf. *United Gas Co.* v. *Railroad Commission*, 278 U. S. 300, 308-309. To the extent that *Wolff* v. *Court of Industrial Relations*, 262 U. S. 522, has not been overruled by later decisions it is not persuasive here, for, as the Court pointed out in that case, different regulations are appropriate for different businesses. See 262 U. S. at 539.

II

THE NATURAL GAS ACT AUTHORIZED THE COMMISSION, AFTER GRANTING A FULL HEARING TO THE COMPANIES, TO ENTER AN INTERIM ORDER DIRECTING THE COMPANIES TO FILE A NEW SCHEDULE OF RATES REFLECTING A PRESCRIBED REDUCTION IN OPERATING REVENUES

The companies contend that, under the terms of the Act, the Federal Power Commission had no authority to enter the type of order here under review. First, they say that the Commission may enter a rate order only after the hearing is completed—in other words, that it lacks authority to enter an "interim" order. Second, they say that the order is invalid because the Commission did not fix just and reasonable rates in accordance with the Act but merely ordered the companies to file a new schedule of rates reflecting a prescribed reduction in operating revenues. We submit that both the Commission and the court correctly rejected these contentions.

A. The Commission acted properly in entering an interim order on the companies' evidence

Section 5 (a) of the Act provides that "Whenever the Commission, after a hearing * * * shall find that any rate * * * is unjust, unreasonable, unduly discriminatory or preferential, the Commission shall determine the just and reasonable rate * * * and shall fix the same by order". The only limitation upon the kinds of rate order which the Commission is authorized to issue is that the order must be made after "a hearing." That statutory requirement was met in the instant case. The companies had every opportunity to present all their evidence on both the jurisdictional and substantive aspects of the problem (R. 3931), cross-examined every witness for both the Federal Power Commission and the Illinois Commerce Commission (R. 3932), offered what rebuttal testimony they desired (R. 3932) and before the so-called interim order was entered stated that they had concluded their case (R. 4004). They filed briefs and argued orally. In short there was a full hearing in every substantial sense. As the Commission very properly observed, defendants "cannot be heard to complain that they have not yet been able to examine on redirect their own witnesses who have not yet been cross-examined, nor is it essential to a full hearing on the motion before us that they be permitted to cross-examine or rebut witnesses who have not yet been offered by counsel for the commissions" (R. 3932).

It seems plain that the hearing required by Section 5 (a) is a hearing in this substantial sense and not the technically completed proceeding to which the companies refer. The purpose of the requirement is simply to ensure that the Commission will act upon evidence and give the utility an opportunity to know, and to meet if it can, the claims, and evidence in support of them, upon which any order will be based. Accordingly, this Court in applying the Transportation Act of 1920 held (*New England Divisions Case,* 261 U. S. 184, 201):

> A hearing may be a full one, although the evidence introduced does not enable the tribunal to dispose of the issues completely or permanently; and although the tribunal is convinced when entering the order thereon, that, upon further investigation, some changes in it will have to be made.

To read the Natural Gas Act in the same manner carries out its purpose that rates shall always be reasonable. It enables the Commission, as it did in the instant case, to hear the utility in full and then make findings and lower the rates to a level which appears reasonable on the evidence most favorable to the utility, such rates to be effective while the Commission continues the hearing to determine whether the rates should be still further reduced. On the other hand, the construction urged by the companies would serve no substantial purpose for the Commission could legitimately achieve the same result by the cumbersome process of opening and closing a succession of hearings.

Moreover, Congress evidently intended the Commission to have this salutory power to enter a rate order without regard to the technical distinctions between an interim order after a full hearing in a pending proceeding and a final order after a proceeding is closed, for in Section 16 it provided, "The Commission shall have power to * * * issue * * * such orders * * * as it may find necessary or appropriate to carry out the provisions of this Act."

The failure to include in the Act power to enter orders fixing temporary rates, after the analogy of the New York and Pennsylvania statutes,[8] is no indication of a contrary intention; there is a vast distinction between fixing rates on the basis of the utility's own case at a time when the hearing could be closed and prescribing a rate on the basis of the utility's original cost less reserve before the utility has had full opportunity to present all its evidence. In this case the Commission has not fixed nor sought to defend the level of rates prescribed by the interim order on any basis that would not be equally applicable to a final order. Cf. *Driscoll* v. *Edison Company,* 307 U. S. 104. The Commission has considered all evidence relevant on any theory of rate making and the validity of its order on the merits is to be tested by the same principles which would govern the validity of any final rate order.

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[8] See *Driscoll* v. *Edison Co.*, 307 U. S. 104; *Matter of Bronx Gas & Electric Co.* v. *Maltbie*, 271 N. Y. 364.

B. The Commission acted properly in directing the companies to file a new schedule of rates reflecting a prescribed reduction in operating revenues

The companies' contention that the order is invalid because it does not fix a schedule of rates ignores the twofold character of rate regulations. One branch is to determine the general rate level; the other is to cure maladjustments, discriminations, and unfairnesses in the details of the schedule. The two may properly be separated and either dealt with alone in such a way as to meet the essential problem before the regulatory body. Particularly that has been true where, as in the instant case, the hearings reveal that a blanket change is needed as well perhaps as detailed adjustments; the former has not been made to wait on the latter.

The Interstate Commerce Commission has long recognized the difference and framed its orders to the general rate structure or the particular tariff according to the problem before it. *New England Divisions Case*, No. 646, October Term 1922, Brief for Interstate Commerce Commission, pp. 65, 67–76. And this Court has held that the Interstate Commerce Commission has power in fixing rates and divisions to deal with the major over-all controversy and leave the detailed schedules for the carriers to develop in the first instance. *New England Divisions Case*, 261 U. S. 184, 201–202.

Similarly, it is an accepted practice for state commissions to order utilities to make such a reduction in rates as will reflect a prescribed decrease in operating revenues. *E. g., Driscoll* v. *Edison Co.*, 307 U. S. 104, 107.

Under the Natural Gas Act the Commission likewise has power to mould and limit its order to meet the needs of the real controversy. Section 5 is modeled after the provisions of the Interstate Commerce Act and Transportation Act of 1920 which had been interpreted to give the Interstate Commerce Commission that power. Moreover, Section 16 provides that the Commission may issue any order which it finds necessary or appropriate to carry out the provisions of the Act. In the present case the real controversy was over the general rate level and not any particular rate, and the hearings had revealed a rate structure far higher than the reasonable levels prescribed by

Section 4. Consequently, it was appropriate to meet that problem by ordering a general reduction without delaying to hear evidence and make a final order upon the details of a precise schedule with which no one was then concerned. Indeed, the companies can scarcely be heard to complain because they were given the right to present for Commission approval the precise rates and charges. As the court below pointed out, such treatment is "more favorable" to them than the promulgation of an entire schedule (R. 4032).

III

THE ISSUES BEFORE THIS COURT ON THE MERITS

Section 19 (b) of the Act provides:

> (b) Any party * * * aggrieved by an order issued by the Commission * * * may obtain a review of such order in the circuit court of appeals * * * by filing * * * a written petition praying that the order of the Commission be modified or set aside in whole or in part. * * * The finding of the Commission as to the facts, if supported by substantial evidence, shall be conclusive. * * * The judgment and decree of the court, affirming, modifying, or setting aside, in whole or in part, any such order of the Commission, shall be final, subject to review by the Supreme Court * * *.

The present proceedings were instituted pursuant to this section.

Two issues on the merits are before the Court. The first is whether the rates prescribed by the Commission are confiscatory in nature, i. e., whether the due process clause of the Constitution has been violated. The second is whether the rates prescribed by the Commission are beyond its statutory power to determine "reasonable rates" upon a finding that the existing rates are "unreasonable" or are "not the lowest reasonable rates" (Sec. 5 (a)).

In so far as the Congress has adopted the measure of constitutional validity as the basis for determining statutory reasonableness, the answer to both questions may turn on the same considerations of fact. In principle, however, the statutory and constitutional questions are separate and distinct and the distinction has an important effect on the scope of judicial review in this case.

The legislative methods which may be prescribed by Congress for rate making are not necessarily the same as the constitutional principles by which the validity of the legislative methods or the rates ordered pursuant thereto must be tested. The scope of statutory authority must be measured by the command of the legislature; the test of constitutionality is drawn from the Constitution. The distinction between statutory and constitutional requirements, obvious enough in most cases where questions of both statutory authority and constitutional validity are involved, would be clear in a rate case if the prescribed legislative method were based on the prudent investment principle and the test of constitutionality drawn from the Fifth Amendment were fair value. In such a case it would not seriously be suggested that the Court was bound to apply the prudent investment principle as the test of constitutional validity of rates merely because the legislature had adopted this standard as the basis of statutory authority, although the legislative action would be persuasive of its reasonableness where the test of validity drawn from the Constitution is reasonableness.

This Court recognized the distinction in *Los Angeles Gas Co.* v. *Railroad Commission,* 289 U. S. 287, 304–305, where the Court rejected a contention that an order of a state utility commission, based in substance on the prudent investment principle, was invalid because of the method employed by the commission. The Court, speaking through Chief Justice Hughes, declared:

> * * * We do not sit as a board of revision, but to enforce constitutional rights. *San Diego Land & Town Co.* v. *Jasper,* 189 U. S. 439, 446. The legislative discretion implied in the rate making power necessarily extends to the entire legislative process, embracing the method used in reaching the legislative determination as well as that determination itself. We are not concerned with either, so long as constitutional limitations are not transgressed. When the legislative method is disclosed, it may have a definite bearing upon the validity of the result

> reached, but the judicial function does not go beyond the decision of the constitutional question. That question is whether the rates as fixed are confiscatory. And upon that question the complainant has the burden of proof and the Court may not interfere with the exercise of the State's authority unless confiscation is clearly established.

The conclusion is the same where the legislative method prescribed or authorized by the statute is fair value. The Court is obviously not bound to apply the statutory standard as the measure of constitutional validity. The distinction has been lost sight of largely because the utility commissions have adopted the rule of *Smyth* v. *Ames* as the legislative method of rate making, with the result that the administrative and constitutional inquiries have been the identical one of determining the present fair value of the utility. As Mr. Justice Brandeis observed in his concurring opinion in ***Southwestern Bell Tel. Co.* v. *Public Service Commission*, 262 U. S. 276, 289, 296:**

> The rule there stated [in *Smyth* v. *Ames*] was to be applied solely as a means of determining whether rates already prescribed by the legislature were confiscatory. It was to be applied judicially after the rate had been made; and by a court which had had no part in making the rate. When applied under such circumstances the rule, although cumbersome, may occasionally be effective in destroying an obstruction to justice, as the action of a court is, when it sets aside

> the verdict of a jury. But the commissions undertook to make the rule their standard for constructive action. They used it as a guide for making, or approving, rates. And the tendency developed to fix as reasonable, the rate which is not so low as to be confiscatory. * * *

The action of the Commission in this case in adopting fair value as the rate base and original investment as the amount to be amortized, thus presents two questions: First, whether the Commission was authorized by the statute to fix reasonable rates on this basis; and second, whether the Constitution condemns the legislative method or result. We show below that the Commission's action was authorized by the Act. See *infra*, pp. 106-112. We also show below that, even if the measure of constitutional validity is that announced in *Smyth* v. *Ames*, the companies have not been denied any constitutional rights. For the reasons set forth above, however, the Court is at liberty to determine whether the standard of validity to be drawn from the Constitution is that of prudent investment. To be sure, if the present fair value standard, adopted by the Commission pursuant to statutory authority, were itself challenged as unconstitutional, the legislative adoption might be of significance in determining constitutional reasonableness. But where, as here, the challenge is that this standard was not faithfully applied, this Court may reject the challenge if the Constitution protects only the investment and if the rates, as we show below, are in excess of what the Constitution, as thus construed, requires.

We proceed, then, to a discusssion of the issues on the merits. We propose to show in that discussion that the rates were reasonable in a statutory sense and that they were not confiscatory in a constitutional sense. Since judicial consideration of the questions of going concern value and amortization have normally been presented to the courts in constitutional cases, we discuss the constitutional issue first. The principles discussed in the portion of the brief devoted to the constitutional issue, however, are very largely applicable to the question of the reasonableness of the rates in the statutory sense.

IV

THE REDUCTION IN RATES ORDERED BY THE COMMISSION DOES NOT VIOLATE THE COMPANIES' CONSTITUTIONAL RIGHTS

The companies urge that the Commission erred in failing to make a separate allowance for "going concern" value, in the computation of the amortization allowance, and in fixing the rate of return at 6½%. We propose to show that the Commission's action with respect to each of these items was correct and accordingly that the claim of violation of the companies' constitutional rights—as well as the claim that the reduced rates ordered are not "reasonable" within the meaning of the statute—is without substance.

In this section of the brief, we discuss the companies' contentions on the assumption that the Constitution requires a fair return on "present fair value." In a subsequent section of the brief, however, we urge that this Court should now declare that the only requirement imposed by the Constitution is that a fair return be allowed upon net investment.[9]

We emphasize now this argument which we make later in the brief for the reason that much of the confusion in the cases with respect to going concern value and amortization is attributable to a failure by the courts to comprehend that the treatment to be accorded these items depends, in part at least, upon whether the "present fair value" or "investment" test is used. For purposes of clarity, therefore, we not only show in this section of the brief that the Commission's treatment of going concern value and amortization was correct under the "present fair value" rule, but also point out the relation of the issues discussed to the "investment" test.

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[9] For purposes of this brief the following definitions will be adopted:

"Investment"—the amount reasonably and honestly invested by the present owner in the public utility properties used and useful in the public service.

"Original cost"—the actual legitimate cost of the property to the company first devoting it to the public service. In this case, "investment" and "original cost" are the same.

"Net investment"—gross investment subject to reduction for the proper amount of depreciation.

"Net original cost"—the original cost less related depreciation, amortization, and depletion reserves.

"Reproduction cost"—the estimated cost of reproducing the existing property of the utility which is used and useful in rendering public service.

A. THE COMMISSION PROPERLY REFUSED TO MAKE A SEPARATE ALLOWANCE FOR GOING CONCERN VALUE

1. The facts with respect to the companies' claim for a separate allowance for going concern value

The Commission adopted the companies' estimate of reproduction cost in fixing the rate base (R. 3937), but refused to make a separate allowance of $8,500,000 claimed by the companies as "going value." In doing so the Commission declared that the rate base was "liberal" and that it had allowed "more than an adequate amount to cover all elements of value" (R. 3936–3937). The companies contend that their estimate of reproduction cost was based solely on the cost of replacing the physical elements and excluded any element of intangible value, and that, according to the uncontradicted testimony of the companies' witnesses, the property had an additional intangible or "going value" of $8,500,000. They urge that the Commission erred both in that it failed to consider "going value" at all and in that it failed to find this value in the amount of $8,500,000 (Br. pp. 68, 101). While they purport to disavow any contention that the physical and intangible values must be separately appraised (Br. p. 68), their claim for an allowance additional to that which they claim for the physical properties obviously comes to the same thing.

The rate base adopted by the Commission included, in addition to labor and material costs, large amounts for overhead, interest, taxes, administrative, legal and supervisory charges, and expenses of preliminary operations (R. 1221–1234). The companies claim, in addition, the right to capitalize costs allegedly incurred during the early period of operations until the development of subsequent capacity. Specifically, these costs are alleged to consist of advertising and promotional expenditures, interest allocated to a portion of the capacity not completely used prior to development of full capacity, taxes allocated to such facilities, depreciation allocated to such facilities, and operating expenses and maintenance costs on the facilities (Br. p. 55). These costs are claimed to be "actual" costs notwithstanding that the facilities were in actual use during the period, although not used to full capacity. The claim is not limited to the two-year period when the companies allegedly were operating at a loss (Ex. 136, p. 1, R. 2959), but embraces all four years, 1932 to 1935, inclusive, during which operations failed to reach the so-called normal operating level of the 1936–1938 period, when the companies operated at a rate which equalled so far as practicable the maximum operating capacity of the physical properties. (R. 1330, 1278.)[10] On this method of calculating going concern value, as the companies' witness Emery frankly conceded (R. 1951), the going value would have been correspondingly increased if operating charges had been greater because of inefficiency. Similarly, Emery testified that if bond interest or taxes had been larger, going value would presently be greater (R. 1957). So, too, he admitted that if existing depreciation be greater than that testified to by the companies' witness on "observed depreciation," going value would be greater (R. 1958).

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[10] The companies' witness, Hamilton (R. 1276–1282), took the average revenues for the fifth, sixth, and seventh years of operation (1936–1938), during which the companies operated at about 92 per cent of theoretically maximum capacity. This figure, $14,847,112, he reduced to $12,372,593 because of increased capacity after 1936. He then ascertained the revenues for 1932, 1933, 1934, and 1935 (the years in which the business was being attached) and divided each year's revenue by the average revenues of $12,372,593 and arrived at the percentage of actual revenue to capacity revenue for those years, and by deducting each percentage from 100 per cent he arrived at the nonproductive capacity of the plant for those years—52.7% for 1932, 49.5% for 1933, 23.3% for 1934, and 2.7% for 1935. He then applied these percentages to interest paid on money, taxes paid, depreciation expense, and operating expense and found $6,664,192 as the expense supposed to be attributable to nonproductive capacity, to which he added $1,567,372, the total actual cost of advertising and similar direct expenditures for attaching business during the years 1932–1935, and arrived at the figure of approximately $8,500,000 for "going value." Emery's method was similar (R. 1327–1337). He likewise took the years 1936, 1937, and 1938, as the time during which the companies were operating substantially at maximum capacity and found that the "lag in attaching business" (R. 1330) was 51.98% in 1932, 56.75% in 1933, 21.42% in 1934, and 3.63% in 1935. Applying these percentages to the interest expense, general expense, and depreciation expense and adding "cost of attaching business" he arrived at practically the same result as Hamilton.

The companies' claim for an $8,500,000 allowance for development costs as part of present fair value seems patently absurd in the light of the record in this case, which shows that there was never any real risk that early deficits in earnings due to development costs would not be amortized out of subsequent earnings or any real potential difficulty in creating a sufficient consumer demand within a short period. The original investors in the enterprise included the owners of three large gas distribution systems in and about Chicago (R. 2088) and before operations began the companies secured a 15-year contract, renewable for five years at their option, with the Chicago District Pipeline Company, under which the latter purchases 90% of the companies' gas and resells it to the three distributing companies in the Chicago area (R. 585, 2088, 2063). These distributing companies, which furnish the gas requirements of the Chicago area, one of the richest and most populous in the country, had a substantial investment in the companies in this case (R. 2088), and guaranteed the contract with Chicago District Pipeline Company (R. 3).

The companies themselves regarded the risk of early deficits as negligible. Thus, the original estimates which they submitted to the Illinois Commerce Commission in 1931 (Ex. 156, R. 3334) before they began operations, in justifying the reasonableness of their charges to the distributing companies, disclosed an expected average return of only 6.3%, and this on the assumption that their gas reserves would be exhausted in 15 years. That the companies considered this expected average rate of return, which they now contend is insufficient even for a going concern, sufficient to warrant a large investment in a new enterprise, is clear proof that they discounted any risk that early development expenses could not be quickly paid out of subsequent earnings without capitalization for the total life of the enterprise.

The return earned by the companies has in fact far exceeded their expectations, and the development costs have already been many times recouped. During the years 1936 to 1938, the period of full operation, the companies made enough to pay all operating, maintenance and general expenses, provide for depletion, depreciation and retirements, and to earn in addition 11.9 percent on their gross investment."[11] The various items claimed as going value have already been charged to operating expenses and in fact paid for by the consumers (Ex. 136, p. 1, R. 2959; Ex. 136, p. 2, R. 2961). Even if the entire sum of $8,500,000 claimed as "going value" be deducted from the net earnings available for return in the three years from 1936 through 1938, the companies would still have earned an average of 7.28% on the undepreciated investment during the years 1936 to 1938. See footnote 11, below. During the period 1932 to 1938, inclusive, the average annual return was 8.1% on the undepreciated investment and 8.8% on the approximate

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[11] This is shown by the following table:

	1936	1937	1938
Capital Assets (Ex. 137, R. 2991)	$59, 529, 748. 76	$59, 436, 823. 31	$59, 197, 842. 69
Working Capital (Ex. 141, R. 3025)	975, 000. 00	975, 000. 00	975, 000. 00
Total	60, 504, 748. 76	60, 431, 823. 31	60, 172, 842. 69
Net Earnings Before Other Charges (Ex. 136, R. 2959)	10, 343, 134. 88	10, 796, 261. 76	9, 910, 662. 19
Depreciation, Depletion, and Retirements (Ex. 136, R. 2959)	3, 207, 293. 21	2, 293, 109. 79	3, 232, 633. 63
Net Earnings Available for Return	7, 135, 841. 67	7, 864, 151. 97	6, 678, 628. 56
Total Undepreciated Cost of Property, plus Working Capital (1936, 1937, 1938)			181, 109, 414. 72
Total Net Earnings Available for Return (1936, 1937, 1938)			21, 678, 022. 20
Average Return on Undepreciated Rate Base (percent)			11. 9
Net Earnings Available for Return less $8,500,000 claimed by the Companies for Going Value			13, 178, 022. 20
Average Return on Undepreciated Rate Base after Deducting from Return the Total Amount Claimed for Going Value (percent)			7. 28

average depreciated investment,[12] much greater than expectations. The return of 6.5% now allowed to the companies as an established enterprise exceeds that contemplated by the companies prior to the commencement of the business. To permit capitalization of these alleged charges already recouped would be to permit an inordinate return.[13]

2. *The controlling decisions of this Court support the Commission's denial of the companies' claim*

On precedent, the companies' claim for a separate allowance for going concern value is plainly untenable. This Court has held that "going value" must be considered by the rate-making agency "upon proof of its existence". *Dayton P. & L. Co.* v. *Public Utilities Commission,* 292 U. S. 290, 308; *Los Angeles Gas Co.* v. *Railroad Commission,* 289 U. S. 287, 314. It is now settled, however, that a separate or additional allowance for such value is not required where the physical assets have been appraised "as part of an assembled whole." *Columbus Gas & Fuel Co.* v. *Public Utilities Commission,* 292 U. S. 398, 411; *Dayton P. & L. Co.* v. *Public Utilities Commission,* 292 U. S. 290, 309; *Denver Stock Yard Co.* v. *United States,* 304 U. S. 470, 478–480; cf. *Des Moines Gas Co.* v. *Des Moines,* 238 U. S. 153, 171. Accordingly, a valuation based on reproduction cost includes a sufficient allowance for intangible going value even though the estimate of replacement cost is "exclusively attributable to physical elements." *Denver Stock Yard Co.* v. *United States,* 304 U. S. 470, 479; *Dayton P. & L. Co.* v. *Public Utilities Commission,* 292 U. S. 290, 309; cf. *Des Moines Gas Co.* v. *Des Moines,* 238 U. S. 153, 171; *Columbus Gas & Fuel Co.* v. *Public Utilities Commission,* 292 U. S. 398, 411; *Driscoll* v. *Edison Co.,* 307 U. S. 104, 117.[11]

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[12] As appears from Exhibit 136, p. 1 (R. 2959) the companies' total earnings in the seven years 1932 to 1938, inclusive, amounted to $8,244,435.79 net profit, to which must be added $23,994,029.98, interest on bonds, and $1,802,416.57, bond discount. Taking $60,000,000 as approximate average investment, the average annual earnings were 8.1% prior to regulation, an amount sufficient to amortize any possible loss during the first three "developmental" years. The return on the approximate average depreciated investment was 8.8% (see p. 11, *supra*).

[13] Even the companies themselves admit (Br. 163) that their average annual earnings for the first seven years of operations (1932–1938) were $1,234,118.88 per year above the amount allowed by the Commission. This is a total of $8,639,316.00, or more than the amount claimed for going value. This does not take into account similar or greater excess earnings from the end of 1938 to the date of the Commission order in July 1940. See Ex. 187, R. 3784, showing increase in net earnings of the companies of $790,318.00 for the 8 months ended August 31, 1939, as against the same period in 1938, and an increase of $1,228,984.00 in net earnings available for dividends after depreciation, depletion, retirement, and fixed charges.

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[11] The opinion of Mr. Justice Butler in *Denver Stock Yard Co.* v. *United States, supra,* suggests that an additional allowance for "going value" might be justified on a showing of an unusual ability to earn at "low rates" as compared with other like utilities (304 U. S. at 480), a suggestion which he had previously advanced in *McCardle* v. *Indianapolis Water Co.,* 272 U. S. 400, 413–415. See also his dissenting

The rationale of these decisions is that when the physical properties and the incidental rights have once been appraised both as to primary valuation and deduction for depreciation, the result in itself reflects a going concern value, for the total amount constitutes valuation from the standpoint of a successful enterprise. It presupposes attached customers, a given demand for services, and appropriate business organization and management. If the properties were not actually a going concern and were not regarded as such, their valuation would be very much less than reproduction cost less depreciation; practically, all the plant and equipment units would have only a scrap or sacrifice sale value. Plainly, therefore, the fact that the utility is a going concern is reflected in every item and every assumption contained in a reproduction cost valuation. See Bauer and Gold, *Public Utility Valuation*, pp. 306–307.

Under the decisions cited, the Commission here clearly gave due consideration to the intangible element of going concern value, because the reproduction new estimate which it used to compute the rate base was based on the cost of reproducing the

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opinion in *Los Angeles Gas & Electric Co.* v. *Railroad Commission*, 289 U. S. 287, 324–325. Whether earning power at reasonable rates may properly be considered in a rate proceeding in which the inquiry is the reasonableness of the rates is a question considered below. See *infra*, p. 58. It is sufficient for present purposes to note that the companies make no claim for going concern value based on relative earning power.

properties as an assembled whole and because the Commission found, on all of the evidence, that the rate base allowed was "more than an adequate amount to cover all elements of value" (R. 3936–3937).

The Court should note the confusion in the companies' argument that the Commission, in adopting the companies' estimate of reproduction cost as the present value of the physical property, excluded any intangible going concern value. The argument is based on the fact that the companies' engineers referred to their reproduction cost appraisal as a "valuation" of the physical properties and stated that it did not include anything for going value. The obvious answer is that these witnesses did not determine value; they only made an estimate of the cost of reproducing the properties. The Commission and the Commission alone is the proper agency to determine the value which is to be used as the rate base. Upon a consideration of the record and for purposes of this case, the Commission took the figure represented by the companies' reproduction cost estimate as the value of the properties as an assembled whole, covering all elements of value.

The Commission was not required to give any consideration to the particular estimate of $8,500,000 going value prepared by the companies' witnesses. This estimate was based on the theory that going value is the difference between the value of the physical plant alone without customers attached and the value of a plant with the maximum number of customers attached from the outset, that this value is measured by the cost of attaching such customers, and that such cost is in turn determined by the theoretical cost of maintaining the theoretically unused capacity and personnel in addition to the out-of-pocket operating expenses for promotion, advertising, and the like already charged to operating expenses. See pp. 40–41 *supra.* The estimate, consistently with the underlying theory, includes in the cost of attaching business the charges thus attributed to unused capacity during years in which there was no deficit as well as during those in which operating deficits were allegedly incurred, presumably in the view that the utility is entitled as a matter of economic fact and constitutional right to commence operations with a full complement of maximum business instantaneously attached.

This method of calculating going value was specifically condemned by this Court in *Galveston Electric Co.* v. *Galveston,* 258 U. S. 388, 394–395. See also *Columbus Gas & Fuel Co.* v. *Public Utilities Commission,* 292 U. S. 398, 411–413; *Dayton P. & L. Co.* v. *Public Utilities Commission,* 292 U. S. 290, 309; *Los Angeles Gas Co.* v. *Railroad Commission,* 289 U. S. 287, 313. In the *Galveston* case, this Court held that a lag in earnings in the development years and due to development costs could not be capitalized and included in the rate base where the rate base was predicated on present value. This ruling was followed in the other cases cited. The method of calculation employed in this case differs from that condemned in the *Galveston* case only in that it includes as a cost of attaching business not only the charges attributed to unused capacity and the like during the period of alleged early deficits but also those incurred after the property was put on a paying basis but before the full load was developed. It seems obvious, however, that if the Constitution does not guarantee the ability to earn a fair return (*Galveston Elec. Co.* v. *Galveston, supra,* at 394–395), *a fortiori* it does not guarantee a utility the ability to reach its full unregulated earning capacity immediately.

It is true that the companies were not subject to federal regulation at the time these alleged costs were incurred and it may be assumed for purposes of argument that the Commission may not retrospectively reduce the companies' past earnings. By the same token, however, the Commission cannot be required to permit the companies to charge present customers an amount sufficient to make up for their failure to realize maximum unregulated earnings in the past, beginning with the moment of commencement of operations. Where present value is the basis of rate regulation, "Deficits in the past do not afford a legal basis for invalidating rates, otherwise compensatory, any more than past profits can be used to sustain confiscatory rates for the future." *Los Angeles Gas Co.* v. *Railroad Commission,* 289 U. S. 287, 313.

The companies contend that the cases we have cited merely hold that the allowance for development costs depends on the history of the particular enterprise (cf. *Los Angeles Gas Co.* v. *Railroad Commission, supra,* at 314) and that the costs claimed in this case, unlike those alleged in the other cases, were actually incurred and should therefore be capitalized as part of the investment. While there is language in the cases to support this distinction, the decisions may not be so narrowly construed. The deficits allegedly incurred in the *Galveston* case were no less a necessary cost of development than the charges claimed here.[15] Thus, the opinion of Mr. Justice Brandeis recognized that, if a fair return were to be calculated on the amount "prudently invested", the funds "necessarily expended at the start in overcoming initial difficulties incident to operation and in securing patronage" (258 U. S. at 394) might with "propriety" be included in the investment base; he concluded, however, that such development costs need not be considered on a present value basis since "Past losses obviously do not tend to prove present value." 258 U. S. at 395. A contrary view would lead to the absurd conclusion that "base value [should] be deemed less in law if there was no development cost, because success was instant and continuous." *Id.* at 396.

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[15] The principal difference between the *Galveston* case and the present one is that in the former the deficits were determined on the basis of an assumed fair rate of return (not challenged as unreasonable) (258 U. S. at 394) whereas here the companies were financed almost entirely by the issuance of 6 percent bonds sold at a discount to affiliated companies (Ex. 137, R. 2991) and the development costs, insofar as they depend on return on investment, were calculated on the basis of interest actually paid on the bonds. This distinction is immaterial. If the cost of money is to be considered a development cost during the early years of the enterprise, it can make no difference on a present value theory of rate valuation in what form the investment is made, whether in exchange for stock or for bonds. Obviously the value of the companies is not enhanced by reason of the fact that the enterprise was financed principally by the sale of bonds to affiliated companies which also purchased all of the stock which was issued (R. 2070-2071).

The companies' attempted distinction (Br. p. 97) of the *Columbus* and *Dayton* cases is equally unavailing. While the language of the opinions in both cases (292 U. S. at 309; *id.* at 412-413) furnishes some support for the contention that the deficits there claimed were not actually incurred or were not due to the initial difficulties of operations, the fact is that the companies' witness Emery gave or supervised the testimony on going value in the *Dayton* and *Columbus* cases which was similar to and was based on the "same general principles" as his testimony in this case (R. 1961).

The only decision of this Court cited by the companies in support of the specific method of calculating going value here advanced is *City of Fort Smith* v. *Southwestern Bell Telephone Co.,* 270 U. S. 627, affirming without opinion *Southwestern Bell Telephone Co.* v. *City of Fort Smith;* 294 Fed. 102 (D. Ark.). In that case the District Court declared that a computation of the cost of attaching customers, similar to that made by the companies' witnesses in this case, was not subject to the objection that this Court had found in the estimate of going value in the *Galveston* case. 294 Fed. at 104. The affirmance of the decision by this Court, however, does not aid the companies. The city's own witness had conceded that the rate allowed by the city would have permitted less than his own estimate of a fair return on present value (294 Fed. at 108) and the cases cited by this Court in affirming leave no doubt that this was the ground on which it sustained the decree enjoining the enforcement of the prescribed rate. The Court cited *Newton* v. *Consolidated Gas Co.,* 258 U. S. 165 at 175, where it was said that "mere past success could not support a demand that it [the utility] continue to operate indefinitely at a loss"; *Galveston Electric Co.* v. *Galveston,* 258 U. S. 388, 395, announcing the companion doctrine that "Past losses obviously do not tend to prove present values"; and three other cases which, at the pages cited, merely declared that present value is controlling in rate valuation. It seems clear, therefore, that this Court affirmed the judgment of the District Court on the ground that the rate of return, based on present value, was concededly confiscatory, and

that it cited the *Newton* and *Galveston* cases as illustrative of the present value principle. It may be observed that in the only case in which this Court has cited the *Fort Smith* case, it did so on the question of the rate of return required to avoid confiscation. See *United Railways* v. *West*, 280 U. S. 234, 252n.

3. *On principle, the inclusion in the rate base of an allowance for going concern value is not required by the Constitution under any permissible theory of rate regulation*

The discussion in the preceding pages demonstrates that the decisions of this Court require rejection of the companies' contentions on the question of going concern value. The companies suggest, however, that in view of the confusion in regulatory practice resulting from the ambiguities in the opinions of this Court, the subject of going concern value in rate valuation should now be reviewed on principle. With that suggestion we are in entire agreement.

The ambiguities in the opinions of the Court are manifest. The Court has frequently said that going concern value must be given consideration and in two cases (*Denver* v. *Denver Union Water Co.*, 246 U. S. 178, 192; *McCardle* v. *Indianapolis Water Co.*, 272 U. S. 400, 413-415) has sustained a decree enjoining a rate as confiscatory because, among other reasons, it was insufficient to allow a return on going value. In the decisions cited, and particularly in the *McCardle* case, the Court seemed to require an allowance separate from and in addition to that for the physical properties. But in other decisions rendered both prior to the *McCardle* case (*Cedar Rapids Gas Light Co.* v. *Cedar Rapids,* 223 U. S. 655, 669; *Des Moines Gas Co.* v. *Des Moines,* 238 U. S. 153, 171) and subsequent thereto (*Dayton P. & L. Co.* v. *Public Utilities Commission,* 292 U. S. 290, 309; *Columbus Gas & Fuel Co.* v. *Public Utilities Commission,* 292 U. S. 398, 411; *Denver Stock Yard Co.* v. *United States,* 304 U. S. 470, 479) the Court has held that a valuation based on an appraisal of the physical assets in actual operation is sufficient, since a plant without business attached would be worth much less. While the Court has emphasized that going concern value depends on the history of the particular enterprise (*Houston* v. *Southwestern Bell Telephone Co.,* 259 U. S. 318, 324–325; *Los Angeles Gas Co.* v. *Railroad Commission,* 289 U. S. 287, 314), it has declined to consider either past deficits (*Galveston Elec. Co.* v. *Galveston,* 258 U. S. 388) or past success (*Newton* v. *Consolidated Gas Co.,* 258 U. S. 165, 175) in determining present value. See Whitten-Wilcox, *Valuation of Public Service Corporations* (2d ed. 1928), p. 1369. And, since the *McCardle* case, the Court has consistently rejected as lacking in the "requisite persuasiveness" (*Los Angeles Gas Co.* v. *Railroad Commission, supra,* at 317) every estimate of going concern value which the ingenuity of professional expert witnesses has been able to devise. *Los Angeles Gas Co.* v. *Railroad Commission supra; Dayton P. & L. Co.* v. *Public Utilities Commission, supra; Columbus Gas & Fuel Co.* v. *Public Utilities Commission, supra; Denver Stock Yard Co.* v. *United States, supra; Driscoll* v. *Edison Co.,* 307 U. S. 104, 117; see Hale, *The "Fair Value" Merry-Go-Round,* 33 Ill. L. Rev. 517, 525–531. This Court should now hold, we submit, that inclusion in the rate base of the going value of customers attached is not required under any permissible theory of rate regulation.

(a) In approaching the issue on principle, two fundamental premises must be kept in mind: *first,* that any value which is attributable solely to the monopoly position of the regulated company need not be included in the rate base; and, *second,* that any value which is based, directly or indirectly, on the earning power of the regulated company also need not be included in the rate base.

The first of these premises is obvious. A legitimate function of rate regulation is to eliminate the evils which, but for the regulation, would be caused by the monopolistic position of the regulated utility. In the case of a private, unregulated business, the prices charged are more or less effectively regulated by actual or potential competition. The rates of a monopolistic utility, on the other hand, are subject to no such competitive check. To assure that the rates will nonetheless be reasonable, the community must and does undertake to regulate them. Plainly, however, in seeking to ascertain what is a "reasonable" rate the rate making agency may at least prevent the exaction of any rates in excess of those which would be charged under conditions of competition. Any value attributable to the existence of the monopoly which is the occasion for the regulation may therefore be omitted from consideration.

This is familiar legal principle. This Court has consistently recognized that a legitimate basis of rate regulation is the existence of monopoly and the need of providing a substitute for competition as a means of preventing excessive earnings. *Munn* v. *Illinois,* 94 U. S. 113; Stone, J., dissenting in *Ribnik* v. *McBride,* 277 U. S. 350, 359–360. On principle, therefore, the legislature may lawfully reduce rates, and hence earning power, to the level which, in theory, would prevail under conditions of free competition. See Whitten, *Fair Value for Rate Purposes,* 27 Harv. L. Rev. 419, 421–423; Richberg, *A Permanent Basis for Rate Regulation,* 31 Yale L. J. 263, 267. Indeed, the theoretical justification of reproduction cost as a measure of value in rate proceedings is that it is deemed to provide a measure of reasonable charges under conditions of competition. See Bauer and Gold, *Public Utility Valuation,* pp. 397–399; Richberg, *op. cit. supra,* at 267; Whitten, *op. cit. supra,* at 423.

The second fundamental premise—that any value which is based, directly or indirectly, on the earning power of the regulated company need not be included in the rate base—is equally true and is, in large measure, a corollary of the first. The object of a rate base valuation is to fix an amount for proper measurement of reasonable rates. Since determination of such rates fixes the allowable earning power, any item which is itself based upon earning power is inappropriate as an element in the measure by which allowable earning power is determined. Under any other ruling, the dilemma is encountered that allowable earning power—i. e., the rates to be fixed—is determined upon a rate base which itself includes items based upon earning power. Since permissible earning power is thus the consequence and not the measure of reasonable rates, reasonable rates must obviously be determined by some criteria independent of earning power. See Hale, *Conflicting Judicial Criteria of Utility Rates,* 38 Col. L. Rev. 959; Bonbright, *Valuation of Property,* Vol. II, pp. 1094–1098; Bauer and Gold, *op. cit. supra,* pp. 49 *et seq.,* 141–147; Beutel, *Valuation as a Requirement of Due Process,* 43 Harv. L. Rev. 1249, 1267.

Even apart from this dilemma, however, a consideration of items based upon earning power cannot be justified. For present purposes, we need consider only earning power due to customers attached, since it is only the difference in value between an "assembled and established plant, doing business and earning money" and "one not thus advanced" which is relevant to the issue of going concern value. Cf. *Los Angeles Gas Co.* v. *Rail-*

road Commission, 289 U. S 287, 313; *Des Moines Gas Co.* v. *Des Moines*, 238 U. S. 153, 165.[16] The earning power due to customers attached is based on (a) the present consumer demand for the service, created through efforts which may historically have involved substantial expenditures, and (b) the present goodwill, if any, based on friendly relations with consumers. We discuss below the propriety of the inclusion in a rate base, computed on an investment basis, of the historical *cost* of creating consumer demand. Our point here is that it is improper to include in a rate base the present *value* of consumer demand and goodwill—in other words, earning power due to customers attached.

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[16] Like enterprises may differ in earning power under conditions of free competition without apparent regard to relative costs of reproduction, due to differences in the efficiency of management, the market demand, or the relative adaptability of the property to the purpose for which it is employed. This may have been the thought underlying the suggestion of Mr. Justice Butler in *Denver Stock Yard Co.* v. *United States*, 304 U. S. 470, 479–480, as to the basis for determining going concern value. But the efficiency of management is not a factor to be considered in determining value in exchange and must therefore be excluded from consideration in fixing the rate basis on a present value basis. *The Minnesota Rate Cases*, 230 U. S. 352, 458. The special earning power due to public demand must, for the reasons suggested in the text, likewise be excluded in the case of a monopoly. *Clark's Ferry Co.* v. *Commission*, 291 U. S. 227, 238. And while it has been said that the element of value due to special adaptability of property to a particular use must be considered (*Clark's Ferry Co.* v. *Public Service Commission*, *loc. cit. supra*), it is difficult to see how this value can be determined without permitting the capitalization of monopoly earning power. Cf. Bauer and Gold, *op. cit, supra*, p. 274. Moreover, such special value must be due to the higher cost of reproducing the service due to the unavailability of equally efficient means. While cost of replacement of the service is the theoretical standard of free competition, the utilities would argue that the application of such a standard would frequently be unfair to the invester (Richberg, *op. cit. supra*, at 277–278) and, in fact, the reproduction cost considered in rate valuation proceedings is that of reproducing the same plant and not the same service. See *McCardle* v. *Indianapolis Water Co.*, 272 U. S. 400, 417–418. The problem of appraising the peculiar adaptability value of certain kinds of property, in any event, is a special problem not involved here and which does not materially affect the general question.

Insofar as consumer demand reflects merely a present existing general demand for the service, as distinct from consumer preference for the particular utility, it is plainly not an item of present value properly includible in the rate base. In the competitive world, the value of a particular plant is not judged by the general consumer demand for the type of articles produced by that plant, even though the creation of such general consumer demand may have required the expenditure of large sums of money in the past; the demand for the type of article already exists and consequently, goodwill aside, one who desires to engage in the business would erect a new plant rather than purchase an old one at a price in excess of the value of the physical properties. Consumer demand is relevant to the value of a particular plant, therefore, only insofar as the demand is for the particular articles produced by the plant—in other words, only insofar as the particular business has acquired goodwill.

The same principle must be applied in rate regulation. The utility, having a monopolistic position, may in practice enjoy the full benefit of the general consumer demand, but, if so, this is an advantage due to its monopolistic position and must therefore be disregarded under the first premise.

The same considerations require the exclusion of any item of present value based on goodwill. While it is not impossible for a utility to build up such friendly relations with customers that they would deal with the utility as a matter of preference (cf. Butler, J., in *McCardle* v. *Indianapolis Water Co.,* 272 U. S. 400, 413–415) the extent to which the relations between the customers and the utility are based on goodwill or necessity cannot be ascertained and it is therefore a reasonable basis for rate regulation to assume that "a consumer * * * will resort to the 'old stand,' because he cannot get [the service] anywhere else." *Willcox* v. *Consolidated Gas Co.,* 212 U. S. 19, 52; *Cedar Rapids Gas Light Co.* v. *Cedar Rapids,* 223 U. S. 655, 669; *Georgia Railway & Power Co.* v. *Railroad Commission,* 262 U. S. 625, 632. It is presumably in this view that this Court has stated that goodwill cannot be considered because it is due to a condition of monopoly. *Cedar Rapids Gas Light Co.* v. *Cedar Rapids, supra; Willcox* v. *Consolidated Gas Co., supra; Los Angeles Gas Co.* v. *Railrad Commission,* 289 U. S. 287, 313.

(b) Acceptance of these premises leads to the conclusion that the Constitution does not require going concern value to be included in a rate base under any permissible theory of valuation. The contrary view is based upon a confusion of the present value and investment principles of rate regulation.

One concept of going concern value—and a concept which the companies urge in some parts of their brief (Br. pp. 89–91)—is that it is the separate and additional value above the appraised property which is due to the fact that there is an assembled business, successfully conducted. Under this concept, going concern value is a value added to the value of the physical properties by reason of the fact that there are customers attached and existent earnings. Plainly, going concern value so conceived is based on general demand or goodwill, neither of which may be considered an element of present fair value in the regulation of a monopoly. Moreover, such going concern value is based directly upon earning power and, under the principles we have discussed, must therefore be excluded from value for rate making purposes.

A second concept of going concern value—and this concept, too, the companies urge in their brief (Br., pp. 81–82)—is that it represents, not the mere fact that the utility is a going concern, but the underlying fact that outlays or capital costs were incurred to reach the state of a going concern. In this view, going concern value is simply the developmental cost to bring the business to the state of a going concern.

So conceived, going concern value—or, more properly, going concern *cost*—is obviously not a proper item in a "present fair value" rate base, for such a rate base seeks to establish value without necessary regard to historical cost. And if it be urged that the historical development cost is simply a measure of the present value of what was obtained by the expenditure—namely, consumer demand, goodwill, and the resulting present earnings—the answer is, as we have already stated, that these items may not properly be considered in determining present value.

Furthermore, the underlying assumption of the reproduction cost theory, which is usually advanced by the utilities as the proper measure of present value, is that the existing demand for service continues and that the existing properties and organization are necessary to provide the service without interruption. Unless there were the actual and continuous demand for service there would be no need of the properties and no justification in assuming their reconstruction. The very valuation of the properties, therefore, presupposes the existence and continuance of the present demand without requiring a developmental period. Moreover, it assumes that the actual operating organization is immediately available, for otherwise the provision of the plant in full completeness at the valuation date would be unreasonable. Since the existing demand and the ability to supply the demand through suitable organization are already predicated when the physical elements are assumed to be reproduced, there remains no need for further assumed expenditures to develop such demand and full efficiency to supply it.

(c) If the "investment" rather than the "present fair value" test is used, there can, of course, be no allowance for going concern value, considered simply as the amount of the total value of a going concern over and above the physical and intangible properties; this is a *value* concept which has no place in a rate base measured by and limited to actual cost.

The same is not necessarily true, however, of going concern cost considered as the development cost necessary to bring the business to the state of a going concern. Where the development cost consists of operating or capital charges which have been returned to the utility through earnings, they may not be charged again to the consumer by inclusion in the rate base. To say that additional development costs incurred after the utility has begun to earn a fair return must be treated as an investment on which a return must be paid is to say that the Constitution guarantees the utility not only its fair but its maximum earning power. Where, however, the utility fails to obtain a reasonable return during the development period, any necessary developmental costs, to the extent that they are represented by actual deficits in earnings, may theoretically be considered as a legitimate expense which a utility should have a reasonable opportunity to recoup.

But—and this is the point which we wish to stress—the Constitution does not require that such development cost be treated as part of the investment. All that the Constitution requires, we believe, is that the investors be allowed a return sufficient to give them a fair opportunity to recoup these costs. It might be argued that this should be done by including the costs in the rate base as part of investment. Sound business and accounting practice, however, forcibly suggest that the proper method is to fix the rate of return at such a figure as to take account of the risk of loss in the development period. The risk of loss in the early years is, as Mr. Justice Brandeis observed in the *Galveston* case, "a reason for allowing a liberal return on the money invested in the enterprise," 258 U. S. at 395. If the rates imposed by regulation from the outset of the business allow a rate of return based on the risk of early loss, the inclusion of such deficits in the investment would obviously permit a double return. Lewis, *Going Value,* 26 Mich. L. Rev. 713, 729.

The soundness of considering the risk of early deficits in the rate of return and not as part of the rate base is particularly clear in view of the accounting practice to consider these outlays in the early years as operating expenses and not as part of the investment. Lewis, *op. cit. supra,* at 723. Moreover, it is difficult if not impossible to determine the extent to which the losses were due to bad management, inefficiency, improper rates, the improvidence of the investment or the inevitable expenses of initial difficulties, a consideration which forcibly argues that the risk of early losses should be taken into account in determining the rate of return rather than by including such losses in the investment. See Lewis, *op. cit. supra,* at 727–728.

Where, as here, the development period occurred prior to the commencement of rate regulation, the consideration of past losses under the "investment" test must vary according to the circumstances. If, as we have suggested, a rate regulation imposed at the outset is valid so long as it permits the investors a reasonable opportunity to recoup losses, a rate imposed after the development period may ignore past losses so long as the investors had a reasonable opportunity to amortize the amount of such losses prior to the commencement of regulation.[17] *Kings County Lighting Company* v. *Willcox,* 210 N. Y. 479, 484–494; cf.

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[17] In Wisconsin, where the past deficit rule was originally developed, it has been consistently ruled that a utility which has amortized its early losses (on the assumption of reasonable rates prior to the beginning of regulation) is not entitled to include past deficits as investment. Numerous decisions of the Wisconsin Public Service Commission are cited in 11 Minn. L. Rev. 642, 650n.

Des Moines Gas Co. v. *Des Moines,* 238 U. S. 153, 165–166; *Lincoln Gas & Elec. Co.* v. *Lincoln,* 250 U. S. 256, 267.[18]

In any event, on the most liberal application of the investment principle, the companies in this case have no basis for complaint. The total book cost of their existing properties, including gas reserves, as of December 21, 1939, was $60,950,000.[19] There is thus a difference of approximately $13,500,000 between the companies' present investment and the rate base of $74,420,424 (R. 3937) adopted by the Commission. This amount is more than ample to allow for the $8,500,000 of "development costs" which the companies claim to have incurred. Furthermore, as we have shown (*supra*, pp. 43-44), the companies' earnings during the period from 1936 to 1938, inclusive, were more than sufficient to amortize the entire $8,500,000 and still give the companies an average return of 7.28% on their undepreciated investment.

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[18] We are not concerned here with the question whether, if the earnings under unregulated rates had been sufficient to return part or all of the actual investment, as distinguished from operating deficits, the rates could be reduced to a level sufficient to yield a return only on so much of the investment as had not been paid back out of earnings. It may be assumed for purposes of argument that a regulatory body cannot retrospectively reduce past excessive profits by reducing present rates. Cf. *Newton* v. *Consolidated Gas Co.*, 258 U. S. 165, 175; *Board of Public Utility Commissioners* v. *New York Tel. Co.*, 271 U. S. 23, 31. It obviously does not follow, however, that development costs incurred prior to regulation must be treated as part of the present investment. The question, when investment is the basis of regulation, is whether the early losses should have been or may be deemed to have been recouped by the companies during the entire period prior to regulation, judged by the utility's own practice or that of like businesses during this period (see *infra*, pp. 90–94). If, under the company's own practice or accepted business usage, early losses may reasonably be regarded as entirely charged as a current operating expense in the years incurred, or if they may be treated as amortized by surplus earnings in the succeeding years and hence as not part of the investment, a rate which does not take into consideration any past losses so returned cannot be deemed to work an impairment of the present investment. A difficulty would arise only if rate regulation began immediately after the years of early losses, but this situation is too remote from the facts of the present case to warrant any discussion even on principle.

B. THE COMMISSION MADE A PROPER ALLOWANCE FOR AMORTIZATION

The Commission allowed $1,557,852 (R. 3941) as an annual charge for amortization or depreciation. The companies claim that the amount allowed should have been $5,100,732 (R. 4040). The Commission based its allowance on the companies' claimed actual investment, without deduction of retirements already made, of $67,173,761 through the years 1932 to 1938, inclusive, as taken from their book records, and estimated future capital additions, including replacements, through the year 1954 of $12,159,380, a total of $79,333,141 (R. 3023), less the estimated salvage value of the property at the assumed end of the project in 1954, $1,049,132 (R. 3025), a net total of $78,284,009 investment to be amortized. The annual allowance of $1,557,852 is the sum which, together with 6½ percent interest compounded annually, will equal at the end of 1954 the sum of $78,284,009 (see App. B., p. 139, *infra*).

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[19] The figures for June 1, 1939, given in the companies' brief (Br., pp. 71-72) simply ignore the retirements of $6,526,160 charged to operating expenses (R. 2993, 3007). The figure of $49,830,479 for capital expenditures is calculated by deducting the figure of $9,367,363 for "Leaseholds" in column 8 of Exhibit 137, p. 2 (R. 2993) from the figure for "Total Plant and Equipment," $59,197,842. In adding to this the figure of $15,893,513, the accumulated expenditures for gas reserves as of Dec. 31, 1938 (Ex. 138, p. 2, R. 3007), however, the companies ignore the retirements of $6,526,160, representing the difference between the two figures for gas reserves. This amount, having been charged to operating expenses, has already been returned to the companies.

The companies contend that the rate base and amortization base should both be determined on present value, which they define as reproduction cost less observed depreciation, plus working capital and a separate allowance of $8,500,000 for going concern value, plus average capital additions until 1954 (Br. p. 6). The rate base and amortization base are not entirely the same on this theory, however, since the companies' position is that, for purposes of amortization allowance, the total estimated future capital additions of $9,145,083, exclusive of replacements, must be added and salvage value of $1,049,132 be deducted, giving a total of $84,341,218 (Br. p. 8). The companies further argue that the proper rate of interest for sinking fund purposes is 2 percent compounded semi-annually (Br. p. 10), and that the period for amortization should be limited to the years following the enactment of the Natural Gas Act or the entry of the rate order in controversy. The figure of $5,100,732 which the companies urge as the proper amortization allowance is presumably the annual allowance which, together with interest compounded semi-annually at 2 percent during this period, will yield $84,341,218.

It is apparent, therefore, that the points of difference between the companies and the Commission are these: (1) The Commission used investment as the amount to be amortized; the companies urge that it should have amortized the present fair value of the properties; (2) the Commission fixed the entire life of the enterprise as the period of amortization; the companies urge that the period of amortization should commence either as of the date of the passage of the Natural Gas Act or as of the date of the entry of the rate order; (3) the Commission computed the amortization allowance on the basis of a 6½ percent interest rate; the companies urge that it should have used a 2% interest rate. On each of these points, we believe that the Commission's action ~~was~~ clearly valid.

1. *The Commission properly provided for amortization of only the investment in the property*

Under the theory which we urge below (Point VI, pp. 112–133, *infra*), that it is only the investment and not the fair value of a utility's property which the Constitution protects—in other words, that the doctrine of *Smyth* v. *Ames,* 169 U. S. 466, is wrong—there can be no possible doubt as to the validity of the Commission's action in using investment as the amount to be amortized. Our argument at this point is that its action is correct even on the view that *Smyth* v. *Ames* correctly states the applicable constitutional principle with respect to the rate base.

The rule of *Smyth* v. *Ames* is based, as the companies assert, on the view that a rate order is a taking of the use of private property for public use for which just compensation must be paid. See *West* v. *Chesapeake & Potomac Tel. Co.*, 295 U. S. 662, 671. We undertake to challenge the validity of this view in Point VI. Even under the rule of *Smyth* v. *Ames,* however, the utility is only entitled to a "fair return on the reasonable value of the property at the time it is being used for the public." *Los Angeles Gas Co.* v. *Railroad Commission,* 289 U. S. 287, 305; *Railroad Commission* v. *Pacific Gas Co.,* 302 U. S. 388, 394–395.[20] The computation of rate of return, or net earnings, however, is directly related to the basis on which operating expense for depreciation is fixed. Cf. Brandeis, J., dissenting in *United Railways* v. *West,* 280 U. S. 234, 256. The most that the rule of *Smyth* v. *Ames* can be deemed to require, therefore, is that the rate of return on fair value be determined with due regard to the basis adopted in fixing the amount to be amortized. Where this is done, the basis for determining the depreciation charge may properly be based on considerations of sound business and accounting practice. To allow the utility a depreciation charge in excess of that assumed by the Commission in fixing allowable net earnings without a corresponding decrease in the adopted rate of return would permit the utility to earn an additional and unwarranted profit.

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[20] A supposed justification of the rule of *Smyth* v. *Ames* as applied to the determination of the rate base is that it allows utilities the same benefit of the appreciation of property values as the owners of unregulated enterprises enjoy. See the supplement to this brief, p. 76.

Insofar as accepted practice may be deemed controlling, there can be no doubt that the Commission's choice of original cost was correct. It is almost uniform business practice to base the depreciation charge on cost. As Mr. Justice Brandeis stated in his dissenting opinion in *United Railways* v. *West,* 280 U. S. 234, 275, this is "the rule sanctioned by the universal practice of business men and governmental departments." This statement is supported in the opinion by an impressive demonstration of authority, drawn from all relevant data; we need only add that the practice has continued unchanged. In non-utility enterprises, the practice is still to base the depreciation charge on cost,[21] and all the systems of accounts established by governmental rate-making agencies, federal and state, have adopted cost as the basis of depreciation.[22] The use of original cost in determining the depreciation charge is justified, as Mr. Justice Brandeis has demonstrated, by every relevant consideration of prudent business and accounting practice.

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[21] Gilman, *Accounting Concepts of Profit*, 348–349, 493; Sanders, Hatfield, and Moore, *A Statement of Accounting Principles* (1938), 31–32, 58–59, 60–65; Saliers, *Depreciation Principles and Applications*, 63, 68–69, 110; Montgomery, *Auditing Theory and Practice* (6th ed., 1940), 480; Paton

In determining a fair rate of return for the companies the Commission gave due regard to the fact that it had adopted original cost as the basis for determining the total amount to be amortized. To adopt present value as the basis for the amortization or depreciation charge without reducing the rate of return allowed by the Commission would permit the companies to earn a double return. This is so in part because the rate of return was based, with due allowance for the difference in risk, on the earnings and yields of securities of other enterprises. The yields of such securities, however, are based on current earnings determined after deducting depreciation on the basis of original cost and not on the basis of present value. In view of the almost universal business practice of computing the depreciation charge on the basis of cost, an in-

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and Littleton, *An Introduction to Corporate Accounting Standards*, 66, 89; see also Peloubet, *Special Problems in Accounting for Capital Assets*, 61 Journal of Accountancy 185; May, *The Influence of Accounting on the Development of an Economy*, 61 Journal of Accountancy 15–16; Bell and Jones, *Auditing* (1941), 245.

[22] The systems of account referred to in note 25, pp. 80–81, *infra*, all adopt cost as the basis of depreciation.

vestor who purchases a security which is priced above par because of increased earning power cannot expect to continue to receive both a yield at the current rate and a liquidating dividend equal to the increased price of the security.

In fixing a fair rate of return for the companies on the basis of the yields on current investments, therefore, the Commission was required to guard against the allowance of the excessive return which would result if it deducted as an operating expense a larger amount for depreciation than that charged in fixing the allowance on current investments. Moreover, in fixing the rate of return, the Commission considered the fact that in computing allowable net earnings it had determined the operating expense for depreciation on the basis of cost and concluded that a 6½ percent return as so computed would be sufficient to finance the full amount of the present value of the properties included in the rate base.

In this view, the Commission's choice of original cost as the basis of amortization satisfies any possible requirement of the rule of *Smyth* v. *Ames*. The record contains and the Commission considered extensive evidence as to the yields of other securities and the earnings of the businesses on which the yields were based (R. 3939; Ex. 185–186, R. 3576–3739; cf. Exs. 147–152, R. 3071-3303). It is clear from both the evidence and the general business practice that these earnings were computed after a depreciation charge based on cost and that the yields on the securities whenever acquired represented earnings computed on the same basis. On the basis of this evidence, as well as other evidence as to comparative risks, the Commission concluded that on a sound basis of 40 percent bonds, 40 percent common stock, and 20 percent preferred stock, the entire amount of the fair value rate base, i. e., $74,420,424 (R. 3937), could be financed with earnings of 6.2 percent to 6.5 percent (R. 3939–3940). In so concluding the Commission expressly took into account that the depreciation expense to be deducted in determining net earnings was based on cost. In rejecting the companies' claim that depreciation should be based on fair value, the Commission declared: "The amounts of amortization are recognized and treated as operating expenses. Operating expenses are stated on the basis of cost. * * * We refuse to make an allowance of amortization in excess of cost. To do so would not be the computation of a proper expense, but instead the allowance of additional profit over and above a fair return. Manifestly such an additional return would unjustly penalize consumers" (R. 3938). In fixing the rate of return the Commission thus gave due regard both to the basis on which it had fixed the amount to be amortized in this case and also to the basis generally accepted in fixing a depreciation charge as reflected in the yields which it considered in determining the rate of return.

The universal business practice to base depreciation on cost is relevant for another reason, too. We are dealing here with the constitutional guarantee of due process; in its application to the present case, that guarantee, as we show below in discussing the underlying principle of *Smyth* v. *Ames,* means simply that there will be no arbitrary governmental interference with property rights. To limit a utility to a depreciation charge which is the same as that universally made by all business men, even though they are completely free of regulation, cannot in any realistic sense be characterized as arbitrary governmental action. To the precise contrary it would be the commission which blinded itself to the practical experience of business men and which thereby saddled upon consumers a charge having no basis in business realities which would be guilty of arbitrary conduct.

United Railways v. *West,* 280 U. S. 234, 253, is, we admit, opposed to our position. The case is distinguishable, however, on the narrow ground that the Court was there dealing with the depreciation of a utility with an indefinite life and which was therefore faced with the necessity of replacing physical properties the service life of which was exhausted; the rationale of the decision that depreciation should be based on fair value rather than original cost was that the former more accurately measured replacement cost than the latter. Here, on the other hand, we have a utility with a limited life expectancy and with physical properties that will, in the main, outlast its gas reserves; there is, therefore, no real problem of replacement at all.[28]

This distinction, however, is not a satisfactory disposition of the matter because, for the reasons we have advanced, the *West* case is wrong on principle. It is opposed to the statement of this Court in *United States* v. *Ludey,* 274 U. S. 295, 300–301, a federal income tax case, where the Court said: "The amount of the allowance for depreciation is the sum which should be set aside for the taxable year, in order that, at the end of the useful life of the plant in the business, the aggregate of the sums set aside will (with the salvage value) suffice to provide an amount equal to the original cost." And it is opposed to the statement of this Court in *Lindheimer* v. *Illinois Bell Tel. Co.,* 292 U. S. 151, 167, that "In determining reasonable rates for supplying public service, it is proper to include in the operating expenses, that is, in the cost of producing the service, *an allowance for consumption of capital in order*

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[28] Moreover, we submit that present value has no predictable relation to future replacement cost (see Brandeis, J., dissenting in *United Railways* v. *West,* 280 U. S. 234, at 278), and is certainly no more reliable a test for this purpose than is original cost. See Stone, J., dissenting in *United Railways* v. *West,* 280 U. S. at 289–291.

to maintain the integrity of the investment in the service rendered." [Italics supplied.] See also *Knoxville* v. *Knoxville Water Co.*, 212 U. S. 1, 13, 14. Mr. Justice Butler, in his concurring opinion in the *Lindheimer* case, stated that the method of depreciation approved by the majority was not in harmony with the principle of the *West* case, 292 U. S. at 176. And the Virginia Supreme Court of Appeals, in *Alexandria Water Company* v. *City Council of Alexandria*, 163 Va. 512, stated that the *West* case was, in its view, at least inferentially overruled by the *Lindheimer* case. It is significant, too, that despite the *West* case, the federal and state utility commissions, almost without exception, have continued to follow cost accounting for depreciation.[24]

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[24] *Re Telephone and Railroad Depreciation Charges*, 177 I. C. C. 351; *Re North West Tel. Co.* (Wis.), P. U. R. 1931A, 53, 56–7; *Re Long Branch Sewer Co.* (N. J.), P. U. R. 1931A, 467, 473; *Re Patrons of Lakeville Water Co.* (Conn.), P. U. R. 1932D, 138; *Re Yonkers Railroad Co.* (N. Y.), P. U. R. 1933B, 61, 84; *Re Mondovi Tel. Co.* (Wis.) P. U. R. 1933B, 319, 330; *Re Mondovi Tel. Co.* (Wis.), P. U. R. 1933D, 142; *Re Lincoln Tel. & Tel. Co.* (Neb. 1935), 6 P. U. R. (N. S.), 81, 90; *Alexandria Water Co.* v. *City Council of Alexandria* (Va. 1935), 7 P. U. R. (N. S.), 53, 113; *Re Yonkers Railroad Co.* (N. Y. 1935), 9 P. U. R. (N. S.), 337, 365; *Re Wisconsin Tel. Co.* (Wis. 1936), 13 P. U. R. (N. S.), 224, 251; *Re Peoples Gas Light & Coke Co.* (Ill. 1937), 19 P. U. R. (N. S.), 177, 257; *Re Northern States Power Co.* (N. D. 1938), 22 P. U. R. (N. S.), 364, 370; *Pacific Tel. & Tel. Co.* v. *Wallace* (Ore. 1938), 23 P. U. R. (N. S.),

In the light of all these considerations, this Court should now, we submit, expressly overrule the *West* decision and hold that, even under the rule of *Smyth* v. *Ames,* rates which provide for a full return of the original investment plus a fair return on the present fair value of the property included in the rate base, satisfy all constitutional requirements.

2. *The Commission properly fixed the amortization period as the entire life of the enterprise*

It has been shown that the charge for depreciation must be based upon cost. The next question is as to the amount of the total cost the companies are entitled to charge for depreciation in the fu-

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65, 86; *Re Northern Power & Light Co.* (N. D. 1939), 30 P. U. R. (N. S.), 1, 5; *Re North Dakota Power & Light Co.* (N. D. 1940), 31 P. U. R. (N. S.), 26, 29; *Re Alabama Water Service Co.* (Ala. 1940), 32 P. U. R. (N. S.) 129; *City of Los Angeles* v. *Nevada-California Electric Corp.* (Fed. Power Comm. 1940), 32 P. U. R. (N. S.), 193, 204; *Re Otter Tail Power Co.* (N. D. 1940), 33 P. U. R. (N. S.), 301, 306; *Re Swan Creek Electric Co.* (Utah 1940), 35 P. U. R. (N. S.), 315, 316; *Re Central Light & Power Co.* (N. D. 1941), 37 P. U. R. (N. S.), 106, 111. The *West* case, wherever considered by the commissions in these cases, was criticised as unsound. Economists and accountants have likewise insisted that cost is the only proper basis of utility depreciation accounting. Mosher and Crawford, *Public Utility Regulation* (1933), 160–162; Jones and Bigham, *Principles of Public Utilities* (1937 ed.), 491 *et seq.;* Wilson, Herring and Eutsler, *Public Utility Regulation* (1938), 196 *et seq.;* see also Haun, *Inconsistencies in Public Utility Depreciation,* 38 Mich. L. Rev. 160, 479.

ture. The answer to this question depends upon the nature of depreciation and the proper method of accounting for it.

The Commission's conclusion that amortization should be regarded as an "operating expense" based on "cost" (R. 3937) reflects the view, now accepted by almost all informed opinion, that depreciation is the diminution of the service capacity of the property or, in terms of the monetary measure of the original service capacity, the diminution in service value. See *Proceedings of the National Association of Railroad and Utilities Commissioners,* 1938, pp. 441–443; *Telephone and Railroad Depreciation Charges,* 177 I. C. C. 351, 372–382. This is the uniform conclusion of all rate-making agencies, both federal and state.[25] This, too, is the view expressed by this Court in *Lindheimer v. Illinois Bell Tel. Co.*, 292 U. S. 151, 167. This view of depreciation is based on the simple principle that the economic value of property—its ability to earn a return—consists of the total units of useful service which it is capable of producing. Paton and Littleton, *Introduction to Corporate Accounting Standards*, p. 84; Porter and Fiske, *Accounting*, p. 406; Taussig, *Principles of Economics*, Vol. I, p. 70; *Proceedings, supra*, pp. 444-445; *Telephone and Railroad Depreciation Charges, loc. cit. supra.*

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[25] The Uniform System of Accounts for Natural Gas Companies promulgated by the Federal Power Commission, effective January 1, 1937, defines depreciation as "the loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of gas plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand and requirements of public authorities, and, in the case of natural gas companies, the exhaustion of natural resources." Service value is defined as "the difference between original cost and net salvage value." See also Uniform System of Accounts for Class A and Class B Telephone Companies promulgated by Federal Communications Commission, effective January 1, 1937; Uniform System of Accounts for Electric Utilities promul-

The annual depreciation is thus the amount of the service capacity which has been consumed in any one year. The service capacity used up in any one year is a cost of operation just as much as fuel or any other property which is totally con-

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gated by the Federal Power Commission, effective January 1, 1937; Uniform System of Accounts for Electric Utilities recommended by the National Association of Railroad and Utilities Commissioners (1936); Uniform System of Accounts for Natural Gas Companies recommended by the National Association of Railroad and Utilities Commissioners. Twenty-seven states have adopted the Federal Communications Commission system for Class A and Class B telephone companies identically; eight have adopted it substantially; no system is prescribed in the other states. See Federal Communications Commission Release, August 18, 1941, Accounting Systems Prescribed by the States for Use of Telephone Companies. Similar systems have been adopted by the majority of states for electric and gas utilities. See *State Commission Jurisdiction and Regulation of Electric and Gas Utilities*, published by the Federal Power Commission, January 1941, pp. 11, 35.

sumed, physically and economically, during the year. As this Court observed in *Illinois Central Railroad* v. *Interstate Commerce Commission,* 206 U. S. 441, 462, "It would seem as if expenditures for additions to construction and equipment, as expenditures for original construction and equipment, should be reimbursed by all of the traffic they accommodate during the period of their duration * * *." It is for this reason that in fixing reasonable rates there should be included in "operating expenses, that is, in the cost of producing the service, an allowance for consumption of capital * * *." *Lindheimer* v. *Illinois Bell Tel. Co.,* 292 U. S. 151, 167. As stated by the companies' witness Cooke, "Depreciation reserve is a charge made to operations over a given period of time, which is intended to recover the amount invested in the fixed asset which is used up or worn out in that time; in other words, to recover the capital investment within the useful life of the property" (R. 2620):

In this case, eight and a half years elapsed between the time of the beginning of business by the companies and the effective date of the rate order and in that time a considerable part of the service life of the plant assets was used up. Consequently, it would be contrary to fact to make the assumption that no part of the service life of the assets should be charged to the prior period.

The companies concede this in principle; they admit that the physical or "viewed" depreciation must be deducted (Br. p. 8) although they ignore the controlling factor of functional depreciation due to the exhaustion of the gas supply. The real question in the case, therefore, is not what period of amortization should be used, but what amount should be considered as charged for depreciation for the period prior to the rate order.

The Commission has in effect concluded that, of the total cost to be amortized, the sum of $13,317,921 should be considered as charged for depreciation during the seven-year period ending December 31, 1938 (see App. B, p. 139, *infra*), a date which is taken merely for purpose of convenience in making comparison with the record evidence as to the companies' past practice. The companies contend that the accrued depreciation is only $2,485,079 for the same period (Ex. 141, R. 3025). The Commission's conclusion is, we submit, amply sustained by the record, both on the "fair value" and "investment" theories of rate regulation. Cf. *Clark's Ferry Co.* v. *Public Service Commission,* 291 U. S. 227, 240; *Georgia Railway & Power Co.* v. *Railroad Commission,* 262 U. S. 625, 633; *Peoples Gas Light & Coke Co.* v. *Slattery,* 373 Ill. 31.

(a) On the theory of *Smyth* v. *Ames* that it is the property and not the investment which the Constitution protects, the actual past depreciation of the property must be deducted in order to determine what property must be returned to the companies in the future. *Knoxville* v. *Knoxville Water Co.,* 212 U. S. 1, 13–14; *Minnesota Rate Cases,* 230 U. S. 352, 456–458; *Lindheimer* v. *Illinois Bell Tel. Co.,* 292 U. S. 151, 157, 167.[26] We have shown that the actual past depreciation is the diminution of service capacity that has occurred.

The diminution of service capacity may best be measured in units of time elapsed or of service rendered. See *Proceedings of the National Association of Railroad and Utilities Commissioners,* 1938 pp. 441–443; *Telegraph and Railroad Depreciation Charges,* 177 I. C. C. 351, 402.[27] And ample data for the reasonable application of either measure is contained in the record. There is voluminous evidence, based on actual experience and observed conditions at the time of the proceedings (cf. *Lindheimer* v. *Illinois Bell Tel. Co.* 292 U. S. 151, 169–170; *McCardle* v. *Indianapolis Co.,* 272 U. S. 400;

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[26] On this theory, business and accounting practice in making provision for the cost of operation represented by the consumption of service life is immaterial. If past charges for depreciation have been excessive, the utility may retain the benefit. *Board of Public Utility Commissioners* v. *New York Tel. Co.,* 271 U. S. 23. If past charges have been inadequate, the utilities must bear the loss. *Knoxville* v. *Knoxville Water Co.,* 212 U. S. 1, 13–14.

[27] The units of service or production method is impractical in the case of many utilities and depreciation expense in such cases is therefore usually measured on a time basis. *Telegraph and Railroad Depreciation Charges,* 177 I. C. C. 351, 403.

416), as to the actual past withdrawals of gas and probable future withdrawals on which the service life of the properties depend (R. 629–646), the physical condition of the properties (R. 1286–1309), the actual rate of their use in the past (R. 206–211) and estimates of future use based on "the controlling test of experience". *Lindheimer* v. *Illinois Bell Tel. Co., supra,* at 170.

The total service life of the depreciable property is limited, as the companies' witnesses testified, by the supply of gas. The companies' witnesses have estimated that the gas supply in the field on which they depend will be exhausted at the end of the year 1954, and that on that date, therefore, the properties now in service must be retired (R. 3936).[28] The companies' evidence shows that physical wear and tear has been a relatively negligible factor (see *infra*, pp. 89–90) and that the withdrawals from the gas field have not and will not require curtailment of the companies' operations below the 1936–1938 average (R. 692), during which the companies operated at the load factor of 92.48% (R. 1330), as close to 100% of total utilization as is practicable in actual operations (R. 632).[29]

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[28] This estimate is based on the rate of past withdrawals by all gas companies, which is an ascertainable fact (R. 206–211) and the rate of future withdrawals, which of course can only be an approximation (R. 629–646). While the estimate may thus require revision in the light of actual experience, an estimate must be made now for the purpose of fixing rates since accrued depreciation and future depreciation expense must both be based on the total service life determined in accordance with the most reliable data now available. Cf. *Lindheimer* v. *Illinois Bell Tell. Co.*, *supra*, at 171–172, 174.

On these facts, it would have been reasonable to conclude that an equal amount of service capacity is lost each year. On the view most favorable to the companies, the depreciation, as the witness Kleinman testified, should be computed on the basis of the actual amount of gas withdrawn and sold by the two companies, thus excluding the physically potential service capacity which allegedly could not be used by reason of limitations of the market demand (cf. R. 2431). The companies' evidence as to the actual rate of use of their facilities in the past (R. 1330) and the probable rate of use in the future (R. 692) provide reliable data on which to determine the total original service capacity and the percentage which has been consumed in actual operations in the past. On the basis of this evidence, the Commission would have been entitled to conclude that the loss of service capacity during the seven-year period was approximately 25 percent of the total.[30]

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[29] It is true that the withdrawals from the field in the past apparently increased slightly from year to year (R. 209) and that this tendency might continue in the future (R. 639), although the companies' witness Dickinson estimated that it would even off in 1942 (R. 645). The absence of uniformity in past or future withdrawals, however, is immaterial. The companies used the average of the years 1936–1938 in computing normal operations throughout the service life, both in their estimate of a 92% operating load factor on which to base "going concern" value (R. 1330) and in their testimony as to future revenues (R. 1401). For all practical purposes, therefore, it is reasonable to assume that the companies' properties have been and will continue to be capable of maximum use throughout the life of the gas reserve without regard to the variations in the rate of total withdrawals by all gas companies withdrawing from the same field. There was some evidence that the limitation of supply would require a reduction of output in the last two or three years (R. 762), but there was other evidence that the companies' estimate was overly conservative (R. 53–54, 1880, 1887).

We have shown above that the monetary measure of depreciation is original cost. The loss of service value, therefore, is a very minimum of about

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[30] This figure is arrived at as follows: The witness Emery took the operating load factor of 92.48%, the three-year average for 1936–1938 (R. 1329–1330), as the measure of normal operations in measuring the "going value" of the property, and other witnesses for the companies' computed future revenues on the same 1936–1938 basis (R. 692). Taking this average at 100, Emery calculated that the percentage of unused capacity, allowing for a change in rated capacity in the early years, was approximately 52% in 1932, 56¾% in 1933, 21½% in 1934, and 3½% in 1935, or an average of about 33⅓%. The change in rated capacity during this period was from 175,000,000 cubic feet per day to 210,000,000 cubic feet per day (R. 1330), that is, the earlier capacity was only 83⅓% of the later. Thus the average used capacity in the first four years was two-thirds of 83⅓% or 55½% of the later years. Taking the useful capacity for each of the last 19 years at 100 and the useful capacity of each of the first four years at 55½, the total capacity may be represented by

25 percent of $59,197,842.69, the cost as shown on the companies' books for the property as of December 31, 1938, or approximately $14,500,000. This is exclusive of $6,526,160 for retirement of gas leases, this sum being the difference between the original cost and the book cost for leases shown as of December 31, 1938 (R. 2993). This amount should be added since it was included by the Commission in the total sum to be amortized (R. 3938). Thus the sum to be deducted from the total amount to be amortized after December 31, 1938, is about $21,000,000, a sum substantially in excess of the amount which the Commission's method of amortization credits to depreciation reserve for these years. See *supra,* p. 83.

The validity of this conclusion is amply confirmed by the companies' own practice. The companies' books show a total of $19,558,810 for this seven-year period for depreciation, depletion, and retirements, the latter having been charged as an

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1900 plus 222, or 2122. On this basis the capacity consumed in the first seven years is 522, representing 222 for the first four years and 300 for the next three years of full capacity, or slightly less than 25% of the total.

The companies' witness Biddison recognized the propriety of determining accrued depreciation on the basis of the percentage of total service capacity consumed in past operations when he calculated the depreciation of the companies' automobiles on the basis of the relation of past mileage to total mileage life (R. 1305-1306). The same witness, however, used the inconsistent and, as we show below (see *infra*, pp. 89-90), indefensible "viewed depreciation" method in estimating the depreciation of all other property of the companies.

operating expense by direct credit to plant account rather than to the depreciation reserve (R. 2959). In the absence of persuasive evidence to the contrary, this amount may be taken as the companies' own estimate of the actual depreciation expense, including the cost of retirements, during the years in question. Cf. *New York Telephone* v. *Prendergast*, 36 F. (2d) 54, 66 (S. D. N. Y.). The companies' suggestion (Br. p. 120) that the amounts set up in their books for these purposes were merely bookkeeping entries is entitled to no credence. The companies' accounting practice was based on studies of service lives and made in accordance with expert advice (R. 2643–2645). The Commission did not believe, and this Court can hardly assume, that the companies, in providing for depreciation, took no account of the current exhaustion of the gas wells or that, ignoring all expert opinion, they failed to treat depreciation expense as an actual expense for the current consumption of capital. See the testimony of the companies' witness Cooke at R. 2619.

The only evidence to which the companies can point in support of a contrary conclusion is the testimony of their witness Biddison. Biddison's estimate of "viewed depreciation" as of January 1, 1939, was only $2,485,079 (Ex. 141, R. 3025). His estimate, however, was based solely on the "physical condition" of the property (R. 1284–1286, 1293–1295). It thus took no account of the controlling factor of the gradual exhaustion of the gas reserves, a factor which was constantly in operation throughout the life of the physical properties. Biddison's method of determining accrued depreciation, which assumes that depreciation is limited to the loss of current operating efficiency and ignores the continuous consumption of the capital invested in the properties, is obviously absurd. It attributes to property which has lost a large part of its total service capacity a present value of only 4.4% less than its value new. And the companies, logically enough, have drawn the indefensible conclusion that no further depreciation will occur throughout the entire life of the properties, assuming proper maintenance (cf. Ex. 142, R. 3029–3031).

(b) On the investment theory of rate making, it is equally clear that the amount in effect allocated by the Commission to past depreciation is reasonable. Since the purpose of depreciation on an investment basis is to give the investors back their full investment at the expiration of the life of the business, the amortization of the investment may be, and under common practice always is, spread over the whole life of the property; any method of amortization of the investment over the whole life of the property is proper so long as it provides a "reasonable plan of distribution." See Brandeis, J., dissenting in *United Railways* v. *West*, 280 U. S. 234, 263–264. In other words, on the investment basis the relation between the rate of depreciation and the return of investment is a matter of sound business accounting. See Bonbright, *Valuation of Property,* Vol. 2, pp. 1139–1140.

If rate regulation had been imposed at the outset of the business, it would clearly have been a reasonable method of distributing amortization, and indeed, the only reasonable method, to spread it over the whole life of the enterprise by granting an amortization allowance each year. This could validly have been done either on a straight line, actual consumption of service, or on a sinking fund basis which defers some of the amortization until the later years. See *Clark's Ferry Co.* v. *Public Service Commission,* 291 U. S. 227, 240–241.

Where, as here, rate regulation is directly imposed for the first time after part of the life of the enterprise has expired,[31] the same methods of amortization may validly be employed, at least so long as their use does not defeat any legitimate past expectations of the investors. In *Knoxville v. Knoxville Water Co.,* 212 U. S. 1, it was held that, in fixing a rate base which reflected depreciation accrued in the past, it was proper to take into consideration not only the actual consumption of the service capacity of the property in the preceding years of the utility's life, but also depreciation reserves for which the company should have made provision in discharge of its "duty to its bond and stockholders." 212 U. S. at 13–14.

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[31] The Court should note that the business of the companies was of a public character from the day it commenced operation. Several million inhabitants of Chicago and the northern part of Illinois were immediately dependent upon it for gas service. To demonstrate the reasonableness of its contract with Chicago District Pipeline Company, the companies presented evidence of the estimated earnings of the project before the Illinois Commerce Commission in 1931 (R. 3320, *et seq.;* R. 3335, *et seq.*). Subsequently, as a result of this inquiry and the refusal of the Illinois Commerce Commission to approve Chicago District Pipeline Company's contract with the Chicago gas distributing utilities, the companies reduced their rates to the Chicago District Pipeline Company. In *Natural Gas Pipeline Co.* v. *Slattery*, 302 U. S. 300, this Court upheld the right of the Illinois Commerce Commission to have access to the companies' books and records in a new proceeding involving the reasonableness of the rates and charges of the Chicago District Pipeline Company.

It is true that in the *Knoxville* case accrued depreciation was apparently based upon fair value rather than investment. But the rationale of the decision was that it was proper to compute the rate base for the future on an assumption as to the proper depreciation reserves which the company itself should have set up in the past in pursuance of its duty to its investors. This principle is, ~~we submit,~~ clearly correct, since the retroactive application of a statute is constitutionally objectionable under the due process clause only where such application undermines without notice reasonable assumptions upon which those subject to the statute have acted in the past.

In this case the assumptions which the Commission made as to the amortization practice which the companies adopted or should have adopted in the past were clearly reasonable and cannot be said to have defeated any legitimate expectations of the companies. To adopt the contrary view that the entire amortization should be attributed to the future life of the enterprise means that the Commission was constitutionally required to assume that the companies did not in fact, or should not have been expected to, make any provision for amortization of investment out of their earnings during the first eight and a half years of their life expectancy of 23 years.[32]

Stated somewhat differently, during the period prior to the rate order the companies must have earned enough to return a reasonable portion of their investment unless their enterprise was improvidently conceived or the management was either inefficient or imprudently failed to maintain a proper reserve "to keep the investment unimpaired." *Knoxville* v. *Knoxville Water Co., loc. cit. supra; Lindheimer* v. *Illinois Bell Telephone Co.,* 292 U. S. 151, at 169; Brandeis, J., dissenting in *United Railways* v. *West,* 280 U. S. 234, at 264. We are not urging that the companies' past earnings may now be retroactively restricted to an amount which would have been reasonable if they had always been subject to regulation; we do urge, however, that the Constitution does not guarantee the companies against any loss of their investment due to past improvidence.

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[32] The companies rely on two cases involving the United Fuel Gas Company (*United Fuel Gas Co.* v. *Kentucky Railroad Comm.*, 13 F. (2d) 510 (E. D. Ky.), affirmed 278 U. S. 300; *United Fuel Gas Co.* v. *W. Va. Pub. Serv. Comm.*, 14 F. (2d) 209 (S. D. W. Va.), affirmed 278 U. S. 322) to sustain their position. However, from the companies' own statement of the cases (Br. 123–127) it is obvious that these decisions, far from supporting their contention, are in accord with what the Commission did in this case. In the Kentucky case, it was specifically held that "a depletion charge, in estimating the reasonable rate, must be figured upon the investment value, and over the entire estimated life of the properties." 13 F. (2d) at 523. The court's observation that the company is entitled to receive back its entire investment, plus a reasonable return upon such investment, "during the dedication of it to public use" (13 F. (2d) at 523) obviously means during the period of operations, and, as was actually held in the case, the period before regulation may be considered. In the West Virginia case, the Commission deducted the past accrued depreciation and amortization from the present fair value, which it reluctantly used as the amortization base, and amortized the balance over the re-

As we have noted, the amount ($19,558,811.44) which the companies charged for depreciation, depletion, and retirement [33] during the years 1932 to

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maining life. P. U. R. (W. Va.) 1925B 705, 743–747. The past accrued depreciation was estimated by taking a certain percentage of earnings during the past operations, although the period did not include the entire period of past operations. It is clear, however, that the period chosen was not dependent on the absence or presence of a regulatory statute, since the company was regulated even prior to the period chosen. The District Court reduced the allowance for future amortization because it concluded that the Commission's estimate of service life was too short. 14 F. (2d) at 211. In neither case was the question of the proper period of amortization before this Court.

[33] The companies charged retirements as an operating expense and did not pay them out of depreciation reserve (R. 3904).

1938, inclusive (R. 2959) is larger than the amount of amortization of investment attributed to those years ($13,317,921) under the sinking-fund method adopted by the Commission (App. B, p. 139, *infra*). Plainly, therefore, the action of the Commission finds ample justification in the companies' own judgment as to the amount of the investment which should have been returned in the past under prudent management.

3. *The Commission used a proper rate of interest in computing the amortization allowance.*

The companies contend that the amortization allowance should have been computed on the basis of 2% interest compounded semiannually rather than on the basis of 6½% interest compounded annually and that the Commission's failure to do this invades their constitutional rights. They advance this contention to the Court in all earnestness despite the fact that they themselves, prior to actual operation but after construction had begun, planned for amortization of their investment by the use of the sinking fund method, using interest at the rate of 6% (R. 3567–3572).[34]

The companies' contention is based on the ground that it is impossible to invest a fund in risk free securities at more than a 2% interest rate. The argument, however, misconceives the nature of the sinking fund method used by the Commission. The companies speak of the method as though it provided for an actual fund to be handed over to a trustee and invested, as in the case of the sinking funds provided for in many trust indentures to retire outstanding bonds. No such actual fund was created or contemplated by the Commission here; rather the Commission used a mathematical sinking fund formula to compute that return from the earnings of the property which would provide not only a fair return on the unamortized portion of the rate base but also a full return of the investment. The sinking fund method, as applied by the Commission in this case, is similar to the usual accounting and financial treatment of this device (R. 2096; R. 1910 *et seq.*). It is designed to permit the utility to include each year in its operating expenses a sum which, with interest compounded annually during the remaining service life of the property

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[34] In practice, however, after the companies began operation, they failed for a time to make any provision for depreciation or amortization. In 1934, as the companies' secretary explained (R. 2643–2645), this neglect was criticized

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by both the Federal Trade Commission and their own privately employed auditing firm. Thereupon, the companies set up a committee to consider the problem. Studies were made, service lives of the various classes of property were estimated, and provision from then on made predicated upon book cost and apparently on a straight-line basis (R. 2645). Between the years 1932 to 1938, inclusive, the companies charged to depreciation, depletion, and retirement the sum of $19,558,811.44 (R. 2959).

at a rate identical with the adopted rate of return, will yield a sum equal to the total amount to be amortized.

In form, the sinking fund method provides for a 6½% return, plus amortization allowance, on a rate base from which no deduction for amortization has been made; in effect, by computing the amortization allowance on a 6½% basis, the formula provides the companies with (1) a 6½% return on the unamortized portion of the rate base; plus (2) the amortization allowance (i. e., the amount which, together with interest of 6½% compounded annually over the amortization period, will equal the investment in the properties); plus (3) an amount equal to 6½% on the amortization reserve.

That this is the effect of the Commission's formula can readily be demonstrated by reference to the example set forth in Exhibit 182 (R. 3553). That example assumes that there is a utility with properties worth $1,000,000, that a fair return on those properties is 8%, and that the life of the properties is 10 years. On this assumption, an annual amortization allowance of $69,029, with interest at 8% compounded annually, is required to return to the utility the full $1,000,000 value of its properties. By allowing the utility 8% upon the full $1,000,000 throughout its life, plus an annual amortization allowance of $69,029, the utility is given each year, as the exhibit shows, an

8% return on the unamortized portion of the rate base, an annual amortization allowance, and 8% on the entire amortization reserve. Over the full 10-year period, therefore, the utility will receive, by way of amortization allowance and interest on amortization reserve, the full $1,000,000 to be amortized, plus an annual 8% return on the unamortized portion of the rate base.

This will become readily apparent by taking the figures for just the first two years. In the first year the rate base is $1,000,000, the return on that rate base at 8% is $80,000, and the amortization allowance is $69,029. In the second year, the unamortized portion of the rate base is $1,000,000 less the amortization reserve of $69,029, or $930,971. Nevertheless the utility is allowed an 8% return on the full rate base of $1,000,000, or $80,000. $74,477 of this $80,000 represents an 8% return on the unamortized portion of the rate base ($930,971) and the remaining $5,523 represents an 8% return on the amortization reserve of $69,029. It is thus evident that by applying the rate of return figure to the full rate base, what the Commission in effect does is to allow that rate of return on the unamortized portion of the rate base plus interest, at the same figure as the rate of return, on the amortization reserve.

As applied to this case, the formula provides the companies out of the earnings of the enterprise, not only with a 6½% return on the unamortized portion of the rate base; but also with an amortization allowance, computed on the basis of 6½% interest, and with 6½% interest on the amortization reserve. Accordingly, no question is presented as to the rate of return which could be earned by an actual fund invested in risk free securities.

It is to be noted that if a rate of interest lower than the 6½% rate of return allowed on the rate base—for example, the 2% figure suggested by the companies—were used to compute the annual amortization allowance, the utility would be receiving 6½% interest on its amortization reserve, even though the amount of the annual amortization allowance was computed on the assumption that only 2% was to be earned. The excess of 4½% interest on the amortization reserve over that which is necessary to return the entire investment is, in substance, an added return on the unamortized portion of the rate base over the 6½% return found to be fair and reasonable. The example in Table II of Exhibit 182 (R. 3555) shows that, in the case of the assumed $1,000,000 enterprise which has a life expectancy of 10 years and which is allowed an 8% return on rate base, the effect of computing the amortization allowance at 2% rather than at 8% is to allow the company an average return on the unamortized portion of the rate base, not of 8%, but of 12.59%.

The only possible objection to the method which the Commission used is that it requires investors to look for their interest on the amortization reserve to the earnings of the business and therefore involves some risk to them. If a straight line method of depreciation had been used, or if an actual sinking fund had been set up allowing the investment of the amortization allowance in risk free securities at 2%, this risk of amortization would not be present. But, if either of these methods had been used, the average annual amortization allowance would have been greater, the unamortized portion of the rate base would have been correspondingly smaller, and, accordingly, the 6½% return on the unamortized portion of the rate base would have been smaller. The larger return on rate base allowed under the Commission's method is a precise measure of reward for the additional risk arising out of the fact that the companies must look to the earnings of a 6½% business rather than to those of a 2% business for their amortization, for the additional return is exactly proportionate to the difference between the interest rate of the supposed riskless investment and the larger rate of return allowed on the companies' business by reason of its supposed risk. If the rate of return is properly determined, the difference in reward will correspond exactly with the difference in return which an investor would ask for taking the additional risk.

C. THE COMMISSION PROVIDED A PROPER RATE OF RETURN

The Commission found "that 6½ percent is a fair annual rate of return upon the rate base allowed" (R. 3940, 3945). Under Section 19 (b) of the Act that finding is conclusive if it is supported by substantial evidence. The court below held that there was substantial evidence in the record to support the finding and its decision in this respect is plainly correct.

In *Bluefield Co.* v. *Public Service Comm.*, 262 U. S. 679, 692–693, this Court pointed out the elements to be considered in determining a fair rate of return:

> * * * A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional rights to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and to enable it to raise the money necessary for the proper discharge of its public duties. A

> rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market and business conditions generally.

See also *Willcox* v. *Consolidated Gas Co.*, 212 U. S. 19, 48–50; *Lincoln Gas & Elec. Co.* v. *Lincoln*, 250 U. S. 256, 268.

Under this test, the 6½% rate which the Commission allowed was clearly reasonable. The evidence shows that profits earned by industrial corporations declined from 11.3 percent on invested capital in 1929 to 5.1 percent in 1938; for utility corporations, profits declined from 7.2 percent to 5.1 percent during the same period; and for railroad corporations the decline was from 6.4 percent to 2.3 percent (Ex. 185, Schedule 17, R. 3697, 3699). Interest rates were at a low level on all forms of long and short term investments and the rates of return demanded by investors were among the lowest that ever existed (Ex. 180, R. 3523; Ex. 185, schedules 1 to 5, R. 3581, *et seq.*). Specifically, securities of natural gas companies were being sold at rates of from 3 to 6 percent with the yields on the bulk of the bond issues falling between 3 and 4 percent. Banks were making large loans at interest rates of from 2 to 3.25 percent in most cases (Ex. 181, R. 3525–3552; Ex. 186, schedules 6, 7; R. 3777, 3779). The Commission was certainly warranted in concluding upon these facts that 6½% was a generous return unless the enterprise was subject to extraordinary risks. Indeed, the companies scarcely urge the contrary.

There was also abundant evidence showing not only that the companies faced no extraordinary risks but that even less risk of loss of capital investment attended the enterprise than the risk to which the ordinary utility is subject.

First, the companies have unusual assurances of an outlet for their product. Metropolitan Chicago is a growing industrial area and forms a thoroughly desirable market. The companies in effect have both a legal and a practical monopoly of the territory, for although they do not service the community directly, the utilities which do service it own 26 percent of the investment in the pipeline company and are really partners in the enterprise (R. 1945). Consequently there is no danger of competition from a new source of supply (R. 2543–2544), while the advantages of gas for many uses offset to a large extent the possibility of losses to competing fuels (R. 3440, 3456, 3485).

Decisive on this point, however, is the fact that 90% of the companies' capacity is taken under the contract with the Chicago District Pipeline Company, which contract is to run until 1946, or until 1951, at the option of the companies (R. 3). Chicago District is bound to take, or at least pay for, over 66⅔%. The contract is guaranteed by the three distributing utilities in Chicago. Few companies can show such complete protection against the risk of losing the market.

Second, the fact that the companies are engaged in an extraction industry is not a risk which is to be reflected in the rate of return. In estimating the life of the natural gas field in order to calculate the amortization period, the dangers of early exhaustion have been taken into account as well as the possibility that the enterprise will live longer than the estimated period. A second allowance for those factors of risk should not be made in the rate of return. To the contrary, the fact that the entire investment is to be amortized over a relatively short period gives the companies security lacking in most industries where capital investments are relatively permanent.

Third, the companies' corporate affiliations make their financial future relatively secure. The resources of the six large corporations which directly or indirectly own all of the stock (p. 9, *supra*) provide assurance that the companies can readily obtain any future capital requirements. Compare *Wabash Valley Electric Co.* v. *Young*, 287 U. S. 488, 501.

Fourth, while the companies stand in the same position as any other corporation in respect to many miscellaneous lesser risks—increased taxes, costs of regulation, inflation, costs of operation, mechanical failures and so forth—the evidence shows that they are more favorably situated in respect to others. The problem of converting inventory into cash is not as great (R. 2082–2084); the labor factor is not as great (R. 2084); credit risks scarcely exist (R. 2084–2086); and risks arising out of varying demands for a product and because of technological changes are small (R. 2086–2088).

The foregoing proof plainly warranted the Commission in concluding that the companies faced no extraordinary dangers of capital losses which should be compensated by extra returns and that they had, on the contrary, a relatively secure investment. There was also evidence that before the enterprise was under way the companies themselves estimated that their return would be approximately 6.3 percent before federal income taxes (Exs. 156, 157, R. 3334, 3368). Their willingness to make the investment for that return is complete proof that 6.5 percent after taxes is a generous return after the business had been put on a stable basis.[35]

The current level of interest rates, the record of recent natural gas financing, the relative security

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[35] Exhibit 136, page 1 (R. 2959), reveals that for the five years preceding the hearing the companies enjoyed stable and growing revenues. The companies' own figures show that net earnings before interest, amortization of bond discount and expense, depreciation, depletion and retirements, and net profit after such charges, as fixed by the companies, were:

Year	Net earnings° before other charges	Net profit after other charges
1935	$8,532,277.12	$2,168,017.77
1936	10,343,134.88	3,619,667.25
1937	10,796,261.76	4,547,717.15
1938	9,910,662.19	3,514,249.97
Eight months ended (Ex. 187, R. 3784)—		
August 31, 1938	6,437,963.07	2,255,799.38
August 31, 1939	7,228,281.71	3,484,783.80

of the investment and the exceptionally strong position of the companies convinced the Commission that, at the time of the rate order, the companies could readily finance the enterprise at 6.24 percent with interest covered 4.68 times (R. 3939).[36] In view of the expert testimony to that effect (R. 2275–2276), as well as of the controlling factors we have mentioned, the Commission's allowance of a 6½ percent rate of return cannot be held unreasonable, but must, on the contrary, be considered extremely generous.

V

THE COMMISSION'S FINDINGS THAT THE COMPANIES' EXISTING RATES ARE UNREASONABLE AND THAT THE LEVEL OF RATES FIXED BY THE COMMISSION ARE REASONABLE ARE SUPPORTED BY SUBSTANTIAL EVIDENCE

The companies contend that there was no substantial evidence to support the finding of the Commission that the existing rates were unreasonable within the meaning of the statute. They further argue that the considerations which support this conclusion likewise require the conclusion that there is no evidence to support the Commission's finding that the level of rates which it fixed was reasonable (Br., p. 145 *et seq.*). The argument is, apparently, that under the provisions of the Natural Gas Act there must be a finding that the companies' rates are unreasonable, that reasonableness of rates must be determined by the value and benefit of the service rendered, and that, accordingly, the fact that existing rates yield millions of dollars in excess of a fair return on the value of the property is not sufficient evidence to support a finding of unreasonableness. The court below dismissed the contentions because "they ignore the well-established holdings, backed by reason and experience, to the effect that a fair rate of return, on a fairly established rate base, supplies the correct test of reasonableness" (R. 4035). This holding, we submit is plainly correct.

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[36] The companies seek to create the impression that the figures used by the Commission (R. 3939) show that the companies could not finance themselves at less than 6.72 percent (Br. p. 215). This is erroneous. The testimony (R. 2275–2276), as well as the Commission's opinion, shows that the proper figure is 6.24 percent. This is calculated as

Section 6 of the Natural Gas Act provides:

> (a) The Commission may investigate and ascertain the actual legitimate cost of the property of every natural-gas company,

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follows: The cost to the companies of bonds would be 40× .0375 or 1.50, the cost of preferred stock would be 20×.061 or 1.22, and the cost of common stock would be 40×.08 or 3.2, plus 10 percent or 3.52. The total is 6.24.

> the depreciation therein, and, when found necessary for rate-making purposes, other facts which bear on the determination of such cost or depreciation and the fair value of such property.
>
> (b) Every natural-gas company upon request shall file with the Commission an inventory of all or any part of its property and a statement of the original cost thereof, and shall keep the Commission informed regarding the cost of all additions, betterments, extensions, and new construction.

This section is modeled directly on Section 208 of the Federal Power Act, which was enacted as part of the Public Utility Act of 1935. As originally introduced in the Senate, this latter provision declared (S. 2796, 74th Cong., 1st sess.):

> SEC. 208 (a) The Commission may investigate and ascertain the actual legitimate cost of the property of every public utility, the depreciation therein, and every fact which in its judgment has any bearing on the determination of such cost or depreciation.
>
> (b) Every public utility upon request shall file with the Commission an inventory of all or any part of its property and a statement of the original cost thereof, and shall keep the Commission informed regarding the cost of all additions, betterments, extensions, and new construction.
>
> (c) In determining just and reasonable rates, the Commission shall fix such rate as will afford the public utility an opportunity

> to earn a fair return on a rate base not in excess of the actual legitimate cost of the property used and useful for the service in question less the accrued depreciation therein.

The avowed purpose of the bill as thus drafted was to place rate regulation on the prudent investment basis. The Senate Committee on Interstate Commerce which reported the bill declared (S. Rep. 621, 74th Cong., 1st sess., p. 52):

> Rate regulation must eventually be based on prudent investment. Recent decisions of the Supreme Court, and the respect which the Court has always paid to the constitutional interpretations of the coordinate branches of the Government, afford grounds for hope that this rule which the committee considers essential to effective rate regulation will be sustained if the Congress should now definitely adopt it as a legislative policy. This would present the case to the Court in an entirely new light.

Prior to the final enactment of the statute, however, this Court in *West* v. *Chesapeake & Potomac Tel. Company,* 295 U. S. 662, reaffirmed the doctrine of *Smyth* v. *Ames.* Accordingly, the bill was reported out in the House with an amendment containing the present Section 208, which is identical with Section 6 of the Natural Gas Act.

It is thus clear that the Commission is authorized to establish reasonable rates on a prudent investment basis and that only if it is "found necessary", (apparently because the rule of *Smyth* v. *Ames*), is there any occasion to consider facts bearing on "fair value". Whether the Constitution requires the adoption of the fair value basis or permits the application of prudent investment principles, however, the reasonableness of the rate is measured by the investment or fair value and not the value of the service to the consumer. If fair value is the test, the utility is entitled to a "fair return upon the reasonable value of the property at the time it is being used for the public". *Los Angeles Gas Co.* v. *Railroad Commission*, 289 U. S. 287, 305; *Railroad Commission* v. *Pacific Gas Co.*, 302 U. S. 388, 394-395; *Denver Stock Yard Co.* v. *United States*, 304 U. S. 470, 475.[37] This Court, it is true, has on occasion suggested that a "reasonable" rate may be higher than a "barely non-confiscatory" rate. See *Banton* v. *Belt Line Ry.*, 268 U. S. 413, 422–423; *Columbus Gas Co.* v. *Public Utilities Commission*, 292 U. S. 398, 414. Section 5 (a) of the Act, however, which declares that "the Commission may order a decrease where existing rates * * * are not the lowest reasonable rates," was obviously designed to remove this hazy distinction and to authorize the Commission, in its discretion, to put in effect the lowest rates consistent with constitutional requirements.

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[37] The case of *Canada Southern R. Co.* v. *International Bridge Co.*, [1883] 8 L. R. App. Cas. 723, cited by the companies to support a contrary ruling (Br. p. 151), is not in point. That was a suit between private parties, and it was conceded that the actual rates charged were reasonable. In this view, the court held that it would be improper to look to the company's profits to find unreasonableness. The court observed, however, that the legislature could provide otherwise. The dicta in *Cotting* v. *Kansas City Stock Yards Co.*, 183 U. S. 79, 95–97, which lends some support to the companies' position, are not in accord with the subsequent decisions of this Court.

There is in fact no other basis available to the Commission. The "value" of an essential service to the consumer obviously cannot be determined. See Brandeis, J., dissenting, in *St. Louis & O'Fallon Ry. Co.* v. *United States,* 279 U. S. 461, at 536–537; cf. Whitten-Wilcox, *Valuation of Public Service Corporations* (2d ed. 1928) pp. 248–250. And no useful purpose could be served by comparison of the companies' rates with those of other gas companies, since the comparison is not significant unless the rates of the other companies are reasonable. Cf. *Los Angeles Gas Co.* v. *Railroad Commission,* 289 U. S. 287, 305.

There can be no doubt that, under either the investment or fair value test, the rates charged by the companies are "unreasonable" and the level of rates prescribed by the Commission are "reasonable" in the sense of the statute. As we have shown above, the potential earnings of the companies at the level of rates ordered by the Commission are more than sufficient to earn a return of and a return on the investment, together with all other costs of operation. On the investment principle, therefore, the Commission was permitted to find that the level of rates which it prescribed was reasonable and that the existing rates, which were above that level, were unreasonable. And though it was "found necessary" by the Commission to consider the reproduction cost in order, no doubt, to remove any possible doubt as to the validity of the order, the companies cannot seriously suggest that the addition to rate base allowed them as a consequence was "unreasonable."

If "fair value" is the test of constitutional validity and if, therefore, it is "found necessary" to consider the facts bearing on such value in order for the Commission to discharge its statutory responsibility, the rates are nevertheless "reasonable" in the statutory sense. For then the constitutional and statutory standards are the same and, for the reasons advanced in Point IV, the Commission's conclusions were correct, both as to result and, if this be necessary, as to method of valuation.

VI

SMYTH *v.* AMES IS NOT BASED ON SOUND PRINCIPLES AND SHOULD BE OVERRULED

In the case of *Driscoll* v. *Edison Light & Power Company*, No. 509, October Term, 1938, the United States filed a brief as *amicus curiae* asking that *Smyth* v. *Ames* be overruled. We have reprinted excerpts from that brief as a supplement to this brief, showing that the present fair value rule is unworkable and unsound, that it has led to a breakdown of the rate-regulation process, and that it is contrary to the overwhelming weight of professional opinion. Here, we shall show, in addition, that the rule is based on legal principles drawn from the law of eminent domain which have no place in rate making, that in rate regulation the sole appropriate test is one of the reasonableness of the regulation and that a method of rate making which gives a fair return on the capital prudently invested in the enterprise is reasonable.

A. *The fair value rule is based on eminent domain concepts*

The rule that a rate is confiscatory unless it enables the utility to earn a fair return on the present fair value of its property is based on the doctrine in the law of eminent domain that "just compensation" must be paid for property "taken" for public use. The Court pointed this out in *West* v. *Chesapeake & Potomac Tel. Co.*, 295 U. S. 662, 671, saying:

> * * * When the property itself is taken by the exertion of the power of eminent domain, just compensation is its value at the time of the taking. So, where by legislation prescribing rates or charges the use of the property is taken, just compensation * * * is a reasonable rate of return upon that value.

The historical development of the fair value rule shows that the law of eminent domain was in fact its source. At first in *Munn* v. *Illinois,* 94 U. S. 113, and companion cases, the Court held that "the people must resort to the polls, not to the courts" for protection against abuses in rate regulation (94 U. S., at 134). Later, however, the Court receded from this extreme view and held that the question of the reasonableness of rates was a judicial question (*Railroad Commission Cases,* 116 U. S. 307, 325, 331; *Chicago Ry.* v. *Minnesota,* 134 U. S. 418), pointing out that unreasonably low rates could not validly be prescribed because that would amount to a deprivation of property without due process of law or a taking of property without just compensation. *Railroad Commission Cases,* 116 U. S. 307, 325, 331; *Georgia Railroad & Banking Co.* v. *Smith,* 128 U. S. 174, 179; *Chicago Ry.* v. *Minnesota,* 134 U. S. 418, 458; *Budd* v. *New York,* 143 U. S. 517, 547. Then, in *Reagan* v. *Farmer's Loan & Trust Co.,* 154 U. S. 362, the "fair value" rule emerged; the Court invalidated a rate order under which the company could not pay even one-half of its bond interest and said, *obiter* (p. 410):

> * * * If the State were to seek to acquire the title to these roads, under its power of eminent domain, is there any doubt that constitutional provisions would require the payment to the corporation of just compensation, that compensation being the value of

> the property as it stood in the markets of the world, and not as prescribed by an act of the legislature? Is it any less a departure from the obligations of justice to seek to take not the title but the use for the public benefit at less than its market value?

The analogy of a "taking" was not expressly referred to again until *Smyth* v. *Ames*, but in *Covington & Lexington Turnpike Road Co.* v. *Sandford*, 164 U. S. 578, 596, the Court observed that rates fixed so low as to destroy the value of property for all purposes would be invalid as a deprivation of property without due process of law. Finally the lower court in *Smyth* v. *Ames* held that the principles of eminent domain must apply in rate regulation, saying (*Ames* v. *Union Pacific Ry.*, 64 Fed. 165, 177 (C. C. Neb.)):

> Now, if the public was seeking to take title to the railroad by condemnation, the present value of the property, and not the cost, is that which [it] would have to pay. In like manner, it may be argued that, when the legislature assumes the right to reduce, the rates so reduced cannot be judged unreasonable if, under them, there is earned by the railroad company a fair interest on the actual value of the property. * * *

Thus this test extracted from the law of eminent domain became the basis of the "fair value" rule of *Smyth* v. *Ames* for determining the constitutionality of rates. See Henderson, *Railway Valua-*

tion and the Courts, 33 Harv. L. Rev. 902, 906–912; Hale, *Conflicting Judicial Criteria of Utility Rates,* 38 Col. L. Rev. 959, 960–964. As we have shown, the rule is still placed on that basis (*West* v. *Chesapeake & Potomac Tel. Co., supra*) and is invoked notwithstanding that when *Smyth* v. *Ames* was decided original cost exceeded "present fair value" and the rule was adopted to show that rates could be based on a value less than original cost. Today it is invoked to prevent rate regulation on any basis other than "present fair value" however much that value may exceed the cost of the property.

B. *The eminent domain concept of present fair value has no place in rate regulation*

In practice the "present value" test to which the Court has thus far adhered makes it impossible to measure the reasonableness of rates by any coherent or feasible standard. Physical property has only a scrap value unless it is capable of earning a return sufficient to justify a larger investment. In other words, the value depends on the earnings. And, since the earnings will depend on the rates to be fixed, the dilemma arises that value depends upon the rates fixed and the rates upon the value. The present fair value rule creates but offers no way out of this dilemma. See Bonbright, *Valuation of Property,* Vol. II, pp. 1094–1098; Hale, *The "Fair Value" Merry-Go-Round,* 33 Ill. L. Rev. 517–520.

The practical impossibility of developing a workable rule under the present fair value concept arises fundamentally from the fact that in principle the doctrine that "just compensation" must be paid for property "taken" has no application in the field of rate regulation. See Hale, *Conflicting Judicial Criteria of Utility Rates,* 38 Col. L. Rev. 959, 963.[38] This should have been apparent when *Smyth* v. *Ames* was decided. Prior to that decision, it had already been established in a utility condemnation case that "the value of the property, generally speaking, is determined by its productiveness—the profits which its use brings to the owner" (*Monongahela Navigation Co.* v. *United States,* 148 U. S. 312, 328–329; see also *C. C. C. & St. L. Ry.* v. *Backus,* 154 U. S. 439), and that compensation must be paid not only for [illegible] physical property but also for the franchise. Earning power under the old rates thus became the test of value in condemnation cases. Hale, *The "Fair Value" Merry-Go-Round,* 33 Ill. L. Rev. 517, 519–520; Hale, *Conflicting Judicial Criteria of Utility Rates,* 38 Col. L. Rev. 959, 964.[39] In a rate case, however, as we have shown, the earning power necessarily depends on the rates to be allowed, which is the very question at issue, and unless earning power under the old rates is adopted as the measure of value, which obviously would prevent any reduction, the whole process becomes involved in a vicious circle. Bonbright, *op. cit. supra,* pp. 1094–1098; Bauer & Gold, *op. cit. supra,* 49 *et seq.,* 141–147; Hale, *The "Fair Value" Merry-Go-Round,* 33 Ill. L. Rev. 517–520; Henderson, *Railway Valuation and the Courts,* 33 Harv. L. Rev. 1031. As Mr. Justice Brandeis pointed out in his concurring opinion in *Southwestern Bell Tel. Co.* v. *Public Service Comm.,* 262 U. S. 276, 292:

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[38] It was precisely this principle of "just compensation" that led Mr. Justice Field in 1877 to dissent in *Munn* v. *Illinois,* 94 U. S. 113, and to deny any power in the states to regulate rates. 94 U. S. at 143.

[39] Of course, where the property of a nonutility without franchise is condemned, it is only the physical property and not the earning power or prospective profits that are taken and paid for. *Mitchell* v. *United States,* 267 U. S. 341; *Joslin Co.* v. *Providence,* 262 U. S. 668; *Bothwell* v. *United States,* 254 U. S. 231.

> The rule of *Smyth* v. *Ames* sets the laborious and baffling task of finding the present value of the utility. It is impossible to find an exchange value for a utility, since utilities, unlike merchandise or land, are not commonly bought and sold in the market. Nor can the present value of the utility be determined by capitalizing its net earnings, since the earnings are determined, in large measure, by the rate which the company will be permitted to charge; and, thus, the vicious circle would be encountered. * * *

See also *Los Angeles Gas Co.* v. *Railroad Commission,* 289 U. S. 287, 305; Mr. Justice Stone dissenting in *West* v. *Chesapeake & Potomac Tel. Co.,* 295 U. S. 662, 689.

Moreover, the strict application of the eminent domain principle of "just compensation" to rate cases would render all rate regulation invalid. Present value would have to be measured by earnings at the old rates, and would be calculated by capitalizing those earnings at the prevailing rate of returns for investments involving similar risks. On the rate base thus determined, a fair return would have to be allowed which would, of course, be the rate of return on investments involving similar risks. The result would be no change in rates at all. The obvious truth of the matter is that every rate reduction which reduces the net earnings of a utility *ipso facto* reduces the value of that utility; if the value prior to the rate reduction must be preserved for constitutional reasons, it necessarily follows that every rate order which reduces that value is invalid.[40]

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[40] It is no answer to say that the dilemma is false because the actual market value will be less than the capitalized earnings by reason of the fact that the market will take into account the prospect of future rate regulation. A business has greater value if its owner can anticipate earnings in excess of just and reasonable profits, and the prospect of future regulation does not entirely diminish that anticipation. Hale, *The "Fair Value" Merry-Go-Round*, 33 Ill. L. Rev. 517, 530. If, therefore, under eminent domain principles, market value, which is earning power in the case of a public utility, sets the measure of "just compensation," and if rates must be fixed to pay the utility "just compensation" in the eminent domain sense, rates can never be reduced below the market expectations prior to the rate proceedings, and adequate rate regulation is still impossible.

This Court, while not professing to abandon the "taking" theory with its corollary requirement of "just compensation" (see *West* v. *Chesapeake & Potomac Tel. Co.,* 295 U. S. 662, 671), has adopted the logically inconsistent position that some rate regulation is permissible. In part the Court has permitted the exclusion of value supposedly due to "monopoly" position (*Clark's Ferry Co.* v. *Public Service Commission,* 291 U. S. 227, 238; see Whitten, *Fair Value for Rate Purposes,* 27 Harv. L. Rev. 419, 421–423; Richberg, *A Permanent Basis for Rate Regulation,* 31 Yale L. J. 263, 267), although an exclusive franchise is an element of value in a condemnation case. *Monongahela Navigation Co.* v. *United States,* 148 U. S. 312, 328–329. As Mr. Justice Brandeis remarked in *Southwestern Bell Tel. Co.* v. *Public Service Commission* (262 U. S. 276, 310–311):

> Value is a word of many meanings. That with which commissions and courts in these proceedings are concerned, in so-called confiscation cases, is a special value for rate-making purposes, not exchange value. This is illustrated by our decisions which deal with the elements to be included in fixing the rate base. In *Cedar Rapids Gas Light Co.* v. *Cedar Rapids,* 223 U. S. 655, 669; and *Des Moines Gas Co.* v. *Des Moines,* 238 U. S. 153, 165, good will and franchise value were excluded from the rate base in determining whether the prescribed charges of the pub-

lic utility were confiscatory. In *Galveston Electric Co.* v. *Galveston,* 258 U. S. 388, the cost of developing the business as a financially successful concern was excluded from the rate base. In *Des Moines Gas Co.* v. *Des Moines,* 238 U. S. 153, 171, the fact that the street had been paved (and hence the reproduction cost of laying gas mains greatly increased) was not allowed as an element of value. But, obviously, good will and franchise value are important elements when exchange value is involved. And where the community acquires a public utility by purchase or condemnation, compensation must be made for its good will and earning power; at least under some circumstances. * * *

The very existence of the power to regulate rates, therefore, shows that the concepts of "just compensation" and "fair value," drawn from the law of eminent domain, have no place in rate cases. Bonbright, *op. cit. supra,* pp. 1092–1096; Bauer and Gold, *op. cit. supra,* p. 147; Beutel, *Valuation as a Requirement of Due Process,* 43 Harv. L. Rev. 1249, 1267; Hale, *The "Fair Value" Merry-Go-Round,* 33 Ill. L. Rev. 517, 519, 530; Hale, *Conflicting Judicial Criteria of Utility Rates,* 38 Col. L. Rev. 959. When property is taken under the power of eminent domain the owner "is entitled to the full money equivalent of the property taken and to be thereby put in as good position pecuniarily as it would have occupied if its property had not been taken." *United States* v. *New River Collieries Co.*, 262 U. S. 341, 343. As we have shown, since value depends on earning power, the reduction of rates and consequent diminution of earnings necessarily diminishes the value of the utility property. Accordingly, it is to assert two mutually contradictory and inconsistent principles to say on the one hand that rate regulation is valid and on the other hand that rate regulation must secure to the property owner "just compensation" in the sense in which that term is used in the law of eminent domain.

C. *Rate regulation should be deemed violative of due process only if arbitrary or unreasonable*

The inconsistency is avoided once it is understood that rate regulation is not the taking of property for public use but is simply an exercise of regulatory power. Eminent domain is the power to command a sale; it involves a transfer of a title or a use which is essential to the Government's need, and not the curtailment of a private use or a restriction of private economic relations. Under the power of eminent domain, the public welfare is promoted by taking the property from the owner and appropriating it to some particular use. Lewis, *Eminent Domain* (3d ed. 1909), sec. 6. It is evident, therefore, that eminent domain concepts apply only where property is appropriated to the public use and where the taking is justified, not because the property taken or the use of it is a public nuisance or other obstacle to valid legislative ends, but because it is needed for some valid public purpose or project. Nichols, *Eminent Domain* (2d ed. 1917) p. 278; Orgel, *Valuation under Eminent Domain* (1936) p. 2; see Gardner, *The Massachusetts Billboard Decision,* 49 Harv. L. Rev. 869, 889–892.

The regulation of rates, on the other hand, promotes the public welfare, not by a "taking", but by regulating and restricting the owner's use and enjoyment of his property. Lewis, *Eminent Domain* (3d ed. 1909), secs. 246, 249. And it is, of course, elementary that Congress may subject the use of privately owned property to reasonable limitations in order to serve valid legislative ends, even though the regulation diminishes the value of the property. As Mr. Justice Holmes remarked in *Block* v. *Hirsch,* 256 U. S. 135, 155:

> The fact that tangible property is also visible tends to give a rigidity to our conception of our rights in it that we do not attach to others less concretely clothed. But the notion that the former are exempt from the legislative modification required from time to time in civilized life is contradicted not only by the doctrine of eminent domain, under which what is taken is paid for, but by that of the police power in its proper sense, under which property rights may be cut down, and to that extent taken, without pay. * * *

Examples of valid legislative regulations which diminish the value of property without compensation are common. Thus, a state may declare that nets used on the waters of the state or on its shores in violation of fish protection statutes shall be summarily destroyed (*Lawton* v. *Steele*, 152 U. S. 133); that the manufacture of oleomargarine shall be prohibited (*Powell* v. *Penna.*, 127 U. S. 678); that the manufacture of intoxicating liquors shall be prohibited (*Mugler* v. *Kansas*, 123 U. S. 623, 661); that the business of conducting a livery stable shall not be carried on within certain territorial limits (*Reinman* v. *Little Rock*, 237 U. S. 171); that bricks shall not be manufactured within certain territorial limits (*Hadacheck* v. *Los Angeles*, 239 U. S. 394); that riparian owners shall not divert waters of a state into another state (*Hudson Water Co.* v. *McCarter*, 209 U. S. 349, 355): that the emission of smoke from buildings is unlawful even though the prevention of such emission would require the discontinuance of use of property and would involve much expense (*Northwestern Laundry* v. *Des Moines*, 239 U. S. 486); and that tanks containing inflammable fluid must be kept underground (*Standard Oil Co.* v. *Marysville*, 279 U. S. 582). Indeed, this Court upheld a statute which required the cutting down of red cedar trees of ornamental value to prevent infection of apple orchards. *Miller* v. *Schoene,* 276 U. S. 272. In that case, this Court stated (pp. 279–280):

> * * * When forced to such a choice the state does not exceed its constitutional powers by deciding upon the destruction of one class of property in order to save another which, in the judgment of the legislature, is of greater value to the public. * * * And where the public interest is involved preferment of that interest over the property interest of the individual, to the extent even of its destruction, is one of the distinguishing characteristics of every exercise of police power which affects property. * * *

See also *Euclid* v. *Ambler Co.,* 272 U. S. 365; cf. *Pennsylvania Coal Co.* v. *Mahon,* 260 U. S. 393. Such reasonable restrictions on the use of property in the interest of the public have been held not to be "takings." *Monongahela Bridge Co.* v. *United States,* 216 U. S. 177, 193; *Union Bridge Co.* v. *United States,* 204 U. S. 364, 388–403; *West Chicago Street Railway* v. *Chicago,* 201 U. S. 506, 524; see Gardner, *The Massachusetts Billboard Decision,* 49 Harv. L. Rev. 869, 889–892.

Price regulation stands on the same footing as other exercises of the police power: the sole test is one of reasonableness. For example, in *Nebbia* v. *New York,* 291 U. S. 502, this Court, after observing that there was nothing "peculiarly sacrosanct about the price one may charge," concluded that "price control, like any other form of regulation, is unconstitutional only if arbitrary, discriminatory, or demonstrably irrelevant to the policy the legislature is free to adopt, and hence an unnecessary and unwarranted interference with individual liberty." (291 U. S. at 532, 539.)

These principles apply to rate regulation, for such regulation is nothing more than one phase of the broader field of price fixing. No property is "taken"; the use of property is regulated. Indeed, the "taking" concept has not even a superficial relevance to utility regulation except where the state requires a utility to extend its service (*New York & Queens Gas Co.* v. *McCall,* 245 U. S. 345; *New York ex rel. Woodhaven Gas Light Co.* v. *Public Service Commission,* 269 U. S. 244) or forbids abandonment if the utility continues to do business anywhere within the state. *United Gas Co.* v. *Railroad Commission,* 278 U. S. 300, 308–309.[41] In some early cases, the power to fix prices or rates was explained by saying that the regulated company had "dedicated" its property to the public use. It is evident, however, from the fact that the property remains private property that there has been no true "dedication." *Minnesota Rate Cases,* 230 U. S. 352, 431–432; *Interstate Commerce Commission* v. *Oregon-Washington R. Co.,* 288 U. S. 14, 40–41.

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[41] No question of forbidding abandonment or compelling an extension is involved here. Moreover, the duty to continue or extend service is based upon the community's dependence for which the utility is responsible. Cf. Cardozo, J., dissenting in *Interstate Commerce Commission* v. *Oregon-Washington R. Co.*, 288 U. S. 14, 47. The instances are numerous and familiar in which a duty has been founded on dependence or reliance and in which the concepts of eminent domain are manifestly irrelevant. See, e. g., *Moch Co.* v. *Rensselaer Water Co.*, 247 N. Y. 160, 167; *Slater* v. *Illinois Central R. Co.*, 209 Fed. 480 (M. D. Tenn.); *Siegel* v. *Spear & Co.*, 234 N. Y. 479; *Creeley* v. *Creeley*, 258 Mass. 460, 463.

As this Court observed in *Nebbia* v. *New York,* 291 U. S. 502, 534, "The statement that one has dedicated his property to a public use is * * * merely another way of saying that if one embarks in a business which public interest demands shall be regulated, he must know regulation will ensue."

Utility regulation, then, and rate fixing in particular, is not a "taking" of property for public use but an exercise of the police power. The validity of such regulation, therefore, does not depend upon impairment of the value of property; impairment of value is frequently the consequence of regulation. The true test of constitutionality under the due process clause in a rate case, as in all regulatory cases, is simply whether the regulation is reasonable.

D. *It is not unreasonable to limit the earnings of a utility to a fair return upon the capital prudently invested*

In urging that rate regulation which takes investment as the rate base is reasonable and therefore consistent with due process, we do not urge that a legislature may not lawfully select other standards suggested by sound business practice. We do contend, however, that prudent investment is a reasonable measure.

The point requires little elaboration here. Mr. Justice Brandeis, in his concurring opinion in *Southwestern Bell Tel. Co.* v. *Public Service Commission,* 262 U. S. 276, has demonstrated the reasonableness of the investment basis by reference to a wealth of relevant data. Additional data are supplied in the supplement to this brief, where we show that the investment basis of rate regulation is sound and workable; that it is overwhelmingly supported by the great body of professional opinion, and that, despite the adherence by this Court to the doctrine of *Smyth* v. *Ames,* many regulatory bodies have advocated utilization of the investment test. It is significant, too, that practical experience in Massachusetts, California and elsewhere shows that this method is just to the utilities, has attracted capital, and has secured adequate service. Since this basis of rate regulation maintains the company's financial integrity and permits it to raise necessary capital, it cannot be deemed arbitrary. Hale, *Conflicting Judicial Criteria of Utility Rates,* 38 Col. L. Rev. 959, 969–970.[42]

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[42] "* * * The money necessary for the proper discharge of its public duties, or necessary to finance the whole enterprise, is not the replacement cost. * * * To raise that necessary money, it will be requisite that the company have a prospect, in the assumed case, of earning 9% on the full

The contrast of the record of that experience with the confusion resulting from application of the fair value rule emphasizes the reasonableness of the investment test. On the basis of long experience, almost all informed opinion is agreed that effective rate regulation under the present value test is a practical impossibility. In the supplement to this brief we show that the rule is unrelated to the end sought, i. e., the allowance of a compensatory return on property devoted by investors to the public service, that it produces arbitrary, unreliable, and absurd results, and that it results in a breakdown of the regulatory process.

The argument commonly advanced for the present value rule is that the basis of rate regulation is the necessity of providing an effective substitute for conditions of competition and that, since under conditions of competition, present or reproduction cost and not original investment controls the prices charged the consumer, the same principle must be applied in rate regulation. See Whitten, *Fair Value for Rate Purposes,* 27 Harv. L. Rev. 419, 421; Richberg, *A Permanent Basis for Rate*

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actual prudent cost defrayed by the investors, no matter how much less it would have cost at the time of the regulation. It will be unnecessary for the purpose that the company have a prospect of earning 9% on anything more than actual prudent cost, no matter how much more it would have cost had the plant been built at the time of the regulation. Money sufficient for building the plant at higher replacement costs is not necessary for the proper discharge of the company's public duties." Hale, *op. cit. supra*, at 970.

Regulation, 31 Yale L. J. 263, 277. The argument, it may be noted, in effect concedes that the full measure of just compensation required in the case of a taking under eminent domain is not required in rate regulation, since the standard of competition permits the reduction of earning power, that is, the value of the property, below the level existing under monopoly conditions. It seems equally clear that, as a matter of due process, there is ample reason to believe that the competition theory is not only unworkable in practice but is not properly related to the legitimate aims of utility regulation. The cost of reproduction which is a measure of prices in private industry is the cost, not of reproducing the identical property, but of reproducing the service. Whitten, *op. cit., supra,* at 426–427; Richberg, *op. cit., supra,* at 277. Such a basis for rate making is entirely unfeasible, because it would require the rate-making agency to decide, upon conflicting evidence, the engineering question of how a plant should be constructed in order most efficiently to render the service now rendered by the utility, and then to determine the cost of building this hypothetical plant (*id.*). Moreover, conditions of competition offer a very imperfect standard for rate regulation. The competitive price may yield large profits to the low cost producer but it brings ruin to the high cost producer. The public, however, has a definite interest in preventing financial distress which will prevent efficient public service. Bonbright, *Merits of Original Cost and Reproduction Cost*, 41 Harv. L. Rev. 593, 621–622.

It is true that to measure the rate base by the sum prudently invested does not allow the owners of utility property the same appreciation in values which owners of other property enjoy in times of prosperity. By the same token, however, the use of the investment method saves utility investors from the depreciation in values from which investors in other types of business suffer in times of depression. The adoption of this test, therefore, cannot be said to be unreasonable on this ground. Under the rule of *Smyth* v. *Ames*, on the other hand, utility investors get both the benefit of appreciation in property values and protection against depreciation. This is so because, in periods of deflation, regulatory agencies cannot undertake to fix values in strict conformity to *Smyth* v. *Ames* without throwing many utilities into receivership, and this would, of course, deprive consumers of necessary utility service.[43]

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[43] "Why, say the defenders of reproduction cost, should railway security holders be given any greater insurance against the fluctuations of price levels than is given to the holders of securities in an unregulated enterprise? The answer is that when the investors in small competitive enterprises fall, they may fall alone, but when the holders of railway securities fall, they force the whole community to become unwilling mourners of their downfall." Bonbright, *Merits of Original Cost and Reproduction Cost*, 41 Harv. L. Rev. 593, 621–622; see Whitten, *Fair Value For Rate Purposes*, 27 Harv. L. Rev. 419, 423–424.

Experience of the past decade has shown that in fact electric, gas, and lighting utilities have not shared with the rest of the community in loss of earnings (Ex. 185, schedule 17, R. 3697–3699). As Mr. Justice Brandeis so aptly observed, "The rule by which the utilities are seeking to measure the return is, in essence, reproduction cost of the utility or prudent investment, whichever is the higher." *Southwestern Bell Tel. Co.* v. *Public Service Commission,* 262 U. S. 276, 311. Since the utilities are not compelled to suffer from a decline in values, it is not unreasonable to deny them the increase.[44]

As the Government stated in its brief in *Driscoll* v. *Edison Light & Power Co.,* 307 U. S. 104 (see supplement to this brief, p. 41), the rule of prudent investment, combining as it does exactness, ease of application, and a proper principle for the determination of reasonable return, is the standard for rate making best adapted to modern business conditions and practices in this country. The case at bar offers the Court an opportunity to write off the books the unsound and unworkable rule of rate making enunciated in *Smyth* v. *Ames.* We urge, therefore, that *Smyth* v. *Ames* be overruled and that this Court now announce that prudent investment is a reasonable and therefore valid basis for the regulation of rates.

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[44] Even if it be assumed that some account must be taken for the factor of increasing prices, this may readily be accomplished by altering the rate of return. See Whitten, *Fair Value for Rate Purposes*, 27 Harv. L. Rev. 419, 434–435; Richberg, *A Permanent Basis for Rate Regulation*, 31 Yale L. J. 263, 273.

CONCLUSION

The decision of the court below should be reversed and the case remanded with directions to enforce the Commission's order in full.

Respectfully submitted.

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APPENDIX A

The Natural Gas Act of 1938, c. 556, 52 Stat. 821, 15 U. S. C., Supp. V, §§ 717–717w, provides:

SEC. 1. (a) As disclosed in reports of the Federal Trade Commission made pursuant to S. Res. 83 (Seventieth Congress, first session) and other reports made pursuant to the authority of Congress, it is hereby declared that the business of transporting and selling natural gas for ultimate distribution to the public is affected with a public interest, and that Federal regulation in matters relating to the transportation of natural gas and the sale thereof in interstate and foreign commerce is necessary in the public interest.

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SEC. 4. (a) All rates and charges made, demanded, or received by any natural-gas company for or in connection with the transportation or sale of natural gas subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges, shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful.

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SEC. 5. (a) Whenever the Commission, after a hearing had upon its own motion or upon complaint of any State, municipality, State commission, or gas distributing company, shall find that any rate, charge, or classification demanded, observed, charged, or collected by any natural-gas company in connection with any transportation or sale of natural gas, subject to the jurisdiction of the Commission, or that any rule, regulation, practice, or contract affecting such rate, charge, or classification is unjust, unreasonable, unduly discriminatory, or preferential, the Commission shall determine the just and reasonable rate, charge, classification, rule, regulation, practice, or contract to be thereafter observed and in force, and shall fix the same by order: *Provided, however,* That the Commission shall have no power to order any increase in any rate contained in the currently effective schedule of such natural gas company on file with the Commission, unless such increase is in accordance with a new schedule filed by such natural gas company; but the Commission may order a decrease where existing rates are unjust, unduly discriminatory, preferential, otherwise unlawful, or are not the lowest reasonable rates.

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SEC. 6. (a) The Commission may investigate and ascertain the actual legitimate cost of the property of every natural-gas company, the depreciation therein, and, when found necessary for rate-making purposes, other facts which bear on the determination of such cost or depreciation and the fair value of such property.

(b) Every natural-gas company upon request shall file with the Commission an inventory of all or any part of its property and a statement of the original cost thereof, and shall keep the Commission informed regarding the cost of all additions, betterments, extensions, and new construction.

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SEC. 9. (a) The Commission may, after hearing, require natural-gas companies to carry proper and adequate depreciation and amortization accounts in accordance with such rules, regulations, and forms of account as the Commission may prescribe. The Commission may from time to time ascertain and determine, and by order fix, the proper and adequate rates of depreciation and amortization of the several classes of property of each natural-gas company used or useful in the production, transportation, or sale of natural gas. Each natural-gas company shall conform its depreciation and amortization accounts to the rates so ascertained, determined, and fixed. * * *

* * * * *

SEC. 13. Any State, municipality, or State commission complaining of anything done or omitted to be done by any natural-gas company in contravention of the provisions of this Act may apply to the Commission by petition, which shall briefly state the facts, whereupon a statement of the complaint thus made shall be forwarded by the Commission to such natural-gas company, which shall be called upon to satisfy the complaint or to answer the same in writing within a reasonable time to be specified by the Commission.

* * * * *

SEC. 19. (a) Any person, State, municipality, or State commission aggrieved by an order issued by the Commission in a proceeding under this Act to which such person, State, municipality, or State commission is a party may apply for a rehearing within thirty days after the issuance of such order. The application for rehearing shall set forth specifically the ground or grounds upon which such application is based. Upon such application the Commission shall have power to grant or deny rehearing or to abrogate or modify its order without further hearing. Unless the Commission acts upon the application for rehearing within thirty days after it is filed, such application may be deemed to have been denied. No proceeding to review any order of the Commission shall be brought by any person unless such person shall have made application to the Commission for a rehearing thereon.

(b) Any party to a proceeding under this Act aggrieved by an order issued by the Commission in such proceeding may obtain a review of such order in the circuit court of appeals of the United States for any circuit wherein the natural-gas company to which the order relates is located or has its principal place of business, or in the United States Court of Appeals for the District of Columbia, by filing in such court, within sixty days after the order of the Commission upon the application for rehearing, a written petition praying that the order of the Commission be modified or set aside in whole or in part. * * * No objection to the order of the Commission shall be considered by the court unless such objection shall have been urged before the Commission in the application for rehearing unless there is reasonable ground for failure so to do. The finding of the Commission as to the facts, if supported by substantial evidence, shall be conclusive. If any party shall apply to the court for leave to adduce additional evidence, and shall show to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for failure to adduce such evidence in the proceedings before the Commission, the court may order such additional evidence to be taken before the Commission and to be adduced upon the hearing in such manner and upon such terms and conditions as to the court may seem proper. The Commission may modify its findings as to the facts by reason of the additional evidence so taken, and it shall file with the court such modified or new findings, which is supported by substantial evidence, shall be conclusive, and its recommendation, if any, for the modification or setting aside of the original order. The judgment and decree of the court, affirming, modifying, or setting aside, in whole or in part, any such order of the Commission, shall be final, subject to review by the Supreme Court of the United States upon certiorari or certification as provided in sections 239 and 240 of the Judicial Code, as amended (U. S. C., title 28, secs. 346 and 347).

* * * * *

APPENDIX B

The operation of the sinking fund formula

Year (1)	Amount to be Amortized (2)	Annual Amortization Allowance (3)	6½% Interest on Reserve (4)	Reserve for Amortization (5)
1 (1932)	$78, 284, 000	[1]$1, 562, 610	....	$1, 562, 610
2 (1933)	78, 284, 000	1, 562, 610	$101, 570	3, 226, 790
3 (1934)	78, 284, 000	1, 562, 610	209, 741	4, 999, 141
4 (1935)	78, 284, 000	1, 562, 610	324, 944	6, 886, 695
5 (1936)	78, 284, 000	1, 562, 610	447, 635	8, 896, 940
6 (1937)	78, 284, 000	1, 562, 610	578, 301	11, 037, 851
7 (1938)	78, 284, 000	1, 562, 610	717, 460	13, 317, 921
8 (1939)	78, 284, 000	1, 562, 610	865, 664	15, 746, 195
9 (1940)	78, 284, 000	1, 562, 610	1, 023, 503	18, 332, 308
10 (1941)	78, 284, 000	1, 562, 610	1, 191, 600	21, 086, 518
11 (1942)	78, 284, 000	1, 562, 610	1, 370, 624	24, 019, 752
12 (1943)	78, 284, 000	1, 562, 610	1, 561, 284	27, 143, 646
13 (1944)	78, 284, 000	1, 562, 610	1, 764, 337	30, 470, 593
14 (1945)	78, 284, 000	1, 562, 610	1, 980, 588	34, 013, 791
15 (1946)	78, 284, 000	1, 562, 610	2, 210, 896	37, 787, 297
16 (1947)	78, 284, 000	1, 562, 610	2, 456, 174	41, 806, 081
17 (1948)	78, 284, 000	1, 562, 610	2, 717, 395	46, 086, 086
18 (1949)	78, 284, 000	1, 562, 610	2, 995, 595	50, 644, 291
19 (1950)	78, 284, 000	1, 562, 610	3, 291, 879	55, 498, 780
20 (1951)	78, 284, 000	1, 562, 610	3, 607, 421	60, 668, 811
21 (1952)	78, 284, 000	1, 562, 610	3, 943, 473	66, 174, 894
22 (1953)	78, 284, 000	1, 562, 610	4, 301, 368	72, 038, 872
23 (1954)	78, 284, 000	1, 562, 610	4, 682, 527	78, 284, 000
Total	....	35, 940, 030	42, 343, 979	....

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[1] The Commission's annual allowance for amortization, $1,557,852, is slightly less than that required to yield $78,284,000 in 23 years at 6½% interest compounded annual. This slight error, however, is plainly *de minimus* and is not complained of by the companies here.

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Nos. 265 and 268

In the Supreme Court of the United States

OCTOBER TERM, 1941

FEDERAL POWER COMMISSION AND ILLINOIS
COMMERCE COMMISSION, PETITIONERS

v.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND
TEXOMA NATURAL GAS COMPANY

NATURAL GAS PIPELINE COMPANY OF AMERICA AND
TEXOMA NATURAL GAS COMPANY, PETITIONERS

v.

FEDERAL POWER COMMISSION AND ILLINOIS
COMMERCE COMMISSION

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT

SUPPLEMENT TO THE BRIEF FOR THE FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION CONSISTING OF EXTRACTS FROM THE GOVERNMENT'S BRIEF IN DRISCOLL v. EDISON LIGHT & POWER CO., NO. 509. OCTOBER TERM, 1938

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The following material consists of extracts from the brief filed by the United States, as *amicus* *curiae,* in *Driscoll* v. *Edison Light & Power Co.,* No. 509, October Term 1938. The material reprinted appeared in the original brief at pages 29 to 138. The few omissions have been noted by asterisks. For purposes of clarity, page, heading and footnote numbers have been changed.

I. THE FAIR VALUE RULE WITH ITS EMPHASIS ON REPRODUCTION COST HAS PROVED TO BE UNSOUND AND UNWORKABLE * * *

A. *The rule is unrelated to the end sought.*

The constitutional requirement governing the determination of public utility rates is that the utility shall be permitted to earn a compensatory return on the property which it has devoted to the public service. What has been thus devoted is the capital invested in the business, and it is on this that the owners of the enterprise are entitled to a fair return. This was pointed out by Mr. Justice Brandeis, concurring, in the *Southwestern Bell Telephone Co.,* case 262 U. S. at 290:

> The so-called rule of *Smyth* v. *Ames* is, in my opinion, legally and economically unsound. The thing devoted by the investor to the public use is not specific property, tangible and intangible, but capital embarked in the enterprise. Upon the capital so invested the Federal Constitution guarantees to the utility the opportunity to earn a fair return.

The rule of *Smyth* v. *Ames* [169 U. S. 466] embodies the fundamental misconception that it is "value" which has been embarked in the enterprise and on which the investors are entitled to a compensatory return.

There is a further consideration which makes the fair-value rule unsound in principle. In measuring the rate of return, recourse is had to profits and economic conditions generally. The profits of business in general must of necessity, for purposes of comparison, be based upon investment, since that is the basis of accounting and financial reporting. As stated in *Bluefield Water Works, Etc. Co.* v. *Public Service Commission,* 262 U. S. 679, 692:

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on *investments* in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. [Italics supplied.]

When rates of return on *investments* increase, it does not follow that the same or even any increase is reflected upon a *fair value* basis. In fact, it is common knowledge that during the period from 1926 to 1929 rates of return on the value of securities actually decreased very substantially, although during the same period higher rates of return for public utilities were prescribed by this Court (*United Railways* v. *West,* 280 U. S. 234). If when rates of return in industry in general are high as based upon investment, but low as based upon the only evidence of value we have, namely, value of securities, and the computed high rates are applied not to investment but to the estimated reproduction cost of properties, a double defect occurs: (1) the application of the rate of return is faulty; and (2) the basis on which it is applied, reproduction cost, is speculative.

This point, we respectfully submit, is worthy of careful consideration. The rate of return on *investment* during the boom years did increase, but as Appendix B, *infra,* pp. 95–97, shows the rate of return greatly decreased on the basis of the market values of securities. Thus in Appendix B it is shown that if 1926 be taken as 100, the index of earnings of composite industries, as related to stock prices, was 78.7 in 1927, 73.9 in 1928, 66 in 1929, 53 in 1930, etc. Thus, increased rates of return based upon *investment* are not attended with increased rates of return based upon market value of securities or, as far as can be ascertained, on market value of properties. It would be proper and consistent to apply the rate of return on investments in industries in general (with elimination, of course, of speculative profits) to the *investment* in public utilities. But it distorts the comparison and leads to double compensation when prices are high, to apply the rate arrived at in the manner indicated not to investment but to a base influenced by high prevailing prices. The rate of return measured by investment should be applied to investment, but only a rate of return on "value" should be applied to value; the two rates should not be confused.

It has been stated that the end sought is just compensation for the use of properties devoted to the public service. The rates of return which are being made on *investment* in other business undertakings, which are attended by corresponding risks and uncertainties, when applied to the reproduction cost of public utility property cannot but work a hardship on either the utilities or the consumers. During periods of high price levels, the hardship is on the consumers. Conversely when low prices prevail, the hardship is on the companies because a low rate would be applied, theoretically at least, to a low base. If this principle were strictly adhered to in depression periods, severe and, perhaps, disastrous consequences to the utilities would inevitably ensue. A literal compliance with the reproduction cost principle permits the utility to reap the profits of every type of unearned increment which accrues to monopolistic or semi-monopolistic enterprises.[1] The inclusion of this element in a rate valuation penalizes the consumer by transferring to the utility valuation the appreciation in property and equipment which is generally attributable to the efforts of the community at large including the consumers of the utility service. It is submitted that the use of the unearned property increment as an element of value, at least for rate-making, is wholly unjustifiable as a matter of sound economic theory or legal principle.[2]

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[1] For a condemnation of the inclusion of the item of appreciation as an item in the value of the utility see the discussion in the Report of the Federal Trade Commission to

B. The rule produces unreliable, arbitrary, and absurd results

As a matter of practice the two chief elements most commonly considered in arriving at fair value under the rule are original cost and reproduction cost.[3] This Court has indicated that neither element is entitled to full weight but has failed to specify how much weight should be ac-

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the Senate of the United States on Public Utility Corporations, January 28, 1935. S. Doc. 92, Part 73A, 70th Cong., 1st sess.

[2] See the letter from Mr. W. R. McCann criticizing the appreciation element in reproduction cost estimates submitted to the Special Committee of the American Society of Civil Engineers. *Report of the Special Committee to Formulate Principles and Methods for the Valuation of Railroad Property and Other Public Utilities* in 81 Transactions of the American Society of Civil Engineers, 1311, 1618–1619 (1917).

[3] Booth, *Prudent Investment, Fair Value, and Public Utility Regulations*, 1 Nat. Lawyers Guild Q. 229, 234 (1938). The author is the general counsel of the Illinois Commerce Commission.

corded each element. As stated in *McCardle* v. *Indianapolis Water Company,* 272 U. S. 400, 410:

> * * * this does not mean that the original cost or the present cost or some figure arbitrarily chosen between these two is to be taken as the measure [of fair value]. The weight to be given to such cost figures and other items or classes of evidence is to be determined in the light of the facts of the case in hand.

The utter impossibility of taking two widely divergent amounts arrived at on wholly different bases, the one (original cost) subject to rather exact measurement and the other (reproduction cost) speculative in the extreme, and combining them reasonably so as to produce a legally sufficient result, has led public utility regulatory agencies to make a polite bow to the elements mentioned, but to employ in fact either prudent investment or reproduction cost as the sole criterion of value. It is wholly unreasonable to expect any commission or any court to combine or compare or weigh $10,000,000 representing the investment in electric plant, $15,000,000 representing one engineer's appraisal thereof, and $8,000,000 representing another engineer's appraisal, in such manner as to arrive at present fair value without producing a result arbitrary or at best unreliable.

The main difficulty with the fair value doctrine lies in the reproduction cost element. This element cannot be regarded as value *per se*. The mere fact that an article would cost a great deal to reproduce today is no evidence at all that it is worth the cost of reproducing it. The cost of reproducing the street railways in the United States would run into enormous sums, but it is common knowledge that such railways are not being built but rather are being abandoned because they are unable to earn their way. The fair value principle, by emphasizing reproduction cost, ignores the economic worth or value of property by substituting therefor an arbitrary criterion. Whether or not the street railway industry is economically sound is of no moment to the valuation engineer. He blindly pursues his policy of valuing what he sees and adds lump sums for the intangibles he cannot see. The engineer values what he finds even though the property would never be reproduced in its present form, even though the market value might be nil, or merely the price of salvage. Despite these uncertainties the estimated cost of reproducing the plant and equipment finds its way into the appraisal which is presumed to represent "value."[4]

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[4] "First, the only possible argument in favor of cost of reproduction springs from the analogous use of cost of reproduction in private competitive business. * * * But the cost of reproduction so far as utilized in establishing prices in private business is not the cost of reproducing the identical property but the cost of reproducing an equally serviceable property. Or, let us say, it is the cost of reproducing the article or service, or an equally useful article or

The theory of reproduction cost, to have any value, must be deemed to have some connection with market value. Yet by its very nature such cannot be the case. There is, generally speaking, no market value for public utility properties; the reproduction cost theory attempts to supply that which does not exist. Value in the last analysis means exchange value—the ability to command other commodities or services in exchange—and this necessarily leads to market value, which is not and cannot be synonymous with reproduction cost.[5]

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service, and never the cost of reproducing a particular plant. In truth, invention and improvement work changes in all industrial operations so rapidly that it is difficult to find any plant a few years old which would be reproduced by competent engineers in the same form today. Therefore, to utilize the idea of cost of reproduction intelligently is not to utilize the cost of reproduction of any particular property but of a service or of an equally useful service. It must be apparent that such a basis for rate making would open up a new field for speculative estimating, to the increased profit of engineers and lawyers and to the increased confusion of the courts and commissions and would bring increasing instability to all public utility operations." Richberg, *A Permanent Basis for Rate Regulation* (1922), 31 Yale L. J. 263, 277.

[5] In one of the more recent publications the fallacy of using reproduction cost as a measure of value is stated by the authors as follows: "In exchange-value economics the real value of a plant is not determined by the cost of reproducing the identical plant but by the cost of producing the commodity in a new plant having the most modern equip-

The reproduction cost factor is particularly inappropriate as applied to property of electric and communications utilities. It is common knowledge that great strides have been made during the last decade in the science of producing, transmitting, distributing, and utilizing electric energy. The same may be said of the telephone and telegraph industries. There are still in existence old plants, middle-aged plants, and modern plants of every sort and description. Regulatory bodies are prohibited from applying the substitute-plant principle, *McCardle* v. *Indianapolis Water Co.*, 272 U. S. 400, 417, 418; hence there is no recourse but to value the property used in public service. This means, as far as public utility valuation engineers are concerned, that old structures, old poles, and old equipment must be valued on the basis of what it would cost to reproduce them today even though they are not, in fact, being produced and would

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ment required to produce the article. No one would be willing to invest in an obsolete plant if a new one could be built to be operated at much lower operating expenses per unit of production if such a plant could be built for the same cost as the obsolete one. It is the cost of building a modern plant of similar capacity that determines the value of a plant in an unregulated competitive industry, and not the cost of reproduction of a similar plant. Hence, reproduction cost does not cause the owners of a regulated enterprise to fare the same as the investors in unregulated competitive enterprises." Wilson, Herring, and Eutsler, *Public Utility Regulation:* 126 (1938).

not be reproduced under any imaginable circumstances.[6]

In practice, the indefensible character of reproduction cost figures stands out in bold relief. In arriving at estimated reproduction cost, two essentials are necessary: (1) a complete inventory of property, and (2) a pricing of the items in the inventory.

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[6] In analyzing the inappropriateness of reproduction cost in its relation to rate regulation, the minority members of the New York Commission on Revision of Public Service Commissions Law stated: "Even if one assumes that the *value of the property*, somehow conceived, is the proper basis of rate control, it by no means follows that cost of reproducing a substantially similar plant even roughly measures that value. This fact must be evident if we take the analogy of any unregulated business property, or of an ordinary commodity used for consumption. The value of a dwelling house, for example, is not measured by the cost of producing a replica unless it may be assumed that, were the existing house destroyed, its owner would find it expedient to build another one just like it. Even more striking is the difference between the value of the assets of a growing, progressive business enterprise and their cost of reproduction. These assets, to be sure, may still be in use, and giving what would be called good service; yet many of them are not giving as good service as could be produced by the most modern type of plant and equipment, constructed in the best possible location, and adapted to existing conditions of demand and of industrial technique. An intelligent appraiser, to be sure, might estimate the replacement cost of these properties as a starting point, but in that case he would write down the reproduction costs ruthlessly, perhaps to a mere fraction of the cost new, as a recognition of the fact that obsolescence, inadequacy, and physical depreciation have greatly impaired their present worth. This, at least, would be the practice of an appraiser who wishes to secure an honest valuation rather than a bloated statement for purposes of 'dressing' the balance sheet." Minority Report, Commission on Revision of Public Service Commission Law (1930), Vol. I, 345.

In computing the inventory, it is necessary to obtain the quantity of physical properties by units of measurement. This means that the size and nature of all structures must be determined, the generating equipment must be listed in detail, the poles must be counted and classified as to size and kind and physical conditions, the miles of wire, by kind and size, must be established, the miles of underground conduit and conductors and the kind and nature thereof (even though not visible because they are below the surface of the ground) must be estimated in some fashion. All property units, therefore, must be either counted, measured, or weighed. Furthermore, the inventory, to have the semblance of scientific precision, must show whether the structure, poles, conduits, etc., are imbedded in soft soil, clay, or rock, and these conditions cannot be determined with any degree of certainty, again because, not being visible, they must be the subject of guesswork. The eye cannot see nor the hand measure all the items which must in some manner or other be accounted for in the hypothetical appraisal. Moreover, the physical condition of all the properties, visible and invisible, must be recorded in the field notes, and allowance made for such condition in computing the so-called "observed depreciation." When it is remembered that telephone, telegraph, and electric power properties extend over enormous areas and the values run into billions of dollars, that all the items represented thereby must be counted, measured, or weighed, it must be recognized that the very method begets errors and must inevitably lead to rampant speculation. It is common knowledge that no two field parties will arrive at the same inventory of physical quantities, and it is likewise common knowledge that a recheck by one field party of the work of another always discloses discrepancies.[7] An analysis and comparison of reproduction cost estimates utilized in a large number of rate cases reveals a startling variation in their substance. (See Appendix C, *infra,* pp. 98–107.)

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[7] The inaccuracies in the estimates by engineers employed in the valuation task are thus analyzed in a report of a committee of civil engineers engaged in that work: "The practice of those engaged in valuation work, from the beginning of such work up to the present time, has varied widely in the matter of determining the cost of reproduction. Some base such cost on existing physical conditions, others on historic conditions, and still others combine the two. Some engineers have included only those physical property units which were actually created in the construction of the property, that is, they have used historic conditions, as to items of cost, with present-day prices for labor and material. Others have used substitute units, or historic prices, or original instead of present methods of work, and still others have used original conditions, original prices, and original methods, in making an estimate of reproduction cost. * * * This failure of engineers engaged in valuation practice to agree on a uniform conception of reproduction has cast some doubt on the real worth of Cost of Reproduction as one of the measures of value." *Report of the Special Committee to Formulate Principles and Methods for the Valuation of Railroad Property and Other Public Utilities* in 81 Transactions of the American Society of Civil Engineers 1311, 1359 (1917).

But that is not all. The property items or units, after inventory, have to be assembled, grouped, classified, and then priced. The pricing process is a monstrous example of guesswork.[6] The present reproduction cost of old equipment which is no longer manufactured can be computed only by some sort of legerdemain. Current prices of such items are not and cannot be known, but the amount they would cost if they were manufactured in some devious manner must be computed. The cost of labor, involving, in turn, an estimate of labor hours and labor price, must be estimated and myriad items of expense, including hypothetical interest which was never incurred, in some manner determined.

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[6] In analyzing one of the opinions of this Court involving a question of valuation for rate-making purposes, it has been observed: "In addition to the expert guessing contest involved in estimating reproduction cost, according to present or past prices, the opinion also adds an additional gambling factor in requiring 'an honest and intelligent forecast as to probable price and wage levels during a reasonable period in the immediate future.' For at least one hundred years (and probably for several thousand years) commerce has been offering its greatest prizes to men who could make honest and intelligent forecasts of future prices. Today the management of any large business would pour wealth into the lap of the inspired genius who could make such forecasts. The question is presented as to whether, when such forecasts are impossible (as they are most of the time) public utility commissions should make any effort to regulate public utility rates. Relying upon past prices alone, it would become evident in practically every case, by the time the case reached the Supreme Court, that there had not been an 'honest and intelligent forecast' of future prices. The illusion * * * that a reliable forecast of future prices can be made, is on a par with the illusion which also radiates from the opinion, that there is such a thing as a 'relatively permanent price level.'" Richberg, *Value—By Judicial Fiat* (1927), 40 Harv. L. Rev. 567, 572.

The results so unscientifically computed are necessarily permeated with inaccuracies. That such results are inaccurate is known to every public utilities commissioner. The results of any two engineers arrived at independently are and will be far apart on any large property. (See Appendix C.) In the words of Mr. Justice Holmes, in commenting on a rate case, "every figure that we have set down with delusive exactness [is] speculative." *City of Louisville* v. *Cumberland Telephone and Telegraph Co.*, 225 U. S. 430, 436. As pointed out by the former chairman of the Public Service Commission of Indiana, "no two engineers, taking the same property, the same unit prices, and the same locality, can arrive at the same figure." 55 Amer. Bar Assn. Rep. 799 (1930). Commissioner Joseph B. Eastman of the Interstate Commerce Commission in a concurring opinion in the *O'Fallon Railway* case said: "With cost of reproduction now exceeding original cost in most cases by anywhere from 50 to 80 percent, it is clear that a method of determining value for rate-making purposes which leaves to unguided judgment the weight to be given such widely divergent factors cannot produce satisfactory results and must be made more definite" (124 I. C. C. 3, 52).

A classical example of the wide variations in determining fair value under the reproduction cost theory is contained in the dissenting opinion of Mr. Justice Stone in *West* v. *Chesapeake & Potomac Telephone Company,* 295 U. S. 662, 691, note 7. The reference shows the following variations in results obtained by engineering appraisals of the telephone property as found in the record of *New York Telephone Company* v. *Prendergast,* 36 F. (2d) 54:

Estimating body	Valuation	Increase over the Commission valuation
Majority of Commission	$366,915,493	
Statutory Court	397,207,925	8.2%
Minority of Commission	405,502,993	10.5%
Master's report	518,109,584	41.2%
Company claim based on Whittemore appraisal	528,753,738	44.1%
Company claim based on Stone & Webster appraisal	615,000,000	67.1%

There was in that case a possible error of almost two hundred and fifty million dollars. It must be evident that no group of men, no matter how well trained or informed, could by any process of reasoning come to any proper conclusions from the so-called evidences of value in that case. Only by arbitrary or capricious action could any finding of fair value be agreed upon by a group of men charged with that duty. It is submitted that a method which is so inherently defective and inevitably unreliable cannot qualify as a *sine qua non* of reasonableness in law.[9]

The experience cited above is not isolated or unique; it is typical of the prevailing experience of all regulatory bodies which deal with "fair value." There is shown in Appendix "C," *infra* p. 98, a comparison of estimates of reproduction cost arrived at in 123 rate cases reported for the years 1928 to 1933, inclusive. *The average variation is shown to be 51.50 percent.*

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[9] As to the significance of the *New York Telephone* case, *supra*, the following observation has been made: "Herein lies the real significance of this case. While it may have lasted considerably longer than the average utility rate proceeding, it is nevertheless typical of the problems and difficulties involved in all rate cases. It illustrates particularly the fact that the *measure* of return to which a utility is entitled is never clear and definite under the prevailing regulatory system. The reciprocal rights of the utilities and the public remain undefined and variable even after most exhaustive investigation. The more thorough the work, the longer it lasts and therefore the more likely it becomes obsolete before final decision. * * * This lack of definiteness as to the fundamental factors of rate control is the bane of the existing regulatory process. It is responsible for virtual breakdown of regulation. It creates and perpetuates conflict of interest. It produces trumped-up evidence, protracted hearings, futile appeals, prohibitive expense, and makes systematic regulation as a regular administrative process an impossibility." Gold, An Example of Rate Litigation and Its Significance (1934), 23 Nat. Mun. Rev. 584, 587.

This court may reasonably conclude from its own knowledge and from the facts disclosed in Appendix C that the reproduction cost estimates of the properties of a large public utility can be little more than a matter of conjecture or speculation. Regulatory agencies, it is respectfully submitted, ought not to be compelled, against their better judgment, to resort to conjecture and speculation in fixing the prices of services which are so vital to the comfort, well-being, and convenience of our citizens. This Court said in the *West* case, *supra*, 295 U. S. at 675:

> It is apparent from what has been said that here the entire method of the commission was erroneous and its use necessarily involved unjust and inaccurate results.

That method (the improper use of price indices) was condemned because it produced unjust and inaccurate results. We submit that a method of rate making which *requires* as an essential component a consideration of reproduction cost is open to even graver objection. The fair-value theory, with its concomitant emphasis on reproduction cost, should not be imposed upon those charged with the duty of seeing that utilities and consumers alike are treated fairly in the fixing of rates.

The "fair value" method of rate-making has led to conclusions demonstrably unsupportable in the face of actual experience. The "fair value" of a utility's property may be many times the actual cost of that property and if, under such circumstances, rates are fixed which fail to yield a "fair return" on this "fair value," those rates must be condemned as confiscatory under the doctrine of *Smyth* v. *Ames, supra.* And this is true no matter how successfully the Company may be able to operate under them, or how liberal the dividends it can pay, or how good the company's credit may be, or what return such rates may afford the Company on its investment prudently made in properties used or useful in the public service. Thus, confiscatory rates under the "fair value" test may enable a utility to operate with outstanding success because confiscation is determined by a method which has no relation to the object sought to be attained. The glaring incongruity between theoretical "fair value" and the actual facts of experience was well illustrated by *Lindheimer* v. *Illinois Bell Telephone Company,* 292 U. S. 151, in which this Court found the theory pursued irreconcilable with the actualities of operation.

No more fatal indictment can be presented against the "fair value" doctrine than that which is offered by the spectacle of successful and prosperous public utilities revealing themselves as the victims of constitutional confiscation upon the criterion of the "fair value" rule. See the dissenting opinion of Mr. Justice Black in *McCart* v. *Indianapolis Water Co.,* 302 U. S. 419, 435. When public utilities find it expedient, as they frequently do, to charge rates lower than those to which they are constitutionally entitled under the doctrine of *Smyth* v. *Ames, supra,* they reveal the true character of the fair-value method of rate making.[10]

C. The rule produces a break-down in the regulatory process

The fair-value rule has proved to be unworkable as part of a regulatory process. The reasons are: (1) the time required to make appraisals and valuations; (2) the unreliability of the results of that method; and (3) the enormous expense involved.

The valuation process, requiring as it does the taking of field inventories and the pricing of the inventory items, cannot be accomplished in a short space of time. Many years are frequently required and assumption upon assumption is made before the speculative result is reached. The long time required to complete a rate case has become common knowledge. The *Ohio Bell Telephone* case, 301 U. S. 292, was in process of adjudication about fourteen years. The Missouri Public Service Commission required over 8 years to reach a determination in its proceedings against the Union Electric Light and Power Company, 17 P. U. R. (N. S.)

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[10] The presidents of the prosperous Consolidated Gas and New York Edison Companies testified before the Committee on the Revision of the New York Public Service Commissions Law of 1930, that it was the policy of their companies to charge rates lower than those to which they were constitutionally entitled. Minority Report, *Commission on Revision of Public Service Commissions Law* (1930), Vol. I, 351.

337; and over 7 years in its proceedings against the Ozark Utilities Company, 18 P. U. R. (N. S.) 408. The North Dakota Board of Railroad Commissioners required almost 3 years in its proceedings against the Northern States Power Company, 15 P. U. R. (N. S.) 126. The New York Public Service Commission consumed at least 5 years in determining reasonable rates for the Long Island Lighting Company, 18 P. U. R. (N. S.) 65. Twenty-seven months after the initiation of its proceedings against the Westchester Lighting Company (15 P. U. R. (N. S.) 299) that Commission stated:

> To continue this proceeding to completion would require the receipt of additional testimony and evidence on the reproduction cost new of used and useful property—probably both by the company on its own behalf and by the Commission on behalf of the public—depreciation with respect thereto, rate of return, as well as completion of the testimony on and possible additional evidence relating to the market value of land and going value. Judging from past experience, at least another two years would probably be consumed in the presentation of this necessary material, which in return would require that the operating revenues, expenses, and any changes during this period be investigated and evidence presented thereon to bring them down to the date of the final determination.

In his dissenting opinion in the *McCart* case, *supra,* Mr. Justice Black included the following table to illustrate the delays in rate litigation (302 U. S. 435):

	Bill filed	Decided	Time
United Fuel Gas Co. v. Railroad Comm'n, 278 U. S. 300	Dec. 1923	Jan. 1929	5 years.
United Fuel Gas Co. v. Public Service Comm'n, 278 U. S. 322	April 1925	Jan. 1929	3 yrs. 8 mos.
Ottinger v. Brooklyn Union Gas Co., 272 U. S. 579	June 1923	Nov. 1926	3 yrs. 5 mos.
Ottinger v. Kings County Lighting Co., 272 U. S. 579	June 1923	Nov. 1926	3 yrs. 5 mos.
Ottinger v. Consolidated Gas Co., 272 U. S. 576	June 1923	Nov. 1926	3 yrs. 5 mos.
Patterson v. Mobile Gas Co., 271 U. S. 131	Aug. 1922	April 1926	3 yrs. 8 mos.
McCardle v. Indianapolis Water Co., 272 U. S. 400	Dec. 1923	Nov. 1926	2 yrs. 11 mos.
Average			3 yrs. 7 mos.

The proceedings before the Illinois Commerce Commission to determine rates for the Illinois Bell Telephone Company, initiated in September 1921, did not reach a final conclusion until 12½ years later, in 1934. See *Lindheimer* v. *Illinois Bell Telephone Co.,* 292 U. S. 151. More than ten of these years were consumed in litigation in the federal courts subsequent to the Illinois Commission's findings in the case. The *New York Telephone Company* case was instituted in 1920 and determined by the New York Public Service Commission in 1924, yet it was not until 1934 that the case was finally settled. See the concurring opinion of Mr. Justice Brandeis in *St. Joseph Stockyards Co.* v. *United States,* 298 U. S. 38, 90.

It is impossible to keep the regulatory process current under the prevailing rule, and unless that rule is changed the paralyzing delays in fixing proper rates which it makes inevitable will continue to cripple utility regulation.[11] Many utilities in the United States have never had their property valued and others have had but one valuation in the comparatively long history of valuation in this country. This Court is familiar with the experience of the Interstate Commerce Commission in its efforts to arrive at the fair value of railroad properties in this country. During the period from 1913 to 1931, approximately $178,000,000 was expended by the Government and by Class I carriers in their attempt to carry out the valuation process. (Testimony of Mr. Alfred P. Thom, General Counsel of the American Railway Executives Association before the Committee on Interstate and Foreign Commerce of the House of Representatives, February 5, 1932.) It is common knowledge that the difficulty in the application of the rule of *Smyth* v. *Ames, supra,* to railroad valuation was in no small measure the direct cause of the amendment of Section 15a of the Interstate Commerce Act to eliminate the necessity of recurrent valuations. (See testimony of Commissioner Joseph B. Eastman before the Committee on Interstate and Foreign Commerce of the House of Representatives, January 19, 1932.)

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[11] Concerning the inability of regulatory authorities to carry on their function of rate making under the present system of valuation, one writer has observed that "it slows up regulation and in a great measure makes it ineffective. In practice it takes so much time to decide the question of rates when it is dependent upon a valuation, that, at best, but few cases can be decided by a state authority in a year. Where the authority has a hundred or more companies under its supervision, as is usually the case, it is obvious that there can be but little regulation of their rates. Regulation, to be effective, should be reasonably prompt. If the company needs relief, it should receive it promptly; otherwise the relief prayed for may not suffice when granted, as during the time of protracted hearings the situation may be going from bad to worse and the loss must be compensated by additional increases in the rates. On the other hand, if the public is entitled to a reduction it should receive it promptly, as earnings, by the decisions of the courts, become the property of the corporation and any excess in rates paid by the consumer can never be recovered by him. * * *" Attwill, *Weaknesses of the Valuation System*, 159 Annals of the American Academy of Political and Social Sciences (January 1932) 96, 98. The author is a former chairman of the Massachusetts Department of Public Utilities.

See also Goddard, *The Evolution and Devolution of Public Utility Law*, 32 Mich. L. Rev. 577 (1934).

The very involvements of the fair value method destroy it as a rate-making expedient. With some fluctuations in price occurring daily, valuations made as of one year, after many years of effort, are obsolete by the time they are determined. When it is remembered that frequently several years are required to make an inventory and appraisal, which becomes obsolete twelve months thereafter, the criticism that the regulatory process is unworkable must be recognized as well founded. No approved process whereby valuations such as discussed herein can be kept current or computed quickly has ever been devised. One noteworthy attempt designed to accomplish this purpose, namely, the use of index numbers, was condemned by this Court in the *West* case, *supra.*

The inherent difficulties in administration as well as the inadequacy of the result of the use of the "fair value" rule have led to various schemes for avoiding its harshness and for speeding up the regulatory process. The most notable of these expedients is the Pennsylvania temporary rate statute involved in this case. Regulation must be free from unworkable formulae or Commission regulation is doomed, for the public is becoming increasingly weary of the long, expensive, and tedious procedure involved in public utility rate-making.

The unreliability of the results reached by an attempt to apply the fair value theory has already been dealt with in this brief. Pages 6-20, *supra.*

The third factor is the enormous cost of the process. The making of appraisals with the necessary time and tedious detailed studies costs gigantic sums.[12] While schemes for surmounting the difficulty have at times been evolved such as that for assessing the regulatory expenses against the utilities as in Louisiana (Gen. Stats. 1932, Secs. 7917.3 to 7917.5), New York (Laws, 1934, C. 282), Pennsylvania (Stats. 1920, Sec. 18163), and Wisconsin (Wis. Stat. C. 196, Sec. 85), the consuming public in the end bears the cost.[13]

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[12] Former Chairman William Prendergast of the Public Service Commission of New York has stated that the appraisal made by the New York Telephone Company cost that Company in the neighborhood of $5,000,000 (Commission on Revision of Public Service Commissions Law (1930), Vol. I, 381). It is estimated that the cost of determining the fair value of all utilities subject to the jurisdiction of the Public Service Commission of New York, even with the cooperation of the utility companies and the adoption of short-cut methods, would run in the neighborhood of $10,000,000 and at least three years would be necessary to arrive at the result. (Minority Report, *Commission on Revision of Public Service Commissions Law* (1930), Vol. I, 394).

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[13] The expenses involved in valuation projects for ratemaking purposes have been graphically described by Harry R. Booth, General Counsel of the Illinois Commerce Commission, as follows: "In connection with a case recently decided by the Illinois Commerce Commission, the Illinois Bell Telephone Company stated in its annual report that it had spent $1,200,000 in preparation of a state-wide appraisal, and this was subsequent to huge expenditures in the *Chicago Telephone* case. In proceedings before the same Commission involving the Commonwealth Edison Company of Chicago, the company's expenditures totaled approximately $1,000,000, a large part of which was for appraisals; and the People's Gas Light & Coke Company, also of Chicago, spent in excess of $750,000, more than $600,000 of which was for appraisal purposes. In Missouri, two recent cases involved expenditures, mostly for appraisal purposes. Of over $900,000 by the Union Electric Company and nearly $300,000 by the Laclede Gas Light Company, including the Commission's expenses in both cases. * * * By some authorities it is stated that a complete reproduction cost appraisal may be expected to cost from one-half of a per cent to one per cent of the reproduction cost of the property in question. Hence, for the electric, gas, and telephone companies alone, which are reported in *Moody's Manual of Public Utilities for 1937* as having a property value of over $20,000,000,000, the cost of making reproduction cost appraisals might run from $100,000,000 to $200,000,000. * * * The costs incurred by utility companies for such valuations are ordinarily charged to operating expenses, with the result that they are, in effect, paid for by the consumers. Costs in-

The burdens of present day rate-making have been so great that commissions have frequently abandoned the attempt to secure through normal channels of regulation reductions in rates to which consumers were entitled. The New York Commission has stated that "consumers have appreciated that it is better to secure a reduction in rates promptly, even though it may not be as large as should be made, in their opinion, and even though it may not be as large as might be ordered by the Commission after a rate case had been conducted, extending over months and perhaps years, and possibly to be litigated in the courts. * * * It may be pointed out that practically the Commission can cover a wider territory and deal with many more cases by negotiation than it can through formal proceedings. The latter consume far more time of the Commission and its limited staff, with the result that where negotiations with ten companies may be concluded in a few months, it would require several years to make the inventories, appraisals, accounting reports, and engineering investigations which rate cases would require." *1931 Annual Report New York Public Service Commission,* Vol. I, p. 8.

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curred by cities and public service commissions are ordinarily paid for out of taxes, which fact, of course, exerts a distinctly discouraging influence." Booth, *Prudent Investment, Fair Value and Public Utility Regulation*, 1 Nat. Lawyers Guild Q. 229, 235 (June 1938).

The Public Service Commission of Maryland has stated that it "has been making a study of the operating results of the various utilities under its jurisdiction and where its studies show that there is at least a possibility of effecting a rate reduction it is conducting informal negotiations with the utilities involved, so that the public may receive the benefits of such reductions as may be found to be reasonable and proper without undue delay." *1932 Report of Maryland Public Service Commission 4.*

The Committee on Valuation of the American Electric Railway Association has pointed out the hazards and burdens to the utility industry itself:

> Such valuation proceedings, as heretofore conducted, are excessively costly, require a long period of time, affect adversely the corporation's credit, interfere with its financing upon favorable terms, and frequently cause the postponement of extensions and improvements to the great detriment of the public. Unless and until there is some change in the legal principles which must be applied in determining fair value, however, the industry cannot escape from this situation.[14]

If public regulation of utility rates is to succeed, these unwarranted burdens on industry, the public, and the commissions must be removed. The economic waste involved in the fair value method must be eliminated and there must be substituted a plain and adequate remedy. The fair value doctrine has had a fair trial, but by the verdict of forty years of regulatory experience it has been found hopelessly wanting.

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[14] Report of the Committee on Valuation of the American Electric Railway Association (1934).

II. Prudent Investment as a Rate Basis is Sound and Workable

A. The basic fallacy underlying the fair-value doctrine is the assumption that "value" rather than "property" has been devoted to the public use. As previously indicated, the object sought to be attained by the limitations of the due process clause is just compensation to those who have devoted their property to the public use. What the Constitution requires is a fair rate of return on the investment of a utility in property used and useful in the public service. The thing devoted to the public use by the investor is not specific property but capital embarked in the utility enterprise. Upon the capital so invested the due-process clause of the Constitution guarantees to the utility the opportunity to earn a fair return. The Constitution does not guarantee to a utility or its investors the opportunity to earn a return either on the "present value" of all the property used by the enterprise or the "cost of reproducing" the property used by the enterprise. This interpretation of due process of law was stated by Mr. Justice Brandeis in his concurring opinion in the *Southwestern Bell Telephone* case, *supra,* as follows (262 U. S. at 290–291):

> The investor agrees, by embarking capital in a utility, that its charges to the public shall be reasonable. His company is the substitute for the State in the performance of the public service; thus becoming a public servant. The compensation which the Constitution guarantees an opportunity to earn is the reasonable cost of conducting the business. Cost includes not only operating expenses, but also capital charges. Capital charges cover the allowance, by way of interest, for the use of the capital, whatever the nature of the security issued therefor; the allowance for risk incurred; and enough more to attract capital. The reasonable rate to be prescribed by a commission may allow an efficiently managed utility much more. But a rate is constitutionally compensatory, if it allows to the utility the opportunity to earn the cost of the service thus defined.

This view of investment as the vital factor accords with the position of economists. As stated by Professor Glaeser of the University of Wisconsin:

> Since public utilities render a service which must be supplied continuously, they should be regulated upon a theory that they are or will become going concerns. They are secured in their market position by means of governmental grants which are either ex-

pressly monopolistic or tend to become such under the pressure of noneconomic competition. They have voluntarily invested their capital upon the implied assurance that they will be permitted to earn reasonable returns. Under modern conditions of regulation the investment of capital may even be compelled by governmental authorities or it is at least invested subject to governmental authorization and approval. Under these conditions of regulated monopoly, the true economic standard for determining the rate base is the investment standard.[15]

B. Prudent investment affords a stable rate base, with all its accompanying advantages to investors and consumers. These have been summarized in the opinion of Mr. Justice Brandeis, concurring in the *Southwestern Bell Telephone Co.* case, *supra,* 262 U. S. 276, 289, 306:

> The adoption of the amount prudently invested as the rate base and the amount of the capital charge as the measure of the rate of return would give definiteness to these two factors involved in rate controversies which are now shifting and treacherous, and which render the proceedings peculiarly burdensome and largely futile. Such measures offer a basis for decision which is certain and stable. The rate base would be ascertained as a fact, not determined as matter of opinion. It would not fluctuate with

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[15] Glaeser, *Outlines of Public Utility Economics* (1927), 505.

the market price of labor, or materials, or money. It would not change with hard times or shifting populations. It would not be distorted by the fickle and varying judgments of appraisers, commissions, or courts. It would, when once made in respect to any utility, be fixed, for all time, subject only to increases to represent additions to plant, after allowance for the depreciation included in the annual operating charges. The wild uncertainties of the present method of fixing the rate base under the so-called rule of *Smyth* v. *Ames* would be avoided; and likewise the fluctuations which introduce into the enterprise unnecessary elements of speculation, create useless expense, and impose upon the public a heavy, unnecessary burden.

Investors rightly expect a return on the capital which they put into the enterprise rather than on the imaginary fair value or reproduction cost of the property.[16] The advantages of a stable rate base from the standpoint of investors in the enterprise were thus emphasized by a committee of the Investment Bankers Association:

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[16] "It is a fair assumption that, in general, investors in establishing public utilities have looked to a fair return on their actual investment to compensate them for their outlay, and have not taken seriously into account any appreciation or depreciation in the value of land or in the price of labor and materials entering into the reproduction cost of structures and equipment. They have necessarily assumed that they would be able and would be permitted to receive for their service an amount equal to their actual cost of production, *i. e.*, operating expenses, depreciation, and interest and profits on their actual capital outlay. * * *. The normal actual capital cost as a basis for rate determination, moreover, has a distinct advantage from the standpoint of public

> So nearly as possible, a stabilized basis of property valuation should be developed. This is easier said than done, but candid effort can surely remove some of the chief causes of instabilities that are dependent on variations in commodity price levels and in varying rates of depreciation and obsolescence. Present deflation of values but emphasizes the disturbing effect of too fluctuating bases of value. To arrive at what is fair will call for mutual concessions—from public regulatory bodies, of preconceived notions that often have reflected political expediency rather than economic and basic considerations; from private ownership, of other preconceived ideas of the rights of private property in a regulated business imbued with a public responsibility and trust. Preconceived notions need to be reappraised or set aside, in favor of the answer to be found only after an un-

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policy. It is desirable that rate schedules should have stability and should not fluctuate with the price of iron pipe or copper wire or with real-estate activity or reactions. A utility is not established for the purpose of speculating in copper wire or iron pipe or land. It must, however, in furnishing its service, invest its money permanently in these things. The utility should not be expected to assume the risks of fluctuations in the price of the land and materials it uses." Whitten, *Fair Value for Rate Purposes*, 27 Harv. La Rev. (1914) 419, 425–426.

biased solution that will more nearly represent public and private rights than any yet applied. This Committee cannot but believe that a sound economic solution will sooner or later receive judicial sanction.[17]

The advantages from the standpoint of the consuming public and the regulatory commissions are self-evident. Protracted, costly, and unsatisfactory controversies over valuation are obviated. Rates can be fixed currently, with a minimum of delay. These considerations are among those that have led many state utility commissions to advocate the adoption of the prudent investment standard.[18]

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There are special reasons which make it appropriate to reconsider the rule of fair value and to replace it with the principle of prudent investment.

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[17] Commercial and Financial Chronicle (November 21, 1931).

[18] The State commissions have been strongly in favor of the prudent investment rate base advocated by the Utility Consumers National Policy Committee. They have been in favor of it, among other reasons, because of the expense and delay caused by minute valuations of utility plants and the many speculative, technical, and highly controversial features such valuations involve. This attitude of the state commissions was referred to in the dissenting opinion of Mr. Justice Brandeis in the *Southwestern Bell Telephone Case* in favor of prudent investment at the rate base." Spurr, *Has Utility Regulation been Reduced to Negotiation and Wheedling?* 21 Pub. Util. Fort. 262 (1937).

The rule of *Smyth* v. *Ames, supra,* was perhaps the only standard which could have been applied at the time it was enunciated by this Court. In 1898, when the rule was announced, regulatory accounting was practically nonexistent in most states. The modern movement toward uniform accounting methods and procedure for local utilities started with the Wisconsin and New York systems which were promulgated in 1908.[19] Since that time, however, accounting regulation has become a major function of public service commissions so that today approximately forty commissions have prescribed a system of accounts for electric utilities. Appendix D of this brief, *infra*, p. 107, contains a list of the state commissions which possess such authority over the accounting practices of public utilities.

It is common knowledge that large amounts of inflation crept into the property accounts of steam railroads during the construction era of their development. Consequently, the accounting book figures in 1898 were wholly unreliable as a basis upon which to compute a just and proper rate.[20] It would appear too from the cases starting with *Munn* v. *Illinois,* 94 U. S. 113, and ending with

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[19] Bentley, *Bibliography of Works on Accounting by American Authors* (1935), Vol. II, 336.

[20] *Report of the Federal Trade Commission to the Senate of the United States on Public Utility Corporations,* January 28, 1935, *Op. cit.* note 1.

Smyth v. *Ames, supra,* that the courts were in a dilemma and were seeking the most reasonable approach to a difficult and troublesome problem. See the opinion of Mr. Justice Brandeis, concurring, in *Southwestern Bell Telephone Company* v. *Public Service Commission,* 262 U. S. at 298–299. The fair value theory in the economic era prevailing in 1898 was about the only theory at that stage of regulatory accounting which appeared to present any satisfactory solution to the problem. It was probably assumed that reproduction cost could be ascertained with a high degree of accuracy. But the intervening forty years have demonstrated beyond peradventure of a doubt that inaccuracy is the most notable feature of reproduction cost appraisals. *Bay State Rate Case,* P. U. R. 1916F, 221, 233. The fair value rule has thus been explained historically:

> With construction reaching back into a dim accounting past, or with the early books destroyed, it is little wonder that in the earlier cases the courts turned away from actual cost, deeming it a thing which could not be ascertained and looked with welcome on estimates of reproduction cost which they were led to believe could be accurately made and readily verified.[21]

When it is considered that we have now had a long period of accounting and security regulation as well as control of mergers and consolidations of utility properties it must be recognized that the situation which called for the decision of *Smyth* v. *Ames, supra,* is no longer existent. When that decision was rendered by this Court it was not generally appreciated that the fair value theory becomes more complicated and difficult of application as utility properties grow in size and expand their operations.[22] What might have been a simple rule thirty years ago becomes today a confounding rule when applied to the huge interstate public utilities like those which are subject to the jurisdiction of federal regulatory agencies. It is important to note here that the present trend of public utility development is toward the merger of operating companies into increasingly larger units.

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[21] Whitten & Wilcox, *Valuation of Public Service Corporations* (2d Ed. 1928), Vol. I, 530.

Despite the fact that this Court has repeatedly approved the doctrine of *Smyth* v. *Ames, supra,* to limit the authority of state regulatory bodies to utilize the prudent investment standard, it has nevertheless been advocated by many state commissions. The Massachusetts Commission has stated:

> * * * in the long run, the rate-paying public as well as the investing public will be best served if regulation makes as its *fundamentally guiding principle* an attempt

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[22] Goddard, *The Evolution of Cost of Reproduction*, 41 Harv. L. Rev. (1927) 550, 566–567.

> to protect investments honestly and prudently made and wisely managed. Any other theory * * * makes every rate case an almost interminable and labyrinthine inquiry into values with endless conflicts between so-called experts.[23] [Italics in original.]

In one of its recent cases the California Railroad Commission stated that its advocacy of the prudent investment theory was based on the following considerations:

> The historical method of valuation * * * in rate proceedings is well grounded upon established facts, is not subject to the vagaries of pet theories, unlimited imagination and abrupt fluctuations of current prices and passing conditions, and therefore, indicates a truer measure of value upon which, through the application of rates, a return may be allowed to reimburse the owner for his enterprise and insure the integrity of his capital honestly and prudently invested. * * *[24]

The same commission has expressed the same opinion in many other of its cases. *National City*

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[23] *Second Annual Report of the Public Service Commission of Massachusetts* (1914), Vol. I, 99, 107. See also the opinion of the former Chairman of the Massachusetts Department of Public Utilities contained in an article devoted to the work of that agency. Attwill, *Weaknesses of the Valuation System*, 159 Annals of the American Academy of Political and Social Sciences (1932), 96.

[24] *Re Pacific Gas & Electric Co.*, 1 P. U. R. (1933) (N. S.) 1.

v. *Sweetwater Water Corp.* (1933), 3 P. U. R. (N. S.) 405; *Re Coast Valleys G. & E. Co.,* P. U. R. 1924C 40; *Re Southern California Telephone Co.,* P. U. R. 1922C 97; *Re San Joaquin Light & Power Corp.,* P. U. R. 1922D 595; *Re Fresno Traction Co.,* P. U. R. 1925C 566. The prudent investment theory has in fact been discussed and advocated in many decisions by local commissions as a sound solution to the existing difficulties of the rate-making procedure.[25] Following the decision of this Court in the *Pacific Gas & Electric Company* case, 302 U. S. 388, the Wall Street Journal on December 28, 1937, published the results of a survey of the views of the various state regulatory commissions on the question of "fair value." The commissions that expressed their preference were two to one in favor of the prudent investment basis as the best solution to the rate-making problem. The advocacy of the prudent investment doctrine by these agencies is overwhelmingly supported by a great body of professional opinion.[26] We have set out in Appendix A, *infra*, pp. 42–94, a summary and analysis of reasoned expressions of this character.

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[25] *Re Sea Cliff & G. C. Gas Co.* (New York Public Service Commission), P. U. R. 1921A, 211; *Re Boise Artesian Water Co.* (Idaho Public Utilities) (1923), 11 Ann. Rep. Idaho Public Utility Commission 155; *Marinette* v. *City Water Co.* (Wisconsin Public Service Commission) (1934), 9 P. U. R. (N. S.) 308; *Milwaukee El. R. & Light Co.* v. *Milwaukee* (Wisconsin Public Service Commission), P. U. R. 1918E, 1; *Re Northern States Power Co.* (North Dakota Board of Railroad Commissioners), 15 P. U. R. (N. S.) 126; *Grand Forks* v. *Red River Power Co.* (North Dakota Board of Railroad Commissioners) (1935), 8 P. U. R. (N. S.) 225; *Barth* v. *Hughes & D. Electric Co.* (North Dakota Board of Railroad Commissioners), P. U. R. 1922A, 740; *Re Midwest Power Co.* (North Dakota Board of Railroad Commissioners), P. U. R. 1922E, 22; *Cavanaugh* v. *Whitefish Municipal Water Utility* (Montana Board of Railroad Commissioners), P. U. R. 1922E, 198; *Re Platte County Independent Telephone Co.* (Nebraska State Railway Commission), P. U. R. 1922D, 303; *Pacific T. & T. Co.* v. *Thomas* (Oregon Public Utilities Commission) (1936), 13 P. U. R. (N. S.) 337.

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[26] Wilson, Herring and Eutsler, *Public Utility Regulation* (1938) 126; Bonbright, *The Valuation of Property* (1937), Vol. II, 1081; Mosher and Crawford, *Public Utility Regulation* (1933) 192; Glaeser, *Outlines of Public Utility Economics* (1927) 505; Jones and Bigham, *Principles of Public Utilities* (1931) 239; Goddard, *Public Utility Valuation* (1916), 15 Mich. L. Rev. 205; Hale, *The "Physical Value" Fallacy in Rate Cases* (1921), 30 Yale L. J. 710; Richberg, *A Permanent Basis for Rate Regulation* (1922), 31 Yale L. J. 263; Whitten, *Fair Value for Rate Purposes* (1914), 27 Harv. L. Rev. 419; Egerton, *Value of the Service as a Factor in Rate Making* (1919), 32 Harv. L. Rev. 516; Henderson, *Railway Valuation and the Courts* (1920), 33 Harv. L. Rev. 902, 1031; Dobie, *Judicial Review of Administrative Action in Virginia* (1922), 8 Va. L. Rev. 477, 504; Bonbright, *Railroad Valuation With Special Reference to the O'Fallon Decision* (1928), 18 Amer. Econ. Rev. Supp. 181; Bauer and Gold, *The Economic Merits of Original Cost and Reproduction Cost* (1928), 41 Harv. L. Rev. 593; Bauer, *Reproduction Cost and Desirable Public Utility Regulation* (1926), 2 J. of Land and Public Utility Economics 408; Beutel, *Valuation as a Requirement of Due Process* (1930), 43 Harv. L. Rev. 1240; Booth, *Prudent Investment, Fair Value and Public Utility Regulation* (1938), 1 Nat. Lawyers Guild Q. 229; Glaeser, *Comments on Legislation and Court Decisions* (1925), 1 J. of Land and Public Utility Economics 250; Goddard, *The Evolution of Cost of Repro-*

The rule of prudent investment, combining as it does exactness, ease of application, and a proper principle for the determination of just compensation, is the standard for rate-making best adapted to modern business conditions and practice in this country.

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duction (1927), 41 Harv. L. Rev. 550; Gold, *An Example of Rate Regulation and its Significance* (1934), 23 Nat. Municipal Rev. 584; Hale, *Conflicting Judicial Criteria of Utility Rates* (1938), 38 Col. L. Rev. 959, 977; Lilenthal, *Regulation of Public Utilities During the Depression* (1923), 46 Harv. L. Rev. 745; Richberg, *The Supreme Court Discusses* Value (1924), 37 Harv. L. Rev. 289; Richberg, *Value—By Judicial Fiat* (1927), 40 Harv. L. Rev. 567; Wheat, *The Present As Compared With Original Cost of Construction* (1937), 20 Pub. Util. Fort. 3; Wheat, *The Regulation of Interstate Telephone Rates* (1938), 51 Harv. L. Rev. 846; Willis, *Significant Changes in Public Utility Law* (1937), 25 Georgetown L. J. 877.

APPENDIX A

EXPRESSIONS OF OPINION ON THE DOCTRINE OF SMYTH *v.* AMES AND ON THE RULE OF PRUDENT INVESTMENT

INTRODUCTION

Since the decision of this Court in *Smyth* v. *Ames,* there has been extensive discussion of the proper basis for public-utility rate regulation. From the first the use of reproduction cost as a factor has been the subject of acute controversy. The need for reexamination of the question in the interest of effective regulation has been thus emphasized:

> The issue between reproduction cost and actual cost, in relation to "fair value" on which a "fair" return must be allowed, is of grave public importance. It leads to the question whether rate regulation is to be a success or failure, and whether regulation should be continued or abandoned. It has been under almost constant discussion during the last 10 years, and has been the chief object of contention in a vast amount of litigation, and in spite of the almost endless discussion and litigation, there is no legal-economic subject which is more confused and in need of scientific clarification. (Bauer, John, *Reproduction Cost and Desirable Public Utility Regulation,* 2 Journal of Land and Public Utility Economics 408 (1926).)

In order to provide a certain amount of the clarification thus urgently needed, an analysis of the literature on the subject of valuation has been made. It is believed that a brief résumé of the principal arguments will be of assistance in an attempt to establish a sound rate base. The arguments are set forth below under appropriate subtitles.

1. The illusive character of "reproduction cost"

The most serious as well as the most obvious defect in the use of reproduction cost as a factor in the determination of utility rates is its utter lack of precision. The idea of reproduction cost is, at first blush, a simple one, and might in fact be workable in the case of a property of small size and little complexity.

> The original conception of reproduction undoubtedly grew out of simple conditions, such as would be met in estimating the cost of reproducing a building or a single structure. In this case, the difference between the original cost of the building or structure and the reproduction estimate would be due wholly to changes in prices of labor and materials and the change in methods of doing work. (American Society of Civil Engineers, *Valuation of Public Utilities,* 81 Transactions (1917) p. 1362.)

The difficulty is that a utility comprises a vast amount of property which is both far-flung and exceedingly complex.

> This simplicity of condition does not obtain in the case of a great property, the actual construction of which has extended over many years, many of the plant units of which have been renewed or replaced by larger ones than were originally installed, which has undergone changes and alterations, and the history and records of which have not been kept fully and completely. In

> such a case the making of a complete estimate of the cost of replacement or reproduction is a very involved undertaking. (*Id., loc. cit.*)

The result of this situation is not only that the determination of reproduction cost is extremely difficult, but, as has been pointed out, no two experts can reach an agreement upon the figure to be used.

> To this criticism of the vagueness of the court's rule as to valuation can be added another, namely, the practical difficulty of making any valuation at all. In every case examined, there has been a great conflict in evidence. Often, when two valuation experts have been employed by the same party, these experts have each made valuations that differed by a great amount. The difficulty seems to be that of making any accurate valuation of the various assets, tangible and intangible, that make up the plant of a modern public utility. (Howell, Ben R., ***Recent Developments in the Application of the Rule of Smyth* v. *Ames in Valuation Proceedings in the Federal Courts,*** 3 Tex. L. Rev. 412, 432 (1924).)

This difficulty is also recognized by the Committee on Valuation of the American Society of Civil Engineers:

> The practice of those engaged in valuation work, from the beginning of such work up to the present time, has varied widely in the matter of determining the cost of reproduction. Some base such cost on existing physical conditions, others on historic conditions, and still others combine the two. Some engineers have included only those physical property units which were actually created

> in the construction of the property, that is, they have used historic conditions, as to items of cost, with present-day prices for labor and material. Others have used substitute units, or historic prices, or original instead of present methods of work, and still others have used original conditions, original prices, and original methods, in making an estimate of reproduction cost.
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> This failure of engineers engaged in valuation practice to agree on a uniform conception of reproduction has cast some doubt on the real worth of Cost of Reproduction as one of the measures of value. (American Society of Civil Engineers, *Valuation of Public Utilities,* 81 Transactions (1917), p. 1359.)

An example of the divergence of expert opinion upon the reduction cost of a utility is set forth below, from an analysis of the New York Telephone case:

> The range of "values" in this case reveals that the doctrine of present value is totally devoid of elements for objective tests. For the same property as of the same date, July 1, 1926, there were six different estimates of the fair "value" and fair "return" of the New York Telephone Company for rate-making purposes:

Estimates of fair profits for New York Telephone Company (on intrastate business as of July 1, 1926)

	Fair value	Rate	Fair return
Majority of Public Service Commission	$366,915,493	7%	$25,635,000
Federal Court	397,207,925	7%	27,804,555
Minority of Public Service Commission	405,502,993	8%	32,480,000
Special Master's Report	518,109,584	8%	41,448,777
Company claim based on Whittemore appraisal	528,753,738	8%	42,300,299
Company claim based on Stone & Webster	615,000,000	8%	49,200,000

> The estimates of value thus ranged from \$366,915,493 to \$615,000,000, with a corresponding spread in the return thereon from \$25,635,000 to \$49,200,000. Between the two valuation estimates by the Company's own experts there was a disparity of more than \$86,000,000. Yet all these estimates purported to be based on the requirements of Supreme Court decisions, and at the end of ten years the final guess remains in doubt! Moreover, much new capital has been added since the date of these estimates, new problems of depreciation have arisen, and, indeed, the whole process of valuing the property now in use, must, according to the theory of present value, start all over again. (Frankfurter, *The Public and Its Government* (1930), p. 105.)

Similarly the striking variation of estimates in the *Indiana Telephone Case* has been described:

> A typical instance of this difficulty is seen in the case of *Indiana Bell Telephone Co.* v. *Public Service Commission*, in which there was a difference of \$4,000,000 between the estimates of two of the commission's engineers. In this same case the difference between the highest valuation offered and the lowest was \$19,000,000, or 45 percent of the highest estimate. Experts, working in good faith and including the same items of valuation, arrive at results so far apart as to prove that such proceedings are of little value in determining the true worth of the property. It can thus be seen that, although the courts are working out the elements, or items, that form a proper basis for valuation, the value to be given these items can never be determined with any degree of certainty. The best that can be said for the

> valuation of public utilities under the present method is that the courts have by their guesses as to the correctness of the expert's guesses, made another guess as to the probable value of the utility in question as a basis for the determination of a rate which will assure a fair return on the investment. (Howell, *op. cit.*, p. 44, at p. 43.)

The effect of the indefiniteness of the concept of reproduction cost is that the rate basis is entirely unpredictable. The utility and the regulatory commission are, until the final decision, entirely in the dark, and so is the investor. It is for this reason, among others, that Professor Robert Hale urges the abandonment of the rule of *Smyth* v. *Ames*.

> The time now seems ripe for the Court to overrule *Smyth* v. *Ames* and to repudiate the principles that the rate-making power is subject to limitations pertinent only to the power of eminent domain, and that rates, to be valid, must yield a fair return on "value." It would seem to the present writer desirable if, in a case presenting the issue, the Court should expressly declare (What it held in effect in the *Lindheimer* case) that rates which enable the company to operate successfully and to raise the necessary money (which they do if they yield a fair return on the actual prudent cost), are valid, quite regardless of what return they yield on a "value" in the determination of which reproduction cost plays a part. This does not mean that it would be desirable for the Court to substitute for the rule in *Smyth* v. *Ames*, a requirement that rates must in all cases yield a fair return on actual prudent cost. A state's policy

which fixes rates on that basis cannot be pronounced the only one that is not "arbitrary." The line between those rate regulations that are arbitrary and those that are not, like the line between other valid and invalid exercises of the police power, can better be left to be pricked out as future occasions arise. But counsel could at least advise clients that the validity of particular rates will be determined with reference to facts pertinent to realities. As the decisions now stand, they cannot advise whether the determination will be made with reference to such facts (as in the *Lindheimer* case), or with reference to so-called values in the determination of which no prediction can be made of the weight which the Court will attach to the various elements of actual cost, replacement cost and "going value." They cannot advise whether a company's prosperous condition will be taken as evidence of the adequacy of its rates (as in the *Lindheimer* case), or as evidence of large "going value" whose existence proves the rates to be inadequate (as in the *McCardle* case); nor whether the good physical condition of the company's property will be taken to show that the annual depreciation allowance is excessive and that the rates may accordingly be reduced (as in the *Lindheimer* case), or to show that the "present value" is high and the rates accordingly "confiscatory" (as in *Board of Public Utility Commissioners* v. *New York Telephone Co.*). Certainly *all* of the conflicting decisions of yesterday cannot be the law of today. (Hale, Robert L., *Conflicting Judicial Criteria of Utility Rates—The Need for a Judicial Restatement*, 38 Columbia L. Rev. 959, 976/977 (1938).)

2. *The fallacy of the "competitive price theory"*

One of the most seemingly plausible arguments which have been advanced in favor of the use of reproduction cost as a basis for valuation is that it tends to maintain rates such as would be charged under a system of competition. The competitive price theory has been stated by Professor Bonbright as follows:

> According to this theory, the object of public service regulation is to deprive utility companies of the power to charge a monopoly price. Rates should therefore be fixed at a level which they would probably reach if they were regulated, not by the fiat of government, but by the forces of normal competition. But under competitive conditions the prices of services and of commodities tend to equal their cost of reproduction. Therefore, under conditions of monopoly, utility prices should be made to equal the cost of reproducing the service rendered. And by cost of reproducing the service is meant the price which would just be sufficient to induce investors to put up a new plant and to give service similar to that given by the present company. (Bonbright, James C., *Depreciation and Valuation for Rate Control,* 27 Columbia L. Rev. 113, 124–125 (1927).)

From an economic standpoint there are serious flaws in the competitive price theory. It is an attempt to apply the competitive principle to a regulated monopoly by a logical *tour de force.* This is pointed out by the same authority:

> In bringing to a close this discussion of the valuation problem, the point that should

be stressed above all others is the folly of attempting to regulate the prices of public monopolies so that they will conform as closely as possible to the prices that are assumed to prevail under conditions of free competition. Overlooking the fact that the proposed imitation of competition is a very poor one, overlooking the fact that a governmental control of rates designed to yield a stated return on reproduction costs is not even a good caricature of the automatic control of prices that takes place in a dynamic competitive market, we must still recognize that the attempt to carry over into the field of the large-scale monopoly the same price system that is assumed to prevail in the field of the small competitive enterprise, is bound to result in a serious misfit. One reason why it is a misfit is that the competitive price system disregards so ruthlessly the financial needs of the individual producer. To the low-cost producer it yields profits far beyond the current rate of interest on invested capital; to the high-cost producer it brings deficits that spell bankruptcy and ruin. As long as competition is full and free this process, harsh though it be to the unfortunate producer, may serve very well the interests of the consumer. For what matters it to him that any one producer is crippled, so long as he can turn to a more fortunate rival for his necessary services and commodities? Not so under monopoly. Not so with a railway that is alone in serving a community. Why, say the defenders of reproduction cost, should railway security holders be given any greater insurance against the fluctuations of price levels than is given to the holders of securities in an unregulated enterprise? The answer is that when the in-

> vestors in small competitive enterprises fall, they may fall alone, but when the holders of railway securities fall, they force the whole community to become unwilling mourners of their downfall (Bonbright, James C., *Merits of Original Cost and Reproduction Cost;* 41 Harvard L. Rev. 593, 621-622 (1928).)

A variation of the competitive price idea has been advanced in support of the theory of reproduction cost. It has been contended that the utility investor will receive the benefit of a flexible income; his return will thus be relatively constant in terms of purchasing power. Thus, it is said, as prices rise utility values will also rise, increasing the investor's receipts and protecting him from the effects of a general rise in prices. One defect in this reasoning is pointed out in a very recent treatise upon the subject of regulation of utilities:

> * * * The argument that, since reproduction costs fluctuate widely this basis of valuation is more equitable, in that the fluctuations tend to parallel the fluctuations in the general commodity price level, is partly fallacious. Reproduction costs include a large percentage of labor costs, while the percentage of labor costs in the general price level may be much less. Moreover, the general price level includes the prices of many items that are not included in reproduction estimates (Wilson, Herring & Eutsler, *Public Utility Regulation,* 1938, p. 127).

The assumption that the income of utility investors will be stabilized under such a rule contains a fundamental error:

> These advocates [of the reproduction cost theory] have recently shown signs of shift-

ing their ground while yielding to attacks upon the illogical "replacement value" theory. They have urged that the investment in the dollars of by-gone years should be translated into a "present investment," that is, the amount of money having the purchasing power of the dollars of yesterday in the commodities of today. The original investment, they suggest, was of a certain purchasing power which, although stated in money at the time of investment, must be restated now in terms of equivalent purchasing power. This claim involves the plausible suggestion that owners of public utility securities should be assured a constant income in purchasing power rather than a constant income in dollars that have a fluctuating purchasing power.

One answer to this new line of argument is that the large amount of investment in public utilities is represented in securities having a fixed return, such as bonds and preferred stock. It is hardly reasonable to ask the Government to provide a fluctuating return for these investors, which they will not be able to obtain, but which will be appropriated solely for the benefit of the common stockholders. Another answer is that it is hardly appropriate for the Government to establish a rule which will favor one class of investors at the expense of the entire community. The new claim that investors should be protected against loss from the reduced purchasing power of the dollar is utterly inconsistent with the old theory of basing rates upon the "value" of the property. (Richberg, Donald R., *The Supreme Court Discusses Value,* 37 Harvard L. Rev., 289, 297–299 (1924).)

This fallacy in the reasoning of the advocates of reproduction cost is pointed out in a report by the Federal Trade Commission to the United States Senate dealing, among other things, with valuation:

> Far transcending any other reply to this argument of the proponents of reproduction cost, however, is that it entirely overlooks the fact that public utilities are almost wholly financed through fixed income-bearing securities, that is, bonds and preferred stocks. The Federal Trade Commission's investigation of the public-utility industry covering 91 representative operating companies engaged in the electric-light and gas business, shows that 70 percent of their capital accounts is represented by outstanding bonds and preferred stocks. What is of further significance is the Commission's disclosure that write-ups of the capital assets of these 91 operating companies approximate 23 percent, substantially all of which was reflected in the equity stocks. In the light of these disclosures, it would be no serious exaggeration to say that the representative public utilities of the country, including railroads to a lesser extent, are more than 90 percent financed through fixed income-bearing securities.
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> Manifestly, fluctuations in the price level do not affect the man owning a $1,000 bond on which he receives 6 percent interest, so far as his dollar investment is concerned. It is clear, then, that any speculative gain or loss, due to the price level, is reflected solely in the common stocks of utilities. Yet it has not been seriously suggested by proponents of reproduction cost that all

> fixed income-bearing utility securities be recalled, and common stock issued in their place (Federal Trade Commission, *Summary Report to the Senate of the United States,* January 28, 1935. Senate Doc. 92, Pt. 73A, 70th Cong., 1st Sess., p. 155).

The fact is that the use of reproduction cost tends to a result precisely opposite to that which its advocates claim for it. Rates are too high after a period of inflation and too low after a period of deflation. See Willis, Hugh Evander, *Significant Changes in Public Utility Law,* 25 Georgetown L. J. 877, 884 (1937).

3. Delay and expense in determining reproduction cost

The delay and expense involved in the determination of reproduction cost constitute a serious practical obstacle to rate regulation. The time-consuming nature of the inquiry has been referred to by Henry ~~C.~~ Attwill, who for many years had been actively concerned with the practical aspects of rate regulation as chairman of the Massachusetts Department of Public Utilities. The valuation system, he writes,

> * * * slows up regulation and in a great measure makes it ineffective. In practice it takes so much time to decide the question of rates when it is dependent upon a valuation, that, at best, but few cases can be decided by a state authority in a year. Where the authority has a hundred or more companies under its supervision, as is usually the case, it is obvious that there can be but little regulation of their rates. Regulation, to be effective, should be reasonably

> prompt. If the company needs relief, it should receive it promptly; otherwise the relief prayed for may not suffice when granted, as during the time of protracted hearings the situation may be going from bad to worse and the loss must be compensated by additional increases in the rates. On the other hand, if the public is entitled to a reduction it should receive it promptly, as earnings, by the decisions of the courts, become the property of the corporation and any excess in rates paid by the consumer can never be recovered by him * * * (*Weaknesses of the Valuation System,* American Academy of Political and Social Sciences, Annals, Vol. 159 (January 1932) p. 96.)

A student of valuation cases writes

> * * * an unreasonable length of time elapses before the courts are able to determine the validity of a prescribed rate. The *Pacific Gas and Electric Company Case,* reversed by the Supreme Court in 1924, and sent back for another valuation proceeding, has been in the courts since 1913. During that time the amount collected by the company above the rate prescribed by the city has been deposited in trust awaiting the outcome of the suit. In many other instances a period of from one to five years elapses after the publishing of a rate schedule before the validity of the rate is determined. Because changing conditions render the previous valuation of little help in determining the question of fair return after such a long time, it is often necessary to have a valuation *de novo,* with its additional expense and delay. (Howell, Ben A., *Recent Development in the Application of the Rule of Smyth* v. *Ames in Valuation Pro-*

ceedings in the Federal Courts, 3 Texas L. Rev. 412, 431 (1935).)

See also Lilienthal, David E., *Regulation of Public Utilities During the Depression,* 46 Harvard L. Rev. 745 (1933); Beutel, Frederick K., *Due Process in Valuation of Local Utilities,* 13 Minn. L. Rev. 409 (1929); Federal Trade Commission, *Summary Report to the Senate of the United States,* January 28, 1935, *op. cit.*, p. 154.

Another example of the delay involved in the determination of reproduction cost is furnished by the history of the litigation in *Lindheimer* v. *Illinois Bell Telephone Company,* 292 U. S. 151:

> * * * The first order of the Commission in the *Lindheimer* case was issued in 1923, and the hearings preceding that order must have occupied many months. It was not until 1933 that the bill in that case was dismissed. Such a length of time is extraordinary, but few utility valuations, including the length of the commission or court hearings, take less than two or three years. The result is that in a period of depression (even though the utility gives bond to insure refunds to rate-payers) consumers do not receive the benefit of rate reductions when they are most needed, and in a period of rising prices the utilities cannot receive the needed increase in rates when overheads and other costs are constantly increasing. (Note, *Public Utilities—Rate Base—Late Supreme Court Decisions,* 34 Mich. L. Rev. 100, 107, (1935).)

The tremendous consumption of time and money in the determination of reproduction cost accomplishes nothing. For a "fair value" so arrived at controls only as of the time of its determination.

The whole question must be reopened again and fought through to a new determination.

For example, in 1923 the New York Public Service Commission issued an order fixing telephone rates. The litigation which was started by this order was not concluded until 1934. In the course of the litigation 37,000 pages of testimony and 3,000 exhibits were submitted. Three judges, composing a statutory court, spent over six months on a study of the record alone. The results accomplished through the expenditure of this time and effort were thus summarized:

> Thus we have the spectacle of a utility whose rates were the subject of controversy continuously for a period of twelve years. As soon, however, as this cycle of rate litigation had been concluded, another was begun. Again New York telephone rates are up before the public service commission. Thus, the continuous wrangle of a dozen years, at times simultaneously before three tribunals, has settled nothing. This is clearly shown by the very basis of the Supreme Court's decision:
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> "* * * Appellant, having obtained this relief, is not entitled to prosecute an appeal from the decree in its favor, for the purpose of reviewing the portions of the decree fixing the value of appellant's property as of the years 1924, 1926, and 1928, and the rate of return to be allowed. The matters set forth in these portions of the decree are not to be regarded as *res judicata* in relation to subsequent legislative action by the public service commission in fixing rates for the future or in any judicial proceeding relating to such rates."

Indeed, how could it be otherwise? Even if it was made fairly to public and company,

> what good is a 1926 or 1928 reproduction cost valuation in 1934 after prices of materials and labor entering into construction have radically altered?
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> Herein lies the real significance of this case. While it may have lasted considerably longer than the average utility rate proceeding, it is nevertheless typical of the problems and difficulties involved in all rate cases. It illustrates particularly the fact that the *measure* of return to which a utility is entitled is never clear and definite under the prevailing regulatory system. The reciprocal rights of the utilities and the public remain undefined and variable even after most exhaustive investigation. The more thorough the work, the longer it lasts and therefore the more likely it becomes obsolete before final decision.
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> This lack of definiteness as to the fundamental factors of rate control is the bane of the existing regulatory process. It is responsible for virtual breakdown of regulation. It creates and perpetuates conflict of interest. It produces trumped-up evidence, protracted hearings, futile appeals, prohibitive expense, and makes systematic regulation as a regular administrative process an impossibility. (Gold, Nathaniel, *An Example of Rate Litigation and Its Significance,* 23 National Municipal Rev. 584, 586-587 (1934).)

Lengthy as valuation proceedings are, they are necessarily expensive. They are expensive to both sides. The utilities are prompted to engage high-priced legal, engineering, and accounting talent, and the commission must follow suit. Furthermore, the utilities pass the expenses incurred by them on to the rate payers. The rate payers thus bear the financial burden of litigating against their own interest.

> * * * As the cost to the utility in prosecuting or defending a rate case is allowed as an operating expense, this cost is eventually paid by the consumers. Thus, there is an incentive to the utility to protract the proceedings as long as possible; because, win or lose, the cost must be absorbed in the rates, and the effective date of any reduction in rates is usually postponed. (Atwill, Henry C., *Weaknesses of the Valuation System,* American Academy of Political and Social Sciences Annals, Vol. 159 (January 1932) p. 96, 98.)

The Federal Trade Commission has likewise called attention to the injustice of the burden placed upon the rate payers:

> Now, the significance of rate litigation, a particularly expensive type of legal procedure because of the expert engineering and accounting testimony upon which it depends, is that the cost of maintaining it in behalf of the companies constitutes an allowable expense of operation and must, therefore, be a determinant in the fixing of any rate estimated to allow a fair return to the utility. Thus, the expense is saddled on the rate-paying public. Furthermore, the cost of maintaining commissions and courts before whom rate cases are tried is a direct charge upon the State's tax resources, again a burden on the public. Likewise, special counsel, where used in behalf of the State or commission, and the fees of any independent experts they may feel called upon to employ, to say nothing of the not inconsiderable item,

> in protracted rate cases, of stenography, printing, and miscellaneous expense are all out of the public pocketbook. What the aggregate of such sums amounts to in any one year has probably never been computed; that it is enormous goes without saying. It is not unsafe to surmise, therefore, that whatever influence lawyers, engineers, and accountants with public-utility connections can bring to bear to preserve a system representing such a source of income of them, will continue to be brought. This is particularly true while, as at present, utility holding companies supply so many of such services and are dependent upon their continuance for much of the holding company's own revenue. (*Summary Report to the Senate of the United States,* January 28, 1935, *op. cit.,* p. 54, at p. 157.)

See also, Note, *Public Utilities—Rate Base—Late Supreme Court Decisions,* 34 Mich. L. Rev. 100, 107 (1935):

> * * * Professor Riggs, an engineer with wide experience in valuation cases, states:
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> "The subject of revaluation of large properties has become a matter of grave concern to officers charged with the management of utilities. Valuation work accurately and carefully done, in sufficient detail to satisfy the requirements of attorneys conducting rate or other cases involving valuation, is costly and time-consuming. * * * To have expended from $50,000 to $500,000 for valuation of utility property within four or five years, and then to face a new valuation to meet the needs of a new case is a serious matter in the case of any company." This expense is passed on to the rate-pay-

ers in the form of an increased allowance for overheads, and an equal expense to the Commission is likewise passed on to the public in the form of increased appropriations for valuation work—or through the failure to hold rate hearings.

The case of *Indianapolis Water Company* v. *McCardle,* 272 U. S. 400, provides a striking illustration of the expensiveness and delay of the proceedings. The facts of the case have been summarized as follows:

> The company was comparatively small. The court, dispensing with the services of a master, heard the evidence itself. The commission, the lower court, and the majority of the Supreme Court, were agreed that the theory of reproduction was to be taken as the determining factor of value, and that 7 percent was a reasonable rate of return on the value so determined. Within seven months of the beginning of these proceedings before the commission, the company and commission, after a complete investigation by the commission's engineers, had agreed upon a valuation of the entire property involved, for bond issue purposes. This result supported in detail the valuation for rate making purposes later made by the commission and questioned in this suit. All these facts tended to simplify the case. There was no necessity of projecting return or calculating fictitious costs of production. The only point at issue was the value of the property on the reproduction theory. Thus we have here an example of a valuation case reduced to its simplest possible element, the determination of the pure fact of value by agreed methods (pp. 424–425).

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An examination of the record and opinions discloses that over forty different estimates of the total value of the property were offered in evidence before the commission and the courts. These estimates ranged from $8,612,399, the actual cost of the property shown by the company's books, to $25,404,026, the value claimed by Mr. Hagenah, an expert witness for the company (p. 425).

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The proceedings in this, the simplest of cases as rate fixing cases go, started on June 8, 1923, and three years and five months later on, November 22, 1926, the Supreme Court finally reversed the commission. The investigation to compile the evidence and the hearing of the testimony in the various tribunals consumed over a year's effort by a combined staff of experts employed by the commission and the company. The briefs and record, in greatly abbreviated form, in the Supreme Court alone had reached a total of about 700 pages which fill a bound volume approximately three inches thick, when the court, to avoid further delay, fixed the valuation (pp. 425–426).

* * * * *

Now suppose the commission on the day the Supreme Court handed down that decision had fixed rates calculated to yield 7 percent on $19,000,000, would the rate stand without a redetermination of the value of the plant? The plain answer on the theory of the case must be, No! The valuation is fixed as of January 1924. The rate necessarily must be fixed as of November 1926. The company if it desired, could question the rates immediately, and the inquiry would have to take place in 1927 (pp. 426–427).

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> The only "fact" of value conclusively established is "spot" value as of 1924; but the spot has moved while the judicial process ground on. The system approved in this case demands a new determination of value, so the commission, courts, and experts must get together once more and construct a new theoretical plant on the "spot" prices of 1927. The very magnitude of the task will again cause the result to be useless. Thus, on the theory of this case, no rate can ever be set which will bind the company (p. 427). (Beutel, *Due Process in Valuation of Local Utilities*, 13 Minn. L. Rev. 409 (1929).)

4. *The fictitious nature of reproduction cost*

The phrase "reproduction cost" covers a concept which has become extremely involved. It would be difficult to conceive of anything farther removed from reality than the idea of reproduction cost as it is at present applied by the courts. A consideration of the manner in which utilities attempt to arrive at the reproduction cost of their plant reveals that there is virtually no relationship between the so-called reproduction cost of existing plant and the price at which a service equally satisfactory could be secured. The completely fictional character of the so-called "value" of property as determined upon the reproduction-cost theory becomes apparent when it is observed that there are possible variations of as much as 100 percent between the estimate of engineers testifying on behalf of a utility and that of a commission's experts.

Richberg, Donald R., *A Permanent Basis for Rate Regulation*, 31 Yale L. J. 263, 269 (1922).

Carl I. Wheat describes the unreality of the reproduction-cost theory vividly:

> Indeed, when it comes to the actual process of arriving at such a figure for a public utility system, as this "reproduction cost" process has been built up in recent rate cases, those who prefer to keep their feet on sound ground must part company with the so-called "experts." In contrast to the realistic approach to the problem, we discover that under this second approach there has been erected a great structure of imaginary and imaginative potential and hypothetical "costs," totally unrelated to reality. And the argument is made that this is what the Supreme Court really meant by its use of the term "present cost." Here, indeed, we discover the *ignis fatuus* of "valuation."
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> It is on this second premise that the "experts" assert the necessity for including the various unreal elements above mentioned, *i. e.,* the nonexistence of the existing plant, the coming to town of a promoter, his speeches to the local clubs offering to build a plant, the excitement and delight of a receptive populace, the preparation of blueprints, the obtaining of new franchises under social, legal, and political conditions not effective when the plant was originally built, the cutting and replacing of pavement not historically cut or replaced, the cost of meeting increased traffic and city growth, and a myriad of like "difficulty factors" that were not present when the plant under consideration was actually constructed, together with divers other hypothetical costs which an actual physical "reproduction" of the property might conceivably entail. Wheat, Carl I., *The Present as Compared*

With the Original Cost of Construction, 20 Pub. Util. Fort. pp. 6–8 (1937).

In the article referred to above Wheat cites a striking example of the unreality of the reproduction cost approach:

> In the Los Angeles Case the book cost of the company's properties totaled $169,000,000; the cost to "reproduce" the properties at the time of the inquiry was claimed to be $182,800,000; and the claim of "fair value" after taking into consideration admitted accrued depreciation, was $175,000,000. We are here concerned solely with the basis of the company's assertion of what it would cost to "reproduce" the properties.
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> That figure was based upon an inventory to which certain derived "unit costs" were applied. Cross-examination of the company's witnesses disclosed that this "appraisal" included $3,171,400 to represent *the cost of cutting and replacing paving over conduits in instances where no such costs were historically incurred,* though the Supreme Court had but recently declared that "the cost in imaginary conditions of cutting and restoring pavements was not an increment of value." It further appeared that the total included $1,033,000 to represent *telephone station installations and associated drop wires which had actually been abandoned at the time of the appraisal.*
>
> Moreover, it was brought out that no less than $1,623,000 was included to represent *"left-in disconnects," i. e.,* telephone disconnected but left by the company, for its own convenience, on the former subscribers' premises. (Picture the imaginary promoter rushing hither and yon over the new

> system feverishly "reproducing" this large amount of already disconnected and idle equipment!) In addition, the sum of $405,500 was included to represent imaginary *organization and franchise costs in excess of those actually incurred in the development of the system*, an item that had recently been specifically disapproved by the Supreme Court. (*Op. cit.* at p. 12.)

The Los Angeles Gas Company, furthermore, claimed a sum of $20,610 representing a glorious flight of fancy—taxes during construction on interest during construction (*op. cit.,* pp. 12–14). The writer describes the method by which the utility sought to ascertain the reproduction value of automobiles:

> Curiously enough, the urge for consistency in presenting "reproduction cost" estimates in the Los Angeles Case led the company's experts into a peculiar *cul-de-sac* when it came to automobiles. Notwithstanding the fact that the southern California used-automobile market is the largest in the United States, and that actual used-car prices are published, are fully standardized, and are readily ascertainable, the company's witnesses decided to "reproduce" its automobiles. To this end they went through the following highly illuminating process:
>
> "(1) They obtained from automobiles piece-part catalogues the prices of some thirty separate parts (representing, said they, some 60 per cent of the total vehicle), (a) for the year each make and model of vehicle was purchased, and (b) for December 31, 1934, the date as of which the 'valuation' was being made;

> "(2) They ascertained the ratio which the sum of these piece-part prices for the year of purchase bore to the sum for December 31, 1934;
>
> "(3) They applied this ratio to the total cost of vehicles of each particular type and age, as shown on the books, and
>
> "(4) They labeled the resulting figure 'reproduction cost new' of automobiles."
>
> In such fashion did they obtain the "cost new" of a 1929 Ford in 1934! If such a process bears any relation to "value"—under *any* definition of that term—it is difficult to perceive it. Yet this is but one example of the lengths to which many otherwise sane men have gone when attempting to build up "reproduction cost" figures in rate cases under the second theory of its nature. (*Op. cit.* at p. 14, footnote 18.)

It goes without saying that if a plant were actually to be reproduced it would be designed in a way to take advantage of possible operating efficiencies. Thus, a plant which would produce at a capacity equivalent to that of existing facilities would normally be of a different design and higher operating efficiency. In the normal course of engineering development economies would be worked out and passed on to the consumer in the form of a reduced rate, resulting from a reduction in the valuation. The purely theoretical character of the concept of reproduction cost takes no account of these operating efficiencies:

> * * * In exchange-value economics the real value of a plant is not determined by the cost of reproducing the identical plant but by the cost of producing the commodity in a new plant having the most modern

equipment required to produce the article. No one would be willing to invest in an obsolete plant if a new one could be built to be operated at much lower operating expenses per unit of product if such a plant could be built for the same cost as the obsolete one. It is the cost of building a modern plant of similar capacity that determines the value of a plant in an unregulated competitive industry, and not the cost of reproduction of a similar plant. Hence, reproduction cost does not cause the owners of a regulated enterprise to fare the same as the investors in unregulated competitive enterprises.

There is, furthermore, a limitation to the concept that the cost of producing the commodity in a new plant regulates the value of an old plant, since, because of technological developments, the value of such a plant would scarcely, if ever, exceed the cost of reproduction and might be considerably less. Reproduction cost, therefore, is a measure of maximum value at best. Wilson, Herring, and Eustler, *op. cit.,* p. 57, at p. 126.

That no public utility property ever is or ever has been actually thus physically "reproduced" does not deter these advocates. They merely assert that they have been told to find the cost of *reproducing* the plant under existing conditions, and "here it is." Admittedly, if this second theory of the reason for developing the item of "present cost" in rate cases were ever to be consciously and definitely adopted by the courts, it would be essential thus to estimate a "construction period," to guess at the cost of cutting and replacing new paving, and to imagine the expense that might be incurred in meeting the many traffic and other community fac-

> tors that have developed since the actual construction, with resultant increased potential costs over and above those which have been met in the historical development of the property under consideration. The adoption by many utilities of this second alleged reason for the development of "reproduction cost" has apparently resulted almost wholly from the hope that by some such reasoning they could thus raise this item farther and farther toward the stratosphere (*Op. cit.* at pp. 6–8).

Similarly Attwill writes:

> When we know that values are required by courts to be placed upon the property of a corporation which no one in the world would pay to acquire, except for the monopoly the utility enjoys through special privileges obtained from the public, and values which usually exceed the total of the market value of the outstanding stock plus its liabilities, we know there is something wrong in this system of valuation. Mr. Justice Stone has aptly described it as a "synthetic" value. Synthetic products are seldom as good as the real thing. (*Op. cit.*, p. 23, at p. 99.)

Furthermore, the new plant construction might well produce at a lower unit cost by reason of its operating efficiencies. Such a reduction in the operating cost would be passed on to the consumer, if the plant in fact were reproduced.

> Even if a new plant of equal capacity were to cost more to construct, it might produce at unit costs so much less than the old plant that the additional cost of construction would be an excellent investment. In

> such a case it would be unfair to require the consumer to pay rates that would yield enough to pay the high operating expenses of the old plant and produce a return equal to that which would be a fair return upon the greater cost of an up-to-date plant. Yet the courts have held in numerous valuation cases that the plant, the cost of reproduction of which is to be estimated, is a plant identical with that in existence and have declared that the cost of reproduction of the plant must be considered in valuation for rate-making purposes. (Wilson, Herring, and Eustler, ***Public Utility Regulation,*** 1938, p. 126.)

From the standpoint of the public, there is a serious consequence of the reproduction cost theory. It discourages the introduction of improvements in the technology of the utility. It is in the words of Attwill, "an incentive to inefficiency."

> The system makes no provision for depreciation by reason of inadequacy or obsolescence due to the change in the art. Under this rule, what incentive is there for the company, once it has absorbed the lighting and power business in its area, to install up-to-date equipment? If it can obtain as great a return on the old as it can on the new equipment, there is little incentive, so far as the profits of the business are concerned, to install the new. (*Op. cit.*, p. 23, at p. 99.)

As stated by another:

> It [reproduction cost], encourages the companies in using antiquated machinery and obsolete equipment because of the increase

> of rates which will result from the practice of including such machinery in the valuation at prices many times greater than its original cost or present value as productive equipment. Thus, in a recent case an obsolete pumping plant that cost less than two hundred thousand and could have been replaced with modern machinery for less than three hundred thousand, was allowed a "reproduction" value of over one million dollars. (Beutel, *op. cit.,* p. 63, at p. 433.)

There is a further factor tending to make the reproduction cost entirely unlike the expense that would be incurred if the utility were actually to be reproduced. The determination of reproduction cost involves the assumption that current prices can be accurately ascertained. As a matter of fact this is very far from true.

> * * * As prices go upward or downward, either as to labor or materials, or as the technological processes of construction or manufacture of equipment change, the amount of the reproduction cost is immediately affected. But these are all unweighted factors, which are not accurately recorded, constantly vary, and hence cannot be determined without wide differences of opinion as to their quantitative significance. Consequently, every attempt to readjust the sum is accompanied by extended litigation, cumbersome proceedings, bulky records, and tremendous expense. (Bauer, *op. cit.,* p. 42, at p. 415.)

There are indeed several ways in which the ascertainment of current prices may be entirely false. There is not only the possibility of error, which attends the determination of most economic facts.

In addition there is a serious danger of a fictitious price level.

> The use of "spot prices" on equipment purchased from the Western Electric Company (though the reflection of "precipitate" price changes had been frowned upon in the West Case) also enabled the utility to take advantage of a sudden recent and rather large price increase by that company, and to claim some $7,000,000 more than would have resulted from the adoption of a 5-year average pricing period (that being the "construction period" actually adopted by the company in its "reproduction cost" estimate). And this in the face of generally declining price levels in respect to almost all other commodities over that period. The fact is that such Western Electric price increases had practically no direct effect on the capital structure of the plant under consideration, since the construction program of this utility had been neglible in amount since this price increase, and in fact had been negligible in amount for some time prior thereto. Thus, by a mere scratch of the pen, the Western Electric Company (another subsidiary of the defendant utility's parent corporation) had created a basis for claims of increased "reproduction costs" totaling millions of dollars in this single case. (Wheat., *op. cit.*, p. 65, at pp. 6–8.)

The general counsel of the Illinois Commerce Commission likewise draws attention to the possibilities of price rigging:

> But inasmuch as the utility company is usually a prospective as well as a former customer of the manufacturer in such a case,

> it is a strain on credulity to assume that the estimated price has much probative force; yet no one is in a better position to make an estimate.
>
> The same difficulty exists, though usually in lesser degree, with quotations of prices even where the items are not obsolete, particularly where an item is a specialty of one manufacturer. An outstanding example is in the case of telephone apparatus of Bell Telephone companies. This is nearly all made by the Western Electric Company, an affiliate; and the price policy of that company has been the reverse of that necessarily followed by competitive companies. When demand falls off, as has happened during the depression, the Western Electric Company raises prices; when demand and production increase, the prices tend to fall. As a reproduction cost appraisal involves the pricing of a vastly greater amount of apparatus than is actually being produced for the Company in question, current Western Electric prices have little to do with such a situation. A somewhat similar condition seems to exist in the case of electrical apparatus made by the General Electric and other large manufacturers. Prices of much of such equipment have gone up during the depression, and the Federal Trade Commission has attacked price-fixing in some such instances. (Booth Harry R., *Prudent Investment, Fair Value and Public Utility Regulation,* 1 National Lawyers Guild Q. 229, 240 (1938).)

There are additional difficulties in the way of the determination of current price levels:

> * * * The difficulty of securing adequate current price data at a time when

> purchases of construction materials are negligible or nonexistent will tend to the use of older data, and thus obscure to a considerable measure the actual reduction in material costs. Reliable labor costs reflecting actual practice are difficult to obtain. (Lilienthal, David E., *Regulation of Public Utilities During the Depression,* 46 Harv. L. Rev. 745, 754 (1933).)

5. *"Reproduction cost" ignores the cost of reproducing a service*

Theoretically reproduction cost should properly be the cost of reproducing a service, not the cost of building an identical plant.

> * * * First, the only possible argument in favor of cost of reproduction springs from the analogous use of cost of reproduction in private competitive business. * * * But the cost of reproduction so far as utilized in establishing prices in private business is not the cost of reproducing the identical property but the cost of reproducing an equally serviceable property. Or, let us say, it is the cost of reproducing the article or service, or an equally useful article or service, and never the cost of reproducing a particular plant. In truth, invention and improvement work changes in all industrial operations so rapidly that it is difficult to find any plant a few years old which would be reproduced by competent engineers in the same form today. Therefore, to utilize the idea of cost of reproduction intelligently is not to utilize the cost of reproduction of any particular property but of a service or of an equally useful service. (Richberg, Donald R., *A*

Permanent Basis for Rate Regulation, 31 Yale L. J. 263, 277 (1922).)

While an accurate application of the theory calls for ascertainment of the cost of reproducing the service, such an ascertainment is in practice impossible:

> * * * It must be apparent that such a basis for rate making would open up a new field for speculative estimating, to the increased profit of engineers and lawyers and to the increased confusion of the courts and commissions and would bring increasing instability to all public utility operations. (*Ibid.*)

The impossibility of applying reproduction cost as it should in theory be applied was observed by Robert H. Whitten as early as 1914:

> * * * The reproduction of the service involves not only the determination of the cost of the most efficient substitute plant, but the determination of the present cost of reproducing the business, the proper allowance under present conditions for interest and profit, and the operating costs for the substitute plant. In most cases it is exceedingly difficult and expensive to determine the design of an equally efficient substitute plant. In the case of a railroad, for example, the cost of determining a substitute location and of estimating the operating costs thereon would be so great as to render it entirely impractical as a factor in rate regulation. It would require a careful survey of various available locations, and estimates of construction and operating costs. The engineering costs of such survey and estimates would be enormous.

> The cost of reproduction in practice, therefore, instead of meaning the cost of a substitute plant of the most modern approved design, capable of performing the same service as the existing plant, has come to mean the cost of a substantially identical reproduction of the existing plant. This is the usual method. It involves, however, a partial abandonment of the reproduction of the service theory, and a somewhat imperfect recognition of the fact that cost of production is necessarily related to the past as well as to the present and future. (Whitten, Robert H., *Fair Value For Rate Purposes,* 27 Harvard L. Rev. 419, 427 (1914).)

6. Unearned increment

When an investor holds property over a period of years, he may become the beneficiary of an unearned increment. It has been contended by some that a reproduction-value rate base enables the investor to realize an appreciation of this kind.

This argument has been advanced by advocates of the use of reproduction cost as the basis for valuations. But, like the "competitive price theory," the claim is specious. The fallacy has been exposed as follows:

> The most common argument against the use of the original-cost method of valuing public utility properties, aside from the difficulties alleged to be encountered in securing records of such costs, is that appreciations in value of property (if such exist) are denied to the owners thereof. The reproductionists; however, do not point to any rule of common equity which entitles them first to earn an adequate return on their investments and then to participate in the

> profits which accrue to appreciation; but they rely on certain judicial passages, which in themselves are sound, although subject to linguistic abuses when applied unadvisedly to valuations that are made bases for rate schedules. (McCann, W. R., American Society of Civil Engineers, *op. cit.*, p. 1618.)

The attempt to evaluate items of unearned increment enhances the speculative character of determinations of value:

> * * * Under the principles of valuation as hitherto established and administered by courts and commissions,[1] "fair value" has become a means of justifying and legalizing almost every type of unearned increment, tangible and intangible, which accrues to unregulated monopoly. By the inclusion of such costless values as going value, water right values, easement values, and by the failure to make anything like complete deductions for accrued depreciation and obsolescence, companies are able to establish "values for rate-making purposes" so large that even the most prosperous and profitable enterprises make the false appearance of earning only a very limited rate of return. (Commission on Revision of Public Service Commissions Law, New York, Minority Report (1930), p. 251.)[2]

Furthermore, the increase in value due to unearned appreciation is altogether a creation of the community. It is manifestly unjust to require the rate-paying public to bear an enhanced burden by reason of an increment which it has created. Richberg, Donald R., *A Permanent Basis for Rate Regulation,* 31 Yale L. J. 263 (1922).

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[1] Italics appearing in original have been omitted.

[2] The minority members were Frank P. Walsh, James C. Bonbright, and David C. Adie.

This is but one way in which the use of a reproduction cost basis enables a utility to increase the charges to the community by reason of values contributed primarily by the community. Current practice with regard to depreciation reserves provides another device for accomplishing the same result:

> * * * It [the reproduction cost method] includes the depreciation reserve as a basis of the return, because as a practical matter it is invested in the plant. This naturally arouses hostility upon the part of the consumer. He is asked to build up an insurance fund to protect the integrity of the stockholders' investment, and then is required to pay a return upon that insurance fund in rates. This necessarily arrays the stockholders and the consumers in hostile camps, with the result that the consumer vigorously assails the provisions for depreciation. This causes vigorous assaults to be made upon the allowances for depreciation in rate controversies, with the result that public authorities are likely to allow too little for depreciation. This must be made up by larger expenditures for maintenance, or the capital of the company will eventually become impaired * * *. Attwill, *op. cit.,* p. 23, at p. 98.)

7. *Effect of competing theories on utility financing*

There is a sharp conflict of opinion as to the respective effects of the rival valuation theories upon the market for utility securities. Passing, for the moment, the merits of the controversy, it is evident that the prevailing uncertainty as to the proper method of rate determination must have an adverse effect. This was pointed out by Robert H. Whitten:

> Investors in putting their money into public utility enterprises are entitled to know whether, in case the utility is appropriately located and normally successful, it will be permitted to earn a return on the actual and necessary investment, or upon the cost of reproduction, or upon the market or exchange value of the property, or upon a combination of these or other factors. Any arrangement might conceivably be fair to the company and fair to the public provided it were known in advance, so that reciprocal relations between risks involved and returns secured might be established, and proper methods of accounting for depreciation and appreciation instituted. For the future at least it is clearly essential that some one standard should be adopted as the normal and controlling standard in determining fair value. As to the past, the situation, while more complicated, still points to the desirability of definitely choosing some standard. (Whitten, Robert H., *Fair Value For Rate Purposes,* 27 Harv. L. Rev. 419, 420.)

The argument in favor of reproduction cost runs largely in terms of realization of unearned increment and stability of the investor's real income. These questions have been discussed above. For present purposes it will be sufficient to quote the following passage from the Federal Trade Commission's report:

> Nevertheless it is said that reproduction cost (which necessarily reflects price changes) is essential to attract capital in a competitive market at minimum rates of interest, since it is necessary to permit utility investors to take advantage of unearned increment in land and other values, in order to induce capital to flow into a regulated enterprise rather than into competitive industries. The argument is that as long as other fields of investment are permitted to hold out the lure of possible unearned increment, utilities must be free to hold out the same lure. Bonbright has pointed out, however, that investors overwhelmingly prefer security of income to opportunity for speculative gains coupled with risk of corresponding loss, as abundantly indicated by the preference of investors for bonds and other fixed interest-bearing securities rather than for common stocks. It is further indicated by the ability of the United States Government to market its bonds at rates considerably below the prevailing rates of interest without the inducement of any speculative gain. Federal Trade Commission, Summary Report to the Senate of the United States, January 28, 1935, *op. cit.*, p. 155.

Similarly,

> It is a fair assumption that, in general, investors in establishing public utilities have looked to a fair return on their actual investment to compensate them for their outlay, and have not taken seriously into account

> any appreciation or depreciation in the value of land or in the price of labor and materials entering into the reproduction cost of structures and equipment. They have necessarily assumed that they would be able and would be permitted to receive for their service an amount equal to their actual cost of production, *i. e.*, operating expenses, depreciation, and interest and profits on their actual capital outlay. (Whitten, *op. cit.*, p. 425.)

To the same effect see Bonbright, James C., *Merits of Original Cost and Reproduction Cost*, 41 Harvard L. Rev. 593 (1928); Hale, *op. cit.* p. 971.

A fluctuating rate of return may, indeed, attract a certain class of capital. But capital so attracted is of dubious usefulness. It represents speculative purchases of equities, a form of "investment" that the utilities and the public might well do without.

> The normal actual capital cost as a basis for rate determination, moreover, has a distinct advantage from the standpoint of public policy. It is desirable that rate schedules should have stability and should not fluctuate with the price of iron pipe or copper wire or with real-estate activity or reactions. A utility is not established for the purpose of speculating in copper wire or iron pipe or land. It must, however, in furnishing its service invest its money permanently in these things. The utility should not be expected to assume the risks of fluctuations in the price of the land and materials it uses (Whitten, *op. cit.* p. 79, at p. 426).

Indeed, the speculative character of reproduction value rates is a source of serious dangers to the utilities themselves. Writing in 1921, a commentator called attention to the probable effects of a prolonged decline in prices:

> * * * It should be pointed out that we are at present quite obviously entering upon a period of declining prices and that in determining a rate base any use of figures representing the cost to reproduce the identical property will deprive public utilities in the near future of any return upon millions of dollars of actual investments which have been made in the last few years in properties which may be reproduced in the years soon to come for less than the amount of the investments which they represent. In such a time it will seem as unfair to the investor that his investment should be scaled down and that the return on his capital should be diminished because of declining price levels as it has seemed unfair to the consumer that the investor's capital should be inflated and his return increased because of rising price levels. (Richberg, Donald R., *A Permanent Basis for Rate Regulation,* 31 Yale L. J. 263 277–278 (1921).)

Likewise, Bauer comments:

> The second general objection to reproduction cost is its failure to provide for proper standards of financial stability in the industries affected by regulation. It would promote speculation during one period and produce financial disintegration during another. It would, in turn, attract unnecessary capital and then retard the desirable flow.
>
> The fact is usually overlooked that by far the greater proportion of the actual investment in public utility properties has been made through bond and preferred stock. A reasonable estimate is that at least

> 75% of the cash capital was furnished by these securities, and only 25% or less by common stock. In many instances the proportion of common-stock investment is even less, and there are important cases where all the money put into the property is represented by limited return securities. Because of such normal financial structure, with the large percentage of fixed-return capital, any change in the return on the investment has a cumulative effect upon the common stock. (*Op. cit.* p. 42, at p. 419.)

A fluctuating rate of return deprives conservative investors of stability, on the one hand; and it tends to imperil the financial soundness of the utility on the other hand. But the evil potentialities of the variable rate base are by no means exhausted. Much of the financial manipulation which discredits the management of utilities is directly traceable to the use of the reproduction cost base. "Undoubtedly, the stakes are high for those who control utilities through very narrow equities, offering great opportunity for speculative gain." Frankfurter, *op cit.*, p. 46, at p. 106.

> The doctrine of fanciful valuation has greatly encouraged recent tendencies in financial organization. In turn, the elaborate and mysterious refinements of intercorporate relations have powerfully sustained the efforts by which lawyers and engineers have built up schemes for inflated values. The search for fictitious value—at best a game of blindman's buff—is thus greatly complicated by the intricacies of elaborate corporate arrangements within utility enter-

> prises. Not only is there the excitement of a game fascinating to technicians in law and engineering, but in applying the prevalent judicial doctrines of utility valuation by manipulating intercorporate relations, there are the cruder but more solid temptations of buttressing unreasonable rates by law and securing huge profits through speculative utility holdings. (Frankfurter, *op. cit.* p. 46, at pp. 107–108.)

8. Practical experience in valuation

The regulatory commissions have hitherto been subjected to a judicially imposed requirement of considering reproduction cost. But there has in fact been a body of experience developed in the application of valuations determined without reference to reproduction cost. The public utility commissions of Massachusetts and California have, over a period of years, made use of a valuation principle which is independent of the use of reproduction cost:

> We are indeed fortunate to have the benefit of the actual experience of at least two states with the historical cost doctrine. Both the Massachusetts and California Commissions have, notwithstanding the absence of judicial support, had the courage to follow this principle through many years of regulation. More than any other state Massachusetts has been able to avoid appeal to the courts, while the California Commission's rate decisions have been sustained with few exceptions in both the state and federal courts. (Rooks, Irvin, & Booth, Harry R., *Rate Regulation of Public Utilities,* 13 Ore. L. Rev. 122, 125 (1934).)

The Massachusetts Public Utility Commission has applied a rate basis resting primarily upon prudent investment, with outstanding success.

> Our concern in Massachusetts now is that we may be forced to abandon a system of regulation that, on the whole, has worked well for nearly half a century. Financiers and economists outside of our State have asserted, with some heat and vigor, that our system is unsound economically and cannot work successfully; that it is unjust to the corporation and its stockholders, and that as capital is timid, it will not seek investment in public utilities in Massachusetts. Representatives of some of our own electric companies have sung the same song. The answer to this is that the system has been in operation for nearly fifty years; that in all that time, resort to the Federal courts has been sought by electric companies in Massachusetts but twice, both cases being abandoned; that all of the electric companies in our State are in sound financial condition, and, so far as I am aware, none have difficulty in securing the necessary capital for their development; and that decisions on rate questions are fairly prompt, and hearings and investigations are rarely protracted. We believe that the good faith of Massachusetts can be relied upon by those who invest their capital in public service enterprises, as it can be relied upon by those who lend the State their money. (Atwill, *op. cit.*, p. 23, at p. 97.)

But if the prudent investment basis has proved feasible in practice the same cannot be said of reproduction cost. In spite of the inordinate expense and difficulty of determining "fair value" under this method the value so determined is frequently not a practicable measure of the return that a utility can in fact receive. Thus, it is found that utilities do not charge a return based upon reproduction cost:

> Chairman Cortelyou of the Consolidated Gas System, Vice President Nickerson in charge of its finances and accounts, and President Sloan of the New York Edison Company and the other electrical properties, all testified that the rates in effect were not yielding the return on the present value of the properties in which they were entitled under Federal Court decisions. In most cases they testified, the rates were not providing a fair rate of return even on actual investment. They said, however, that these rates were good business, i. e., dictated by "good business judgment," that they were in general adequate to enable the companies to obtain all the new capital required to properly service the communities, and they admitted further that the companies were able to pay good dividends on their common stock.
>
> Such testimony exposes the absurdity of the whole valuation claim which has gone so far to wreck public utility regulation. The companies are expending great sums of money and are making extreme efforts to secure rulings from the Courts to the effect that rates dictated by good business judgment and adequate to secure new capital are confiscatory under the 14th amendment to the federal constitution. Unquestionably such admissions show that the valuations of these properties could safely be reduced not only below the elaborate figures for present value built up by the engineering and ac-

> counting forces of the corporation but also below the actual investment figures on the books of the corporations. (*Commission on Revision of Public Service Commissions Law,* Minority Report (1930) 271.)

A serious consequence of prevailing practice in the application of reproduction cost is its effect upon the expert administration of utility law. In practice the decision as to the rate is taken out of the hands of the Commission and rests with the last judge or master who passes on the case:

> * * * In practical operation, such a system substitutes the judgment of a master appointed by a court for that of the duly sworn body created by the state for that particular purpose. (Attwill, *op. cit.,* p. 23, at p. 99.)

Another practical consequence of the use of reproduction cost as a factor in determining the rate basis is sometimes referred to as "social friction." By this is meant the constantly increasing ill-will which is fostered by prolonged and bitter controversies over the determination value.

> The customer on the other hand is subject to all sorts of annoyances; the constant changes of rates by injunctions, the retroactive effect of Supreme Court decisions coming years after the litigation starts, uncertain business conditions following the unforeseeable variations in rates, and the loss of large sums of money due to the impossibility of refunding overcharges on impounded rates subsequently declared illegal.
>
> * * * * *
>
> But, though the consumer is heavily burdened, the public at large is the greatest

> sufferer from the present "process" of valuation. The unnecessary social friction due to the overloading of the legal machinery, the diverting of the attention of courts from other important matters of law to attend to purely speculative questions of fact, the lost effort of commissions due to constant delays and unnecessary reversals, all these are minor matters compared with the financial cost entailed in the proper conduct of a valuation case. Expert witnesses and capable counsel are expensive luxuries. One eastern public service corporation reports that the engineering cost alone of evaluating a two hundred and thirty million dollar plant was over a million and three quarters dollars. Add to this the fees of expert witnesses and a competent legal staff and it becomes apparent that no private citizen or civic organization can, and no state governmental agency supported by taxes will, attempt to compete with the corporations in gathering and presenting evidence before the master of the court. (Beutel, *op. cit.*, p. 63, at pp. 432–433.)

* * * * *

9. Miscellaneous judicial and administrative opinion concerning the merits of the reproduction cost versus prudent investment controversy

In addition to the many authorities cited and quoted in the foregoing portions of this appendix, there are a number of commissions which have taken a very positive stand with respect to the controversy. Likewise, there are a number of judicial opinions which have pointed out the evils of the present system and protested against its continuation. An examination of these authorities will serve to clarify the position of the Government in this brief:

Perhaps the best exposition of the prevailing attitude of those who have been in direct contact with this problem is contained in the Minority Report of the Commission on Revision of Public Service Commissions Law of New York. The report states:

> In our opinion the greatest single weakness of the existing system of public utility regulation—and this applies not merely to New York State but to the country as a whole—lies in the hopeless difficulties inherent in the use of a physical valuation of property as the basis of rate control. Unless and until this fatal defect in regulating theory has been overcome, any attempt to revise the Public Service Law must fail to reach the root of the trouble. To a very large degree the other weaknesses which have been disclosed in the New York regulatory system, such as the understaffing of the Commission, the tendency of the Commission to become a purely judicial as distinct from a regulating body, and even the evils resulting from the unrestricted financial operations of holding companies are a repercussion from this more fundamental obstacle to effective control. We believe that we share this view with the great majority of impartial students of the problem and that the existing system would find almost no defenders were it not for the support which it derives from those utility companies which believe that its maintenance is in their pecuniary self-interest. (Commission on Revision of Public Service Commis-

sions Law, New York, Minority Report (1930) p. 334.)

It has been the considered judgment of the great majority of the regulatory commissions that the use of reproduction cost is not a proper factor in the determination of a valuation. Indeed it is apparent that except insofar as the courts have compelled them to do otherwise, the commissions have tended to decline to apply the reproduction cost rule. In order to bring out the extent to which the commissions have adopted this position, we have conducted an extensive examination of the rulings of the commissions. Below are listed a selection of decisions in which it has been held that reproduction cost should not be a controlling factor:

Danbury v. Danbury & Bethel Gas & Electric Light Co., P. U. R. 1921D, 193, 206.
Re Potomac Edison Co., P. U. R. 1933B, 6.
Grafton County Electric Light & Power Co., P. U. R. 1916E, 879, 885–888.
Northampton Gas Petition, P. U. R. 1915A, 618, 626.
Bay State Rate Case, P. U. R. 1916F, 221, 223.
Middlesex & Boston Rate Case, 2nd Ann. Rep., Massachusetts, Public Service Commission, Vol. I, pp. 105–112 (1914).
Public Service Commission v. Washington Power, Light & Water Co., 7 Ann. Report, Public Service Commission of Washington, 130 (1917).
Re York County Water Co., P. U. R. 1921A, 439.
Iroquois Natural Gas Co., P. U. R. 1919D, 76.

In re Tarkio Electric & Water Co., 12 Mo. P. S. C. R. 260 (1922).
Re Northern States Power Co., 15 P. U. R. (N. S.) 126.
Re Platte County Independent Telephone Co., P. U. R. 1922D, 303.
Re Roanoke Water Works Co., P. U. R. 1920C, 745.
Re Georgia R. & Power Co., P. U. R. 1921A, 165.
Re So. California Telephone Co., P. U. R. 1922C, 97.
Re Exeter Water Works, P. U. R., 1923B, 339.
Re Cole, P. U. R. 1921C, 385.
Marinette v. City Water Co., 9 P. U. R. (N. S.) 308 (1934).
Milwaukee El. R. & Light Co. v. Milwaukee, P. U. R. 1918E, 1.
Grand Forks v. Red River Power Co., 8 P. U. R. (N. S.) 225.
Pacific T. & T. Co. v. Thomas, 13 P. U. R. (N. S.) 337.

A number of regulatory commissions have gone further than to condemn the use of reproduction cost as a basis for the valuation of public utilities. They have held that the prudent investment valuation of a utility is the factor that should control in the making of the rate. It must be noted that the commissions to a large extent have been forced to adopt a different theory because of the prevailing view as to the propriety of the use of reproduction cost. It seems highly probable that if reproduction cost were not forced upon the commissions by the courts, there would be wide agreement as to the merits of the prudent investment method. The following are some of the cases in which the commissions have not only rejected reproduction cost as the basis, but have affirmatively adopted the prudent investment theory:

Public Service Commission v. Pacific Telephone & Telegraph Co., P. U. R. 1916D 947, 955.

Butler v. Lewiston A & W Street Ry. Co., P. U. R. 1916D, 25.

Public Service Commission of Washington v. Spokane Falls Gas Light Co., P. U. R. 1921C, 523.

Carlson v. Jamestown Telephone Co., P. U. R. 1920F, 645.

Poughkeepsie & W. Falls R. Co., 1st Ann. Rep., New York Public Service Commission, Vol. I, p. 255 (1921).

Cavanaugh v. Whitefish Municipal Water Utility, P. U. R. 1922E, 198.

Morris v. N. W. Bell Telephone Co., P. U. R. 1922D, 769.

Re So. Ill. Light & Power Co., P. U. R. 1919D, 489.

Re Pacific Gas & Electric Co., 1 P. U. R. (N. S.) 1.

Re Coast Valleys G. & E. Co., P. U. R. 1924C, 40.

Re San Joaquin Light & Power Corp., P. U. R. 1922D, 595.

Re Fresno Traction Co., P. U. R. 1925C, 566.

Department of Public Service v. Grays Harbor Railway & Light Co., 12 P. U. R., 178, 200.

Re Michigan Bell Telephone Co., 10 P. U. R. (N. S.) 149.

Re Sea Cliff & G. C. Gas Co., P. U. R. 1921A, 211.

Re Boise Artesian Water Co., 11 Ann. Rep. Idaho Public Utilities Commission 155 (1923).

Barth v. Hughes & D. Electric Co., P. U. R. 1922A, 740.

Re Midwest Power Co., P. U. R. 1922E, 22.

The general opinion of regulatory authorities who have passed upon the question of the proper valuation base is overwhelmingly in favor of the prudent investment as opposed to the reproduction cost method. Mr. Justice Brandeis in his concurrence in the Southwestern Bell Telephone Company case (262 U. S. 276), pointed out that the Public Utility Reports for the years 1920 to 1923 inclusive, contain 363 cases passing upon the method of determining rate base. In 63 of these cases, reproduction cost was severely criticized or expressly repudiated. In 5 cases, reproduction cost was applied. In almost the entire remainder, the reproduction cost was either ignored or given only slight weight.

The objection to reproduction cost has been expressed as follows by a commission:

> This method (reproduction at prices prevailing at time of valuation) of determining value * * * is based upon prophecy instead of realty, and depends so much upon half-truths that it bears only a remote resemblance to facts, and rises at best, only to the plane of a dignified guess. (*Danbury* v. *Danbury & Bethel Gas & Electric Light Co.* (Connecticut Public Utilities Commission) P. U. R. 1921D, 193, 206.)

This Court itself has found it an extremely difficult task to reconcile the reproduction cost method with the world of reality. Even as early as 1912, the Court expressed some doubt as to the exactness of this method. Speaking for the Court, Mr. Justice Holmes said, "Every figure that we have set down with delusive exactness is 'speculative'." *City of Louisville* v. *Cumberland Telephone and Telegraph Co.,* 225 U. S. 430, 432 (1911).

Concurring in the *Southwestern Telephone Company* case (262 U. S. at 290), Mr. Justice Brandeis said:

> * * * The so-called rule of *Smyth* v. *Ames* is, in my opinion, legally and economically unsound. The thing devoted by the investor to the public use is not specific property, tangible and intangible, but capital embarked in the enterprise. Upon the capital so invested the federal Constitution guarantees to the utility the opportunity to earn a fair return. * * *

In his concurring opinion in *St. Joseph Stockyards Co.* v. *U. S.,* 298 U. S. 38, Mr. Justice Brandeis repeated this objection to the *Smyth* v. *Ames* doctrine. In a separate concurring opinion, Justices Stone and Cardozo said:

> We think the opinion by Mr. Justice Brandeis states the law as it ought to be, although we appreciate the weight of precedent that has now accumulated against it.

APPENDIX B

Relation between earnings and stock prices, 1924–1937 [1]

[Index numbers 1926=100]

	Composite	Industrials	Public utilities	Railroads
1924				
1st quarter	109.6	108.2	119.5	71.6
2nd quarter	84.5	89.6	108.3	65.4
3rd quarter	76.0	71.8	87.5	95.3
4th quarter	85.9	76.5	107.9	104.1
Average	86.9	85.9	105.4	84.9
1925				
1st quarter	82.4	82.9	106.9	66.0
2nd quarter	99.5	106.1	95.3	85.7
3rd quarter	101.8	98.3	81.3	128.8
4th quarter	89.6	82.8	99.0	102.5
Average	93.3	92.0	95.8	96.0
1926				
1st quarter	91.4	95.3	101.6	69.6
2nd quarter	107.0	112.5	99.9	94.2
3rd quarter	107.4	108.1	8.9	126.9
4th quarter	94.8	87.6	110.9	107.1
Average	100.0	100.0	100.0	100.0
1927				
1st quarter	84.9	85.2	109.1	68.2
2nd quarter	87.2	90.5	95.5	70.2
3rd quarter	79.6	75.2	81.9	94.0
4th quarter	65.5	55.5	97.4	79.8
Average	78.7	75.3	95.5	78.0
1928				
1st quarter	70.5	68.2	96.5	58.4
2nd quarter	75.0	76.4	79.1	67.8
3rd quarter	80.3	78.3	73.0	100.4
4th quarter	70.0	61.5	83.3	103.9
Average	73.9	70.7	82.5	82.9

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[1] Sources of Indexes of Earnings and Stock Prices:

Earnings Indexes:

Standard Trade and Securities, Volume 3, Statistical Section, (Published by Standard Statistics Company):

Supplement of October 15, 1937, page 7.

Stock Prices Indexes:

Standard Trade and Securities, Volume 3, Statistical Section, (Published by Standard Statistics Company):

Supplement of May 29, 1936, page B-103.

Supplement of July 17, 1937, page B-160.

Supplement of October 15, 1937, pages 46, 47, and 48.

Relation between earnings and stock prices, 1924–1937—Continued

[Index numbers 1926=100]

	Composite	Industrials	Public utilities	Railroads
1929				
1st quarter	62.6	61.5	72.8	61.3
2nd quarter	72.8	72.5	60.1	84.1
3rd quarter	63.4	65.2	41.2	97.6
4th quarter	66.3	59.0	70.6	93.5
Average	66.0	65.5	59.2	84.8
1930				
1st quarter	54.5	56.2	62.5	41.6
2d quarter	58.0	58.2	53.4	57.8
3d quarter	51.9	47.2	55.2	74.7
4th quarter	51.2	35.4	87.5	73.3
Average	53.4	50.4	63.0	60.7
1931				
1st quarter	40.5	33.0	83.7	16.5
2d quarter	53.3	48.3	83.5	36.3
3d quarter	43.1	35.3	71.1	46.7
4th quarter	30.8	2.7	114.1	24.3
Average	42.0	37.2	88.1	29.0
1932				
1st quarter	33.5	12.5	86.1	----------
2d quarter	25.6	14.0	152.7	----------
3d quarter	10.9	----------	103.0	----------
4th quarter	9.5	----------	107.5	5.1
Average	22.2	----------	120.0	----------
1933				
1st quarter	----------	----------	116.1	----------
2d quarter	47.5	40.1	107.9	4.6
3d quarter	51.0	50.5	97.1	49.0
4th quarter	41.9	28.5	149.1	4.9
Average	37.6	28.9	118.6	----------
1934				
1st quarter	44.0	36.3	132.7	----------
2d quarter	50.6	60.1	116.0	----------
3d quarter	41.0	40.9	111.6	----------
4th quarter	35.9	23.4	173.6	----------
Average	45.5	40.5	131.9	----------
1935				
1st quarter	50.0	55.1	209.2	----------
2d quarter	68.4	68.4	151.9	----------
3d quarter	52.9	52.2	112.8	----------
4th quarter	75.7	66.1	137.7	78.5
Average	65.5	61.3	147.0	----------

Relation between earnings and stock prices, 1924–1937—Continued

[Index numbers 1926=100]

	Composite	Industrials	Public utilities	Railroads
1936				
1st quarter	53.7	52.8	122.8	----------
2d quarter	76.8	75.6	121.6	15.8
3d quarter	62.6	60.5	105.5	52.2
4th quarter	80.5	70.6	158.8	86.8
Average	69.1	65.8	127.4	38.6
1937				
1st quarter	63.8	60.5	135.7	25.5
2d quarter	80.6	81.6	155.9	14.6

APPENDIX C

Summary of comparison of reproduction cost estimates in rate cases[1]

[Detail pages 131 to 138]

	No. of cases	Appraisal amounts			Excess of company appraisal
		Company	City or commission	Excess of company appraisal	
					Percent
Year 1928	25	$67, 495, 001	$51, 965, 943	$15, 529, 058	29. 88
Year 1929	32	396, 382, 303	267, 409, 792	128, 972, 511	48. 23
Year 1930	18	185, 542, 529	138, 940, 783	46, 601, 746	33. 54
Year 1931	18	321, 257, 149	210, 931, 858	110, 325, 291	52. 30
Year 1932	10	152, 413, 117	74, 320, 022	78, 093, 095	105. 08
Year 1933	20	276, 949, 277	180, 569, 492	96, 379, 785	53. 38
Total	123	1, 400, 039, 376	924, 137, 890	475, 901, 486	51. 50

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[1] The cases shown in this appendix are all the cases reported in Public Utility Reports for the years 1928 to 1933, inclusive, for which comparable information was given.

Reproduction cost estimates in rate cases—1928–1933

YEAR 1928

Name of case	Jurisdiction	P. U. R. reference	Appraisal amounts			Percent excess of company appraisal
			Company	City or commission	Excess of company appraisal	
1. Re Home Telephone Company	Indiana P. S. C.	1928 A 450	$1,187,746	$998,681	$189,065	18.93
2. Re Georgia Power Company	Georgia P. S. C.	1928 A 834	23,352,860	19,614,216	3,738,644	19.06
3. Knoxville *v.* South Pittsburg Water Co.	Pennsylvania P. S. C.	1928 B 211	9,112,933	8,211,343	901,590	10.98
4. Re Clarksburg Light & Heat Co.	West Virginia P. S. C.	1928 B 296	4,482,000	2,004,143	2,477,857	123.64
5. Shamokin *v.* Roaring Creek Water Co.	Pennsylvania P. S. C.	1928 B 393	4,000,000	2,000,000	2,000,000	100.00
6. City of Erie et al. *v.* Mutual Telephone Company	Pennsylvania P. S. C.	1928 B 537	5,023,494	421,828	771,666	18.15
7. Clearfield *v.* Clearfield Water Company	Pennsylvania P. S. C.	1928 B 633	803,379	413,344	390,035	94.36
8. Re Pomona Valley Telephone and Telegraph Union.	California R. R. Com.	1928 B 707	729,231	684,350	44,881	6.56
9. Re Northwestern Indiana Telephone Co. et al.	Indiana P. S. C.	1928 B 729	545,672	491,179	54,493	11.09
10. Re Clinton County Telephone Co.	Missouri P. S. C.	1928 B 796	221,017	200,231	20,786	10.38
11. Re Pekin Water Works Co.	Illinois Commerce Com.	1928 C 269	639,146	541,370	97,776	18.06
12. Re Associated Telephone Co.	Indiana P. S. C.	1928 C 295	340,332	273,000	67,332	24.66
13. Borough of Keyport *v.* County Gas Company	New Jersey Board of Public Utility Comrs.	1928 C 327	1,749,481	1,160,444	589,037	50.76
14. Re Capital City Water Company	Missouri P. S. C.	1928 C 442	880,779	677,314	203,465	30.04
15. Re Guilford Chester Water Co.	Connecticut P. U. C.	1928 C 549	1,548,786	1,168,801	379,985	32.51
16. Re Madison Railways Co.	Wisconsin R. R. Com.	1928 C 844	1,960,216	1,203,000	757,216	62.94
17. University City *v.* West St. Louis Water & Light Co.	Missouri P. S. C.	1928 D 337	6,261,899	4,460,278	1,801,621	40.39
18. Re Capital City Telephone Co.	Missouri P. S. C.	1928 D 766	291,554	218,395	73,159	33.50
19. Dept. of Public Works *v.* Morton Electric Co.	Washington Dept. Pub. Wks.	1928 D 813	34,179	20,064	14,115	70.35
20. Re Decatur County Independent Telephone Co.	Indiana P. S. C.	1928 E 5	360,000	325,000	35,000	10.77
21. Re Lexington Water Company	Missouri P. S. C.	1928 E 329	390,117	275,216	114,901	41.75

Reproduction cost estimates in rate cases—1928–1933—Continued

Name of case	Jurisdiction	P. U. R. reference	Appraisal amounts			Percent excess of company appraisal
			Company	City or commission	Excess of company appraisal	
22. Re Elwood Water Company	Indiana P. S. C.	1928 E 702	$650,000	$329,529	$320,471	97.25
23. Re Logansport Telephone Company	Indiana P. S. C.	1928 E 719	932,245	640,044	292,201	45.65
24. Santa Barbara *v.* Southern Counties Gas Company.	California R. R. Com.	1928 E 771	1,479,935	1,488,423	8,488	[1](0.57)
25. Electric Public Utility Company *v.* Public Service Commission.	Maryland Circuit Court	1928 E 956	518,000	315,750	202,250	64.05
Total for 1928			67,495,001	51,965,943	15,529,058	29.88
YEAR 1929						
1. Mayor of Hyattsville *v.* Washington Suburban Gas Co.	Maryland Public Service Commission.	1929 E 4, 6	$892,984	$685,140	$207,844	30.34
2. Re Public Service Electric and Gas Co.	New Jersey Board of Public Utilities Commissioners.	1929 E 17	197,673,670	114,408,002	83,265,668	72.78
3. Re Minier Mutual Telephone Company	Illinois Commerce Commission	1929 E 285	135,133	97,785	37,348	38.19
4. Public Utilities Commission *v.* Camden & Rockland Water Co.	Maine Public Utilities Commission.	1929 E 226, 230	1,311,667	1,157,924	153,743	13.28
5. Re City of Fresno	California Railroad Commission	1929 E 503, 507	3,030,754	1,662,601	1,368,153	82.29
6. Re Lincoln Telephone & Telegraph Company	Nebraska State Railway Commission.	1929 E 512	314,834	268,653	46,181	17.19
7. Re Southern California Telephone Company	California Railroad Commission	1929 E 610, 613	100,000,000	97,100,000	[2]2,900,000	2.98
8. Re Southern Indiana Telephone Company	Indiana Public Service Commission.	1929 E 641, 645	64,029	58,573	5,456	9.19
9. R. Illinois Water Service Company	Illinois Commerce Commission	1929 E 650, 652	746,763	569,705	177,058	31.08

10. Plainfield-Union Water Co. *v.* Board of Public Util. Commissioners of N. J.	United States District Court, D. New Jersey.	1929 D 3, 13, 23	6,066,823	3,243,677	2,823,146	87.04
11. Re Oconto City Water Supply Company	Wisconsin Railroad Commission	1929 D 65	301,082	211,574	89,508	42.31
12. Re Lincoln Telephone & Telegraph Company	Nebraska State Railway Commission.	1929 D 116, 119	53,817	40,194	13,623	33.89
13. Re Lambertville Water Co.	N. J. Board of Public Util. Commissioners.	1929 D 138	203,984	114,772	89,212	77.73
14. Franks *v.* Johnstown Tel. Co.	Pa. Public Service Comm	1929 D 161	2,403,115	1,719,507	683,608	39.76
15. Columbia *v.* Columbia Water Co.	Pa. Public Service Comm	1929 D 289	498,431	372,481	125,950	33.81
16. Greencastle Water Works Co. *v.* P. S. Comm. of Indiana et al.	U. S. Dist. Ct. S. D. Indiana, Indianapolis Division.	1929 D. 287, 293, 294, 295.	523,500	334,164	189,336	56.66
17. James W. Sharp et al. *v.* Newville Water Co.	Pa. Public Service Comm	1929 618	67,474	40,238	27,236	67.69
18. Re City of Los Angeles et al.	Cal. R. R. Comm	1929 C 380, 396	827,818	668,330	159,488	23.86
19. City of Erie *v.* Pa. P. S. Comm	Pa. Superior Court	1929 C 568	5,023,494	4,251,826	771,668	18.15
20. Worcester Electric Lt. Co. *v.* Henry C. Atwill et al.	U. S. District Court, Massachusetts.	1929 B 1, 34	16,242,027	9,898,805	6,343,222	64.08
21. P. S. Comm. *v.* Great Northern Utilities Co.	Montana P. S. Comm	1929 B 177	199,709	36,267	163,442	450.66
22. James W. Sharp et al. and Borough of Newville *v.* Newville Water Co.	Penn. P. S. Comm	1929 B 320	67,474	40,238	27,236	67.69
23. Re Madison Telephone Co.	Nebr. State Railway Comm	1929 B 385	103,379	91,825	11,554	12.58
24. Re Middle States Telephone Co.	Ill. Comm. Comm	1929 B 390, 393	582,196	567,042	15,154	2.67
25. Re Dixon Water Co.	Ill. Comm. Comm	1929 B 403	491,885	434,027	57,858	13.33
26. Re Vermont Teleph. & Exch. Co.	Ill. Comm. Comm	1929 B 411	17,923	14,611	3,312	22.67
27. Pittsburgh *v.* Peoples Natural Gas Co.	Penn. P. S. Comm	1929 B 526, 529	53,426,292	24,374,207	29,052,085	119.19
28. Re Middle States Utilities Co.	Mo. P. S. Comm	1929 B 554, 556	72,011	56,351	15,660	27.79
29. Jones *v.* Wabash Valley Elec. Co.	Indiana P. S. Comm	1929 B 562	88,721	72,157	16,564	22.96
30. University City *v.* West St. Louis Water & Light Co.	Mo. P. S. Comm	1929 612	4,331,634	4,278,427	53,207	1.24
31. Re Northern Indiana Tel. Co.	Ind. P. S. Comm	1929 A 74	564,340	506,597	57,743	11.40
32. Long *v.* Snow Shoe Water Co.	Penn. P. S. Comm	1929 A 655	55,240	[1]33,990	21,250	62.52
Total for year 1929			396,382,303	267,409,792	128,972,511	48.23

[1] Decrease.

Reproduction cost estimates in rate cases—1928–1933—Continued

YEAR 1930

Name of case	Jurisdiction	P. U. R. reference	Appraisal amounts			Percent excess of company appraisal
			Company	City or commission	Excess of company appraisal	
1. Re Salamonia Tel. Co.	Ind. P. S. Comm.	1930 E 39, 40	$29,352	$17,899	$11,453	63.99
2. Re Cambridge Home Tel. Co.	Ohio P. U. Comm.	1930 E 65, 73	630,396	395,576	234,820	59.36
3. Re Ind. Service Corp.	Ind. P. S. Comm.	1930 E 276, 278	6,106,011	5,664,009	442,002	7.80
4. Re Kansas City Public Service Co.	Mo. P. S. Comm.	1930 E 384, 395	40,615,610	33,826,216	6,789,394	20.07
5. Re Iroquois Gas Corp.	N. Y. Dept. of Public Service, State Div., P. S. Comm.	1930 D 31, 32	53,430,014	27,137,668	26,292,346	96.89
6. Me. P. U. Comm. *v.* Gould Elec. Co.	Me. P. U. Comm.	1930 D 289, 294	546,495	375,630	170,865	45.49
7. Re Home Telephone Co.	Ind. P. S. Comm.	1930 D 481	243,647	157,738	85,909	54.46
8. Re Mich. Federated Utilities, Mt. Clemens Division.	Mich. P. U. Comm.	1930 D 506	1,453,088	1,413,733	39,355	2.78
9. Fort Worth Gas Co. *v.* City of Fort Worth et al.	U. S. Dist. Ct. N. D., Texas, Fort Worth Division.	1930 C 203, 205, 210.	6,297,976	3,426,570	2,871,406	83.80
10. Re Pacific Telephone & Telegraph Co.	Cal. R. R. Comm.	1930 C 481, 498	63,086,000	56,863,987	6,222,013	10.94
11. Vincennes Water Supply Co. *v.* P. S. Comm. of Ind.	U. S. Circuit Court of Appeals Seventh Circuit.	1930 B 216, 220, 221.	1,163,719	778,769	384,950	49.43
12. Re Starke County Tel. Co.	Ind. P. S. Comm.	1930 B 336	58,544	49,351	9,193	18.63
13. Re Northwestern Ind. Tel. Co.	Ind. P. S. Comm.	1930 B 431, 434	199,350	181,477	17,873	9.85
14. Re Ill. Bell Tel. Co., Decatur Exchange	Ill. Comm. Comm.	1930 B 455, 456	2,076,386	1,865,078	211,308	11.33
15. Re Wisconsin Public Util. Co.	Wis. R. R. Comm.	1930 A 119	564,584	500,526	64,058	12.80
16. Re Ill. Bell Tel. Co., Edwardsville Exchange	Ill. Comm. Comm.	1930 A 143, 145	269,492	220,283	49,209	22.34

17. West Palm Beach Water Co. *v.* City of West Palm Beach.	U. S. Dist. Ct. Sou. Dist. of Florida.	1930 A 177, 187	5,969,186	3,544,835	2,424,351	68.39
18. Re Citizens Independent Tel. Co.	Ind. P. S. Comm.	1930 A 431	2,802,079	2,521,438	280,641	11.13
Total for year 1930			185,542,529	138,940,783	46,601,746	33.54

YEAR 1931

1. Village of Blair *v.* Northern States Power Company.	Wisconsin R. R. Commission	1931 A 91	312,357	216,482	95,875	44.41
2. Re Los Angeles Gas & Electric Corp.	California R. R. Commission	1931 A 147, A 166	95,767,351	65,500,000	30,267,351	46.21
3. Re Southern Indiana Gas & Elec. Co.	Indiana P. S. C.	1931 A 404	689,455	598,275	91,180	15.24
4. Re Johnson County Telephone Co.	Indiana P. S. C.	1931 A 451	401,443	303,881	97,562	32.11
5. Re Bowdoin Utilities Company	Montana P. S. C.	1931 B 25, B 43	750,564	622,606	127,958	20.55
6. Re Ohio Bell Telephone Company	Ohio P. U. C.	1931 B 51	144,995,146	91,061,900	53,933,246	59.23
7. Re Springfield City Water Company	Missouri P. S. C.	1931 B 82	4,066,500	3,203,566	862,934	26.94
8. Re Beckley Water Company	West Virginia P. S. C.	1931 B 279	532,404	326,495	205,909	63.07
9. Re United Corporation	Indiana P. S. C.	1931 B 501	102,409	74,089	28,320	38.22
10. City of Elko *v.* Elko Lamoille Power Company	Nevada P. S. C.	1931 C 20	428,789	319,909	108,880	34.03
11. Re Mondovi Telephone Company	Wisconsin R. R. Commission	1931 C 442	61,412	56,252	5,160	9.17
12. Re Escanaba Power & Traction Co.	Michigan P. U. C.	1931 D 154	2,162,364	1,428,223	734,141	51.40
13. Re Utica Gas & Electric Company	New York Dept. of P. S. State Div. Public Service Commission.	1931 D 309	20,285,500	9,246,468	11,039,032	119.39
14. Re City of Spooner	Wisconsin R. R. Com.	1931 E 43	99,657	54,805	44,852	81.84

Reproduction cost estimates in rate cases—1928–1933—Continued

YEAR 1931—Continued

Name of case	Jurisdiction	P. U. R. reference	Appraisal amounts			Percent excess of company appraisal
			Company	City or commission	Excess of company appraisal	
15. Re Community Telephone Co.	Wisconsin P. S. C.	1931 E 63	$64, 362	$56, 998	$7, 364	12. 92
16. City of Charleston et al. *v.* Public Service Commission.	W. Va. Supreme Court of Appeals.	1931 E 76	38, 243, 345	26, 569, 430	11, 673, 915	43. 94
17. Re Michigan Home Telephone Co.	Michigan P. U. C.	1931 E 440	1, 643, 302	1, 475, 384	167, 918	11. 38
18. Re Atlanta Gas Company	Georgia P. S. C.	1931 E 464, E 466	10, 940, 819	10, 018, 125	922, 694	9. 21
Total for 1931			321, 257, 149	210, 931, 858	110, 325, 291	52. 30

YEAR 1932

Name of case	Jurisdiction	P. U. R. reference	Company	City or commission	Excess of company appraisal	Percent excess of company appraisal
1. City of Vincennes *v.* Vincennes Water Supply Co.	Indiana P. S. C.	1932 A 21	$1, 517, 810	$611, 588	$906, 222	148. 18
2. International Railway Co. *v.* William A. Prendergast, et al.	U. S. District Court, Western District of N. Y.	1932 A 167	55, 000, 000	18, 788, 884	36, 211, 116	192. 73
3. Re United Fuel Gas Co.	W. Virginia P. S. C.	1932 B 66	47, 186, 190	29, 659, 150	17, [illegible]7, 040	59. 09
4. City of Moncton *v.* Moncton Tramways, Electricity & Gas Company, Ltd.	New Brunswick Board of Comrs. of P. U.	1932 B 374	385, 214	336, 020	49, 194	14. 64
5. Re Alexandria Water Co.	Virginia State Corp. Com.	1932 C 350	2, 026, 895	1, 145, 000	881, 895	77. 02
6. Scranton-Spring Brook Water Service Company et al. *v.* Public Service Commission of Pennsylvania.	Pennsylvania Superior Court.	1932 C 477	39, 976, 705	19, 586, 596	20, 390, 109	104. 10
7. Re City of Visalia	California R. R. Commission	1932 C 520	248, 408	89, 329	159, 079	178. 08
8. Re Ohio Central Telephone Corp.	Ohio P. U. C.	1932 D 441	1, 594, 203	953, 511	640, 692	67. 19

9. Central Kentucky Gas Co. *v.* Railroad Commission of Kentucky et al.	U. S. District Court, Eastern Dist. of Ky.	1932 E 71	2,028,069	1,189,489	838,580	70.50
10. Re Missouri Utilities Company et al.	Missouri P. S. C.	1932 E 462	2,440,623	1,960,455	480,168	24.95
Total for 1932			152,413,117	74,320,022	78,093,095	105.08

YEAR 1933

1. Public Util. Comm. et al. *v.* Newport Water Corp.	R. I. Public Util. Comm.	1933 E 1	$3,533,087	$2,241,720	$1,291,367	57.61
2. Borough of Grove City *v.* Union Heat & Light Co.	Penn. P. S. Comm.	1933 E 90	823,344	430,477	392,867	91.26
3. City of Mauston *v.* Mauston Tel. Co.	Wis. P. S. Comm.	1933 E 161	55,903	48,842	7,061	14.46
4. City of Seattle *v.* Seattle Gas Co.	Wash. Dept. of Public Works	1933 E 253	15,327,289	11,761,320	3,565,969	30.32
5. City of Trenton *v.* Mo. Public Service Company	Mo. P. S. Comm.	1933 E 270	288,890	231,972	56,918	24.54
6. P. S. Comm. of Mo. *v.* East Mo. Power Co.	Mo. P. S. Comm.	1933 E 369	707,566	548,276	159,290	29.05
7. City of Wheeling *v.* Natural Gas Co. of W. Va.	W. Va. P. S. Comm.	1933 D 1, 21	10,061,736	6,695,387	3,366,349	50.28
8. Clark's Ferry Bridge Co. *v.* P. S. Comm. of Pa.	Pa. Superior Court	1933 D 173, 178	1,029,297	741,871	287,426	38.74
9. Mont. P. S. Comm. *v.* Billings Gas Co. (and Gallatin Natural Gas Co.).	Mont. P. S. Comm.	1933 D 341	1,165,798 1,678,836	719,331 949,728	446,467 729,108	62.07 76.77
10. Okla. Corp. Comm. Re. Lone Star Gas Co. et al.	Okla. Corp. Comm.	1933 C 1, 17, 22	70,595,343	41,391,666	29,203,677	70.55
11. Re Indiana (Interstate) Public Service Company.	Ind. Public Service Comm.	1933 C 274	209,681	155,000	54,681	35.28
12. Re Broad River Power Co.	S. C. R. R. Comm.	1933 C 351, 359	26,319,132	12,847,671	13,471,461	104.86
13. Re Potomac Edison Co.	Maryland P. S. Comm.	1933 B 6, 41	14,801,560	10,131,370	4,670,190	46.10
14. Re Yonkers Railroad Co.	N. Y. Dept. of P. S., State Division.	1933 B 61, 65	5,104,648	3,851,865	1,252,783	32.52
15. Elko-Lamoille Power Co. *v.* P. S. Comm. of Nevada et al.	U. S. Dist. Ct. D. Nevada	1933 B 191, 199	518,138	372,884	145,254	38.95
16. Wichita Gas Co. *v.* P. S. Comm. of Kans.	U. S. Dist. Ct. D. Kansas, First Division.	1933 B 225, 242, 243	105,000,000	73,000,000	32,000,000	43.84
17. Re Augusta Lt. & Tel. Co.	Wis. P. S. Comm.	1933 B 478, 481	38,512	24,477	14,035	57.34
18. Fort Fairfield Lt. & Pr. Co. et al. *v.* Me. Public Service Co.	Me. P. S. Comm.	1933 B 493	1,882,508	1,504,864	377,644	25.09
19. Re Patrons of Clinton Electric Lt. & Pr. Co.	Conn. P. U. Comm.	1933 A 467, 472	355,450	254,107	101,343	39.88

Reproduction cost estimates in rate cases—1928–1933—Continued

YEAR 1933—Continued

Name of case	Jurisdiction	P. U. R. reference	Appraisal amounts			Percent excess of company appraisal
			Company	City or commission	Excess of company appraisal	
20. Re Northwestern Elec. Co.	Ore. P. U. Comm.	1933 A 493, 499	$17,452,569	$12,666,669	$4,785,900	37.78
Total for year 1933			276,949,277	180,569,492	96,379,785	53.38
Total, years 1928 to 1933, inclusive (123 cases)			1,400,059,376	924,157,880	475,901,496	51.50

APPENDIX D

Tabulation of States having statutes authorizing public service commissions to regulate the issuance of securities of electric or gas utilities and statutes authorizing commissions to prescribe a uniform system of accounts for such utilities

Authority to regulate issuance of securities		
States having authority	Statutory reference	States having no authority
Alabama	Secs. 9744-9753, Code of Ala., 1923.	Colorado.
Arizona	Sec. 708, Rev. Code of Ariz., 1928.	Delaware.[1]
Arkansas	Act 324, Acts of Gen. Assembly of Ark., for 1935, Secs. 58 & 59.	Florida.[2]
		Idaho.
California	L. 1915, Ch. 91, Sec. 52 (a).	Iowa.[2]
Connecticut	Ch. 191, Public Acts of 1935.	Louisiana.
District of Columbia	D. C. Code, T. 26, Sec. 99.	Minnesota.[2]
Georgia	Sec. 2665, 1926 Code.	Mississippi.[2]
Illinois	R. S. 1933, Ch. 111a, Sec. 35.	Montana.
Indiana	Ch. 5, Pub. Serv. Acts, Secs. 54-503, 54-504.	Nevada.
Kansas	Sec. 66-125, Gen. Sts. of Kans., 1935.	Oklahoma.
Kentucky	Sec. 3959-24, Ky. Stats.	South Dakota.[2]
Maine	Sec. 41, Ch. 62, Rev. Stats.	Texas.[3]
Maryland	Sec. 392, Art. 23, Ann. Code of P. G. L. of Md.	Utah.
Massachusetts	Ch. 222, Mass. Acts of 1935.	West Virginia.
Michigan	Sec. 11077, Compiled Laws of 1929.	Wyoming.
Missouri	Secs. 5195-5196, Rev. St., 1929.	
Nebraska	Secs. 75-1201, C. S., 1929.	
New Hampshire	Ch. 24, Sec. 1, P. L. of N. H.	
New Jersey	Sec. 167-24 (e) & (f), Supp.	
New Mexico	Secs. 32-705, 32-706, 1929 C. L.	
New York	Sec. 69, Public Service Law.	
North Carolina	C. S. 1112 (18); Sec. 18, Ch. 307 P. L. 1933.	
North Dakota	Sec. 4609c 20; Supp. C. L. of N. D.	
Ohio	Secs. 614-53-54-55, Gen. Code of Ohio.	
Oregon	Ch. 441, Ore. L. 1933.	
Pennsylvania	Art. VI, Secs. 601-604, L. 1937.	
Rhode Island	Ch. 2345, P. L. of 1926.	
South Carolina	1932 Reg. Act, Sec. 1 (l), Sec. 2 (m) & (s).	
Tennessee	Sec. 5452 (d), Code of Tenn.	
Vermont	Sec. 5953, P. L. Vt. Also Secs. 5991 & 6105.	
Virginia	Ch. 160A, Secs. 4073(1)-4073(16).	
Washington	Sec. 2, Ch. 540, L. 1933.	
Wisconsin	Ch. 184, Wisc. Stats.	

Authority to prescribe uniform system of accounts			
States having authority	Statutory reference	Date of first order adopting uniform system of accounts	States having no authority
Alabama	Secs. 9786-9788, Code of Ala., 1923	February 6, 1924	Delaware.[1]
Arizona	Sec. 3, Const. Art. XV	1928.	Florida.[2]
Arkansas	Act 324, Acts of Gen. Assembly of Ark., 1935, Secs. 22 (a) & 8 (c).	None adopoted.	Iowa.[2]
		October 28, 1912	Louisiana.
California	Sec. 48, Act 6386, G. L.	January 10, 1916	Minnesota.[2]
Colorado	Sec. 33, p. 480, L. 1913	November 1, 1928	Mississippi.[2]
Connecticut	Sec. 3602, Gen. Sts. Rev. 1930	1930	New Mexico.
District of Columbia	Sec. 32-37, T. 26, D. C. Code	October 24, 1922	South Dakota.[2]
Georgia	Sec. 2663, Code 1926	October 27, 1913	Texas.[3]
Idaho	Sec. 59-524, —525, Id. Code Ann.	1919	
Illinois	Secs. 11-15, Ch. 111 2/3, R. S. 1933		
Indiana	Sec. 54-209, P. S. C. Acts	May 1, 1913	
Kansas	Secs. 66-122, 123, R. S.	October 27, 1922	
Kentucky	Sec. 4 (l), p. 580, L. 1934	1936	
Maine	Secs. 17-21, Ch. 62, R. S.	July 1, 1915	
Maryland	Sec. 388, Art. 23, Ann. Code, P. G. L. of Md.	June 12, 1911	
Massachusetts	Ch. 382, Mass. Acts of 1887	1887	
Michigan	Sec. 11098, Ch. 209, C. L.	December 18, 1914	
Missouri	Sec. 5190, Mo. Stats. Ann.	January 1, 1915	
Montana	Sec. 3885, Code of 1921	1913	
Nebraska	Sec. 1, Const. Art. X	None adopted.	
Nevada	Sec. 6109, C. L.	None adopted.	
New Hampshire	Sec. 7, Ch. 240, Public Laws	1914	
New Jersey	Sec. 167-17 (d), Supp.	December 3, 1912	
New York	Sec. 66, subd. 4, P. S. L.	October 21, 1908	
North Carolina	C. S. 1112 (13); Sec. 13, Ch. 307, P. L. 1933	November 18, 1931	
North Dakota	Ch. 192, L. 1919	July 29, 1921	
Ohio	Sec. 614-10, Gen. Code	January 1, 1915	
Oklahoma	Okla. Stats. 3620	July 1, 1914	
Oregon	Or. C., Sec. 61-211-212	June 16, 1913	
Pennsylvania	Sec. 1404, Art. V, P. U. Law	November 19, 1918	
Rhode Island	Sec. 58, Ch. 253, G. L. 1923	None adopted.	
South Carolina	Sec. 2 (o), 1932 Reg. Act	January 1, 1931	
Tennessee	Sec. 5451, Tenn. Code	December 28, 1922	
Utah	Sec. 76-4-22, R. S.	December 26, 1922	
Vermont	Sec. 6096, P. L. of Vt.	May 27, 1929	
Virginia	Sec. 4070, Va. Code	December 11, 1926	
Washington	Sec. 2, Ch. 151, L. 1933	January 28, 1913	
West Virginia	Sec. 8, Art. 2, Ch. 24, Code of W. Va.	March 6, 1923	
Wisconsin	Sec. 196.06 Wisc. Stats.	December 15, 1908	
Wyoming	Sec. 94-144, R. S. 1931	March 13, 1923	

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[1] Delaware has no regulatory commission.

[2] Regulatory Commission of this State has no jurisdiction over electric or gas utilities.

[3] Regulatory Commission of this State has no jurisdiction over valuation or rates of electric utilities.

U. S. GOVERNMENT PRINTING OFFICE : 1941

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No. 268

In the Supreme Court of the United States

OCTOBER TERM, 1941

NATURAL GAS PIPELINE COMPANY OF AMERICA AND
TEXOMA NATURAL GAS COMPANY, PETITIONERS

v.

FEDERAL POWER COMMISSION AND ILLINOIS
COMMERCE COMMISSION

ON CROSS-PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT OF APPEALS FOR THE SEVENTH CIRCUIT

MEMORANDUM FOR THE RESPONDENTS FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION

In the Supreme Court of the United States

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ON CROSS-PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT OF APPEALS FOR THE SEVENTH CIRCUIT

MEMORANDUM FOR THE RESPONDENTS FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION

This case involves review of an interim order of the Federal Power Commission issued under the Natural Gas Act of 1938, 52 Stat. 821, 15 U. S. C., Supp. V, §§ 717–717w, ordering a reduction in the rates charged by petitioners. The respondents have hitherto filed a petition, No. 265, for a writ of certiorari to review the issues decided adversely to the Federal Power Commission and the Illinois Commerce Commission by the court below. The cross-petition presents those questions which the court below either decided favorably to the respondents or failed to consider. The questions presented by the cross-petition are, for the most part, of general importance in the administration of the Natural Gas Act and may all appropriately be considered in determining whether the court below properly vacated the order of the Federal Power Commission. Accordingly, we do not oppose the granting of the writ on this cross-petition in the event the Court grants the writ in No. 265.

Respectfully submitted.

CHARLES FAHY,
Acting Solicitor General.
GEORGE F. BARRETT,
Attorney General of Illinois.

AUGUST 1941.

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Petitioners,
vs.
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Respondents.

CROSS-PETITION FOR THE WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT AND BRIEF IN SUPPORT THEREOF.

J. J. HEDRICK,
GEORGE I. HAIGHT,
S. A. L. MORGAN,
Attorneys for Petitioners.

THE GUNTHORP-WARREN PRINTING COMPANY, 215 WEST JACKSON, CHICAGO

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IN THE

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vs.

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AND

ILLINOIS COMMERCE COMMISSION,

Respondents.

CROSS-PETITION FOR THE WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SEVENTH CIRCUIT AND BRIEF IN SUPPORT THEREOF.

To the Honorable the Chief Justice and the Associate Justices of the Supreme Court of the United States:

The cross-petition of Natural Gas Pipeline Company of America and Texoma Natural Gas Company, hereinafter called "petitioners", respectfully shows:

A.

Summary Statement of the Matter Involved.

1. The respondent herein, Federal Power Commission, has filed in this Court a petition, Docket No. 265, for the writ of certiorari to the United States Circuit Court of Appeals for the Seventh Circuit to review a judgment of that Court entered on April 14, 1941.[1] Petitioners will file their brief in opposition to said petition in cause No. 265. By the present petition, petitioners seek review of certain questions, only in the event that this Court grants the petition in Docket No. 265.

2. This is the first rate regulatory proceeding under the Natural Gas Act (15 U. S. C. 717, *et seq.*, 52 Stat. 821, *et seq.*, effective June 21, 1938), hereinafter referred to as the "Act." The pertinent sections of the Act are set forth in the Appendix hereto, page 25. This proceeding was initiated by a complaint against petitioners filed with the Federal Power Commission, hereinafter called "Commission", by the Illinois Commerce Commission, hereinafter called "complainant" (R. Vol. I, p. 1). Involved in this proceeding is a so-called "interim" order (R. Vol. VIII, pp. 3942-46) entered by the Commission on July 23, 1940, directing petitioners on or before August 15, 1940, to file new schedules of rates and charges for natural gas sold at wholesale which should "reflect" a reduction in operating revenues of petitioner Natural Gas Pipeline Company of America of not less than $3,750,000 per annum (R. Vol. VIII, p. 3946). The order further provided that the new schedules "shall be effective as to all bills regularly rendered on and after September 1, 1940" (R. Vol.

---

[1] Petitioners are not filing the record with this cross-petition, but intend that, to avoid duplication, the record filed in Docket No. 265 be used with this petition. Since petitioners have not been served with a copy of the record filed in cause No. 265, record references to the proceedings in the Court of Appeals are necessarily omitted in this cross-petition. However, it is assumed that the transcript of proceedings in the Court of Appeals, including the opinion and judgment, will be appended to Volume VIII of the record printed for use below.

VIII, p. 3946). The opinion of the Commission appears at R. Vol. VIII, pp. 3925-42. On August 8, 1940, the said Commission amended its order to extend the time for filing the new schedules to September 1, 1940.

3. Upon petitioners' petition for review under Section 19(b) of the Act (15 U. S. C. 717 r-b), the Circuit Court of Appeals for the Seventh Circuit set aside the so-called "interim" order as amended and remanded the case for further proceedings in conformity with its opinion. That Court held that the Commission erred:

a. in failing to include in the rate base and in the amount to be amortized an allowance as going-concern value of the actual costs incurred in developing the markets;

b. in fixing the period of amortization at twenty-three years, beginning with the commencement of petitioners' operations on January 1, 1932, several years prior to the enactment of the Natural Gas Act, and ending December 31, 1954, adopted by the Commission as the date at which the economic life of petitioners' reserves of natural gas would be exhausted, instead of the period beginning with the time when petitioners were first subjected to regulation by the enactment of the Natural Gas Act and ending December 31, 1954;

c. in failing to use the present fair value, including going-concern value, instead of the original cost of present facilities, in fixing the amount to be amortized; and

d. in failing to use present fair value, including going-concern value, of existing facilities other than gas reserves and the proper allowance under the principle of average investment for necessary future capital expenditures, in fixing the rate base, instead of reproduction cost undepreciated of present facilities and actual cost of future facilities only through the year 1942.

4. Petitioners, operated as a single enterprise (R. Vol. I, p. 11), are engaged in producing, purchasing, transport-

ing, and selling natural gas (R. Vol. I, p. 11). Petitioners built and now maintain and operate a pipeline from the Texas Panhandle, where the gas reserves are located, to a point near Joliet, Illinois (R. Vol. I, p. 514). With respect to sale, the Act applies only "to the sale in interstate commerce of natural gas for resale for ultimate public consumption for domestic, commercial, industrial, or any other use * * *" (Sec. 1, 15 U. S. C. 717). About 90% of the gas sold by petitioners is purchased in interstate commerce by Chicago District Pipeline Company for resale to public utilities in the Chicago area (R. Vol. I, p. 3); the remaining 10% is purchased in interstate commerce by public utilities for resale and by industrial consumers along the pipeline (R. Vol. I, p. 3). The rates at which petitioners sell at wholesale vary, dependent upon the use to which the gas is put by the ultimate consumer (R. Vol. II, p. 687-8). These rates or prices were fixed by private contracts at a time when petitioners constituted a strictly private enterprise, long prior to their being subjected to regulation by the enactment of the Natural Gas Act. Petitioners have not held, and do not now hold, themselves out to sell gas to all who apply, but have confined their sales to a few selected buyers under private contracts (R. Vol. I, p. 11). This ~~case~~ differs from the ordinary public utility case in that petitioners have not themselves dedicated their properties to a public use. Another distinction between this case and the ordinary public utility case is that petitioners are engaged in an extractive industry, the life of which is definitely limited to the life of the source of supply of natural gas.

5. The undisputed facts are: (1) petitioners' sales are private sales to a few selected buyers; (2) petitioners are not a common carrier; (3) they have not constituted themselves a public utility or dedicated their property to the public use by offering to sell their commodity to all who apply; and (4) the industry in which they are engaged is

not one in which "free competition had been 'degraded into anarchy'" (*Sunshine Anthracite Coal Co.* v. *Adkins*, 310 U. S. 381, 395) (on the contrary, respondents contend that petitioners are too prosperous). Despite these facts the Court of Appeals held that the Act as applied to petitioners is valid under the Fifth Amendment to the United States Constitution. That Court also held that the Act and the regulation sought to be imposed are valid under the Fifth Amendment despite the fact that the Act and such regulation operate to take the use of petitioners' property for the public interest, and prohibit petitioners from withdrawing their property from such use except by permission of the Commission. This ruling is probably in conflict with the decision of this Court in *Wolff* v. *Court of Industrial Relations*, 262 U. S. 522.

6. The Commission did not determine just and reasonable rates and fix the same by order as required by Section 5(a) of the Act (15 U. S. C. 717 d). The Commission merely required that new schedules be put in effect reflecting a reduction in operating revenues to the extent of $3,750,000 per annum (R. Vol. VIII, p. 3946). Petitioners sell gas at various prices for various types of uses (R. Vol. II, p. 687-8). There is no evidence in the record upon which the Commission can determine what the various charges and rates should be. In failing to determine just and reasonable rates and fix the same by order, the Commission failed to carry out the mandate of the statute. The Court of Appeals nevertheless held that this procedure "while irregular and unusual * * * was in no way harmful or prejudicial" to petitioners, and overruled petitioners' contention that for this reason the order is improper and invalid under the Natural Gas Act.

7. The Commission's finding that petitioners' present rates are unreasonable (R. Vol. VIII, p. 3945) is unsupported by any evidence. The Commission was concerned

not with petitioners' rates but only with petitioners' profits. It is apparent from the Commission's opinion and findings that the Commission sought to impose a barely nonconfiscatory return (R. Vol. VIII, p. 3925-46). A rate yielding a return "substantially higher" than a barely nonconfiscatory return may be reasonable (*Banton* v. *Belt Line Corp.*, 268 U. S. 413). Neither the Commission nor complainant introduced any evidence going to the reasonableness or unreasonableness of petitioners' present rates. *Petitioners sell at various rates; not one of these rates was considered by the Commission for the purpose of determining its reasonableness or unreasonableness.* The only fact in the record in any way bearing on the question of reasonableness of the existing rates is that petitioners now earn $2,966,852 a year in excess of the barely nonconfiscatory return and the annual amortization allowance allowed by the Commission. The Court of Appeals held that the rate base fixed by the Commission was inadequate, because it did not include an allowance for present fair value including going-concern value. That Court also held that the annual amortization allowance fixed by the Commission was inadequate because the Commission failed to use present fair value including going-concern value. The average annual earnings of petitioners for the first seven years of the enterprise have been $1,234,118 per year in excess of the amount allowed by the Commission for amortization and return (R. Vol. V, p. 3005). During the whole period from 1932 to 1954, inclusive, petitioner's average annual earnings will be only $1,598,262 per year in excess of the amount allowed by the Commission for amortization and return (R. Vol. V, p. 3023).

The record does not support the Commission's finding that this excess constitutes the rates unjust and unreasonable, but on the contrary shows that the excess is reasonable on account of the great risks and hazards involved in petitioners' business, their past deficits, their declining future returns, and the creative skill and efficiency of the management in the conception, the designing, the construction, and the operation of the enterprise. With respect to petitioners' business, the Circuit Court of Appeals said:

> "They (petitioners) present an amazingly interesting picture of the difficulties of long distance transportation of natural gas, of the tremendous effort, skill, and risk taken by these companies, of the extraordinary improvements necessary in construction and other apparatus, of economic management of business—securing fill-in contracts in slack periods, and maintaining high loads in pipe lines, without which petitioners' business would be on the rocks (or invoking Sec. 77B of the Bankruptcy Act) instead of perplexing commissions and courts with questions arising out of large profits."

The Court of Appeals stated the problem with respect to lack of substantial evidence to support the Commission's finding that the present rates are unreasonable, but did not state any conclusion thereon.

8. The evidence upon which the Commission relied in fixing the rate of return at 6½% contradicts rather than supports the Commission's finding. There is no substantial evidence to support the finding. The figures adopted by the Commission in its opinion (R. Vol. VIII, p. 3939) show that the cost of capital to petitioners would be 6.72%. In addition to the cost of capital, petitioners must be allowed compensation to cover risk, creative enterprise, engineering skill, and especially skillful management. The Court of Appeals erroneously held that there was substantial evidence to support the finding of the Commission that 6½% is an adequate rate of return.

9. Despite the uncontradicted fact that the yield on securities, as nearly risk free as could be obtained, is not more than 2%, the Commission fixed the interest rate to be used in computing the annual allowance for amortiza-

tion by the sinking-fund method at 6½% (R. Vol. VIII, p. 3945), frankly stating in its opinion that it is fair to fix such interest rate at the same figure as the allowed rate of return (R. Vol. VIII, p. 3938). The Circuit Court of Appeals did not consider or pass on this point. That Court erred in failing to hold the action of the Commission on this point to be error.

The Commission overlooked the purpose of the sinking-fund method of computation. The purpose of the sinking fund is to insure a return of the amount to be amortized to the investor at the end of the amortization period. The Commission's order compels the petitioners to speculate to get a return of the amount to be amortized.

10. The Commission adopted the sinking-fund formula for amortization and, hence, purported to adopt an undepreciated rate base. With respect to the physical properties, the Commission did not deduct the observed depreciation from 1932, when petitioners commenced operations, to 1939, the date of the investigation; however, with respect to the gas reserves, the Commission took the value as of June 1, 1939, and thus deducted the depletion of the gas reserves. On the Commission's own theory, petitioners are entitled to a fair return on an undepreciated rate base, but the Commission's order does not permit a return on such a rate base. The finding of the Commission as to the rate base, so far as the Commission went, is based upon petitioners' evidence accepted by the Commission. On that evidence and on the Commission's theory, the Commission's order is on its face confiscatory. The Court of Appeals did not consider this point and thus erred in failing to hold that the Commission's order is confiscatory on this ground.

The Commission allowed the sum of $1,557,852 as the annual allowance for amortization computed by the sinking-fund method using as base a 23-year amortization period, and 6½% compound interest on the [illegible]nd accruals (R. Vol. VIII, p. 3945). The Co[illegible]ixed the amount to be amortized at $78,284,009, w[illegible] the Court of Appeals held to be too low. The annual amortization allowance will not yield that figure on the basis fixed by the Commission. It will produce only $78,045,648. On the basis of its own figures as to the proper amount to be amortized, the Commission's mathematical error results in confiscation of $239,361. The court of Appeals erred in failing to hold that the Commission's order is confiscatory on this ground.

11. Petitioners were required to proceed with their evidence shortly after the beginning of the hearing before the Commission's Trial Examiner and before a case had been made against petitioners (R. Vol. I, p. 15-34). At the conclusion of petitioners' direct testimony (when only 7 of petitioners' 37 witnesses had been cross-examined), a motion by counsel for the Commission and complainant for an "interim" order was filed (R. Vol. VIII, p. 3903-14) and the Commission's so-called "interim" order was entered (R. Vol. VIII, p. 3925-46). The hearing before the Commission has not been concluded (R. Vol. VIII, p. 3946). Under Section 5(a) of the Act (15 U. S. C. 717 d) the Commission has authority to enter an order fixing rates only after a "hearing." The Court of Appeals erroneously held that the so-called "interim" order was within the Commission's jurisdiction and authority.

B.

Jurisdiction.

The jurisdiction of this Court is sustained by Sec. 240(a) of the Judicial Code, as amended by the Act of February 13, 1925 (43 Stat. 938, 28 U. S. C. 347 a) and is also sustained by Sec. 19(b) of the Act (15 U. S. C. 717 r-b). The judgment of the Court of Appeals was entered on April

14, 1941. No petition for rehearing was filed in that Court. The present petition is filed within three months of the entry of the judgment of the Court of Appeals.

C.

Questions Presented and Reasons for Allowance of the Writ.

1. Is the Act, insofar as it purports to authorize the regulation of petitioners' prices for natural gas sold in interstate commerce, fixed by contract prior to the enactment of the Natural Gas Act, invalid as applied to petitioners and petitioners' business because in violation of the Fifth Amendment to the Constitution of the United States?

In view of the facts set forth above in paragraphs 4 and 5, the holding of the Court of Appeals that the Fifth Amendment is not violated is probably in conflict with the decisions of this Court cited in the annexed brief in support of this petition (p. 20, *post*).

If the decision of the Court below is not so in conflict, it decided an important question of Federal law which has not been, but should be, settled by this Court. The question of the validity of the Act is of national importance and concern.

2. Are the Act and the regulation sought to be imposed thereunder invalid under the Fifth Amendment because their necessary operation would be to convert petitioners' property and business from a strictly private to a public use and prohibit petitioners from withdrawing from or discontinuing their business except by permission of the Commission?

The holding of the Court of Appeals that the Fifth Amendment is not violated in this regard is probably in conflict with the decisions of this Court in *Wolff* v. *Court of Industrial Relations*, 262 U. S. 522.

If the decision of the Court below ~~is~~ not so in conflict, it decided an important question of Federal law which has not been, but should be, settled by this Court.

3. Does Section 5(a) of the Act require the Commission, after a proper finding based on substantial evidence that the existing charges are unjust and unreasonable, to determine the just and reasonable rates in each classification of sales by petitioners and fix each new rate by order?

In holding that Section 5(a) of the Act does not require the determination and fixing of rates, and requires no more than consideration of profits, the Court below decided an important question of Federal law which has not been, but should be, settled by this Court. The importance of the question goes far beyond this particular case. The proper administrative procedure under the Act should be settled by this Court. Furthermore, the Court below so far sanctioned a departure from the accepted and usual course of administrative proceedings as to call for an exercise of this Court's power of supervision.

4. Is the Commission's finding that petitioners' present rates are unjust and unreasonable supported by substantial evidence?

The Commission's finding that 6½% per annum is an adequate rate of return is based solely on the Commission's conclusion that petitioners' profits are excessive because they are in excess of a barely compensatory return. That this conclusion is erroneous clearly appears from the holdings of the Court below, namely: that the rate base upon which the Commission measured profits is inadequate; that petitioners' business involves extraordinary risks and hazards; and that the earnings of petitioners have been substantially increased by creative skill in design and construction of their facilities, efficient management in the operation of these facilities, and in the developing and maintaining of an exceptionally high load factor. In the light of these circumstances, the fact that the earnings or profits exceed a barely nonconfiscatory return will not sustain a finding that the charges producing such earnings are unjust and unreasonable. A basic question is whether Section 5(a) of the Act (15 U. S. C. 717 d) requires a finding upon the reasonableness of *each rate* presently charged by petitioners, or whether a general conclusion as to petitioners' profits is a sufficient basis for a finding that *each rate* of petitioners is unreasonable. This question of the proper construction of the Act should be settled by this Court. A proper finding on the issue of reasonableness of present rates is, under Section 5(a) of the Act, a jurisdictional prerequisite to the fixing of new rates. A determination of this question now is important in this case in order that justice be done between the parties, and that a continuation of the hearing, if unnecessary, be obviated. Further, such a determination is important as to what quantum of proof is necessary to support a finding that existing rates are unjust and unreasonable and as to the elements which must be considered in arriving at such a finding.

5. Is the Commission's finding that 6½% per annum is a fair rate of return for petitioners supported by substantial evidence?

In holding that this finding is supported by substantial evidence, the Court below has so far departed from the accepted and usual course of judicial proceedings as to call for an exercise of this Court's power of supervision. The Court below ignored the evidence on which the Commission relied in its opinion, which evidence was to the effect that cost of capital to petitioners would be 6.72%. Furthermore, the Court below failed to give effect to the compelling and uncontradicted evidence on other factors entering into the fixing of a proper rate of return.

6. In computing the annual allowance for amortization by the sinking-fund method, did the Commission err in

disregarding the undisputed evidence as to the earnings which can be realized from investments in the nearest to risk-free securities and in using as the compound interest rate on the sinking-fund accruals the same rate as the rate of return allowed?

This novel and important question should be settled by this Court. A determination of this issue will be more far-reaching than this particular case. If there is to be a continuation of the hearing in this case, a guide to a correct decision should be given.

7. Is the Commission's order confiscatory on its own findings and conclusions in view of its deduction of depletion on the gas reserve in fixing the rate base and mathematical error in computing the annual allowance for amortization?

8. Does the Commission have jurisdiction and authority under the Act to require a respondent whose rates are challenged to present its evidence before a case is made against it, and to enter an "interim" order at the conclusion of such respondent's direct testimony?

9. Does the presentation of the respondent's direct testimony with only partial cross-examination in a proceeding before the Commission under the Act constitute a "hearing" within the meaning of the Act?

Questions 8 and 9 above are important procedural questions under the Act; their significance goes far beyond this particular case. In holding the so-called "interim" order in this case is valid, the Court below decided important Federal questions in a way probably in conflict with the applicable decisions of this Court cited in the annexed brief, page 24, *post*.

If the decision of the Court below is not so in conflict, it decided important questions of Federal law which have not been, but should be, settled by this Court.

Further, the Court below so far sanctioned a departure from the accepted and usual course of administrative proceedings as to call for an exercise of this Court's power of supervision.

Petitioners show to this Court that each of the questions above specified is an important question; that they are of especial significance under the Act; that if this Court reviews the issues raised in the petition for the writ of certiorari in cause No. 265, the questions herein specified should also be reviewed.

Wherefore, your petitioners pray that, if this Court grants the petition for the writ of certiorari in cause No. 265, this petition be granted and that the writ of certiorari issue to the Circuit Court of Appeals for the Seventh Circuit for the purpose of reviewing the questions hereinbefore specified; that the judgment of the Court of Appeals be modified to provide that the order of the Commission be vacated and set aside and the cause remanded to the Commission with directions to dismiss the proceedings; and that petitioners be granted such other and further relief as to this Honorable Court shall seem meet.

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BRIEF FOR PETITIONERS IN SUPPORT OF CROSS-PETITION FOR THE WRIT OF CERTIORARI.

OPINIONS BELOW.

The opinion of the Commission appears at R. Vol. VIII, pp. 3925-42, and is not officially reported.

The opinion of the Circuit Court of Appeals for the Seventh Circuit appears in Vol. VIII of the record, and is not yet officially reported.

JURISDICTION.

The grounds upon which the jurisdiction of this Court is invoked are stated in the foregoing petition (p. 9, *supra*).

STATEMENT OF THE CASE.

A determined effort is made to limit the following statement to those facts which, in addition to the facts stated in the petition, are essential to an understanding of the questions presented and the reasons assigned for the allowance of the writ.

1. **Origin of the Enterprise.** In 1926 it was known that the Texas Panhandle gas field contained enormous reserves of natural gas (R. Vol. I, p. 493). No prospective markets for this gas were available within the distance ordinarily traversed by natural gas pipe lines at that time; but in the Midwest, several large centers of population, including the Chicago area, were not served with natural gas (R. Vol. I, pp. 493-4). At that time some of those who afterwards became the owners of petitioners con-

ceived the idea of developing a pipe line system traversing the more than 950 miles from the gas field to the Chicago area. Great mechanical and economic difficulties were presented. There was no history by which to gauge the prospect of such an undertaking. Gas pipe lines then in operation traversed only short distances (R. Vol. I, p. 494), and utilized a thick-walled, lap-weld pipe held together at the joints by couplings (R. Vol. I, pp. 494-5). Gas was then transported from pressures ranging from 400 to 500 pounds per square inch (R. Vol. I, p. 497). The proposed line to Chicago traversed a territory crossed by 31 rivers. A problem which demanded solution was the solidification under pressure of the moisture contained in natural gas into hydrates which blocked the passage of the gas in the pipe line (R. Vol. I, pp. 507-8). Years of research and experimentation followed. By 1930 sufficient progress had been made to undertake the venture (R. Vol. I, p. 502). A thin-walled, seamless pipe and also a thin-walled, electric-welded pipe had been developed as a result of petitioners' efforts, each of which weighed substantially less per lineal unit than the old type of pipe, and each of which could be utilized in large diameters under operating pressures in excess of 700 pounds to the square inch (R. Vol. I, p. 506). Means for removing the moisture from natural gas and thus preventing the formation of hydrates had been developed by petitioners (R. Vol. II, p. 650).

2. **Petitioners' Properties.** Petitioners acquired large reserves of natural gas in the Texas Panhandle field. After culling and consolidating their holdings, petitioners now have leases on about 150,000 acres (R. Vol. I, p. 623). Petitioners have drilled or acquired 171 wells (R. Vol. I, p. 623). An ever-present hazard in the maintenance of these wells is the accumulation of salt in the formation or well which blocks off the gas (R. Vol. I, p. 455). The maintenance of the wells involves the treating for "salting", blowing

water out, etc. (R. Vol. I, pp. 627-8). During the remaining life of their gas supply petitioners will have to drill and equip about 215 additional wells to meet their market requirements (R. Vol. II, pp. 864, 882). In spite of petitioners' efforts to protect their gas reserves, only 40% of the gas withdrawn from under petitioners' leases has been produced through petitioners' wells, the other 60% having been lost through drainage to low-pressure areas in the field (R. Vol. I, p. 240). These are but some of the many factors which make for great uncertainty in petitioners' source of supply.

A gathering system, including mains 24" in diameter and smaller lateral lines, was constructed out over the gas field for the purpose of gathering the gas at the wells and transporting it to a central point near Fritch, Texas (R. Vol. I, p. 531; Vol. II, p. 910). At Fritch, petitioners constructed their initial main compressor station. Also located at Fritch is petitioners' dehydration plant (R. Vol. I, pp. 467-8).

From Fritch, petitioners constructed their main pipe line 24" in diameter across Oklahoma, Kansas, Nebraska, Iowa, and on to Joliet, Illinois (R. Vol. I, p. 518). A map showing the route appears at R. Vol. V, p. 2687. About every 80 miles along the pipe line is a compressor station (R. Vol. I, p. 533). There are 10 such stations (R. Vol. I, p. 533). An aerial photograph of the Fritch station appears at R. Vol. V, p. 2803.

The 31 river crossings present a special hazard (R. Vol. I, p. 515). Petitioners have constructed two types of river crossings: an overhead suspension bridge and a multiple line submerged crossing (R. Vol. I, p. 520). A picture of an overhead suspension bridge appears in the record at R. Vol. V, p. 2783. A picture of a typical submerged crossing appears at R. Vol. V, p. 2785. Among the rivers crossed are the Missouri and the Mississippi (R. Vol. I, p. 526). One of the greatest risks confronting petitioners is line failures (R. Vol I, p. 604). In February, 1938, petitioners suffered a line failure which cost about $250,000 (R. Vol. I, p. 604). Any break in the line involves the tremendous hazard of explosion and fire (R. Vol. I, p. 605). Petitioners are handling a highly explosive material under terrific pressures.

The fact that petitioners' facilities are operated at substantially higher pressures and stresses than have heretofore been employed by the pipe line industry presents a serious element of uncertainty (R. Vol. III, p. 1568). As the record shows, it is a matter of common knowledge that as equipment is worked or stressed toward ultimate capacity and is continuously employed at a very high percentage of total capacity, there is a tendency to fatigue, and in the absence of experience as a guide there is the serious question as to how long petitioners' facilities will hold up under the excessive strain, regardless of how well they are maintained or how well they have held up down to the present time (R. Vol. III, p. 1456).

3. **Petitioners' Marketing Contracts.** Since beginning operations petitioners have made a total of 161 contracts—all by private negotiation (R. Vol. II, p. 685). Of these contracts 47 are still in effect (R. Vol. II, p. 685). Twenty cover a supply of natural gas to be resold for domestic consumption (R. Vol. II, p. 685). These 20 contracts are referred to as "firm" contracts (R. Vol. II, p. 685). Under them petitioners are obligated to deliver gas to the capacity of their pipe line (R. Vol. II, p. 685). Of the remaining 27, two cover the sale of gas at the wells (R. Vol. II, p. 685), and 25 are for the sale of gas for industrial use (R. Vol. II, pp. 685-6). The industrial contracts are "interruptible" contracts (R. Vol. II, p. 686). They provide for an interruption of service in the event that petitioners are unable to supply the gas after the obligations of the firm contracts are met (R. Vol. II, p. 687). The interruptible contracts are divided into classes, each class taking

precedence over the lower classes in the event that petitioners are unable to serve all (R. Vol. II, p. 687). The higher classes pay a higher rate (R. Vol. II, p. 687). The interruptible industrial contracts do not obligate purchasers to take a minimum amount of gas (R. Vol. II, p. 687). These contracts are in fact only an option to the purchasers to take gas from petitioners' pipe line (R. Vol. II, p. 689). The total income under petitioners' firm contracts will not support petitioners' operations (R. Vol. I, p. 581).

The development of markets by petitioners up to the total capacity of their pipe line was a tedious, long, and expensive process. Prospective consumers of natural gas were using other fuels—artificial gas, oil, coal, kerosene, or distillate. The change-over from any of these fuels to natural gas involved expense and inconvenience, and efforts to introduce natural gas met with stubborn sales resistance (R. Vol. II, p. 1277), to overcome which required great expenditure of time, effort, and money (R. Vol. II, p. 677). It was not until 1936, four years after operations began, that the demand equaled the original rated capacity of petitioners' pipe line. (R. Vol. II, p. 676; Vol. III, p. 1329).

SPECIFICATION OF ERRORS.

The errors intended to be urged are those specified in the petition under "Questions Presented and Reasons for Allowance of the Writ" (pp. 10 to 14, *supra*), the Court below having ruled adversely to petitioners, or failed to rule, upon the questions there stated.

SUMMARY OF ARGUMENT.

The argument follows the order of the questions stated in the petition (pp. 10 to 14, *supra*).

ARGUMENT.

1. Constitutionality of Price Regulation Under the Act.

It is apparent that the decision of the Court below on this question is probably in conflict with the applicable decisions of this Court in *Williams* v. *Standard Oil Co.,* 278 U. S. 235; *New State Ice Co.* v. *Liebmann,* 285 U. S. 262; *Tyson* v. *Banton,* 273 U. S. 418; *Wolff* v. *Court of Industrial Relations,* 262 U. S. 522; *Michigan Public Utilities Com.* v. *Duke,* 266 U. S. 570; *Producers* v. *Railroad Commission,* 251 U. S. 228. In the foregoing cases this Court has consistently held (1) that the Fifth and Fourteenth Amendments prohibit price fixing on private sales of a commodity, no matter how useful or desirable the commodity may be to the public; and (2) that the Fifth and Fourteenth Amendments prohibit the conversion of a private business into a public utility by legislative fiat.

The cases of *Munn* v. *Illinois,* 94 U. S. 113, and *Townsend* v. *Yeomans,* 301 U. S. 441, are distinguishable in that petitioners have not themselves dedicated their property to the public use, and held themselves out to serve all who apply.

The cases of *Nebbia* v. *New York,* 291 U. S. 502, *Sunshine Anthracite Coal Co.* v. *Adkins,* 310 U. S. 381, and similar cases, are not in point, as the Court below recognized, in that those cases "all involved * * * critical, economic conditions which demanded legislative solution, and such critical condition and urgent necessity of immediate control are here absent".

The case of *Olsen* v. *Nebraska,* .... *U. S.* ...., decided April 21, 1941, is not authority for price fixing on private sales of a commodity. The legislation there under consideration limited the maximum charges of employment agencies and was directed against frauds and unscrupulous dealings.

There is no significance to the fact that public utilities are purchasers of petitioners' natural gas. The public utilities also necessarily purchase other articles and commodities—pipes, compressor equipment, automobiles, gasoline, pencils, paper, etc. The decision below opens the door for legislative control of prices of all commodities—lumber, pipes, iron, ore, steel, food, oil, leather, etc. The importance of the question here raised is patent.

2. **Constitutionality of the Act and the Regulation Imposed in View of the Taking of Petitioners' Property for the Public Use With No Opportunity to Petitioners to Withdraw Except by Permission of the Commission.** That the decision of the Court below on this question is probably in conflict with the decision of this Court in *Wolff v. Court of Industrial Relations,* 262 U. S. 522, is evident. In that case this Court struck down as violative of the Fourteenth Amendment a state statute providing, *inter alia,* for the fixing of wages in meat-packing plants, the employer being, under the terms of the statute, required to pay the wages fixed and the employee being forbidden to strike against the wages fixed. The statute there prohibited the employer to cease business save on permission of the state authority. This Court termed such privilege to withdraw "illusory." In the case at bar petitioners cannot, under the Act, discontinue any present service without permission of the Commission; and the Commission may require them to extend their facilities and render additional service from which they may not withdraw without permission (Sec. 7; 15 U. S. C. 717 f).

If it be thought that this issue is not involved in this case because petitioners have not attempted to withdraw, attention is called to two points: (1) the employer in the *Wolff Case* had not attempted to withdraw; and (2) in the case at bar, Section 21 of the Act (15 U. S. C. 717 t) imposes a fine or imprisonment, or both, upon any party who willfully and knowingly violates the Act. A statute, the validity of which may be tested only by a violation thereof at the risk of penalties, is unconstitutional (*Oklahoma Operating Co.* v. *Love,* 252 U. S. 331).

3. **Commission's Failure to Fix Rates as Required by the Act.** The Commission did not consider or determine the various rates for the various types of uses of natural gas. It did not consider or determine what spreads there should be between the various rates. It did not consider or determine whether there should be different rates. There is no evidence in the record upon which such determinations could be made. The language of Section 5(a) of the Act (15 U. S. C. 717 d) is mandatory. The language is clear: "the Commission shall determine the just and reasonable rate * * * and shall fix the same by order * * *."

The importance of this question of the proper construction of the Act is manifest. The decision of the Court below is erroneous. The question should be settled by this Court.

4. **Lack of Substantial Evidence to Support the Commission's Finding That Petitioners' Present Rates Are Unreasonable.** This question is not one of fact. Petitioners do not ask this Court to weigh evidence or settle a dispute of fact. The facts are clear and uncontradicted. The question is one of law. It has two aspects: (1) Does Section 5(a) of the Act (15 U. S. C. 717 d) require an examination of and finding upon the reasonableness of *each rate* charged by a natural gas company, or is a general conclusion (unwarranted here) that the company's profits are too great a sufficient basis for a finding that *each rate* is unreasonable? This is an important question of the proper construction of the Act. This question has not been, but should be, settled by this Court. It should be noted that a proper

finding of unreasonableness of present rates is a jurisdictional prerequisite to the fixing of new rates. (2) Is the quantum of proof sufficient to satisfy the requirement of substantial evidence as to the unreasonableness of each present rate, or even as to alleged excess profits? There is no evidence in the record as to the reasonableness or unreasonableness of the various present rates of petitioners. The present rates are presumptively reasonable. *St. Joseph Gas Co.* v. *Barker,* 243 Fed. 206. With respect to petitioners' profits, the facts set out in paragraph 7 of the petition (p. 5, *supra*) show that the profits are not excessive or unreasonable, particularly in view of the sound holding by the Circuit Court of Appeals that the rate base, upon which the Commission purported to measure the profits, is inadequate.

5. **Rate of Return.** The holding of the Court below that the Commission's finding of 6½% as a fair rate of return for petitioners is supported by substantial evidence is erroneous. A review of this question does not involve a dispute of facts. It is a legal question as to the quantum of proof required. A bare outline of the problem is stated in paragraph 8 of the petition (p. 7, *supra*). The decision below calls for an exercise of the supervisory power of this Court.

6. **Interest Rate on Sinking Fund.** The question of whether the interest rate on a sinking fund for amortization should be the same as the rate of return is a novel and important question which has not been, but should be, settled by this Court. The Commission's determination that the interest rate should be the same as the rate of return is based upon faulty reasoning and upon a misapprehension of the underlying reason for applying the sinking-fund method of amortization. This Court should exercise its power of supervision.

7. **Validity of "Interim" Order.** The question of the validity of the so-called "interim" order is a novel and important question which has not been, but should be, decided by this Court. It is apparent that the decision of the Court below that the Commission has implied powers under the Act is probably in conflict with the applicable decisions of this Court in *Siler* v. *L. & N. Co.*, 213 U. S. 175, and *I. C. C.* v. *C. N. O. & T. P. R. Co.*, 167 U. S. 479.

It is respectfully submitted that, if this Court grants the petition for the writ of certiorari in cause No. 265, the prayer of the present cross-petition should be granted.

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APPENDIX.

PERTINENT SECTIONS OF THE NATURAL GAS ACT.

(15 U. S. C. 717.)

SECTION 1. (15 U. S. C. 717.) (a) As disclosed in reports of the Federal Trade Commission made pursuant to S. Res. 83 (Seventieth Congress, first session) and other reports made pursuant to the authority of Congress, it is hereby declared that the business of transporting and selling natural gas for ultimate distribution to the public is affected with a public interest, and that Federal regulation in matters relating to the transportation of natural gas and the sale thereof in interstate and foreign commerce is necessary in the public interest.

(b) The provisions of this Act shall apply to the transportation of natural gas in interstate commerce, to the sale in interstate commerce of natural gas for resale for ultimate public consumption for domestic, commercial, industrial, or any other use, and to natural-gas companies engaged in such transportation or sale, but shall not apply to any other transportation or sale of natural gas or to the local distribution of natural gas or to the facilities used for such distribution or to the production or gathering of natural gas.

SECTION 4. (15 U. S. C. 717c.) (a) All rates and charges made, demanded, or received by any natural-gas company for or in connectiton with the transportation or sale of natural gas subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges, shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful.

(b) No natural-gas company shall, with respect to any transportation or sale of natural gas subject to the jurisdiction of the Commission, (1) make or grant any undue preference or advantage to any person or subject any person to any undue prejudice or disadvantage, or (2) maintain any unreasonable difference in rates, charges, service, facilities, or in any other respect, either as between localities or as between classes or service.

(c) Under such rules and regulations as the Commission may prescribe, every natural-gas company shall file with the Commission, within such time (not less than sixty days from the date this Act takes effect) and in such form as the Commission may designate, and shall keep open in convenient form and place for public inspection, schedules showing all rates and charges for any transportation or sale subject to the jurisdiction of the Commission, and the classifications, practices, and regulations affecting such rates and charges, together with all contracts which in any manner affect or relate to such rates, charges, classifications, and services.

(d) Unless the Commission otherwise orders, no change shall be made by any natural-gas company in any such rate, charge, classification, or service, or in any rule, regulation, or contract relating thereto, except after thirty days' notice to the Commission and to the public. Such notice shall be given by filing with the Commission and keeping open for public inspection new schedules stating plainly the change or changes to be made in the schedule or schedules then in force and the time when the change or changes will go into effect. The Commission, for good cause shown, may allow changes to take effect without requiring the thirty days' notice herein provided for by an order specifying the changes so to be made and the time when they shall take effect and the manner in which they shall be filed and published.

(e) Whenever any such new schedule is filed the Commission shall have authority, either upon complaint of any State, municipality, or State commission, or upon its own initiative without complaint, at once, and if it so orders, without answer or formal pleading by the natural-gas company, but upon reasonable notice, to enter upon a hearing concerning the lawfulness of such rate, charge, classification, or service; and, pending such hearing and the decision thereon, the Commission, upon filing with such schedules and delivering to the natural-gas company affected thereby a statement in writing of its reasons for such suspension, may suspend the operation of such schedule and defer the use of such rate, charge, classification, or service, but not for a longer period than five months beyond the time when it would otherwise go into effect: *Provided*, That the Commission shall not have authority to suspend the rate, charge, classification, or service for the sale of natural gas for resale for industrial use only; and after full hearings, either completed before or after the rate, charge, classification, or service goes into effect, the Commission may make such orders with reference thereto as would be proper in a proceeding initiated after it had become effective. If the proceeding has not been concluded and an order made at the expiration of the suspension period, on motion of the natural-gas company making the filing, the proposed change of rate, charge, classification, or service shall go into effect. Where increased rates or charges are thus made effective, the Commission may, by order, require the natural-gas company to furnish a bond, to be approved by the Commission, to refund any amounts ordered by the Commission, to keep accurate accounts in detail of all amounts received by reason of such increase, specifying by whom and in whose behalf such amounts were paid, and, upon completion of the hearing and decision, to order such natural-gas company to refund, with interest, the portion of such increased rates or charges by its decision found not justified. At any hearing involving a rate or charge sought to be increased, the burden of proof to show that the increased rate or charge is just and reasonable shall be upon the natural-gas company, and the Commission shall give to the hearing and decision of such questions preference over other questions pending before it and decide the same as speedily as possible.

SECTION 5. (15 U. S. C. 717d.) (a) Whenever the Commission, after a hearing had upon its own motion or upon complaint of any State, municipality, State commission, or gas distributing company, shall find that any rate, charge, or classification demanded, observed, charged, or collected by any natural-gas company in connection with any transportation or sale of natural gas, subject to the jurisdiction of the Commission, or that any rule, regulation, practice, or contract affecting such rate, charge, or classification is unjust, unreasonable, unduly discriminatory, or preferential, the Commission shall determine the just and reasonable rate, charge, classification, rule, regulation, practice, or contract to be thereafter observed and in force, and shall fix the same by order: *Provided, however,* That the Commission shall have no power to order any increase in any rate contained in the currently effective schedule of such natural gas company on file with the Commission, unless such increase is in accordance with a new schedule filed by such natural gas company; but the Commission may order a decrease where existing rates are unjust, unduly discriminatory, preferential, otherwise unlawful, or are not the lowest reasonable rates.

SECTION 7. (15 U. S. C. 717f.) (a) Whenever the Commission, after notice and opportunity for hearing, finds such action necessary or desirable in the public interest, it may by order direct a natural-gas company to extend or improve its transportation facilities, to establish physical connection of its transportation facilities with the facilities of, and sell natural gas to, any person or muncipality engaged or legally authorized to engage in the local distribution of natural or artificial gas to the public, and for such purpose to extend its transportation facilities to communities immediately adjacent to such facilities or to territory served by such natural-gas company, if the Commission finds that no undue burden will be placed upon such natural-gas company thereby: *Provided,* That the Commission shall have no authority to compel the enlargement of transportation facilities for such purposes, or to compel such natural-gas company to establish physical connection or sell natural gas when to do so would impair its ability to render adequate service to its customers.

(b) No natural-gas company shall abandon all or any portion of its facilities subject to the jurisdiction of the Commission, or any service rendered by means of such facilities, without the permission and approval of the Commission first had and obtained, after due hearing, and a finding by the Commission that the available supply of natural gas is depleted to the extent that the continuance of service is unwarranted, or that the present or future public convenience or necessity permit such abandonment.

(c) No natural-gas company shall undertake the construction or extension of any facilities for the transportation of natural gas to a market in which natural gas is already being served by another natural-gas company, or acquire or operate any such facilities or extensions thereof, or engage in transportation by means of any new or additional facilities, or sell natural gas in any such market, unless and until there shall first have been obtained from the Commission a certificate that the present or future public convenience and necessity require or will require such new construction or operation of any such facilities or extensions thereof: *Provided, however,* That a natural-gas company already serving a market may enlarge or extend its facilities for the purpose of supplying increased market demands in the territory in which it operates. Whenever any natural-gas company shall make application for a certificate of convenience and necessity under the provisions of this subsection, the Commission shall set the matter for hearing and shall give such reasonable notice of the hearing thereon to all interested persons as in its judgment may be necessary under rules and regulations to be prescribed by the Commission. In passing on applications for certificates of convenience and necessity, the Commission shall give due consideration to the applicant's ability to render and maintain adequate service at rates lower than those prevailing in the territory to be served, it being the intention of Congress that natural gas shall be sold in interstate commerce for resale for ultimate public consumption for domestic, commercial, industrial, or any other use at the lowest possible reasonable rate consistent with the maintenance of adequate service in the public interest.

SECTION 19. (15 U. S. C. 717r.) (a) Any person, State, municipality, or State commission aggrieved by an order issued by the Commission in a proceeding under this Act to which such person, State, municipality, or State commission is a party may apply for a rehearing within thirty days after the issuance of such order. The application for rehearing shall set forth specifically the ground or grounds upon which such application is based. Upon such application the Commission shall have power to grant or deny rehearing or to abrogate or modify its order without further hearing. Unless the Commission acts upon the application for rehearing within thirty days after it is filed, such application may be deemed to have been denied. No proceeding to review any order of the Commission shall be brought by any person unless such person shall have made application to the Commission for a rehearing thereon.

(b) Any party to a proceeding under this Act aggrieved by an order issued by the Commission in such proceeding may obtain a review of such order in the circuit court of appeals of the United States for any circuit wherein the natural-gas company to which the order relates is located or has its principal place of business, or in the United States Court of Appeals for the District of Columbia, by filing in such court, within sixty days after the order of the Commission upon the application for rehearing, a written petition praying that the order of the Commission be modified or set aside in whole or in part. A copy of such petition shall forthwith be served upon any member of the Commission and thereupon the Commission shall certify and file with the court a transcript of the record upon which the order complained of was entered. Upon the filing of such transcript such court shall have exclusive jurisdiction to affirm, modify, or set aside such order in whole or in part. No objection to the order of the Commission shall be considered by the court unless such objection shall have been urged before the Commission in the application for rehearing unless there is reasonable ground for failure so to do. The finding of the Commission as to the facts, if supported by substantial evidence, shall be conclusive. If any party shall apply to the court for leave to adduce additional evidence, and shall show to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for failure to adduce such evidence in the proceedings before the Commission, the court may order such additional evidence to be taken before the Commission and to be adduced upon the hearing in such manner and upon such terms and conditions as to the court may seem proper. The Commission may modify its findings as to the facts by reason of the additional evidence so taken, and it shall file with the court such modified or new findings, which if supported by substantial evidence, shall be conclusive, and its recommendation, if any, for the modification or setting aside of the original order. The judgment and decree of the court, affirming, modifying, or setting aside, in whole or in part, any such order of the Commission, shall be final, subject to review by the Supreme Court of the United States upon certiorari or certification as provided in sections 239 and 240 of the judicial Code, as amended (U. S. C., title 28, secs. 346 and 347).

(c) The filing of an application for rehearing under subsection (a) shall not, unless specifically ordered by the Commission, operate as a stay of the Commission's order. The commencement of proceedings under subsection (b) of this section shall not, unless specifically ordered by the court, operate as a stay of the Commission's order.

SECTION 20. (15 U. S. C. 717s.) (a) Whenever it shall appear to the Commission that any person is engaged or about to engage in any acts or practices which constitute or will constitute a violation of the provisions of this Act, or of any rule, regulation, or order thereunder, it may in its discretion bring an action in the proper district court of the United States, the District Court of the United States for the District of Columbia, or the United States courts of any Territory or other place subject to the jurisdiction of the United States, to enjoin such acts or practices and to enforce compliance with this Act or any rule, regulation, or order thereunder, and upon a proper showing a permanent or temporary injunction or decree or restraining order shall be granted without bond. The Commission may transmit such evidence as may be available concerning such acts or practices or concerning apparent violations of the Federal antitrust laws to the Attorney General, who, in his discretion, may institute the necessary criminal proceedings.

(b) Upon application of the Commission the district courts of the United States, the District Court of the United States for the District of Columbia, and the United States courts of any Territory or other place subject to the jurisdiction of the United States shall have jurisdiction to issue writs of mandamus commanding any person to comply with the provisions of this Act or any rule, regulation, or order of the Commission thereunder.

SECTION 21. (15 U. S. C. 717t.) (a) Any person who willfully and knowingly does or causes or suffers to be done any act, matter, or thing in this Act prohibited or declared to be unlawful, or who willfully and knowingly omits or fails to do any act, matter, or thing in this Act required to be done, or willfully and knowingly causes or suffers such omission or failure, shall, upon conviction thereof, be punished by a fine of not more than $5,000 or by imprisonment for not more than two years, or both.

(b) Any person who willfully and knowingly violates any rule, regulation, restriction, condition, or order made or imposed by the Commission under authority of this Act, shall, in addition to any other penalties provided by law, be punished upon conviction thereof by a fine of not exceeding $500 for each and every day during which such offense occurs.

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IN THE

Supreme Court of the United States

October Term, A. D. 1941.

No. 265

FEDERAL POWER COMMISSION and ILLINOIS
COMMERCE COMMISSION,
Petitioners,

vs.

NATURAL GAS PIPELINE COMPANY OF AMERICA
and TEXOMA NATURAL GAS COMPANY,
Respondents.

ON PETITION FOR CERTIORARI.

BRIEF FOR RESPONDENTS.

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FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION,
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vs.
NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY,
Respondents.

ON PETITION FOR CERTIORARI.

BRIEF FOR RESPONDENTS.

In the cross-petition (Docket No. 268) for writ of certiorari filed by the respondents herein they seek review of certain questions, only in the event that this Court grants the petition herein. Respondents submit that the petition herein presents neither a case nor questions of the character for certiorari jurisdiction. Petitioners' effort to show novelty and importance is based principally upon inaccurate statements of the record. These will be pointed out in the following discussion of the questions raised in the petition.

I.

The Question Respecting Going-Concern Value Is Not of the Character for Certiorari Jurisdiction.

A. The petition misstates the question. The real question involves no principle of law, but only a factual study of this particular record.

Petitioners' statement of the question (Pet. 2) and discussion (Pet. 9-12) on the issue of going-concern value correctly presents neither the question nor the record. Petitioners assert (Pet. 2, 9) that the question is whether a *separate* allowance *must* be made for going-concern value. Petitioners say (Pet. 9) that the Commission appraised the physical assets "as part of an assembled whole" (which is inaccurate) and that the court below required a separate allowance for going-concern value (which is inaccurate). The court below properly held, among other things, that the Commission did not value the property as a going concern but only as inert property, and that the Commission erred in allowing no going-concern value (R. Vol. VIII, p. 4039).

The true issue is whether the Commission's opinion and findings, in view of the record, show *any* allowance for going-concern value. Contrary to petitioners' assertion (Pet. 9), the court below did not hold that a separate allowance for going-concern value is necessary where that value is included in the appraisal of the property (See cases, Pet. 9). Petitioners do not raise or challenge the elementary proposition that going-concern value, where proved, is property which may not be taken without due process. *The petition does not specify for review any question as to respondents' proofs of going-concern value or the amount (not less than $8,500,000) which respondents claim and which the court below found proper* (R. Vol. VIII, p. 4039).

The true issue here involves no novel or important question of law. The decision below is not in conflict with decisions of this Court. It is not in conflict with decisions of other courts of appeals. The question involves only a factual study of this particular record. Petitioners' statement that the decision below on going-concern value is "a far-reaching departure from the principles heretofore established in other fields of utility regulation" (Pet. 12) is without basis. Petitioners refer to other cases pending under the Natural Gas Act and assert that "The Commission has assumed that, under the decisions of this Court, an appraisal of the property as 'part of an assembled whole' was sufficient" (Pet. 11). The decision below does not disturb the Commission's assumption. There is no ground for the exercise of certiorari jurisdiction. Petitioners importune this Court "to review evidence and discuss specific facts."[1]

B. The decision below on going-concern value is sound.

1. *The court below correctly decided that the Commission made no allowance for going-concern value.*

Petitioners' assertion (Pet. 9) that the Commission's valuation includes going-concern value is contrary to the record.

(a) The Commission *accepted* the testimony of respondents' witnesses as to reproduction cost new of the physical properties and as to the value of the gas reserves (R. Vol. VIII, p. 3936). *Petitioners do not mention the fact that respondents' witnesses as to the value of the physical properties did not place a value on the properties as a going concern* (R. Vol. II, pp. 1236, 1276; Vol. III, p. 1355). These witnesses testified as to the reproduction cost new of each item (R. Vol. II, pp. 1191-1276). They did not value the properties as a going concern or "as part of a assembled whole" (R. Vol. II, pp. 1236, 1276; Vol. III, p. 1355). They did not include the intangible or going-concern value (R. Vol. II, pp. 1236, 1276; Vol. III, p. 1355).

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[1] *U. S. v. Johnson*, 268 U. S. 220; *Southern Power Co. v. N. C. Public Service Co.*, 263 U. S. 508.

(b) The Commission also *accepted* respondents' evidence as to capital additions from June 1, 1939, to December 31, 1942, and as to working capital (R. Vol. VIII, p. 3936-7). From the four items, (1) reproduction cost new of physical properties, (2) value of gas reserves, (3) capital additions, and (4) working capital, the Commission made up the rate base (R. Vol. VIII, p. 3937). *Not one of these items includes any going-concern value.*

(c) The Commission flatly rejected respondents' claim for going-concern value (R. Vol. VIII, pp. 3936-7).

(d) The Circuit Court of Appeals correctly interpreted the Commission's opinion in holding that the Commission made no allowance for going-concern value. The court said (R. Vol. VIII, p. 4039):

> "The Commission argues that in fixing the value of the rate base as high as $74,420,424, it gave full recognition to petitioners' business as a going business concern. This statement is contrary to the memorandum filed by the Commission with its findings. The $74,420,424 was made up of—
>
> | | |
> |---|---|
> | Reproduction Cost New of Physical Properties | $56,302,250 |
> | Value of Gas Reserves | 13,334,775 |
> | Capital Additions for the Period June 1, 1939 to December 31, 1942 | 3,808,399 |
> | Working Capital | 975,000 |
> | Total Rate Base | $74,420,424 |
>
> The total is the amount which the Commission adopted as its rate base. It does not include going value.
>
> Moreover, in its opinion, the Commission said, 'The Companies' claim of $8,500,000 for going concern value

must be disallowed. The amount obviously is an arbitrary claim, not supported by substantial evidence warranting its allowance. Its allowance would mean the acceptance of a deceptive fiction resulting in an unfair imposition upon consumers.'

In the face of this statement we must assume that the Commission did not allow any sum for going value."

(e) Petitioners assert (Pet. 9, footnote 5) that there is "ample evidence" that the Commission included going-concern value. Two items of "ample evidence" are stated (Pet. 9, footnote 5). The first is "the Commission's adoption, as its basis of valuation, of respondents' estimate of reproduction cost, which was $13,500,000 in excess of the original investment (R. 3937) and which included, in addition to labor and material costs, large allowances for overheads, such as interest, taxes, and administrative, legal, supervisory and 'preliminary operations' (R. 1224-1231, 1234)" (Pet. 9, footnote 5). Two answers to this are apparent. In the first place, the Commission *accepted* respondents' reproduction cost estimate as the fair value. That reproduction cost estimate does not include going-concern value. To point out that the fair value found by the Commission is more than the original investment does not show that the fair value found by the Commission includes going-concern value. To determine what the fair value as found by the Commission includes, it is necessary to consider what the Commission *did*. What the Commission did is clear. Furthermore, petitioners are not in a position to attack the finding of the Commission as to fair value. That this finding of the Commission is supported by substantial evidence is unchallenged. Under Sec. 19(b) of the Natural Gas Act (15 U. S. C. 717 r-b) neither this Court nor the court below has power to set aside the Commission's finding and substitute its own finding.

Petitioners' reference to the fact that the Commission's finding as to fair value of the inert physical property "included, in addition to labor and material costs, large allowances for overheads, such as interest, taxes, and administrative, legal, supervisory and 'preliminary operations' " is a misleading statement of the record. Petitioners' statement implies that these "overheads" are for the cost of attaching business to an inert property. This is not true. The "overheads" to which petitioners refer are *for the period of construction* (R. Vol. II, pp. 1224-31). These are construction costs. Respondents' claim of going-concern value is based upon proved costs of attaching business *after* the period of construction (R. Vol. II, p. 1278; Vol. III, p. 1329). These costs as proved were found proper by the court below (R. Vol. VIII, p. 4039), and are unchallenged here.

The second answer to petitioners' first item of "ample evidence" is that the difference of some $13,500,000 between the finding of the Commission as to fair value and the original investment does not establish that the Commission made a finding as to going-concern value *on evidence.* With respondents' evidence of going-concern value rejected by the Commission, there was no evidence in the record on which the Commission could have given consideration to going-concern value. The Commission did not have before it any evidence as to the value of the property as a going-concern or "as part of an assembled whole." If, as petitioners appear to suggest, the Commission took a middle figure between respondents' reproduction cost new estimate and original investment and then added something for going-concern value (which is not what the Commission did), the adding of something was not based on evidence, but on guess. Respondents are not in the position of a party attacking a rate order in a District Court; respondents did not and do not have the burden of proving their going-concern value. If petitioners' suggestion were accurate as to fact, it is apparent that rates fixed on the basis of a guess as to the value of certain property are unreasonable.

Petitioners' second item of "ample evidence" (Pet. 9, footnote 5) is the Commission's statement that it allowed in the rate base "more than an adequate amount to cover all elements of value" (R. Vol. VIII, p. 3937). This is not a statement that going-concern value was included. Further, the statement manifestly does not overcome the uncontradicted fact that the Commission accepted respondents' reproduction cost estimate, which did not include going-concern value, and expressly rejected respondents' claim of going-concern value. Moreover, the statement does not overcome the lack of any evidence upon which the Commission could have fixed going-concern value, the Commission having rejected respondents' evidence.

2. *Petitioners do not challenge the decision below that a going-concern value of not less than $8,500,000 is proved.*

As stated above, the petition does not specify for review any question as to respondents' proofs of going-concern value or as to the value claimed by respondents (See Pet. 2). Both the proofs and the amount were upheld by the court below (R. Vol. VIII, p. 4039). However, attention is called to a serious misstatement of the record by petitioners in their discussion of going-concern value. Petitioners state (Pet. 9-10):

> "* * * the going-concern allowance approved by the court below was calculated on the basis of interest and return assumed to have been unearned in the past and other deficiencies in past earnings, previously included in operating expenses, during the period of business development (R. 1276-1282; 1327-1337; 2943-2947), a method which this Court has specifically condemned.

Galveston Elec. Co. v. *Galveston*, 258 U. S. 388, 393-397; *Columbus Gas & Fuel Co.* v. *Public Utilities Commission*, 292 U. S. 398, 411-413."

By this erroneous statement petitioners seek to bring this record within the rule laid down in the *Galveston case*, that the cost of developing an "*operating*" plant into "*a financially successful concern*"[2] is not allowable as going concern value. Respondents' evidence, however, is not based on such cost. The evidence is the actual cost of putting respondents' plant *into operation*. Respondents initially built their plant of sufficient capacity for the anticipated total market (R. Vol. II, pp. 680, 1279). It was impossible to develop the market the instant the pipeline was complete (R. Vol. II, p. 680). The development of the market took four years (1932-1936) and was expensive (R. Vol. II, pp. 676-7). It was impractical and uneconomic to lay small pipe for the initial market and lay larger pipe as the market was developed (R. Vol. II, pp. 680, 1279; Vol. III, p. 1328). The same was true of compressor stations and other facilities (R. Vol. II, pp. 680, 1279; Vol. III, p. 1328). During the four years required to put respondents' facilities into operation, respondents incurred actual costs on idle facilities in respect to (1) interest, (2) taxes, (3) depreciation, and (4) non-varying operating costs (R. Vol. II, pp. 1278-1282; Vol. III, pp. 1329-1337). In addition, respondents expended the sum of $1,567,372 in the four-year period for advertising and other promotional activities for development of the total market (R. Vol. II, p. 1281; Vol. III, p. 1329). This Court in the *Galveston case* clearly distinguished between "the cost of converting the inert railway plant into an operating system" and "the cost of developing the operating railway system into a financially successful concern" (258 U. S. 393-4). This Court condemned the second cost, but not the first.[3]

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[2] 258 U. S. 393.

That the decision below is sound and does not conflict with the decision in the *Galveston case* is shown by the decision of this Court in *Southwestern Bell Tel. Co.* v. *City of Fort Smith*, 294 Fed. 102, 104-6, affd. 270 U. S. 627. In that case this Court, in an unanimous opinion, approved a going-concern value reached upon the same basis as that presented here, and cited the *Galveston case* as authority. It is significant that petitioners do not mention this case.

It will be recalled that with respect to the "overheads, such as interest, taxes, and administrative, legal, supervisory, and 'preliminary operations,'" included in the Commission's reproduction cost appraisal, petitioners sought to imply that these items were for the period from completion of the facilities to full operation of facilities, whereas in fact these overheads were for the period of construction (Pet. 9, footnote 5). With respect to the costs based upon interest, taxes, depreciation, etc., on idle facilities included in respondents' evidence, petitioners seek to imply that these items were for the period *after* full operation, whereas in fact they were for the period from completion of facilities to full operation.

The failure of petitioners to raise any question as to respondents' proofs of going-concern value disposes of the issue. However, it is apparent that the issue involves only a review of the evidence and a discussion of the specific facts shown on this record. It is likewise apparent that the decision of the court below in respect to respondents' proofs is sound.

---

[3] In *Columbus G. & F. Co.* v. *Public Utility Com.*, 292 U. S. 398, cited by petitioners (Pet. 10), the utility, attacking the rates in the District Court, failed to prove going-concern value such as proved here. This Court said (p. 412):

> "No evidence was offered by the appellant that expenses had been incurred 'in overcoming initial difficulties incident to operation and *in securing patronage.*' *Galveston Electric Co.* v. *Galveston, supra.*"

The Court also said (p. 413):

> "From the testimony as a whole one gains a definite impression that the opinions are derived for the most part from a professed experience and understanding of business conditions generally, and very little from any knowledge of the 'history and circumstances of the particular enterprise'."

II.

The Question Respecting the Period of Amortization Is Not of the Character for Certiorari Jurisdiction.

The second question raised by petitioners is (Pet. 2):

> "Whether, in determining the annual allowance for amortization, the Commission may compute the allowance on the basis of the entire service life of the capital assets or only on the basis of the remaining life from the date of the passage of the Natural Gas Act of June 21, 1938, or from the date of the rate order."

The Circuit Court of Appeals sustained respondents' point or proposition on this question as follows:

> THE COMMISSION'S ORDER SHOULD BE SET ASIDE BECAUSE IT IS CONFISCATORY IN THAT THE COMMISSION PROVIDED FOR THE AMORTIZATION OF ONLY THE ORIGINAL COST OF THE PROPERTY AND FIXED THE AMORTIZATION PERIOD AT THE ENTIRE LIFE OF RESPONDENTS' BUSINESS, WHICH COMMENCED LONG PRIOR TO REGULATION.
>
> A. THE NECESSARY OPERATION AND EFFECT OF THE NATURAL GAS ACT, IF VALID, IS TO CONDEMN TO PUBLIC USE RESPONDENTS' PROPERTY UTILIZED IN THE CONDUCT OF THEIR BUSINESS, WHICH, PRIOR TO THE ENACTMENT OF THE ACT, WAS A STRICTLY PRIVATE ENTERPRISE.
>
> B. A VALID ADMINISTRATION OF THE NATURAL GAS ACT REQUIRES THAT RESPONDENTS BE COMPENSATED, BY A PROPER AMORTIZATION ALLOWANCE, FOR THE PRESENT FAIR VALUE OF THEIR PROPERTIES, INCLUDING GOING CONCERN VALUE, AS OF THE TIME THEY WERE CONDEMNED FOR PUBLIC USE.
>
> C. THE PROPER PERIOD OF AMORTIZATION IS THAT BEGINNING WITH REGULATION UNDER THE NATURAL GAS ACT AND ENDING WITH THE LIFE OF RESPONDENTS' ENTERPRISE.

Respondents commenced business on January 1, 1932 (R. Vol. I, p. 561). The Commission, for the purposes of the order, adopted the testimony of respondents' witnesses to the effect that the life of respondents' reserves would be exhausted by December 31, 1954 (R. Vol. VIII, p. 3938). The Commission fixed the period of amortization at 23 years, commencing January 1, 1932, and ending December 31, 1954, and fixed the amount to be amortized at $78,284,009, the original cost of all capital assets through the entire 23-year period, except the costs incurred in developing respondents' business, claimed as going-concern value, less salvage (R. Vol. VIII, p. 3938). Respondents contended that the proper amount to be amortized is the *present* value of respondents' property, including actual costs incurred in developing their business, or going-concern value, plus future capital additions necessary to continue their present volume of business, less salvage, *and that the period of amortization should begin with the date when respondents were first subjected to regulation*—on August 1, 1940, the date of the order, or, in any event, not earlier than June 21, 1938, when the Natural Gas Act was passed (R. Vol. VIII, p. 4015).

Respondents claimed as the proper amount to be amortized the sum of $84,341,218, made up of the following items (Exhibit 211, R. Vol. VII, p. 3902):

Reproduction cost new, excluding gas reserves	$56,302,250
Viewed depreciation (deduct)	2,866,758
Value of gas reserves	13,334,775
Cost of additional property	9,145,083
Going-concern value	8,500,000
Working capital	975,000
	$85,390,350
Less salvage	1,049,132
	$84,341,218

No issue is presented as to the figures making up the total claim. In fixing the rate base the Commission accepted respondents' figure of $56,302,250 as representing the reproduction cost new (R. Vol. VIII, p. 3936). The figures representing the viewed depreciation are established by the undisputed testimony of the witnesses who testified on that point (R. Vol. II, pp. 1286-1305). The value of the gas reserves in their depleted state was established by undisputed testimony (R. Vol. III, pp. 1350-1360) and was accepted by the Commission in fixing the rate base (R. Vol. VIII, p. 3937). The Commission also accepted the cost of additional property necessary to continue respondents' business through the remainder of the period ending December 31, 1954 (R. Vol. VIII, p. 3938), and the figures submitted by respondents as to necessary working capital (R. Vol. VIII, p. 3937). The figures representing the item of going-concern value were not disputed. The figures submitted by respondents' witnesses as to salvage value stand undisputed in the record (R. Vol. V, p. 3021). The questions presented, therefore, are not questions of fact or questions of economics, as petitioners contended in the court below, nor did the court in its decision "enter a debatable field of fact and choose and prescribe an invariable method of computation," as charged by petitioners in their application. They are strictly legal questions—indeed, questions of constitutional rights.

Petitioners ignore entirely the difference in the status of respondents prior to the enactment of the Natural Gas Act and the status of an ordinary distributing utility under regulation from the beginning of its operations, which voluntarily dedicated its property to public use upon entering business. The three cases cited in the footnote on page 13 of the petition had to do with such distributing utilities, which were under regulation from the beginning: An entirely different situation is presented when a purely private enterprise is put under regulation by an act of Congress which operates to change the character and use of its property by requiring that it be utilized in the public interest.

Prior to the enactment of the Natural Gas Act respondents were engaged in a strictly private enterprise. They expended many millions of dollars in acquiring natural gas reserves in the State of Texas, developing those reserves, and constructing a pipeline and other facilities for transporting natural gas from these reserves to distant markets, where the gas was sold to selected customers under private contracts. At no time did respondents hold themselves out to sell gas to the general public. They invested their money in this enterprise on the theory that they would control their marketing policies, select and pass upon the credit of those to whom they would sell gas, and determine whether or not any prospective customer would be able to purchase a sufficient volume of gas to justify their building extensions required to deliver gas to such particular customer. In other words, they launched this enterprise and invested a large amount of money, representing the cost of their reserves and facilities, in a business which they expected and intended to operate in their own interests, just as any private business is operated in the interest of those who establish and own it.

The effect of the Natural Gas Act is to change entirely the character of respondents' ownership and use of their property. They are not given the choice of dedicating their property to the public interest or discontinuing their business. They are no longer a private enterprise. Their property is no longer subject to use in the private interests of the owners but must now be devoted to the public interest. They are no longer the sole judges of the credit and the accessibility of any utility applying for service. They cannot discontinue the sale and delivery of natural gas to any utility whose business turns out to be unprofitable or for any other reason undesirable. They must continue in business and sell natural gas to any utility to which the Commission shall direct them to sell. By legislative fiat they have been changed from a strictly private enterprise, owning and operating property for their own private purposes and in their own interest, to custodians of property which they must operate, whether they like it or not, for the benefit of the public under the direction of the Commission.

This is condemnation. The courts have frequently pointed out the analogy between condemnation proceedings in the exercise of the right of eminent domain and in the rate making process.[4]

It was not the money expended by respondents in 1930 and 1931 in acquiring gas reserves and constructing their pipelines, compressor stations and other facilities, or that spent for additional capital facilities from year to year up to the enactment of the Natural Gas Act, which the Act operates to condemn. That money was expended and was beyond the reach of Congress, the Commission, or respondents. It was *the property which respondents owned and used* in connection with the conduct of their business which Congress required respondents to subject and devote to the public interest. "It is that property and not the cost of it that is protected by the Fifth Amendment. * * * It is settled by the decisions, * * * that just compensation is the value of the property taken at the time of taking." *Brooks-Scanlon Corp.* v. *U. S.*, 265 U. S. 106, 123, 68 L. Ed. 934, 941.

Past earnings or losses, methods of bookkeeping, book entries for depreciation or depletion, failure to make provision in the accounts for amortization, all are immaterial. It is utterly immaterial what the properties cost respondents or how much of that cost has been returned to them in earnings over the period during which they operated as a private enterprise. The property which they owned and used in their business at the time the Natural Gas Act became effective was their property and the then value of that property belonged to them. They cannot be deprived of that property or its use without the compensation guaranteed to them under the operation of the due process clause of the Fifth Amendment; nor can they be required to apply as a credit on that value any part of their earnings or revenue prior to the enactment of the Natural Gas Act.

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[4] *San Diego Land & Town Co.* v. *National City*, 74 Fed. 79, 84.
Spring Valley Waterworks v. *San Francisco*, 124 Fed. 574, 594-5.
Monongahela Navigation Co. v. *U. S.*, 148 U. S. 312, 37 L. Ed. 463.
West v. *Chesapeake, etc., Co.*, 295 U. S. 662, 671, 79 L. Ed. 1640, 1646-7.
Vogelstein & Co. v. *U. S.*, 262 U. S. 337, 340, 67 L. Ed. 1012, 1014.
U. S. v. *New River Collieries Co.*, 262 U. S. 341, 344, 67 L. Ed. 1014, 1017.

Congress can condemn respondents' property only by a procedure consistent and comportable with due process of law under the Fifth Amendment. Due process requires, as an absolute condition to a valid condemnation of their property, to public use, that respondents be allowed to earn a reasonable return on the value of their property during the time it shall be subjected to public use and that they be allowed to set aside out of the earnings over the same period an amount which, together with the salvage value of the property, at the end of the period will return to them the value of their property at the time of condemnation. In the case of a continuing utility of indefinite life, the return of the value is secured by an adequate allowance for depreciation, sufficient in amount to replace the facilities as and when they become worn out or obsolete. In the case of an extractive industry like that of respondents, the life of which is limited by a diminishing source of supply, the return of the value of the property is secured by a proper allowance for amortization which together with the salvage value will return to them that value as of the time their business terminates. The application of the principle in the fixing of the so-called rate base and in the allowance for depreciation or amortization is clearly and emphatically stated by the Supreme Court in *United R. & E. Co. v. West,* 280 U. S. 234, 253-4, 74 L. Ed. 390, 410-11. Petitioners cite no decision of this Court to the contrary, but content themselves with the observation that, so far as that case is deemed to support the decision of the court below, "it can no longer be regarded as controlling."

The same constitutional principle invoked to support respondents' claim that in fixing the amount to be amortized the Commission must consider the value of the property as of the time it is first condemned to public use under the Natural Gas Act, and not the original cost of that property eight or ten years previously, supports with equal emphasis respondents' claim that the compensation for that fair value or return to respondents of that fair value must be paid out of earnings subsequent to the time of condemnation. Otherwise, the full amount representing the value is not returned, but only the portion thereof represented by the original cost less the accruals over the several years prior to regulation. Only 15 years, approximately, of the field's life remained at the time regulation began. If the Commission could distribute the amortization over the entire 23 years' life of the field, it follows that only 15/23 of the proper amount to be amortized would be returned to respondents. They are not entitled merely to 15/23 of that amount, but to *all* of that amount plus the additional amounts representing future capital outlays necessary to the continuance of their business.

The Commission cannot impose regulation retroactively by going back to the beginning of 1932 and deducting from the proper amount to be amortized, which includes the present value of respondents' properties, an amortization allowance plus interest thereon, compounded annually at 6½%, the rate of return allowed, over eight or nine years prior to the time they were subjected to regulation under the Natural Gas Act. Whether respondents made too much or too little prior to regulation is utterly beside the issue. Whether their earnings were paid out as dividends or applied to retirement of the capital is of absolutely no import; for, as we have already pointed out, the property which was condemned under the Natural Gas Act was respondents' property, and the value of that property must be returned to respondents under regulation and not prior to regulation. No other holding but that of the court below can be reconciled with the due process clause of the Fifth Amendment, as that court aptly pointed out in its opinion.

On page 13 petitioners assert that the decision of the court below requires a method of determining amortization or depreciation which is in conflict with the prevailing practice of the industry and of the regulatory bodies. We have already pointed out that the three cases cited by petitioners involve distributing utilities under regulation from the beginning of their operations. We have found only two cases in which the status of the regulated concern had formerly been that of an unregulated private enterprise. In each of these cases the regulatory body and the trial court adopted the principle for which respondents are here contending; and both these cases were affirmed by this Court. In one of these cases the company commenced business in 1903. It purchased many additional properties in 1909. But the Railroad Commission of Kentucky fixed the beginning of the period of amortization as 1910, the year in which the company voluntarily dedicated its properties to public use by entering upon the distribution of gas to the public under franchises as a public utility. *United Fuel Gas Co.* v. *Railroad Commission*, 13 Fed. (2) 510, 526; affirmed in *United Fuel*

Gas Co. v. *Railroad Commission,* 278 U. S. 300. In the other case the Public Service Commission of West Virginia fixed as the beginning of the amortization period, not the date when the company dedicated its properties to the public interest, but the date of the first rate order. *In re United Fuel Gas Co.* (W. Va.), Case 1516, P. U. R. 1925 B, 705; *United Fuel Gas Co.* v. *Public Service Commission,* 14 Fed. (2) 209, 225; affirmed in 278 U. S. 322.

Conclusion.

For the reasons pointed out, respondents respectfully submit that the Circuit Court of Appeals reached the correct judgment in vacating and setting aside the Commission's order, and that the petition for writ of certiorari should be denied.

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Supreme Court of the United States

OCTOBER TERM, 1941.

No. 265

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION,
Petitioners,

vs.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY,
Respondents.

No. 268

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY,
Petitioners,

vs.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION,
Respondents.

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1941.

No. 265.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION,

Petitioners,

v.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY,

Respondents.

No. 268.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY,

Petitioners,

v.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION,

Responents.

BRIEF FOR NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY.

INTRODUCTION.

These two cases, argued as one, are before this Court on certiorari on the petition (No. 265) of the Federal Power Commission (hereinafter called "Commission") and Illinois Commerce Commission (hereinafter called "complainant"), and on the cross-petition (No. 268) of Natural Gas Pipeline Company of American and Texoma Natural Gas Company (hereinafter called "cross-petitioners").

Opinions Below.

The opinion of the Commission appears at R. Vol. VIII, pp. 3925-3942.

The opinion of the Circuit Court of Appeals for the Seventh Circuit (R. Vol. VIII, pp. 4026-4041) is reported at 120 Fed. (2d) 625.

Jurisdiction.

The jurisdiction of this Court is invoked under Sec. 19(b) of the Natural Gas Act (15 U. S. C. 717 r(b)) and Sec. 240(a) of the Judicial Code, as amended by the Act of February 13, 1925.

Statute Involved.

The pertinent provisions of the Natural Gas Act of 1938 (52 Stat. 821; 15 U. S. C. 717) are set forth in Appendix A.

Statement of the Case.

Presented for review is a judgment of the Circuit Court of Appeals (R. Vol. VIII, p. 4041) vacating and setting aside a so-called "Interim" order of the Commission (R. Vol. VIII, pp. 3942-3946). The Commission's order directed cross-petitioners to file and put into effect new schedules of rates and charges for natural gas sold at wholesale which should "reflect" a reduction in the operating revenues of Natural Gas Pipeline Company of America of not less than $3,750,000 per annum (R. Vol. VIII, p. 3946).

Cross-Petitioners' Business.

Both cross-petitioners are Delaware corporations with their principal places of business in Chicago, Illinois (R. Vol. I, p. 1). Operated as a single enterprise (R. Vol. I, p. 11), they are engaged in producing, purchasing, transporting, and selling in interstate commerce at wholesale natural gas (R. Vol. I, pp. 11, 557). Three-fourths of their market requirements are produced from their own reserves in the Panhandle gas field of Texas, and one-fourth thereof is purchased from Colorado-Interstate Gas Company at a point near Gray Junction, Oklahoma (R. Vol. VIII, pp. 3998-3999). Cross-petitioners transport their gas through their own pipeline, which extends from the Panhandle gas field to a point near Joliet, Illinois (R. Vol. I, p. 11). Cross-petitioners have never held, and do not now hold, themselves out to sell natural gas to the general public, but have confined their sales to selected buyers under private contracts negotiated between the seller and the buyer (R. Vol. I, p. 11). They are now selling gas under 47 different contracts (R. Vol. II, p. 685). About 90% of the gas sold by cross-petitioners is purchased by Chicago District Pipeline Company, which in turn sells it to public utilities in the Chicago area (R. Vol. I, p. 3). The remaining 10% is sold to certain public utilities and industrial consumers along the pipeline in the States of Kansas, Nebraska, Iowa, and Illinois (R. Vol. I, p. 3).

The construction of cross-petitioners' pipeline was commenced in 1930 (R. Vol. II, p. 653) and completed near the end of 1931 (R. Vol. I, p. 560). Their operation records were set up as of January 1, 1932, at which time, however, not all of the construction work had been fully completed (R. Vol. I, p. 561). Cross-petitioners' evidence before the Commission was to the effect that, assuming the most favorable conditions in producing and transporting natural gas in the light of the quantity of gas contained in the reservoir in which cross-petitioners' reserves are located and the prospective withdrawals from such reservoir, the latest date to which the economic life of cross-petitioners' reserves will extend will be at the end of the year 1954. Witnesses for cross-petitioners testified that cross-petitioners' business will not continue to such date, but that it will have to be discontinued for economic reasons at a prior date, probably some time between the end of 1951 and 1954 (R. Vol. II, p. 695). On this evidence the Commission assumed, for the purposes of the interim order, that cross-petitioners' business will continue until December 31, 1954 (R. Vol. VIII, p. 3938).

Proceedings Before the Commission.

The effective date of the Natural Gas Act (15 U. S. C. 717) was June 21, 1938. This action was instituted on September 23, 1938, by a complaint filed with the Commission by complainant (R. Vol. I, p. 1). Subsequently, the Commission initiated a general investigation "concerning all rates, charges, classifications", etc., of cross-petitioners (R. Vol. I, p. 6). The two proceedings were consolidated for purposes of hearing (R. Vol. I, p. 14); and evidence was taken before a trial examiner designated by the Commission (R. Vol. I, p. 14). Cross-petitioners were directed to proceed with their evidence before complainant and the Commission completed their testimony (R. Vol. I, pp. 15, 24).[1] Upon completion of cross-petitioners' direct testimony,[2] counsel for the Commission and complainant ~~filed a~~ motion for an "interim" order reducing cross-petitioners' rates and charges (R. Vol. III, p.

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[1] Because cross-petitioners were unable to proceed with their evidence on the first day of the hearing, counsel for the Commission and complainant put on two witnesses, but thereafter cross-petitioners proceeded with their direct testimony (R. Vol. I, pp. 34, 187).

[2] Of the thirty-seven witnesses called by cross-petitioners, only seven have been cross-examined; and complainant and the Commission have called but six witnesses, four of whom testified on subjects related to rate of return.

3903). Upon this motion, the Commission's order under review, dated July 23, 1940, was entered (R. Vol. VIII, pp. 3942-6). The hearing before the Commission has not been concluded (R. Vol. IV, p. 2100).

The Commission's Order and Opinion.

From the Commission's opinion (R. Vol. VIII, pp. 3925-3942) it appears that it was the Commission's view that cross-petitioners' present annual revenues exceed by $3,750,000 the amount which the Commission found to be a proper annual return, a proper annual allowance for amortization, and a proper annual allowance for operating expenses. In analyzing the order and the memorandum opinion of the Commission, it is highly important to remember that cross-petitioners are not public utilities holding themselves out as offering to sell natural gas to the general public. From the beginning of their operations on January 1, 1932, down to the time when the Natural Gas Act became effective, cross-petitioners were engaged in selling natural gas to selected customers at rates fixed by private contracts negotiated between cross-petitioners and their several customers. *This case, therefore, differs from an ordinary public utility case in that cross-petitioners have never themselves dedicated their properties to a public use.* They were engaged in a strictly private business until Congress, through the enactment of the Natural Gas Act (if that Act be valid), dedicated their property to the use of the public. *Another distinction between cross-petitioners and the ordinary public utility is that cross-petitioners are engaged in an extractive industry, the life of which is definitely limited to the life of the source of their supply of natural gas.* Upon the exhaustion of their gas reserves, cross-petitioners' entire investment will become worthless, except to the amount of the salvage value of the physical properties. The evidence, which the Commission purported to adopt for the purposes of the interim order, shows that at some time prior to December 31, 1954, cross-petitioners' gas reserves will have been exhausted. If the Natural Gas Act operates to impose regulation upon cross-petitioners and subjects their properties to public use during the remaining period through which they will have natural gas available for their operations, the constitutional administration of that Act requires (1) that cross-petitioners be allowed a reasonable return on the value of the property subjected to public use, and (2) that provision be made to return to cross-petitioners by the end of the period the value of the property subjected to public use plus the cost of additional capital facilities which cross-petitioners will be required to provide in order to continue their business.

We shall state briefly the Commission's holding or finding on the several issues presented by this review.

The rate base. Before the Commission and the court below cross-petitioners contended, and now contend, that the proper rate base is as follows (R. Vol. VIII, p. 3935):

Reproduction cost new of physical properties (exclusive of gas reserves) as of June 1, 1939, $56,302,250 less viewed depreciation, $2,866,758	$53,435,492
Value of Gas Reserves as of June 1, 1939	13,334,775
Capital Additions from June 1, 1939, to December 31, 1954	6,046,286[1]
Going Concern Value	8,500,000
Working Capital	975,000
	$82,291,553

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[1] This figure differs from the $9,145,083 sought for future capital expenditures in the allowance for amortization. The $6,046,286 is the *average investment* for future capital expenditures from 1939, the date of the investigation, to December 31, 1954.

The rate base adopted by the Commission is as follows (R. Vol. VIII, p. 3937):

Reproduction Cost New of Physical properties (exclusive of gas reserves) as of June 1, 1939	$56,302,250
Value of Gas Reserves as of June 1, 1939	13,334,775
Capital Additions from June 1, 1939, to December 31, 1942	3,808,399
Working Capital	975,000
	$74,420,424

The Commission accepted the figures of cross-petitioners for reproduction cost new but did not deduct from that figure the existing or viewed depreciation. The Commission refused to make the deduction on the theory that it was adopting the entire life of the properties (1932 to 1954, inclusive) as the period of amortization and adopting the sinking-fund method for amortizing the entire investment (R. Vol. VIII, p. 3936).

However, in dealing with the gas reserves as a part of the rate base, the Commission took the value of the depleted reserves as of June, 1939 rather than the value of the gas reserves prior to their depletion. Here again the Commission accepted cross-petitioners' figures (R. Vol. VIII, pp. 3935-3937). The inconsistency of the Commission's method of treating the reserves and other physical properties in arriving at the rate base is apparent, though no explanation is found in the Commission's memorandum opinion or order.

With respect to the cost of additional capital facilities, the Commission refused to allow such costs after December 31, 1942. The $6,046,286 which cross-petitioners contended should be allowed for capital additions represents the *average investment* for future capital additions from 1939 (the date of the investigation) to December 31, 1954, in order to carry on their present business. That figure through those years represents the average amount which cross-petitioners will have invested in the business by way of additional capital facilities.

The Commission excluded from the rate base any allowance for going-concern value of cross-petitioners' property (R. Vol. VIII, pp. 3936-3937).

Rate of return. Before the Commission and the court below cross-petitioners contended, and now contend, that the fair rate of return should be not less than 8% (R. Vol. VIII, p. 3987). Notwithstanding the Commission quoted with approval figures submitted by its own employee (R. Vol. VIII, p. 3939) showing that it would cost cross-petitioners 6.72% per annum to refinance their capital structure, the Commission made a finding that 6½% was a fair annual return upon the rate base fixed as aforesaid (R. Vol. VIII, p. 3945). In fixing the rate of return, the Commission manifestly gave consideration only to the single element of cost of capital.

Amount to be amortized. Before the Commission and the court below cross-petitioners contended, and now contend, that the amount to be amortized is properly made up as follows (Exhibit 211, R. Vol. VII, p. 3902):

Reproduction cost new, excluding gas reserves	$56,302,250
Viewed depreciation (deduct)	2,866,758
Value of gas reserves	13,334,775
Cost of additional property	9,145,083[1]
Going-concern value	8,500,000
Working capital	975,000
	$85,390,350
Less Salvage	1,049,132
	$84,341,218

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[1] This figure is the total cost of additional properties. It differs from the $6,046,288 in the rate base because the rate base figure is average investment for future capital additions.

The Commission rejected cross-petitioners' contention that the present value of the properties, including going-concern value, plus the cost of additional capital facilities in the future, should be amortized, and held that only the original cost of the properties utilized in the business, *i. e.*, the total amount invested in the properties throughout the life of the enterprise, less the salvage value thereof, should be amortized. The Commission fixed the amount of such original cost less salvage at $78,284,009 (R. Vol. VIII, p. 3944).

Amortization period. Before the Commission and the court below cross-petitioners contended, and now contend, that cross-petitioners have never themselves voluntarily dedicated their properties to a public use; that prior to the enactment of the Natural Gas Act (effective June 21, 1938) cross-petitioners were a strictly private enterprise; and that the operation of the Natural Gas Act, if valid, was in legal effect to condemn cross-petitioners' property to public use. Cross-petitioners further contended, and now contend, that in fixing the amortization period it is improper to apply against the amount to be amortized a portion of the earnings of cross-petitioners prior to the beginning of regulation under the Natural Gas Act; that the Government must take cross-petitioners as it found them when it in effect condemned their properties; and that the proper period of amortization is from the beginning of regulation, August 1, 1940, to the end of 1954. The Commission rejected these contentions and held that the proper period of amortization is 23 years, from the first of 1932 to the end of 1954 (R. Vol. VIII, p. 3945); and that cross-petitioners must apply against the amount to be amortized a portion of their earnings prior to the condemnation of their properties.

Interest on sinking fund. Before the Commission and the court below cross-petitioners contended, and now contend, that under the uncontradicted evidence the maximum interest rate to be used in computing the annual sinking fund allowance is 2% per annum compounded semi-annually (R. Vol. VIII, p. 3981). The Commission adopted the sinking-fund formula for amortization, but set the interest rate to be used in making the computation at the arbitrary figure of 6½% per annum, compounded annually, on the ground that such rate was fair because that was the rate of return allowed (R. Vol. VIII, p. 3935). The Commission ignored entirely the uncontradicted evidence (R. Vol. III, p. 1433) that the types of securities in which a sinking fund would be invested would not yield in excess of 2% per annum compounded semi-annually.

Commission's Conclusion. The Commission summarized its conclusions as follows (R. Vol. VIII, p. 3941):

Income available for amortization and return		$9,362,032
Less amortization		1,557,852
Income available for return		$7,804,180
Rate Base	$74,420,424	
Rate of return	6.5%	
	$4,837,328	4,837,328
Available for reduction in net revenues		$2,966,852
Consequent reduction in Federal income taxes		783,909
Total available for rate reduction		$3,750,761

Commission's failure to fix rates: The Commission did not determine just and reasonable rates and fix the same by order as required by Section 5(a) of the Natural Gas Act (15 U. S. C. 717 d). The Commission's order requires that cross-petitioners' "rates and charges * * * shall be reduced to reflect a reduction of not less than $3,750,000 per annum in the operating revenues of Natural Gas Pipeline Company of America'' (R. Vol. VIII, pp. 3945-3946), effective retroactively as of August 1, 1940 (R. Vol. VIII, p. 3946).

The Judgment and Opinion of the Circuit Court of Appeals.

Upon cross-petitioners' petition for review the court below vacated and set aside the Commission's order and remanded the case to the Commission for further proceedings in conformity with the opinion of the court (R. Vol. VIII, p. 4041-4042).

The court held (R. Vol. VIII, pp. 4037-4041) that the Commission erred

a. in failing to include in the rate base and in the amount to be amortized an allowance as going-concern value of the actual costs incurred in developing the markets;

b. in fixing the period of amortization at twenty-three years, beginning with the commencement of petitioners' operations on January 1, 1932, several years prior to the enactment of the Natural Gas Act, and ending December 31, 1954, adopted by the Commission as the date at which the economic life of cross-petitioners' reserves of natural gas would be exhausted, instead of the period beginning with the time when cross-petitioners were first subjected to regulation by the enactment of the Natural Gas Act and ending December 31, 1954;

c. in failing to use the present fair value, including going-concern value, instead of the original cost of present facilities, in fixing the amount to be amortized.

The Court did not pass upon cross-petitioners' contention that the maximum interest rate to be used in computing the amortization allowance by the sinking-fund formula is 2% per annum, compounded semi-annually. The Court stated the problem with respect to cross-petitioners' contention that the Commission's finding that the present rates are unreasonable is not supported by substantial evidence (R. Vol. VIII, p. 4033-4034), but the Court did not expressly rule on this question.

The court held that the Commission's failure to fix rates did not invalidate the order because cross-petitioners were not "aggrieved," and there was "no prejudice" to cross-petitioners (R. Vol. VIII, pp. 4031-4032).

The court below held that there is substantial evidence to support the Commission's finding that 6½% is a fair rate of return (R. Vol. VIII, pp. 4035-4037).

The court further held that the "interim" order entered by the Commission against cross-petitioners is within the power and jurisdiction of the Commission (R. Vol. VIII, pp. 4034-4035).

The court held that the price regulation sought to be imposed upon cross-petitioners is valid under the Fifth Amendment to the United States Constitution and that the regulation imposed by the Natural Gas Act is valid under the Fifth Amendment, despite the fact that such regulation is imposed with no opportunity to cross-petitioners to withdraw except by permission of the Commission (R. Vol. VIII, p. 4030-4031).

The Commission's order was stayed by the court below prior to the date upon which cross-petitioners were required by the order to file new schedules of rates (R. Vol. VIII, pp. 4025-26).

THE EVIDENCE.

Origin of the Enterprise.

In 1926 it was known that the Texas Panhandle oil and gas field in northwestern Texas contained enormous reserves of natural gas (R. Vol. I, p. 493). No prospective markets for this gas were available within the distance ordinarily traversed by natural gas pipelines; but in the Midwest several large centers of population, including the Chicago area, were not served with natural gas (R. Vol. I, pp. 493-4). At that time some of those who afterwards became the owners of cross-petitioners conceived the idea of developing a pipeline system traversing the more than 950 miles separating the gas field from the Chicago area, to the end that adequate reserves of gas be developed in Texas and that gas be transported by pipeline to supply the needs of that great center of population (R. Vol. I, p. 494). To that end they assembled a corps of engineers under the direction of Floyd C. Brown, now Vice President and General Manager of cross-petitioners, with instructions that they conduct a study and make a report on the feasibility of such a project (R. Vol. I, p. 494). After extensive studies these engineers submitted an adverse report (R. Vol. I, p. 499). They pointed out that no pipeline had ever been constructed over such a long distance and that such an undertaking was confronted with uncertainties and with mechanical and economic difficulties which seemed insurmountable under the then existing conditions. There was no history by which to gauge the prospects of such an undertaking. Gas pipelines then in operation, which traversed comparatively short distances (R. Vol. I. p. 494), utilized a thick walled, lap-weld pipe, held together at the joints by couplings (R. Vol. IV, p. 494-5). They transported gas at pressures ranging from 400 to 500 pounds per square inch (R. Vol. IV, p. 497). The thick walled pipe ran into tonnage so rapidly that a serious problem of investment cost was at once presented in considering a 950 mile line. It was found that thirty-one rivers traversed the territory over which the line would have to be constructed (R. Vol. I, p. 515). These included the great Mississippi and Missouri Rivers and numerous other streams which assumed dangerous characteristics in flood seasons, such as the Canadian River and the Big Blue River in Texas. Toward the eastern end of the line the problem of keeping the pipe anchored in the prevalent treacherous peat beds appeared almost insurmountable. It was known that when transported at high pressures the moisture contained in natural gas solidified into hydrates which literally choked the line and blocked the passage of the gas. These and other serious difficulties and handicaps prompted this corps of engineers to advise against the undertaking (R. Vol. I, p. 499).

But those who had conceived the enterprise refused to take "no" for an answer. They directed these engineers, and others, to enlist the suport of pipe manufacturers and cooperate with them in the development of some type of thin walled pipe which would overcome the excessive weight and the mechanical defects of the old lap-weld pipe and which would permit the transportation of gas at higher pressures (R. Vol. I, p. 499, Vol. II, pp. 650-1). They directed these engineers also to enlist the support of equipment manufacturers to the end that new facilities, such as compressor units, gate valves and river headers suitable for use in connection with the new type of pipe in contemplation, be developed (R. Vol. I, p. 499, Vol. II, p. 656). They directed that researches be pursued to find a practical means of removing the hydrates from natural gas so that gas could be transported at substantially higher pressures (R. Vol. I, p. 507, Vol. II, p. 650). Years of research and experimentation followed. By the end of 1929 these engineers and those cooperating with them had found the solution. A thin walled seamless pipe and also a thin walled electric welded pipe had been developed, each of which weighed substantially less per lineal unit than the old type of pipe, and each of which could be utilized under operating pressures in excess of 700 pounds to the square inch (R. Vol. I, p. 506). Other facilities necessary to pipeline operations were designed and adapted for use with these new types of pipe. Practical means of removing the moisture from natural gas, and thus preventing the formation of hydrates, had been developed (R. Vol. II, p. 650). Thus the cost of pipe had been substantially reduced and the utilization of the higher pressures permitted the transportation of a substantially larger volume of gas per unit of steel than had been accomplished by successful pipelines then in operation (R. Vol. I, p. 500).

The original entrepreneurs were now ready to translate their vision into reality. But they had decided to spread the risk to include others (R. Vol. I, p. 501). Meantime others had become interested in supplying the Chicago area with natural gas from the same Texas field (R. Vol. I, p. 501). A number of those other interested parties joined with the original enterprisers in the organization of cross-petitioners early in the year 1930 (R. Vol. I, p. 502).

Cross-Petitioner's Properties.

Cross-petitioners acquired large reserves of gas in the Panhandle field. They originally acquired leases on about 316,000 acres (R. Vol. I, p. 619). This included both desirable and undesirable acreage (R. Vol. I, p. 620). Cross-petitioners were forced to buy leases in blocks and to take the bad with the good (R. Vol. I, pp. 620-1). In view of the drilling and delay rental requirements of the gas leases, cross-petitioners have culled their original leases to eliminate the undesirable (R. Vol. I, p. 623). They have acquired some additional leases to round out and consolidate their holdings (R. Vol. I, p. 623). Cross-petitioners' present holdings cover about 150,000 acres (R. Vol. I, p. 623). On this acreage cross-petitioners have drilled or acquired 171 wells (R. Vol. I, p. 623). Cross-petitioners have been forced to abandon eight of these wells because of "salting" (R. Vol. I, pp. 459, 461). Salt in the formation or well sometimes blocks off the gas (R. Vol. I, p. 455). Cross-petitioners have encountered this trouble in a total of 26 wells (R. Vol. I, p. 462). The equipping of the wells includes a casing for the bore, a meter, and a meter house (R. Vol. II, p. 887). The maintenance of the wells involves treating for "salting," blowing water out, etc. (R. Vol. I, pp. 627-8).

Cross-petitioners will, during the remaining life of their gas supply, have to drill and equip about 215 additional wells to meet their present market requirements (R. Vol. II, pp. 864, 882). In spite of cross-petitioners' efforts to protect their gas reserves, only 40% of the gas withdrawn from under cross-petitioners' leases has been produced through cross-petitioners' wells, the other 60% having been lost through drainage to low pressure areas in the field (R. Vol. I, p. 240).

A gathering system, including mains 24" in diameter and smaller lateral lines, was constructed out over the field for the purpose of gathering the gas at the wells and transporting it to a central point near Fritch, Texas (R. Vol. I, p. 531; Vol. II, p. 910). At Fritch cross-petitioners constructed their initial main compressor station (R. Vol. I, p. 533). This compressor station has 15 compressors, each of which is driven by a 1250 h. p. engine (R. Vol. I, p. 533). Each of these compressor units weighs about 400,000 pounds (R. Vol. I, p. 533). An aerial photograph of the Fritch station appears at R. Vol. V, p. 2803. Also located at Fritch is the cross-petitioners' dehydrating plant (R.

Vol. I, pp. 467-8). Operators of gas pipelines have long been troubled with the forming of hydrates in the line which block the gas and cause considerable trouble (R. Vol. I, pp. 466-7). Cross-petitioners have largely eliminated this difficulty through improvements embodied in their dehydrating plant (R. Vol. I, p. 508). Also located at Fritch is cross-petitioners' natural gas extraction plant (R. Vol. II, p. 768). Natural gasoline is extracted from the gas before the gas is forwarded through the pipeline (R. Vol. II, p. 1069). This natural gasoline is sold by cross-petitioners (R. Vol. II, p. 1069).

From Fritch cross-petitioners constructed their main pipeline, 24 inches in diameter, across Oklahoma, Kansas, Nebraska, Iowa, and on to Joliet, Illinois, a distance of more than 900 miles (R. Vol. I, p. 518). A map showing the route appears at R. Vol. V, p. 2687. Cross-petitioners were the first to build and operate a gas pipeline 900 miles long (R. Vol. I, pp. 497-8). The pipeline is buried in the ground to a depth averaging five feet from the top of the pipe (R. Vol. II, p. 1151). The pipe is laid in 40-foot sections which are alternately welded and coupled together, each coupling being provided with a rubber gasket (R. Vol. I, pp. 508, 520). Through work of great intensity with the A. O. Smith Corporation of Milwaukee and the steel companies, cross-petitioners obtained a thin-walled pipe capable of taking the high pressures contemplated (R. Vol. I, p. 500). The pipe was tested for a pressure of 800 pounds per square inch (R. Vol. II, p. 661). The normal operating pressure is over 700 pounds (R. Vol. III, p. 1316).

In laying the pipeline cross-petitioners had to obtain rights of way from 2500 to 3000 landowners (R. Vol. I, p. 516).

The 31 river crossings present a special hazard. There are two types of river crossings: an overhead suspension bridge and a multiple line submerged crossing (R. Vol. I, p. 521). Cross-petitioners have an overhead suspension bridge over the Big Blue River in Texas (R. Vol. I, pp. 521-2). Because cross-petitioners underestimated the treacherous nature of the bed of this river, the shifting channel, etc., they twice lost the pipe laid in a submerged crossing (R. Vol. I, p. 522). After these two experiences, cross-petitioners resorted to the overhead bridge (R. Vol. I, p. 522). A picture of the bridge appears at R. Vol. V, p. 2783. At the entry to the bridge is a valve manifold header through which the 24-inch pipe is run into two 18-inch lines (R. Vol. I, p. 521). On the other side of the river the two 18-inch lines converge, through the same type of header, into the single 24-inch line (R. Vol. I, pp. 521-2).

The other river crossings along cross-petitioners' pipeline are of the submerged type. A picture of a typical submerged crossing appears at R. Vol. V, p. 2785. The main 24-inch pipe is reduced through a manifold header to six 12-inch lines which are laid in the stream bed (R. Vol. I, p. 522). The smaller lines are used because of the difficulties in handling a 24-inch line in dredging a trench in the bed of a flowing stream and laying the line below the normal stream bed (R. Vol. I, p. 523). Another reason for the multiple line is that it provides an element of safety. If one line fails, the others may hold and enable cross-petitioners to continue service (R. Vol. I, p. 524). There is a great deal of buoyancy in a gas pipeline (R. Vol. I, p. 524). The lines on a stream bed are clamped down and the lines crossing flood valleys and river bottoms are anchored or weighted down (R. Vol. I, p. 524). The multiple line submerged on a stream bed is arched upstream so that the force of the stream will tend to place the pipe and welded joints in compression rather than tension (R. Vol. I, p. 525). If the lines were laid straight across the stream or curved downstream, the pressure of the water against the pipes would through the pipelines into tension and the welded joints would be subjected to an undue strain (R. Vol. I, p. 525).

In cross-petitioners' business continuous service is all important (R. Vol. I, p. 604). Customers, particularly those serving domestic consumers, must be assured that there will be no interruptions in service, or that interruptions will be kept at a minimum. One of the greatest risks confronting cross-petitioners is line failures (R. Vol. I, p. 604). In February, 1938, cross-petitioners suffered a line failure which resulted in a total loss of about $250,000 (R. Vol. I, p. 604). Any break in the line involves the tremendous hazard of explosion and fire (R. Vol. I, p. 605). Cross-petitioners are handling a highly explosive material under terrific pressures. They must constantly guard against damage to life and property. A break in the line will result in loss of revenue from reduced sales of gas in addition to the expense of repairs (R. Vol. I, p. 604).

The weight of the gas adds to the mechanical problems in the construction and operation of the pipeline (R. Vol. II, p. 932). The gas makes two 90-degree turns in passing through a header (R. Vol. II, p. 932). The weight of the gas passing a header every 24 hours is about 5,250 tons (R. Vol. II, p. 932). This weight is equivalent to the weight of 3,500 automobiles passing over the header each 24 hours at the rate of 14 miles per hour (R. Vol. II, p. 932). The maintenance of the pipeline involves such jobs as welding a sleeve (a heavy plate of steel) to the pipeline while the line is in operation (R. Vol. III, p. 1316). The pipeline, carrying pressures of over 700 pounds per square inch and having a daily flowing capacity of 210,000,000 cubic feet, is continued in operation while the welder raises the wall of the pipe to a fusing heat to weld the sleeve to the pipe (R. Vol. III, p. 1316).

On an average of about every 90 miles along the pipe line is a compressor station (R. Vol. I, p. 533). There are ten such stations including the one at Fritch. Some of the stations along the line have 6 compressor units, each having a 1250 h.p. engine; others have 5 such units (R. Vol. I, p. 533).

Cross-Petitioners' Marketing Contracts.

Cross-petitioners sell their gas in and around the Chicago area and to purchasers along their pipeline (R. Vol. I, p. 3). A total of 161 contracts have been made—all by private negotiation (R. Vol. II, p. 685). Of these contracts, 47 were still in effect when the record was made (R. Vol. II, p. 685). Of these 47 contracts, 20 cover a supply of natural gas to be resold for domestic consumption (R. Vol. II, p. 685). These 20 contracts are referred to as "firm" contracts (R. Vol. II, p. 685). Under them cross-petitioners are obligated to deliver gas to the capacity of their pipeline (R. Vol. II, p. 685). Of these 20 contracts, one expired in 1939, 8 will expire in 1941, and 11 in 1946 (R. Vol. II, p. 685).[9] Included among the 11 is the contract with the Chicago District Pipeline Company, which may be extended for 5 years beyond 1946 at cross-petitioners' option (R. Vol. II, p. 685). Of the remaining 27 contracts, 2 cover the sale of gas at the wells (R. Vol. II, p. 685) and 25 are for the sale of gas for industrial use (R. Vol. II, pp. 685-6). The industrial contracts are "interruptible" (R. Vol. II, p. 686). They provide for interruption of service in the event that the cross-petitioners are unable to supply gas after the obligations of the firm contracts are met (R. Vol. II, p. 687). The interruptible contracts are divided into classes, each class taking precedence over the lower classes in the event that the cross-petitioners are unable to serve all (R. Vol. II, p. 687). The higher classes pay a higher rate (R. Vol. II, p. 687).

The interruptible industrial contracts are mostly for short periods of time and do not obligate the purchasers to take a minimum amount of gas (R. Vol. II, p. 687). These contracts are in fact only an option to the purchasers to take gas from cross-petitioners' pipeline (R. Vol. II, p. 689). The purchasers pay only for what they take (R. Vol. II, p. 689). During the year 1937, when cross-petitioners had brought their pipeline load up to capacity, cross-petitioners' industrial sales were $3,775,-215.64 out of a total gross of about $15,000,000 (R. Vol. II, p. 690). The industrial consumption in that year was 29,118,904,000 cubic feet. The next year, 1938, the industrial consumption declined to 24,304,875,000 cubic feet (R. Vol. II, p. 690), and the revenues declined to $3,069,485.53 (R. Vol. II, p. 690). The decrease in revenue from this service amounted to approximately $706,000. The total revenues of cross-petitioners declined approximately $1,-300,000 in 1938 as compared with 1937 (R. Vol. I, p. 584). The industrial consumption is subject to fluctuations in business conditions in general and in the particular industries served (R. Vol. I, p. 582). It is also subject to the physical hazards connected with pipeline operation, competition with other fuels, etc. (R. Vol. I, pp. 571-2). The total income under cross-petitioners' firm contracts will not support cross-petitioners' pipeline operations (R. Vol. I, p. 581).

The Load Building Period.

The actual construction of the pipeline and facilities was commenced during the summer of 1930 (R. Vol. II, p. 653). By the 15th of October, 1931, the construction had proceeded to the point that cross-petitioners were able to transport some gas through the line to its northern terminus at Joliet, Illinois, and from that date cross-petitioners delivered and sold some gas (R. Vol. II, pp. 662-3). By the end of 1931 the construction of the system was so near completion that cross-petitioners' books and records were later set up on an operating basis as of January 1, 1932 (R. Vol. II, p. 664).

In the beginning cross-petitioners were equipped to transport 175,000,000 cubic feet daily; but their market outlet at that time was only 60,000,000 cubic feet daily (R. Vol. II, p. 675). The development of markets up to the total capacity was a tedious, long and expensive process. Prospective purchasers were using other fuels. For cooking they were using artificial gas. For water heating and house heating they were using coal or oil. For space heating and for the firing of industrial boilers they were using coal, oil, kerosene or distillate. The change-over from any of these fuels to the use of natural gas involved expense and inconvenience, and efforts to introduce natural gas met with stubborn sales resistance (R. Vol. II, p. 1277), to overcome which required great expenditure of time, effort and money (R. Vol. II, p. 677). Four years passed before the demand equaled the original rated capacity of the line (R. Vol. II, p. 676; Vol. III, p. 1329). During this period large sums of money, aggregating $1,567,791, were expended in contributing to retail sales campaigns by the utilities purchasing gas from cross-petitioners, in advertising, in personal solicitation, and in other promotional activities (Exhibit 130, R. Vol. V, p. 2943; Vol. III, p. 1340).

But this was not all the cost incurred. In the pipeline industry it is impractical in the beginning to install pipelines and facilities barely adequate to supply the market outlets then developed and subsequently add to the facilities as the load develops (R. Vol. II, p. 1279; Vol III, p. 1328). It requires two 18-inch pipelines or six 12-inch pipelines to transmit the same quantity of gas which may be transported at the same pressure through a 24-inch line (R. Vol. I, p. 531). The reserves must be located with reference to the gathering system to prevent unnecessary investments in field gathering lines (R. Vol. I, p. 623). Prudent management requires that in projecting a pipeline system adequate reserves and facilities be provided in the beginning to produce and handle the ultimate volumes of gas for which markets can be developed over a reasonable period of years (R. Vol. II, p. 1279). A part of the reserves and facilities necessarily will stand by during the load building period—to a diminishing degree as the load is built up. Such reserves and facilities cannot be provided in advance of the load except at substantial carrying costs to the investor. Cross-petitioners' original investment was raised [illegible] the issuance of interest bearing bonds and the assuming of some interest bearing notes (R. Vol. II, p. 1279). The interest on these bonds and notes and the *ad valorem* taxes on the original reserves and facilities to the extent that the payments were made on capital tied up in these standby reserves and facilities represented out-of-pocket costs. Meantime the depreciable facilities were sustaining depreciation through deterioration, and, to the extent that the depreciable facilities were standing by awaiting the loading of the line, this depreciation represented out-of-pocket costs during the load building period. The non-varying operating expenses, that is, those operating expenses which did not vary with the volume of gas handled during the load building period, were fixed by the requirements of a plant equipped to handle a full load. In other words, these expenses were just as great during the period of load building as they would have been had the line been loaded. To the extent that the facilities were standing by awaiting the loading of the line, these operating expenses represented out-of-pocket costs during the period of attaching business (R. Vol. II, p. 1281).

Other substantial costs in the same connection, not stated in terms of dollars, included that of assembling and training the organization and acquainting the personnel with their respective duties throughout the widespread system, that of assembling and developing records, reports and systems of accounting, and that of seasoning the various units of plant equipment throughout the system (R. Vol. II, p. 1282).

The witness Emery summed up these elements of cost, not including the three last mentioned, at $8,568,093. Using these cost figures as the basis of his testimony, he testified that cross-petitioners' properties possess a going concern value in addition to the value of the "bare bones" or inert physical properties of at least the amount stated (R. Vol. III, p. 1337). He testified also that it would require an expenditure of at least that amount to reproduce this going-concern value, if cross-petitioners were now at the beginning of their operations (Exhibit 130, R. Vol. V, p. 2943; Vol. III, p. 1340). Another witness, Hamilton, arrived at total cost figures during the load building period of $8,500,000 (R. Vol. II, p. 1282), and upon the basis of those figures testified that cross-petitioners' properties having a going concern value in excess of the value of the inert physical properties of at least the amount last stated (R. Vol. II, p. 1282).

As the operations continued through the load building period, the management and engineering staff, by careful observation, experimentation and research and through the adding of certain capital facilities, by the end of the year 1935 built up the operating discharge pressure to 710 pounds and the operating fiber stress to approximately 25,130 pounds per square inch on the electric welded pipe and 27,650 pounds on the seamless pipe, an achievement never attained by successful pipeline operators with the types of pipe and facilities in use prior to the construction of cross-petitioners' line (R. Vol. IV, pp. 2597-8). Through this initiative and engineering skill, cross-petitioners built up the rated daily capacity of the system from the original 175,000,000 cubic feet to 210,000,000 cubic feet (R. Vol. II, p. 677; Vol. III, pp. 1330, 1467).

Cross-petitioners, by the exercise of creative skill in the design and construction of their facilities, and of careful and sustained diligence have developed a capacity per pound of steel far above anything that had been developed or even conceived (R. Vol. II, pp. 1046-7), and have built up a capacity factor far above that of any other large system (R. Vol. III, p. 1467). By negotiation they have succeeded in obtaining interruptible industrial outlets for the excess volume of gas, which can be handled economically through their facilities, above the demand under their firm contracts for gas to be used ultimately for domestic and commercial purposes (R. Vol. II, pp. 683-4). By this means they have built up their annual load factor to more than 92% of the total rated capacity of their facilities (R. Vol. III, p. 1330).

A very substantial portion of the revenues of cross-petitioners ($1,207,067 of a total of $14,853,600) is realized from the sale of additional volumes of gas which cross-petitioners have produced, transported and sold through the increase in the daily capacity of their facilities from the original 175,000,000 to 210,000,000 cubic feet and through the building up of their annual load factor to more than 92% of the total rated capacity (R. Vol. III, p. 1468).

Cross-Petitioners' Gas Reserves.

The Panhandle gas field embraces approximately 1,400,000 acres spread over an area 125 miles long by an average of about 15 miles wide (R. Vol. I, p. 199). Along the northeast flank of the field at irregular intervals large deposits of oil have been encountered in the same formations which produce free gas at higher structural levels (R. Vol. I, p. 202). The production of oil from these areas has been attended with enormous production of natural gas (R. Vol. I, pp. 202-3). Those engaged in other activities in the vicinity of the oil fields, particularly the natural gasoline and carbon black industries, have produced tremendous quantities of natural gas (R. Vol. I, pp. 202-3). As a result of these heavy withdrawals, low pressure areas were soon formed along the northeast side of the field (R. Vol. I, pp. 211-220). Continued heavy production has resulted in the spreading of these low pressure areas out over the field, until there is now scarcely any portion of the field where the original pressure of about 430 pounds per square inch at the wellhead prevails (R. Vol. I, pp. 211-220).

Cross-petitioners' reserves are located along the central portion of the field in areas of relatively high pressures (R. Vol. I, p. 623); but the regional drainage toward the low pressure areas to the northeast has resulted, and is resulting, in the depletion of the gas from cross-petitioners' reserves at a much more rapid rate than would result from cross-petitioners' production alone (R. Vol. I, pp. 240, 354). Tremendous quantities of gas have been produced from the field from the year 1926 down to the present time (R. Vol. I, pp. 238-9). The production at present goes to pipelines, natural gasoline extraction plants, carbon black plants, or is utilized in the production and refining of oil and in other oil field industrial operations (R. Vol. I, pp. 629-646). Large quantities are wasted directly to the air in connection with the production of oil (R. Vol. I, p. 644). In 1939 the annual production was about 586,677,575,000 cubic feet and was increasing from year to year (R. Vol. I, pp. 629-646).

Qualified geologists conducted extensive studies and testified concerning the quantity of recoverable gas originally in the field and now remaining in the field (R. Vol. I, pp. 306-7; Vol I, pp. 245, 352, and Vol. I, pp. 237, 238). Exhaustive studies indicate that, at the rate of the probable withdrawal, the maximum life of this field will not extend beyond the end of the year 1954 (R. Vol. II, p. 695). The uncontradicted evidence is to the effect that cross-petitioners' operations will prove uneconomic, and for that reason will terminate, sometime prior to the end of

1954 (R. Vol. II, p. 695). For the purposes of the interim order, the Commission accepted cross-petitioners' evidence as to the probable life of the field, except that it assumed production of the requirements of the line to full capacity to the end of 1954, ignoring the evidence that cross-petitioners' operations will cease some time prior to the end of 1954, and fixed the date last named as the end of the period of amortization (R. Vol. VIII, p. 3938).

Capital Additions to Cross-Petitioners' Properties, and Replacement, Maintenance and Operating Expenses.

Down to the present time most of the wells connected to cross-petitioners' gathering lines have produced at pressures sufficient to force the gas through the gathering system to the initial compressor station near Fritch, Texas (R. Vol. I, p. 532; Vol. II, pp. 867-870). These pressures are declining, however; and already it has been necessary to install one field compressor station for the purpose of boosting the gas from wells in the vicinity into the gathering system (R. Vol. I, p. 633). As the pressures continue to decline it is inevitable that additional compressor units will have to be installed throughout the area on which cross-petitioners' wells are located in order to transport the gas from the wellhead to the initial compressor station in such quantities as to supply the demands upon the pipeline (R. Vol. I, p. 633).

Cross-petitioners have drilled or acquired about 171 wells during the years 1932 to 1938, inclusive (R. Vol. I, p. 623). In the past many of the wells have been drilled to satisfy drilling obligations and to protect cross-petitioners' reserves against drainage to the wells of others (R. Vol. I, p. 562). The decline in pressures is accompanied by a more rapid decline in the productive capacity of the gas wells (R. Vol. II, pp. 699, 875). Consequently, cross-petitioners will be required to drill a large number of additional wells in order to keep the productive capacity at such levels as that the wells can be produced prudently at the rate necessary to supply cross-petitioners' markets (R. Vol. II, p. 875). Careful studies reveal that a minimum of 215 additional wells must be drilled during the period beginning with 1939 and ending with 1952 (R. Vol. II, p. 864). Each of these wells must be equipped with a meter and regulator and other capital facilities. To each of these wells a pipeline must be laid in order to transport the gas into the gathering system. The increasing number of wells and units of well equipment, the laying and maintaining of additional gathering lines, and the field compressor stations will require additional personnel, additional housing and transportation facilities, and additional capital maintenance facilities (R. Vol. II, pp. 891, 893, 928).

The experience of the past years has disclosed that additional capital facilities must be provided in order to insure continuous service through the pipeline system. Several river crossings have already been replaced and others must be replaced (R. Vol. II, pp. 912-918). Added facilities must be provided for the gasoline plant, the dehydrating plant, and each of the ten compressor stations (R. Vol. II, pp. 771, 819-837). Electrolysis has developed in the soil at several places traversed by the pipeline, resulting in serious deterioration in the pipeline and connections (R. Vol. II, p. 926). Capital outlays will be required to anticipate and prevent damage of this character. It is now clearly foreseen that still other additional capital facilities will have to be provided in order to insure the continued operation of cross-petitioners' facilities (R. Vol. II, pp. 1056-8).

An exhaustive study of the future capital requirements of cross-petitioners to cover the cost of drilling and equipping wells, building additional gathering lines, field compressor stations, maintenance equipment, housing facilities, river crossings, and other capital requirements was conducted at the direction of cross-petitioners' general superintendent, Kesinger (R. Vol. II, pp. 704-5), under the supervision of a specially qualified engineer, Bussard (R. Vol. II, p. 704), with whom all the department heads and other employees of cross-petitioners and two experienced outside engineers of wide reputation, Biddison and Gill, collaborated (R. Vol. II, p. 705). The same study developed the cost of replacements and maintenance of the facilities and the cost of operations, taxes, and other necessary expenditures over the future life of the field. Future capital equipment, replacements, maintenance and operating costs were computed in these studies at costs of labor and material prevailing on the first of June, 1939, a date shortly prior to the offering of the testimony. Taxes were computed on the basis of the then levies, notwithstanding cross-petitioners' witnesses then predicted, that taxes will increase (R. Vol. II, pp. 1058-9), a prediction which has already been vindicated (R. Vol. VIII, p. 3945).

The evidence dealing with future capital maintenance and operating costs is unequivocally to the effect that only those charges have been included which definitely can be foreseen now as inevitable (R. Vol. II, p. 706), though the witnesses knew that there were other expenditures in all these classifications which would certainly be required but which cannot be definitely foreseen at this time (R. Vol. II, p. 706).

Future Revenues of Petitioners.

During cross-petitioners' entire operations their general superintendent, Kesinger, has been responsible for their marketing activities, except as to natural gasoline, for the marketing of which the superintendent of operations, G. M. Davidson, has been responsible (R. Vol. II, p. 1069). These executives made careful analyses of the probable future revenues from the sale of gas (R. Vol. II, p. 696) and natural gasoline (R. Vol. II, p. 1080). In estimating the future revenues from the sale of gas the witness Kesinger assumed that the average revenues for the years 1936, 1937 and 1938, the three full years during which cross-petitioners had operated after developing a full load, would continue through 1951 (R. Vol. II, p. 695). No effort was made to predict the probable revenues by years for the reason that the consumption of natural gas is very sensitive to changes in weather conditions and to business fluctuations (R. Vol. II, pp. 696-7). The testimony shows that cross-petitioners' gross revenues in 1938 were more than one million dollars less than in the previous year (Exhibit 136, R. Vol. V, p. 2959). In selecting the average revenues from the sale of gas for the years 1936, 1937 and 1938 as the basis of computing future revenues from that source, the witness observed that there doubtless would be years like 1937 when the revenues would exceed this average, but that there would likewise be years like 1938 when the revenues would be less than the average (R. Vol. II, p. 697).

Cross-petitioners urged that in view of the fact that theirs is an extractive industry and that the life of their entire investment depends upon the limited life of their reserves, the Commission should look forward over the remaining prospective life, in the light of the uncontradicted testimony, and allow, in fixing the amount to be amortized, the entire cost of additional capital facilities, and that it provide in the allowance for expenses each year the average annual cost of capital replacements and the estimated costs for maintenance and operations (Exhibit 141, R. Vol. V, p. 3025, Vol. III, p. 1411; Exhibit 210, R. Vol. VII, p. 3901, Vol. IV, p. 2637; Exhibit 142, R. Vol. V, p. 3029, Vol. III, p. 1414; Exhibit 211, Vol. VII, p. 3902, Vol. IV, p. 2638, all of which costs are summarized in Exhibit 117, R. Vol. V, p. 2819, Vol. II, p. 1068). Cross-petitioners urged also that in view of the limited life of their business and the expense and delay incident to repeated rate proceedings, the Commission should take into account the cost of additional capital facilities now definitely foreseen and make an additional allowance in the rate base, under the principle of average investment, over the future life of the project (Exhibit 141, R. Vol. V, p. 3025, Vol. III, p. 1411; Exhibit 210, R. Vol. VII, p. 3901, Vol. IV, p. 2637; Exhibit 142, R. Vol. V, p. 3029, Vol. III, p. 1414; Exhibit 211, R. Vol. VII, p. 3902, Vol. IV, p. 2638).

For the purposes of the interim order, the Commission accepted cross-petitioners' estimates of the cost of additional capital facilities, capital replacements, maintenance and operation through the year 1954, and allowed the cost of additional capital facilities and capital replacements in fixing the amount to be amortized (R. Vol. VIII, p. 3944). For the purposes of the order, the Commission also accepted cross-petitioners' estimates of future revenues (R. Vol. VIII, p. 3945). However, the Commission in fixing the rate base allowed capital additions only through December 31, 1942 (R. Vol. VIII, p. 3936).

Reproduction Cost New of Cross-Petitioners' Property.

After exhaustive studies, a group of qualified and experienced experts, Hamilton, Eastman, Willard, and Stoddart, developed the figures showing the reproduction cost new of cross-petitioners' present facilities other than gas reserves (R. Vol. II, pp. 1191-1276). Another witness, Biddison, well qualified for the assignment, carefully went over the depreciable properties and testified as to the existing depreciation thereon (R. Vol. II, pp. 1284-1310). The two sets of figures were put together, and the figures showing the reproduction cost new less observed depreciation of the depreciable properties were compiled (Exhibit 125, R. Vol. V, pp. 2922-5; Vol. II, p. 1310). Another expert, Wallace, after careful analysis, testified to the present fair value of the gas reserves (R. Vol. III, pp. 1341-

66). An expert, Eastman, testified as to the required working capital (R. Vol. II, pp. 1231-3). Three business men of long years' experience, Smith, Taubman, and Solow, testified to the probable salvage value of cross-petitioners' facilities (R. Vol. II, pp. 1119-90, Exhibit 122, R. Vol. V, p. 2841, Vol. II, p. 1190). The figures showing the original cost of the capital facilities in use as of January 1, 1939, (Exhibit 141, R. Vol. V, p. 3025; Vol. III, p. 1411), and as of June 1, 1939 (Exhibit 142, R. Vol. V, p. 3029; Vol. III, p. 1414), were offered in evidence.

The Commission, for the purposes of this order, accepted cross-petitioners' figures covering reproduction cost new of the depreciable properties other than leaseholds, the value of the leaseholds, the required working capital, the ultimate salvage value of the properties, and the original cost of the physical facilities.

Interest on Sinking Fund for Amortization.

Bearing on the proper allowance for amortization, cross-petitioners called a banker, Zweiner, Assistant Cashier of the Harris Trust & Savings Bank, Chicago, to testify as to the character of securities which an investment trustee would consider available in handling a trust fund of the size of the annual allowance for amortization (R. Vol. III, pp. 1367-79). The witness testified that, under the existing conditions, the nearest to risk free securities available would be government bonds and high class municipal bonds, and that of these securities only government bonds were available at all times (R. Vol. III, p. 1369). He listed all the government bonds outstanding at the time he testified on September 7, 1939 (Exhibit 132, R. Vol. V, p. 2951; Vol. III, p. 1377), and from this list selected those he considered available (Exhibit 133, R. Vol. V, p. 2953; Vol. III, p. 1377). He then calculated the yield on the bonds available at the prices as of August 15, 1939, the date on which he started his studies, and determined that the net yield to the investor on such investments would be 1.35% per annum over the period ending with the year 1954 (R. Vol. III, p. 1374). As a result of the outbreak of war shortly after this witness' figures were prepared, the yields on government bonds advanced (R. Vol. IV, p. 2130). Another witness, Delafield, who has had wide experience as a banker and later as a financial executive in a company owning extensive natural gas pipeline and public utility properties, testified that in his opinion about 2%, compounded semi-annually, would be the proper rate to use in computing an amortization allowance by the sinking fund formula (R. Vol. III, pp. 1433, 1435).

Return on Investment Over Entire Life of Properties.

Bearing on cross-petitioners' contention that in testing their prices and charges, to determine whether or not they are unreasonable and unjust, *their investments and earnings throughout the whole period from the beginning of their operations on January 1, 1932, to the time when their reserves will be exhausted should be considered, cross-petitioners prepared and offered the figures showing past and future capital investments, including replacements, past and future operating expenses, and past and future revenues, from which it appeared that, after returning the capital investment and paying the expenses of operation, the revenues over the whole period would yield to cross-petitioners a return of only 6.39% on the average annual investment* (Exhibit 140, R. Vol. V, p. 3021; Vol. III, p. 1407). The summary sheet of Exhibit 140 is reproduced in Appendix B hereto, p. 274, *infra*.

Exhibits Summarizing Revenues, Costs, Etc., of Cross-Petitioners.

Going to the issues involved in fixing probable charges, should the Commission find it proper to fix reduced charges, cross-petitioners caused to be prepared, and offered in evidence, two exhibits, Nos. 141 and 142 (R. Vol. V, pp. 3025, 3029; Vol. III, pp. 1411, 1414). In Exhibit 141 the estimated revenues set out in the testimony to which we have already referred were used, as were also the figures covering the costs of operation and maintenance and the cost of replacements. In arriving at the assumed present fair value in this exhibit, the original cost of the capital assets other than gas reserves, less viewed depreciation of the depreciable assets, and the original cost of the gas reserves less depletion were used. To this assumed present fair value was added $8,500,000 as going concern value and $975,000 as working capital, with an additional allowance, under the principle of average investment, during the future years to cover the cost of additional capital facilities, bringing the total rate base up to $75,305,459. Also the figures of the experts who testified on that subject as to the liquidating salvage value of the properties were used in this exhibit. The total amount to be amortized assumed in this exhibit was $77,513,135, representing the present fair value of the properties, including going concern value and working capital, plus $9,338,983 to cover cost of additional capital facilities in the future, less the liquidating salvage value in the amount of $1,049,132. The allowance for amortization assumed was computed by determining what amount, set aside annually, with interest at 1.35% compounded annually, would, during the period beginning January 1, 1939, and ending December 31, 1954, return to cross-petitioners the full amount to be amortized. From all these figures it was determined that, if the present fair value of the property be assumed at original cost less existing depreciation and depletion, cross-petitioners would receive a return on the rate base assumed as aforesaid of only 4.79% per annum during the remaining life of their project (Exhibit 141, R. Vol. V, p. 3025; Vol. III, p. 1411). Later this exhibit was revised by Exhibit 210, which differs from Exhibit 141 only in that in computing the allowance for amortization an interest rate of 2% compounded semi-annually was used in order to conform the figures to the testimony offered by cross-petitioners at a date subsequent to the offering of Exhibit 141. Exhibit 210 shows that, on the rate base assumed in Exhibit 141, cross-petitioners' present revenues, after proper allowance for amortization, would return over the remaining life of the field an average of 5.1% per annum (R. Vol. VII, p. 3901). Exhibit 210 is reproduced herein in Appendix C, p. 275, *infra*.

Exhibit 142 was substantially similar to Exhibit 141, except that there cross-petitioners assumed as the present fair value of the property the reproduction cost new of the present facilities other than leaseholds, less viewed depreciation, and as the present fair value of the reserves the figures of the expert on that subject. On such basis it developed that, after paying the operating expenses and costs of replacement and setting aside an amount each year sufficient to return the present fair value of the properties, including going concern value, working capital, and the proper allowance for additional capital facilities, computed on the basis of an interest rate of 1.35% compounded annually, the return to cross-petitioners on the proper rate base during the future life of the field would be an average of 3.69% (Exhibit 141, R. Vol. V, p. 3025; Vol. III, p. 1411). This exhibit was also revised (Exhibit 211) to conform the allowance for amortization to the revision in the interest rate used from 1.35% to 2%. On that basis it developed that, after setting aside an amount each year sufficient to provide for amortization and after paying the expenses of maintenance and operation, cross-petitioners will receive an annual return on the proper rate base of 4% per annum (R. Vol. VII, p. 3902). Exhibit 211 is reproduced herein in Appendix D, p. 276, *infra*.

Evidence Relating to Rate of Return.

The only controverted issue of fact presented by the opinion and order is the fair and reasonable rate of return to which cross-petitioners are entitled. The facts relating to the subject of going concern value and the holdings of the Commission and the Court below thereon present questions of law as to the legal effect of the testimony. On other issues, including the rate base, the amount to be amortized, the working capital and ultimate salvage value, the Commission, for the purposes of this order, accepted the testimony offered by cross-petitioners. Other issues involved present pure questions of law.

Cross-petitioners urge that in finding that 6½% per annum is a fair and reasonable return the Commission erred as a matter of law in that there is no substantial evidence to support such finding (R. Vol. VIII, p. 3987). In order to present this point clearly it will be necessary to state in some detail the facts going to the subject of rate of return.

Cross-petitioners contend that of all the regulated enterprises the natural gas pipeline industry, engaged only in the production, transportation and sale at wholesale of natural gas, is the most beset with risks and hazards. They contend also that, by reason of the geological and production problems and the competition among the thousands of producers in their single source of supply, the mechanical problems presented by the numerous rivers traversed by their pipelines and other topographical conditions, and the long distance separating their source of supply from their markets, cross-petitioners are confronted with special hazards not common to all those engaged in the same business.

It is impracticable to point out here all the evidence dealing with the numerous risks with which cross-petitioners are confronted; but we will undertake to mention some of these major dangers and risks pointed out by witnesses for cross-petitioners.

1. *The Danger of Failure in the Supply of Gas.* For the purposes of this case the Commission accepted the estimate of cross-petitioners' witnesses that the maximum life of cross-petitioners' source of supply will not extend beyond the end of 1954 (R. Vol. VIII, p. 3938). In the evidence it was pointed out that the field might not last that long, or that economic conditions in cross-petitioners' business might result in an earlier termination of cross-petitioners' business (R. Vol. II, p. 695). As a consequence of the operation of any or all of a number of factors, such as increased withdrawals, physical complications and economic developments, cross-petitioners' business may terminate prior to the end of the maximum life assumed (R. Vol. II, p. 695). Investors buying bonds of natural gas companies protect themselves against these contingencies by requiring that the bonds mature at a date materially in advance of the indicated exhaustion of the reserves (R. Vol. III, pp. 1430, 1501, Vol. IV, pp. 2607-8). The Commission, in fixing the rate of return, failed to give effect to inherent risks respecting the gas supply, made no provision in the allowance for amortization for these manifest contingencies. Cross-petitioners, therefore, are faced, and will continue to be faced, with the very serious risk that they will lose that part of their capital which the Commission has assumed they will recover during the latter part of the project's life.

2. *The Danger of Increased Costs.* In cross-petitioners'

estimates of costs in the future of additional capital facilities, replacements of existing facilities, maintenance, and operating expenses, the costs of materials and labor were computed on prices as of June 1, 1939 (R. Vol. II, p. 837). The estimates of taxes were based on levies in effect on the date last mentioned (R. Vol. II, p. 1058). Conditions point to an increase in costs of materials and labor (R. Vol. I, pp. 450-1) and to increased taxes (R. Vol. I, p. 600, Vol. III, p. 1579). This Court will take judicial notice of the fact that the predictions of this record in these respects have been borne out. The Commission in its order made allowance for one substantial tax increase occurring during the interval between the offering of the testimony and the entering of the order (R. Vol. VIII, p. 3945). Cross-petitioners are faced with substantial risks that all these costs may materially increase during the period covered by a rate order entered at this time (R. Vol. III, pp. 1582-3).

3. *Dangers Incident to Employment of High Pressures and High Stresses.* The fact that cross-petitioners' facilities are operated at substantially higher pressures and stresses than have heretofore been employed by the pipeline industry presents a serious element of uncertainty (R. Vol. III, p. 1568). As pointed out by a witness, it is a matter of common knowledge that as equipment is worked or stressed toward ultimate capacity and is continuously employed at a very high percentage of total capacity, there is a tendency to fatigue, and in the absence of experience as a guide there is always a serious question as to how long the facilities will hold up under the excessive strain, regardless of how well they are maintained or how well they have held up down to the present time (R. Vol. III, p. 1456). The same witness pointed out that it is entirely possible that cross-petitioners may find it necessary to reduce the stresses in the interest of safety to life and property. A relief of the stresses must be accomplished

by a reduction in operating pressures, with a consequent reduction in the volume of gas transported. Another alternative might be to increase the cost of replacements and maintenance incident to the failure of the facilities operated at their present high stresses (R. Vol. III, p. 1456). Cross-petitioners are, and will continue to be, confronted by a serious risk that their revenues may be reduced by the necessity to reduce stresses, or that their costs of operation will be increased to offset the effect of employing the high stresses to which their facilities are now subject (R. Vol. III, p. 1456).

4. *Danger of Pipeline Failure.* Notwithstanding the fact that cross-petitioners' pipeline system has been in operation only eight years, several line failures have already occurred, one of which proved to be rather serious, resulting in interruption of service and in costs, including loss of revenues, of nearly $250,000 (R. Vol. I, p. 604). Already one river crossing has failed and others have been seriously damaged (R. Vol. I, p. 522). In estimating their revenues in the future, cross-petitioners assumed continuous service and only the replacement and maintenance of capital assets which now definitely can be foreseen. Cross-petitioners are confronted with the risk that serious losses of revenue or substantially increased costs, and possibly both, may result from failures of the pipeline in the future.

5. *Danger That Another Source of Supply Nearer to Cross-Petitioners' Market May Be Discovered.* If a circle be drawn about the City of Chicago with a radius of 950 miles, the distance traversed by cross-petitioners' lines, it would embrace an enormous territory. The discovery of gas in sufficient quantities anywhere within that territory would place cross-petitioners in competition with others who manifestly would be able to produce and transport gas to cross-petitioners' markets at lower cost than can cross-petitioners. It is a matter of common knowledge that the fascinations of the oil business have for years

resulted in exploration activities throughout the United States, and no one can tell when a tremendous reserve of natural gas within three or four hundred miles, or even at a shorter distance from Chicago, may be discovered. Already free gas has been discovered in substantial quantities in southern Illinois, not more than one-third as far away from Chicago as the Texas Panhandle (R. Vol. I, pp. 591-2). Other important discoveries of natural gas have occurred in Michigan, less than half the distance from Chicago of cross-petitioners' reserves (R. Vol. I, pp. 591-2). Recently an extensive lease play has taken place in the Forest City basin in southeastern Nebraska, not more than one-third the distance down cross-petitioners' line from Chicago (R. Vol. I, p. 592). Large reserves of gas across the Ohio River in Kentucky, only about half the distance from Chicago as cross-petitioners' reserves, are already known to exist (R. Vol. III, p. 1764). Cross-petitioners' industrial contracts do not require minimum purchases. The firm contracts will not support cross-petitioners' operations (R. Vol. I, p. 581).

6. *Danger of Competition With Other Fuels.* Cross-petitioners must meet serious competition with other fuels and electricity in every use to which consumers apply natural gas. In the kitchens, where the gas consumed commands the highest price of any gas, the gas range or cook stove is in keen competition with the electric range, electric roaster and the electric grill (R. Vol. III, pp. 1495, 1585). The electric industry is making substantial inroads on this type of business. From Exhibit 186 (R. Vol. VII, p. 3725; Vol. IV, p. 2072), prepared by the Commission's witness Smith, it appears, in Schedule 1 (R. Vol. VII, p. 3727), that the average annual gas sales (M.C.F.) per customer for domestic use declined from 62.5 in 1929 to 53.6 in 1938, and that the average annual revenue per customer for domestic gas during the same period declined from $41.65 to $37.52. Exhibit 204 (R. Vol. VII, p. 3885, Vol.

IV, p. 2486) shows that in the electric field the per customer use of electricity in kilowatt hours increased from 499 in 1929 to 845 in 1938, and that the annual revenues per customer during the same period increased from $31.44 to $35.57. In the City of Chicago during the same period the per customer domestic gas sales decreased from 159.3 therms to 143.9 therms, and the annual revenues per customer decreased from $29.85 to $24.68 (Exhibit 202, R. Vol. VII, pp. 3877-3883, Vol. IV, p. 2482). Over the same period the Chicago electric utility experienced an increase in the per customer domestic consumption from 468 kilowatt hours to 863 kilowatt hours, and an increase in annual revenues from $25.50 to $33.42 (Exhibit 204, R. Vol. VII, p. 3885, Vol. IV, p. 2486). Schedule 1 of Exhibit 186 (R. Vol. VII, p. 3727, Vol. IV, p. 2072) shows that while there was a slight increase in the total per customer consumption of gas for commercial uses during the same ten year period, the revenue per customer had decreased from $102.64 to $98.93, indicating a material decrease in the unit price of gas for uses classified as commercial. The same exhibit shows that in 1929 the per customer consumption in the industrial field was 30,642.5 M.C.F. and that in 1939 the per customer volume had declined to 19,846.7 M.C.F., while the annual revenue per industrial customer declined from $6,170.52 in 1929 to $3,372.18 in 1938. These declines are unquestionably attributable to the circumstance that in the sale of gas for industrial purposes keen competition is encountered with coal, oil and other fuels (R. Vol. IV, pp. 2578-9).

7. *Danger of Increased Taxes and of Punitive Legislation.* While in their estimates for future operating expense summarized in Exhibit 117 (R. Vol. V, pp. 2819-39, Vol. II, p. 1068), cross-petitioners' witnesses projected the taxes through the period ending in 1954 on a basis of the levies or rates as they existed in 1939, it is a matter of common knowledge that we are just emerging (we hope) from the

worst depression in the history of this country, and that the expenses of running all branches of the government, from the national government down to the school district, have substantially increased during the period of the depression; that by reason of the inability of the citizenship to pay increased taxes commensurate with these increased expenditures large deficits have resulted; and that bonds and other evidence of indebtedness have been issued by the Federal government and by many of the local units of government. The situation manifestly presents serious danger of increased taxes (R. Vol. III, pp. 1578-9). The present defense program in this country has brought higher taxes. During the years 1932 to 1934, inclusive, cross-petitioners' taxes averaged about $340,300 a year. In 1935 their taxes had increased to almost double this average, and by 1937 they had increased to almost four times this average (Exhibit 116, p. 2, R. Vol. V, p. 2807, Vol. II, p. 1065).

It is a matter of common knowledge that there is widespread political agitation for the levying of greatly increased taxes on those who are in the business of extracting and marketing natural resources (R. Vol. III, pp. 1502-3). At every session of the Legislature of Texas in recent years strenuous effort has been made to increase the production taxes on natural gas by amounts varying from 100 to 1,000 per cent (R. Vol. I, p. 600). In the State of Illinois there has been no session of the Legislature in recent years but that bills have been introduced proposing the levy of taxes ranging up to as much as ten cents per M. C. F. on the sale of natural gas in that state. One of these bills, providing for a levy of five cents per M. C. F., actually passed the Senate (R. Vol. I, p. 601). The levy of a tax of five cents per M. C. F. would absolutely destroy cross-petitioners' industrial markets for natural gas, for the reason that the increase in price could not be passed on to the customer, who will pay only the price justified by the competitive price of coal, oil and other available fuels. Indeed, this proposed tax in Illinois is not intended as a revenue measure but is punitive in character. It is well known that the coal miners, coal operators, coal dealers, railroad operators, railroad employees, and other organized groups take the position that the use of natural gas for industrial fuel cuts down the consumption of coal, thus reducing the demand for labor in the coal mines, on the railroads, and in the coal distributing establishments, and reacts on the revenues of the operators, the railroads, and the coal distributors (R. Vol. I, p. 600, Vol. III, p. 1503).

Directly related to this agitation, in all probability, is the suggestion embodied in the report by the Natural Resources Commission to the President, and by the President forwarded to Congress with his recommendation that it be given serious consideration. In this report the commission recommends that a Federal tribunal be set up with full power to control the use of coal, oil, natural gas and electricity to the end that the higher order of fuels, which doubtless would include natural gas, be reserved in the public interest for higher and more important uses and purposes, and that the lower orders of fuel be used for other purposes, such as the firing of boilers, in the interest of conserving the more desirable fuels. A bill to set up such a commission has been offered, and doubtless would receive the support of the organized interests above referred to, which are interested in limiting the fuel utilized by industry to coal and in excluding the use of natural gas as industrial fuel. It is manifest that the danger of this character of legislation, whether it involve an increase in taxes or a limitation of the use of natural gas, presents a serious menace to cross-petitioners' business.

8. *Danger of Increasing Costs of Regulation.* In Exhibit 117 (R. Vol. V, pp. 2819-2839, Vol. II, p. 1068) cross-petitioners' witness Campbell estimated that $30,000 a year

would be required after 1940 through 1950 to cover regulatory expenses. There is always the possibility of expensive proceedings before the Federal Power Commission if its right to regulate the prices at wholesale for natural gas be upheld. In this connection it must be remembered that regulation by the Federal Power Commission is not the only regulation to which cross-petitioners are subject. They are likewise subject to regulation by the Securities and Exchange Commission, by the National Labor Relations Board, and by the tribunal which administers the Wages and Hours Act; and their production activities are subject to regulation by the Railroad Commission of Texas. In the event of proceedings before any of these regulatory bodies $30,000 per annum would represent a small part of the cost. For some time legislation granting drastic powers to the Texas Railroad Commission has been urged upon the Texas Legislature, and in a recent session of the Legislature a bill was actually passed by the Senate conferring on the Railroad Commission authority to prorate and control the production from gas wells to the end that pipelines divide their market outlets with those who do not have markets (R. Vol. I, p. 580). If a valid act of this character were passed, cross-petitioners would be subjected to drastic increases in expenses and capital costs (R. Vol. I, pp. 580-1). They would be required to purchase gas at the prevailing field price, which now is about four cents per M. C. F. at the well, and in order to obtain this gas it would be necessary to build gathering lines to, and install meters at, numerous wells of others, some of which would doubtless be located at remote distances from cross-petitioners' gathering lines (R. Vol. I, p. 581). Eventually they doubtless would find it necessary to install field compressor units to boost the purchased gas into their gathering system (R. Vol. I, p. 532).

9. *Danger of Inflation.* The increased costs referred to in the preceding sections were primarily those incident to

the increased quantities of material and the increased volume of labor that would have to be purchased and employed in the adding of more capital facilities and a greater aggregate of replacements and maintenance than those assigned in the estimates summarized in Exhibit 117 (R. Vol. V, pp. 2819-39; Vol. II, p. 1068), which estimates are based upon prices of material and wages of labor obtaining on June 1, 1939. Among competent students of present economic conditions there is wide-spread sentiment that the country is faced with substantial increases in the price of commodities and with an attendant increase in the wages of labor (R. Vol. I, p. 449; Vol. III, pp. 1582-3). It is true that this danger confronts all industry and that such a situation would require that regulatory bodies re-examine existing rates. However, in view of the limited life of cross-petitioners' reserves, serious consequences might result from the inevitable delay that would attend any effort by them to obtain relief through regulatory processes.

10. *Danger of Varying Demand.* One of the most serious risks confronting cross-petitioners is the risk of losing substantial revenues over long or short periods due to variations in the demand for gas (R. Vol. I, pp. 571, 697). This danger has already manifested itself in the difference in the gross revenues as between the years 1937 and 1938 amounting to about $1,100,000 (Exhibit 136, R. Vol. V, p. 2959, Vol. III, p. 1393). This resulted in a decline in the net revenue in the amount of about $886,000 (Exhibit 136, R. Vol. V, p. 2959, Vol. III, p. 1393). In view of the fact that so much of cross-petitioners' revenues are received from the sale of gas used ultimately for industrial purposes (R. Vol. I, p. 584), cross-petitioners' business reacts immediately to and directly with fluctuations in the business conditions confronting the industries which utilize their gas (R. Vol. I, p. 584). Cross-petitioners are in an especially hazardous position on this point by reason of the fact that they sell their commodity at wholesale and have

no control over the policies affecting the sales to the ultimate consumer (R. Vol. III, p. 1583). The primary interest of the distributor is in its own earnings and not in the earnings of cross-petitioners. This is just as true of the three Chicago distributing companies which indirectly own a minority interest in the securities of cross-petitioners as of other distributors. Most of these distributors have standby equipment for the manufacture of artificial gas. Most of them continue to manufacture gas and blend it with the natural gas purchased from cross-petitioners before selling it to the ultimate consumer. Any conflict of interest between cross-petitioners and the distributing companies inevitably would be resolved by the latter against cross-petitioners without regard to any losses which cross-petitioners might sustain (R. Vol. III, pp. 1583-4). Cross-petitioners, therefore, are precluded from resorting to changes in policies and other means of protecting themselves against losses incident to business fluctuations or other circumstances resulting in varying demand for natural gas.

Evidence on Risks Offered by Complainant and the Commission.

The witnesses who testified for complainant and the Commission did not controvert the evidence of risks pointed out by witnesses for cross-petitioners. Three of their experts did not touch on the subject. Only Kleinman, called by complainant, testified concerning risks. In his direct testimony he did not mention any of the risks above pointed out; but he did undertake to discuss certain risks which he argued do not confront cross-petitioners, but do confront unregulated industries. In effect, he testified that a risk in business arises out of a decision which must be made by the management and which, when made, will affect the subsequent profits realized by the business (R. Vol. IV, p.

2082). Among the risks he mentioned as not applicable in any material degree to the operations of cross-petitioners were the risk of converting cash into inventory (R. Vol. IV, p. 2082), the risk of labor disturbances (R. Vol. IV, p. 2084), the risk of overhead expense connected with business (R. Vol. IV, p. 2084), the credit risk (R. Vol. IV, p. 2085), the risk of competition between rival concerns for the same market with the same product (R. Vol. IV, p. 2085), and the risk due to technological changes (R. Vol. IV, p. 2087). On his cross-examination the witness admitted that most of these risks confront cross-petitioners as well as others (R. Vol. IV, p. 2409); but he tried to minimize the importance of these risks as applied to cross-petitioners (R. Vol. IV, p. 2409). Called to testify in rebuttal (R. Vol. IV, p. 2558), Delafield, a witness for cross-petitioners, called attention to the tremendous inventory of natural gas which cross-petitioners acquired at a cost of more than $15,800,000 in the Texas Panhandle field, and to the fact that it will require some fifteen or twenty years from the date it was acquired to accomplish a turnover of this inventory. During this period, he pointed out, competing producers will be withdrawing gas from the same field, with the result that cross-petitioners have a distinct inventory risk against which they are more helpless than would be the owner of an inventory of manufactured articles or merchandise kept under lock and key controlled by the owner (R. Vol. IV, pp. 2574-5). He denied that cross-petitioners are without risk in connection with labor disturbances (R. Vol. IV, p. 2576), and pointed out that cross-petitioners employ some ten or twelve groups of men, one at each compressor station and one in the field, any one of which, were it to go out on strike, would put cross-petitioners completely out of business until the disturbances could be settled. He pointed out that, far from being without credit risks, cross-petitioners have taken a loss of more than $1,250,000 annually, since 1935, below the contract price, as the result of a controversy arising between the complainant and Chicago District Pipeline Company (R. Vol. IV, p. 2578). He also testified to facts contradicting the testimony of Kleinman in claiming that cross-petitioners are not confronted with competition, pointing out in that connection that their keen competition with electricity, coal, oil and other fuels may be equally as disastrous as competition with another gas company (R. Vol. IV, pp. 2578-9).

The testimony of the four witnesses offered by cross-petitioners and the four witnesses offered by the Commission and complainant, relating specifically to the rate of return, will be discussed in the argument on that issue. pages 185 to 215 of this brief.

SPECIFICATION OF ERRORS.

In this brief we discuss the questions raised in the petition for the writ of certiorari (No. 265) as well as the questions raised in the cross-petition (No. 268).

The Commission and complainant in their petition for the writ of certiorari specified two questions as follows (Pet. 2):

> "1. Whether in issuing a rate order under the Natural Gas Act, the Federal Power Commission is required to include within the rate base a separate allowance for 'going-concern value';
>
> 2. Whether, in determining the annual allowance for amortization, the Commission may compute the allowance on the basis of the entire service life of the capital assets or only on the basis of the remaining life from the date of the passage of the Natural Gas Act, June 21, 1938, or from the date of the rate order."

In addition the Commission and complainant "reserved" the following question (Pet. 2, Ft. Note):

> "Whether, on judicial review of a rate order of the Commission under Section 19(a) of the Natural Gas Act, the order may be vacated for failure to make an allowance or adequate allowance for certain items of value or cost, in the absence of a finding that the rates permitted by the order are confiscatory, unjust, or unreasonable."

Cross-petitioners do not accept the foregoing statement of the questions as accurate presentations of the issues. On these matters cross-petitioners' contentions, broadly stated, are:

1. The decision of the Court below respecting going-concern value is sound. The Court below correctly held that the Commission's order should be set aside because it is confiscatory in that the Commission dis-

regarded going-concern value in fixing the rate base and in fixing the amount to be amortized;

2. The decision of the Court below respecting the period of amortization and the amount to be amortized and the amount of the rate base is sound. The Court below correctly held that the Commission's order should be set aside because it is confiscatory in that the Commission provided for the amortization of only the original cost of the properties and fixed the amortization period at the entire life of cross-petitioners' business, which commenced long prior to regulation;

3. The Court below found confiscation; but under the authority and duty imposed upon the Court below by Section 19(b) of the Natural Gas Act (15 U. S. C. 717 r(b)) the Court in *reviewing* an order under that section might set aside the order for reversible error, even in the absence of a finding of confiscation. This is not a case in the District Court in which the utility attacking rates fixed by a governmental body has the burden of showing confiscation to make out a case.

Cross-petitioners' contentions on the questions raised in their cross-petition are, broadly stated, as follows:

1. While the Court below did not pass upon the question, the Commission's order should be set aside on the ground that it is confiscatory in that it is based upon an interest rate of 6½% on the sinking fund;

2. While the Court below did not pass upon the question, the Commission's order should be set aside because there is no substantial evidence to support the Commission's finding that cross-petitioners' present rates are unjust or unreasonable. Under Section 5(a) of the Natural Gas Act (15 U. S. C. 717 d), the Commission has authority to fix new rates only after a proper finding, based upon substantial evidence, that the present rates are unjust and unreasonable;

3. The Court below erred in not sustaining cross-petitioners' contention that the Commission's order should be set aside because the Commission did not fix new rates as required by the Natural Gas Act;

4. The Court below erred in not sustaining cross-

petitioners' contention that the Commission's order should be set aside because it is confiscatory in that it denies cross-petitioners a fair rate of return;

5. The Court below erred in not sustaining cross-petitioners' contention that the Commission's order should be set aside because the Commission is without power and jurisdiction to enter an "interim" order;

6. The Court below erred in not sustaining cross-petitioners' contention that the Commission's order should be set aside because the Natural Gas Act, as applied by the Commission to cross-petitioners' business, is in conflict with the Fifth Amendment to the Constitution of the United States.

In addition cross-petitioners contend:

If this Court should reverse the judgment of the Court below and uphold the Commission's order, cross-petitioners should not be required to refund to their customers the amounts representing the ordered reduction in revenues which have accrued since the Commission's order.

SUMMARY OF ARGUMENT.

1.

The Court Below Found Confiscation; However, on a Judicial Review of a Rate Order of the Commission Under Section 19(b) of the Natural Gas Act, It Is Unnecessary for the Reviewing Court to Find That the Rates Permitted by the Order Are Confiscatory, Unjust, or Unreasonable in Order to Reverse; for It Is the Duty of the Reviewing Court to Vacate the Order If the Commission Committed Reversible Error in the Proceedings Leading up to the Order.

The Commission and complainant, in their petition for a writ of certiorari, in addition to the principal questions (respecting going concern value and period of amortization), "reserved for argument on the merits" the following question:

> "Whether, on judicial review of a rate order of the Commission under Section 19(a) of the Natural Gas Act, the order may be vacated for failure to make an allowance, or adequate allowance, for certain items of value or cost, in the absence of a finding that the rates permitted by the order are confiscatory, unjust, or unreasonable."

A reading of the opinion of the court below (R. Vol. VIII, pp. 4026-4041) shows beyond fair dispute that the court found that the Commission's order would result in confiscation because of the failure to make allowance, or adequate allowance, for certain items of value or cost. It is true that the court below did not enter findings of fact and conclusions of law such as are required of Federal trial courts. But the court below did not, in this case, sit as a trial court; it sat as a court of *review,* and carried out the duty imposed upon it by the Natural Gas Act, to-wit: to *review* of the Commission's order.

With respect to going concern value, the court below found that the Commission's failure to include this item of cost which cross-petitioners incurred in developing their properties into an operating concern was the taking of property without due process (R. Vol. VIII, pp. 4038, 4039). With respect to the period of amortization and the Commission's failure to use present value, including going concern value, in fixing the amount to be amortized and the rate base, the court below found confiscation. Indeed, on this point the court below said (R. Vol. VIII, p. 4040):

> "Avoidance of conflicts with the Fifth Amendment of the Constitution is involved. Petitioners' (cross-petitioners here) position avoids the conflicts; respondents' (Commission and complaint here) creates an unavoidable clash."

There is no doubt that the court below found confiscation. The court's conclusion that the Commission's order is confiscatory is clear from its opinion. Therefore, the question stated above as "reserved" by the Commission and complaint is, in fact, an academic and moot question on this record.

However, it is perfectly clear that the Natural Gas Act (Section 19(b)). confers on the court below the authority, and imposes on it the duty, to *review* the order of the Commission. The authority and duty of the court below and of this Court, under Section 19 of the Natural Gas Act, are essentially and fundamentally different from the authority and duty of a District Court in a rate case in which the regulated concern is the plaintiff attacking rates fixed by a governmental agency. In such a case, the plaintiff must allege and prove that the rates are confiscatory and violative of the Fifth Amendment or Fourteenth Amendment to the Constitution. In the absence of a showing of confiscation by the plaintiff, the court, in the exercise of its equity powers, cannot disturb the rates. Here the authority and duty of the courts is to review and to set aside the Commission's order, if there be reversible error. Cross-petitioners had no burden before the Commission, had no burden in the court below, and have no burden here, to show that the Commission's order is confiscatory. Cross-petitioners have only the burden of showing reversible error. In fact, cross-petitioners have shown confiscation, and the court below found confiscation. Confiscation constitutes reversible error; but aside from confiscation, cross-petitioners are entitled to have the order vacated and set aside if they show that in the proceedings leading up to the order, and in the order, the Commission committed reversible error.

2.

The Court Below Correctly Held That the Commission's Order Should Be Set Aside Because It Is Confiscatory in That the Commission Disregarded Going Concern Value in Fixing the Rate Base and in the Amount to Be Amortized.

A. The Commission Erred in Refusing to Allow Cross-Petitioners' Claim of $8,500,000 *as Going Concern Value.*

B. In Any Event, the Commission Erred in Refusing to Allow Any Going Concern Value.

(*Infra*, pp. 68-101.)

The uncontradicted evidence shows that during the period of developing cross-petitioners' business the latter incurred out-of-pocket costs aggregating not less than $8,500,000, which costs will be entirely lost to cross-petitioners unless they are permitted to capitalize the same as going concern value to be included in the rate base and in the amount to be amortized. No effort is made here to capitalize past losses or to capitalize the speculative increase in value of the properties subjected to public use. Cross-petitioners contend only that they should be permitted to capitalize necessary, proper, and reasonable costs actually incurred and paid during the period of development as an incident to putting their business on a going basis. These costs consisted of (1) actual contributions to sales campaigns and other promotional activities with a view of obtaining customers who would utilize the gas which cross-petitioners were in position to transport and deliver; (2) interest actually paid for money borrowed to acquire and install facilities to be held in readiness for use as the market outlets were expanded; (3) taxes actually paid on such facilities prior to actual use; (4) actual depreciation sustained on such facilities prior to their being put in use; and (5) operating expenses and maintenance costs incident to maintaining such facilities prior to their being put in use.

In fixing the rate base the Commission refused to allow these costs or any part of same as going concern value in addition to the value of the component parts making up the system as as whole. In fixing the amount to be amortized the Commission erroneously disregarded the present value of the properties and held that cross-petitioners are entitled to amortize only the original cost of their facilities; but in arriving at the original cost the Commission disregarded entirely the costs incurred as an incident to developing the market outlets to the original normal capacity of cross-petitioners' facilities.

City of Fort Smith v. *Southwestern Bell Tel. Co.*, 270 U.,S. 627-28, affirming

Southwestern Bell Tel. Co. v. *City of Fort Smith*, 294 Fed. 102, 104-6.

McCardle v. *Indianapolis Water Co.*, 272 U. S. 400, 413, 415.

Omaha v. *Omaha Water Co.*, 218 U. S. 180, 202.

Des Moines Gas Co. v. *Des Moines*, 238 U. S. 153, 165.

3.

The Court Below Correctly Held That the Commission's Order Should Be Set Aside Because It Is Confiscatory in That the Commission Provided for the Amortization of Only the Original Cost of the Property and Fixed the Amortization Period at the Entire Life of Cross-Petitioners' Business, Which Commenced Long Prior to Regulation.

A. The Necessary Operation and Effect of the Natural Gas Act, If Valid, Is to Condemn to Public Use Cross-Petitioners' Property Utilized in the Conduct of Their Business, Which, Prior to the Enactment of the Act, Was a Strictly Private Business.

B. A Valid Administration of the Natural Gas Act Requires that Cross-Petitioners Be Compensated by a Proper Amortization Allowance for the Present Fair Value of Their Properties, Including Going Concern Value, as of the Time They Were Condemned for Public Use.

C. The Proper Period of Amortization Is that Beginning With Regulation Under the Natural Gas Act and Ending with the Life of Cross-Petitioners' Enterprise.

(*Infra*, pp. 102-129.)

At the time cross-petitioners' pipelines and facilities were constructed and acquired in the years 1930 and 1931 and at the time their operations began on January 1, 1932, cross-petitioners were engaged in a private business. Prior to the enactment of the Natural Gas Act they owed no duty to the public or to their customers to produce, transport and deliver natural gas at rates less than their negotiated charges. The enactment of the Natural Gas Act operated to subject cross-petitioners' properties to a public use. Such a taking is strictly analogous to, and equivalent to, a condemnation of private property to public use. The public, acting through the governmental agency, must take cross-petitioners as it found them at the time of the enactment of the Natural Gas Act. Cross-petitioners are entitled, in addition to a reasonable return on the value of their property subjected to public use, to a return of that value through proper allowance for amortization over the period during which their property shall be subjected to public use.

It was not the cost of cross-petitioners' property, the principal part of which was incurred in 1930 and 1931, that the operation of the Natural Gas Act in effect condemned; but it was the property itself which cross-petitioners were using in the conduct of their business at the time the Act was passed that was condemned and subjected to public use.

The holding of the Commission that cross-petitioners be charged with amortization accruals, with interest thereon, from the first of January, 1932, more than six and a half years before the Natural Gas Act was passed, manifestly operates to deny to cross-petitioners a substantial part of the fair value of the properties condemned and subjected to public use as of the time the Act was passed, and thus to confiscate that proportion of such value represented by the assumed accruals for amortization, together with interest thereon, prior to the enactment of the Act.

The Fifth Amendment to the Constitution of the United States.

West v. *Chesapeake, etc., Tel. Co.*, 295 U. S. 662, 671.

United R. & E. Co. v. *West*, 280 U. S. 234, 253-4.

Spring Valley Waterworks v. *City of San Francisco*, 124 Fed. 574, 594-5.

4.

While the Court Below Did Not Pass on the Question, the Commission's Order Should Be Set Aside on the Ground That It Is Confiscatory in That, in Computing the Annual Allowance for Amortization by the Sinking Fund Method, the Commission Charged Cross-Petitioners Compound Interest on the Annual Installments at the Rate of 6½% Per Annum.

A. In Providing for Amortization the Commission Was Required to Allow Annual Installments for Accruals Out of Earnings Which, Added Together, Will Return the Proper Amount To Be Amortized by the Time Cross-Petitioners' Reserves of Gas Are Exhausted.

B. Under the Sinking Fund Method Adopted by the Commission, in Computing the Annual Allowance the Interest Rate Used in the Computation, Under the Uncontradicted Testimony, Must Be No Higher Than 2% Per Annum Compounded Semi-annually.

(*Infra*, pp. 130-144.)

The only justification for employing a sinking fund method of computing the annual amortization allowance is that cross-petitioners will receive an amount each year to apply on the total amount to be returned at the end of the amortization period, and that because the purchasers are paying annual installments on this obligation in advance they are entitled to be compensated in the rates for the use of the amounts returned from the time of payment to the end of the period. The question immediately arises as to what compensation the purchasers should be allowed on these installments. The issue is squarely drawn between cross-petitioners and the Commission. Cross-petitioners urged before the Commission and before the court that this compensation should be the interest at prevailing rates obtaining on investments as nearly free from risk as can be obtained. Under the uncontradicted evidence this rate should not exceed 2% per annum, compounded semi-annually; but the Commission used 6½%. It fixed this rate on the theory that, if a rate of return of 6½% is fair and equitable for the company, by the same token it would seem to be fair and equitable in computing the amortization to be allowed. In other words, the Commission held that if cross-petitioners are entitled to a return of 6½% on the value of their reserves, pipelines, and other facilities, the purchasers are entitled to the same rate as interest on the amortization installments. This holding cross-petitioners attacked as erroneous and confiscatory.

United Fuel Gas Co. v. *Public Service Commission*, 278 U. S. 322, affirming

United Fuel Gas Co. v. *Public Service Commission*, 14 Fed. (2) 209, 211-12.

United Fuel Gas Co. v. *Railroad Commission*, 278 U. S. 300, 319.

Cheltenham & Abington Sewerage Co. v. *Public Service Commission*, 122 Pa. Sup. 252, 186 Atl. 149, 160.

5.

A. While the Court Below Did Not Expressly Pass on the Question, the Commission's Order Should Be Set Aside on the Ground That There Is No Substantial Evidence to Support the Commission's Finding That Cross-Petitioners' Present Charges Are Unjust and Unreasonable.

B. If by Implication It Overruled Cross-Petitioners' Contention on This Point, the Court Below Erred in Not Sustaining Cross-Petitioners' Contention That the Commission's Order Should Be Set Aside Because There Is No Substantial Evidence to Support the Commission's Finding That Cross-Petitioners' Present Charges Are Unjust and Unreasonable.

(*Infra,* pp. 145-166.)

There is a difference between a nonconfiscatory return and a reasonable return. Evidence of a barely nonconfiscatory rate of return is not evidence that a rate which yields a higher return is unreasonable. The effort of the Commission in this case has not been to set a reasonable rate, but a barely nonconfiscatory rate. Section 5(a) of the Natural Gas Act (15 U. S. C. 717d) gives the Commission authority to fix rates only after the Commission has found "that any rate, charge, * * * is unjust, unreasonable," etc. Such a finding must be based on substantial evidence. There is no substantial evidence in this record to support the Commission's finding that cross-petitioners' present charges are unreasonable. The only fact in any way bearing on the question is that cross-petitioners now earn $2,966,852 a year in excess of what the Commission deems to be a barely nonconfiscatory return on a rate base of $74,420,424. This one fact standing alone is clearly not substantial evidence that cross-petitioners' present rates are unreasonable. The Commission, in effect, held that a barely nonconfiscatory return before amortization for cross-petitioners is $6,395,180 annually. In 1932 cross-petitioners' net earnings from operations before amortization and return amounted to only $3,665,594. In 1933 they amounted to only $4,106,544; and in 1934 to only $6,193,069. The average annual earnings for the first seven years have been only $7,629,298. This is only $1,234,118 per year above what the Commission regarded as a barely nonconfiscatory return. On the evidence accepted by the Commission, the revenues remaining for amortization and return over the whole period from 1932 to 1954, inclusive, at the present rates would be only $7,993,442 per year, which is only $1,598,262 per year in excess of the amount allowed by the Commission as barely nonconfisactory return.

The record does not support the Commission's finding that this excess is unreasonable; but, on the contrary, shows that the excess is reasonable on account of the great risks and hazards involved in cross-petitioners' business, past deficits and declining future returns, and the creative skill and efficiency of management in the conception, designing, construction and operation of cross-petitioners' facilities.

Wichita R. R. & El. Co. v. *Public Utilities Commission*, 260 U. S. 48, 57-9.
St. Joseph Gas Co. v. *Barker*, 243 Fed. 206, 213.
National Labor Relations Board v. *Abell Co.*, 97 Fed. (2) 951, 957.

6.

The Court Below Erred in Not Sustaining Cross-Petitioners' Contention That the Commission's Order Should Be Set Aside Because the Commission Did Not Fix New Rates as Required by the Natural Gas Act.

(*Infra,* pp. 166-174.)

Section 5(a) of the Natural Gas Act provides that whenever, after a hearing, the Commission finds that any rate is unreasonable, the Commission shall determine the reasonable rate and "shall fix the same by order." The Commission here did not fix by order the new rates at which cross-petitioners would be required to sell natural gas to their customers. The order merely required cross-petitioners to file new schedules of rates reflecting a reduction in their revenues to the extent of $3,750,000 annually. Obviously, the statute requires that the Commission shall determine the reasonable rates from substantial evidence. Cross-petitioners sell upon various bases to various types of users. They make a capacity charge and a number of different commodity charges based on the type of service. There is no evidence in this record upon which the Commission can determine what the various charges and rates should be for each type of service or for any type of service. The Commission has failed to carry out the mandate of the statute. A proper order, based upon substantial evidence, cannot be entered in the present state of the record.

Section 5(a) of the Natural Gas Act, 15 U. S. C. 717d.

Missouri, ex rel., S. W. Bell Tel. Co. v. *Public Service Commission,* 262 U. S. 276, 296-298.

7.

The Court Below Erred in Not Sustaining Cross-Petitioners' Contention That the Commission's Order Should Be Set Aside Because It Is Confiscatory in That It Denies Cross-Petitioners a Fair Rate of Return.

A. *There Is No Substantial Evidence to Support the Finding of the Commission That 6½% Per Annum on the Rate Base Allowed by the Commission Is a Fair Rate of Return for Cross-Petitioners.*

B. *Under the Evidence Submitted by Cross-Petitioners, Which Is Uncontradicted by any Subtsantial Evidence, Cross-Petitioners Are Entitled to a Rate of Return on the Rate Base Claimed by Them of Not Less Than 8%Per Annum.*

(*Infra*, pp. 175-215.)

The evidence on which the Commission relied in fixing the rate of return at 6½% per annum contradicts rather than supports the Commission's finding. There is no substantial evidence to support the finding. The rate of return allowed would not yield an amount sufficient to pay the actual cost, under the uncontradicted evidence, of refinancing cross-petitioners' properties through the issuance of new securities.

Bluefield W. W. & I. Co. v. *Public Service Commission,* 262 U. S. 679, 692.

Willcox v. *Consolidated Gas Co.,* 212 U. S. 19, 48-9.

Missouri, ex rel., S. W. Bell Tel. Co v. *Public Service Commission,* 262 U S. 276, 291.

8.

The Court Below Erred in Not Sustaining Cross-Petitioners' Contention That the Commission's Order Should Be Set Aside Because the Commission Is Without Power and Jurisdiction to Enter an Interim Order.

A. *The Power and Jurisdiction of the Commission to Fix Charges for Natural Gas Are Derived Solely from the Natural Gas Act.*

B. *By the Enactment of the Statute, Congress Neither Conferred Nor Intended to Confer on the Commission Power and Jurisdiction to Enter an Interim Order in the Midst of the Hearing.*

C. *The Order Entered by the Commission Under the Assumption That It Had Power and Jurisdiction Under the Statute to Enter an Interim Order Is Void.*

(*Infra*, pp. 216-234.)

Cross-petitioners were required to proceed with their testimony before the Commission and complainant were required to develop the testimony in support of their contention that cross-petitioners' existing rates are unjust and unreasonable. At the conclusion of cross-petitioners' *direct* testimony (before 30 of their 37 witnesses had been cross examined), the motion for interim order was filed with the Commission by complainant and counsel for the Commission. The hearing before the commission had not been concluded. Counsel for the Commission and complainant announced at that time that they would cross examine cross-petitioners' witnesses and then develop their testimony. We submit that the Natural Gas Act (Section 5) requires that the hearing be completed before an order reducing rates can be entered. Cross-petitioners have not had such a full hearing. Since there is no provision in the statute for entering an interim order, and, under the plain wording of the statute, the Commission has authority only after a complete hearing to enter an order fixing rates, the present order is clearly beyond the commission's jurisdiction.

> *Interstate Commerce Commission* v. *L. & N. R. R. Co.*, 227 U. S. 88, 91-3.
>
> *Ohio Bell Tel. Co.* v. *Public Service Commission*, 301 U. S. 292, 298-300.
>
> *Wisconsin Tel. Co.* v. *Public Service Commission*, 287 N. W. 122, 133-8 (Sup. Court Wis.).

9.

The Court Below Erred in Not Sustaining Cross-Petitioners' Contention That the Commission's Order Should Be Set Aside Because the Natural Gas Act, as Applied by the Commission to Cross-Petitioners' Business, Is in Conflict With the Fifth Amendment to the Constitution of the United States.

A. *The Regulation Imposed Is Violative of the Fifth Amendment Because Cross-Petitioners' Business Is Not Affected With a Public Interest and Not Subject to Price Regulation.*

B. *The Regulation Imposed Is Violative of the Fifth Amendment Because It Involves a Taking of the Use of Cross-Petitioners' Property for the Public and Prohibits Cross-Petitioners from Withdrawing Their Property from Such Use Except by Permission of the Commission.*

(*Infra*, pp. 234-254.)

Cross-petitioners do not transport gas through their pipeline for hire. They are not a common carrier.

Cross-petitioners are not a public utility. They do not hold themselves out to sell gas to anyone who may apply. They sell gas only to selected customers upon negotiated terms and prices.

They are not public servants. Their business is purely private. The fact that they sell in part to public utilities does not constitute them a public utility. Natural gas is only one of a number of commodities and articles that the public utilities use in their business of furnishing service to their retail consumers. The purchasing utilities also use pipelines, pumps, engines, automobiles, adding machines, typewriters, stationery, pencils, and hundreds of other items. The fact that natural gas is a commodity which is useful to the public does not render cross-petitioners a public utility because they sell that commodity to utilities which hold themselves out to serve the public with natural gas. Gasoline, theater tickets, food, etc., are commodities useful to the public; but the courts have held that purveyors of such commodities are not subject to price regulation.

The taking of the use of private property and prohibiting the owners from the withdrawing of that property from such use except by permission of a regulating tribunal was held unconstitutional in the Wolff Packing Company case, cited below. The regulation here attempted is unconstitutional, regardless of whether cross-petitioners' business is affected with a public interest.

Williams v. *Standard Oil Company*, 278 U. S. 235, 239-40.

New State Ice Co. v. *Liebmann*, 285 U. S. 262, 277.

Wolff Packing Co .v. *Court of Industrial Relations*, 262 U. S. 522, 534, 536-7, 539-44.

Union Falls Power Co. v. *City of Oconto Falls*, 265 N. W. 722, 723 (Supreme Court Wis.).

10.

If This Court Should Reverse the Judgment of the Court Below and Affirm the Commission's Order, Cross-Petitioners Should Not Be Required to Refund to Their Customers the Amounts Representing the Ordered Reduction in Revenues Which Have Accrued Since the Commission's Order.

A. *No Public Interest Will Be Served by Requiring Cross-Petitioners to Pay Over to Their Wholesale Customers the Very Substantial Sums of Money Involved in Such a Refund; Which Amounts the Purchasing Utilities Have Contracted to Pay Cross-Petitioners and Which, If Refunded to Them, Such Purchasing Utilities Could Not Be Required by State Regulatory Bodies to Pass on to Their Customers.*

B. *The Existing Rates Are Valid and Enforcible Until the Commissian Shall Determine the Just and Reasonable Rates and Fix the Same By Order; and Even If the Court Below Correctly Held That the Commission Could Require Cross-Petitioners to File a New Schedule of Rates Effecting the Reduction Ordered, Such New Rates Could Not Be Made Retroactive But Would Become Effective Only When Constituted the New Rates By Order of the Commission.*

(*Infra*, pp. 260-264.)

This proposition and its subdivisions constitute a summary of the argument supporting the contention raised.

ARGUMENT.

I.

The Court Below Correctly Held That the Commission's Order Should Be Set Aside Because It Is Confiscatory in That the Commission Disregarded Going Concern Value in Fixing the Rate Base and the Amount to Be Amortized.

A. *The Commission Erred in Refusing to Allow Cross-Petitioners' Claim of $8,500,000 as Going Concern Value.*

B. *In Any Event, the Commission Erred in Refusing to Allow Any Going Concern Value.*

(Sec. 2, Summary of Argument, *supra,* p. 54.)

The statement (p. 2) and discussion (pp. 9-12) by the Commission and complainant in their petition to this Court for a writ of certiorari on the issue of going concern value correctly presents neither the question nor the record. They assert (p. 2) that the question is whether a *separate* allowance must be made for going concern value. They assert also (p. 9, footnote 5) that the Commission appraised the physical assets "as part of an assembled whole" (which is inaccurate) and that the court below required a separate allowance for going concern value (which is inaccurate). The court below properly held, among other things, that the Commission did not value the property as a going concern, but only as inert property, and that the Commission erred in allowing no going concern value (R. Vol. VIII, p. 4039).

The Commission and complainant in their petition to this Court do not raise or challenge the elementary proposition that going concern value, where proved, is property, which may not be taken without due process. The petition does not specify for review any question as to cross-petitioners' proofs of going concern value or the amount (not less than $8,500,000) which cross-petitioners claim, and which the court below found proper (R. Vol. VIII, p. 4039). Finding themselves in no position to attack this evidence, which is uncontradicted, the Commission and complainant seek here to avoid meeting the evidence by asserting (p. 9, footnote 5) that the going concern value was considered by the Commission in appraising the physical assets "as part of an assembled whole." They assert also (pp. 9-10) that the going concern allowance approved by the court below was calculated on the basis of interest and return, assumed to have been unearned in the past, and other deficiencies in past earnings, previously included in operating expenses during the period of business development, asserting further that this is a method which this Court has specifically condemned (p. 10).

The assertion of the Commission and complainant (p. 9, footnote 5) that the Commission's valuation includes going concern value is conclusively refuted by the record.

(a) The Commission *accepted* the testimony of cross-petitioners' witnesses as to reproduction cost new of the physical properties and as to the value of the gas reserves (R. Vol. VIII, p. 3936). Nowhere in their petition to this Court do the Commission and complainant mention the fact that cross-petitioners' witnesses who testified as to the value of the physical properties did not place a value on such properties as a going concern (R. Vol. II, pp. 1236, 1276; Vol. III, p. 1355). These witnesses testified as to the reproduction cost new of each item (R. Vol. II, pp. 1191-1276). They did not value the properties as a going concern or "as part of an assembled whole" (R. Vol. II, pp. 1236, 1276; Vol. III, p. 1355). They expressly excluded the intangible or going concern value in the figures submitted (R. Vol. II, pp. 1236, 1276; Vol. III, p. 1355).

(b) The Commission also accepted cross-petitioners' evidence as to capital additions from June 1, 1939, to December 31, 1942, and as to working capital (R. Vol. VIII, pp. 3936-7). From the four items (1) reproduction cost new of the physical properties, (2) value of the gas reserves, (3) capital additions, and (4) working capital, the Commission made up the rate base (R. Vol. VIII, p. 3937). *Not one of these items included any going concern value.*

(c) The Commission flatly rejected cross-petitioners' claim for going concern value, and so stated in its opinion (R. Vol. VIII, pp. 3936-7).

(d) The court below correctly interpreted the Commission's opinion in holding that the Commission made no allowance for gong concern value. In its opinion the court below said (R. Vol. VIII, p. 4039):

> "The Commission argues that in fixing the value of the rate base as high as $74,420,424, it gave full recognition to petitioners' business as a going business concern. This statement is contrary to the memorandum filed by the Commission with its findings. The $74,420,424 was made up of—
>
> | | |
> |---|---|
> | Reproduction Cost New of Physical Properties | $56,302,250 |
> | Value of Gas Reserves | 13,334,775 |
> | Capital Additions for the Period June 1, 1939 to December 31, 1942 | 3,808,399 |
> | Working Capital | 975,000 |
> | Total Rate Base | $74,420,424 |
>
> "The total is the amount which the Commission adopted as its rate base. It does not include going value.
>
> "Moreover, in its opinion, the Commission said, 'The Companies' claim of $8,500,000 for going concern value must be disallowed. The amount obviously is an arbitrary claim, not supported by substantial evidence warranting its allowance. Its allowance would mean the acceptance of a deceptive fiction resulting in an unfair imposition upon consumers.'

"In the face of this statement we must assume that the Commission did not allow any sum for going value."

(e) The Commission and complainant assert (p. 9, footnote 5) that there is "ample evidence that the rate base adopted did and was intended to reflect the value of the physical property 'as part of an assembled whole.'" Two items of this alleged "ample evidence" are stated in the same footnote. The first is, "* * * the Commission's adoption, as its basis of valuation, of respondents' estimate of reproduction cost, which was $13,500,000 in excess of the original investment (R. 3937) and which included, in addition to labor and material costs, large allowances for overheads, such as interest, taxes, and administrative, legal, supervisory and 'preliminary operations' (R. 1224-1231, 1234) * * *". Two answers to this claim are apparent.

In the first place, cross-petitioners' estimate of reproduction cost, which the Commission accepted, was not $13,500,000 in excess of the original investment in the properties covered by the reproduction study. The reproduction cost figures were prepared as of June 1, 1939 (Exhibit 142, p. 1; R. Vol. II, p. 1414). The capital expenditures, excluding gas reserves, as of January 1, 1939, amounted to $49,830,479 (Exhibit 141, p. 2, line 19; R. Vol. III, p. 1411). The estimated cost of additional capital expenditures for 1939 was $856,558 (Exhibit 141, p. 2, line 22; R. Vol. III, p. 1411). The estimated cost of additional property from June 1, 1939, to the end of that year was $662,658 (Exhibit 142, p. 2, line 22; R. Vol. VIII, p. 1414). Thus it appears that the total expenditures for capital facilities as of June 1, 1939, amounted to $50,024,379. The reproduction cost new figure adopted by the Commission for the physical properties, exclusive of gas reserves, as of June 1, 1939, was $56,302,250. Thus it appears that the figure adopted amounted to only $6,277,871 in excess of the original investment in the physical properties other than leaseholds.

However, in figuring the original cost of cross-petitioners' properties it is unfair to include the original cost of the physical properties alone; for, as we shall point out later in this brief, cross-petitioners incurred actual costs aggregating $8,500,000, *after they commenced operations*, in developing their markets from the small quantity (60,000 M. C. F. daily), with which they commenced business, up to the original normal capacity, which put their operations on an earning basis. Also, the original cost of the leasehold interests aggregated as of January 1, 1939, $15,893,513.08 (Exhibit 138, p. 2, line 21; R. Vol. V, p. 3007; Vol. III, p. 1397). The Commission allowed only $13,334,775 as the value of the gas reserves. The allowance for the physical properties, including gas reserves, therefore, aggregated $69,637,025. The original cost of the other physcal properties the leaseholds and the going concern value amounted to the sum of $50,024,379, $15,893,513.08, and $8,500,000, a total of $74,417,892.08; so it appears that, instead of allowing in the rate base on account of existing properties $13,500,000 more than the original cost of the property subjected to public use, the Commission allowed $4,780,867.08 less than its original cost.

In the next place, the Commission *accepted* cross-petitioners' reproduction cost estimate as to the fair value (R. Vol. VIII, p. 3936); and, as already pointed out, that reproduction cost estimate did not include going concern value. To point out that the fair value found by the Commission from the reproduction cost new figures is more than the original investment in the properties does not show that the fair value found by the Commssion includes going concern value. To determine what the fair value as found by the Commission includes, it is necessary to consider what the Commission *did*. What the Commission did is clear from the language of the court below quoted in Subdivision (d) above.

The reference by the Commission and complainant in their petition to this Court to the fact that the Commission's finding as to fair value of the inert physical property "included, in addition to labor and material costs, large allowances for overheads," etc., is a misleading statement of the record. The statement implies that these "overheads" and other items were allowed as costs of attaching business to inert property. That is not true. Those "overheads" and other items were *costs incurred during the period of construction* (R. Vol. II, pp. 1224-31). Cross-petitioners' claim for going concern value is based upon proved costs of attaching business *after the period of construction* (R. Vol. II, p. 1278; Vol. III, p. 1329). These costs, as proved, were found proper by the court below (R. Vol. VIII, p. 4039) and are unchallenged in the petition of the Commission and complainant for writ of certiorari.

The second item of "ample evidence" referred to in the same footnote is, "* * * the Commission's declaration, in rejecting the companies' claim for a separate allowance for 'going concern value,' that the rate base included 'more than an adequate amount to cover all elements of value' (R. 3936-3937)." This is not a statement that going concern value was included. That the Commission did not regard going concern value as a proper "element of value" is manifest from the preceding language of the Commission that "the companies' claim of $8,500,000 for going concern value must be disallowed * * *." Further, the statement of the Commission that it was convinced it was allowing in the rate base more than an adequate amount to cover all elements of value manifestly does not overcome the uncontradicted fact that the Commission accepted cross-petitioners' reproduction cost estimate, which did not include going concern value, and expressly rejected cross-petitioners' claim for going concern value, as already pointed out. The statement by the Commission of what it was doing at the time it wrote its opinion cannot be reconciled with what it and complainant now say it did.

A serious misstatement of the record appears in the petition to this Court by the Commission and complainant (pp. 9-10). They there state, "The going concern allowance approved by the court below was calculated on the basis of interest and return assumed to have been unearned in the past and other deficiencies in past earnings, previously included in operating expenses, during the period of business development (R. 1276-1282; 1327-1337; 2943-2947), a method which this Court has specifically condemned. *Galveston Elec. Co.* v. *Galveston*, 258 U. S. 388, 393-397; *Columbus Gas & Fuel Co.* v. *Public Utilities Commission*, 292 U. S. 398, 411-413." By this inaccurate statement the Commission and complainant here seek to bring cross-petitioners' claim for going concern value within the rule laid down in the *Galveston* case, that the cost of developing an "operating" plant into "a financially successful concern" is not allowable as going concern value. The evidence supporting the claim here presented is not based on any such cost. The evidence is the actual cost of putting cross-petitioners' plant *into operation*. This character of cost has been expressly upheld by this Court in *City of Fort Smith* v. *Southwestern Bell Tel. Co.*, 270 U. S. 627, 628, as we shall point out later in this brief.

The record shows conclusively that the witnesses who testified to the value of the physical properties did not include in those values the intangible or going concern value. In presenting the reproduction cost new of the physical properties other than leases, the witnesses took all physical property--pipelines, compressor stations, buildings, etc.—and established the cost of reproducing those units, *without including anything except the costs of the inert property* at the time of completion, before seasoning and before it had business attached (R. Vol. II, pp. 1236, 1276). One of these witnesses, Hamilton, testified also to the going concern value of the property as separate and distinct from the value of the physical property, to which he had already testified (R. Vol. II, p. 1276). The witness Wallace, who testified to the value of the leaseholds, made it equally clear that he was not valuing the property as a part of a going concern (R. Vol. III, p. 1355). Since the Commission adopted the figures of both these witnesses, there can be no claim here that, in arriving at the values based on the figures adopted, the Commission took into account the element of going concern value.

The witness Hamilton, an engineer of wide and long experience in dealing with such matters (R. Vol. II, pp. 1191-4), testified in substance that there is a going concern value attaching to the property of cross-petitioners in addition to the value of the component physical parts which go to make it up; that by going concern value he meant a value to be assigned to the property *over and above the cost of its physical property because of the fact that it has made the necessary expenditures and sacrifices to get a business attached;* that cross-petitioners have attached this business and have built the income up to a paying basis; that *the cost entering into this going concern value came after the construction of the physical property,* and created an item of value; that cross-petitioners' pipeline without customers and without business was something entirely different from the same pipeline with its customers attached, and doing business with an operating organization seasoned and familiar with their jobs and with the low operating costs resulting from the employment of that kind of an organization (R. Vol. II, p. 1276).

He continued that when a pipeline is built into a town it is necessary to supplant other fuels which the potential customers are then using, namely, coal, oil, or some other fuel; that, even though the cost of gas is comparative, the pipeline is nevertheless confronted with the reluctance of customers to throw away their investment in the equipment they are using and provide other equipment in order to use natural gas (R. Vol. II, p. 1277). He made a study of the items of cost incurred by cross-petitioners during the period when they were engaged in building up the load from its small beginning to the level attained by the end of 1935, when for the first time the pipeline became fully loaded up to its original capacity. He then took the figures for the years 1936, 1937 and 1938, over which the pipeline had been operated after being loaded, and found that the average result in terms of gross revenues for the three years was $14,847,112 (R. Vol. II, p. 1278). This revenue was earned, however, after the rated capacity of the pipeline had been increased from the original 175 million cubic feet daily to 210 million cubic feet. During the period up to the latter part of 1935 the capacity of the line had been only 175 million cubic feet daily. On that capacity basis, therefore, the normal revenues during the load building period would have been $12,372,593, or 175/210 of the average revenues for the three year period after the line became loaded (R. Vol. II, p. 1278). He then showed that in the year 1932, the first year of operation, the revenues were only 47.3% of $12,372,593; in 1933, only 50.5% of that amount; in 1934, 76.7% of that amount; and in 1935, 97.3% of that amount. From these figures he determined that during 1932 52.7% of the facilities provided by cross-petitioners was standing idle awaiting the time when the load would be developed to the point where the full facilities would be utilized; and in 1933, 49.5% of the facilities was standing idle; in 1934, 23.3%; and in 1935, 2.7% was still standing idle (R. Vol. II, pp. 1278-9).

Hamilton explained that in the construction of a pipeline system it is economical to build the pipeline for the ultimate capacity for which it is designed, and that it is impractical and uneconomical to resort to piecemeal construction of a pipeline system. He illustrated his point by the observation that it would have taken an 18 inch line to carry 50% of the load which a 24 inch line was capable of handling, and that in rights of way and many other items the smaller line would have cost the same as a 24 inch line (R. Vol. II, p. 1279). From this testimony it is easy to see that had the pipeline been built in the beginning for just the load that it had during 1932, cross-petitioners would have had to build another 18 inch line by the beginning of 1934, during which year the load was built up to 76.7% of the capacity of the 24 inch line. The practical, economical thing, therefore, from the standpoint of cross-petitioners' overall investment, and from the standpoint of those to be served by the pipeline, was to design and build the pipeline and facilities and hold them in readiness to serve the load as rapidly as it could be developed, rather than to make the uneconomical capital additions that otherwise would have been required as the load increased.

The record shows without contradiction that the costs of the reserves and facilities were paid with borrowed money and by the assumption of certain interest-bearing notes executed and delivered as a part of the purchase price for gas reserves (R. Vol. II, p. 1279). For this borrowed money bonds aggregating $60,000,000 were executed by cross-petitioner Natural Gas Pipeline Company of America to the lenders, payable over a period of fifteen years (Exhibit 137, p. 1; R. Vol. V, p. 2991; Vol. III, p. 1394; Vol. III, p. 1681).

Hamilton called attention to this indebtedness and pointed out that cross-petitioners knew that it would be a few years before the project could acquire business sufficient to put the facilities to full utilization, and that they knew also that it would be necessary to spend large sums of money on sales promotion, both directly and by contributions to their purchasers who were to resell the gas at retail (R. Vol. II, p. 1279). He explained that since the facilities were built with funds on which cross-petitioners were paying interest during the load building period, a portion of these interest payments represented actual costs of providing those facilities in advance of utilization (R. Vol. II, pp. 1279-80). He then pointed out that there were other costs, such as taxes, depreciation, and fixed operating charges not varying with the volume of business handled, which were attributable to the unused portion of the facilities during the load building period (R. Vol. II, pp. 1279-80). He found that during the load building period, 1932, 1933, 1934, and 1935, cross-petitioners made actual payment of interest on its bonds and notes in the respective sums of $3,666,350, $3,625,079, $3,598,392, and $3,474,732; and he rightfully concluded that 52.7% of the interest paid in 1932, 49.5% of the interest paid in 1933, 23.3% of the interest paid in 1934, and 2.7% of that paid in 1935, aggregating $4,658,809, was interest paid out of pocket in order to provide in advance facilities which were not actually utilized during the load building period (R. Vol. II, p. 1280).

By the same reasoning he determined that of the *ad valorem* taxes applying to the property itself, without including income taxes or taxes of that character, during the same four year period of load building, $379,185 was paid on facilities standing idle awaiting the development of the load (R. Vol. II, p. 1280).

Next he took the figures of the witness Biddison, who testified as to actual depreciation occurring to June 1, 1939, aggregating $2,866,758, which figures and the supporting testimony stand uncontradicted in the record, and, for the purposes of his computation, assumed that this depreciation had occurred at a uniform rate during the eight year period since construction (R. Vol. II, p. 1280). By the same reasoning used in connection with computing the interest and taxes paid out, he arrived at a figure of $358,345 as representing the average actual annual depreciation on cross-petitioners' facilities. Correcting that figure to apply only to facilities in use during the load building period, he found that the actual annual depreciation sustained on the facilities provided in advance of utilization was $298,621 (R. Vol. II, p. 1280). Applying the same percentages as those applied to the interest and tax payments for each of the four years, Hamilton determined that the sum of $382,832 represented the cost to cross-petitioners in terms of actual depreciation of facilities standing idle during the load building period (R. Vol. II, p. 1281).

Next he explained that certain expenses are fixed and do not vary in proportion to the quantity of gas handled and that certain officers' salaries do not go up or down with the load (R. Vol. II, p. 1281). Certain other expenses do vary almost directly in proportion to the quantity of gas handled, and, naturally, during the development period these latter expenses were much lower than in subsequent years when full capacity of the line was being utilized (R. Vol. II, p. 1281). Without making detailed analyses, he considered that general and administrative expenses, pipeline maintenance expenses and telephone expenses were fixed and that a certain portion of those expenses was attributable to the system's nonproductive capacity during the load building period. In other words, these particular items of expense, according to the witness, would have been no greater had the pipeline been loaded to capacity, the pipeline being so manned and equipped that the cost of items of that character necessary to handle the reduced volume of gas would continue to meet those charges when the lines were loaded. He therefore applied the same percentages to the non-varying operating charges for the four years of load building period, arriving at a total of $1,243,366 of operating expenses attributable to the facilities standing by and waiting to be loaded (R. Vol. II, p. 1281).

He found from the companies' books (R: Vol. II, p. 1281) that since the completion of the project cross-petitioners had made direct expenditures for the sole purpose of attaching business, which they afterwards continued to enjoy, of substantial sums of money during the four years of load building period. These moneys were actually paid out in advertising and other promotional activities and as contributions to purchasers to be used in the same character of activities, and amounted to $1,567,972 during the four year period (R. Vol. II, p. 1282).

Adding the amounts actually paid out as interest, as taxes, as non-varying operating costs, the amount sustained as actual depreciation on account of facilities awaiting utilization, and the amount actually paid out directly in promotional activities, he arrived at a total of $8,231,564 (R. Vol. II, p. 1282). Hamilton pointed out that the sum just stated did not include all of the costs of attaching business; that there had been omitted from these calculations any cost incident to the seasoning of the plant and any cost for assembling and training the operating personnel. He then testified that in his judgment the properties of cross-petitioners had a going concern value in excess of the inert or bare physical properties of at least $8,500,000 (R. Vol. II, p. 1282).

Another witness, Emery, testified from the same basic cost figures. He had not seen Hamilton's figures and was not familiar with Hamilton's approach in applying the basic cost figures to the going concern value (R. Vol. III, pp. 1338-9). His approach to the determination of the idle capacity differed from Hamilton's approach in that he arrived at the percentage of the total rated capacity of the facilities not being used during the years 1932, 1933, 1934 and 1935 by a study of the volumes handled during the load building period rather than the revenues derived from the sale of those volumes (R. Vol. III, p. 1330). He ascertained that during the three years following the loading of the line cross-petitioners maintained an annual load factor of 92.48% of the total rated capacity of the line, which during that time was 210 million cubic feet daily (R. Vol. III, p. 1330). Applying that annual load factor of 92.48% to the rated capacity of the line during the load building period, which was 175 million cubic feet daily, and then comparing the result with the load actually transported through the line during each of those four years, Emery found that of the total normal capacity 51.98% was unused during the year 1932, 56.75% was unused in 1933, 21.42% was unused in 1934, and 3.63% was unused in 1935 (R. Vol. III, p. 1330). It is interesting to note that the percentage of lag for each of the four years as determined by Emery from comparison of volumes handled corresponds very closely with the percentage reached by Hamilton through his approach from comparison of revenues.

Applying these percentages, at which he had arrived by the approach above stated, to the same items of cost used by Hamilton in his computations, Emery found that interest was paid out on borrowed funds invested in facilities provided in advance of utilization in the sum of $4,859,896; that *ad valorem* taxes were paid on unused facilities during the same period in the amount of $396,489; that non-varying operating expenses attributable to this same idle capacity were paid during the same period in the sum of $1,226,818; and that depreciation sustained by that part of the facilities representing capacity not utilized during the period amounted to $517,099, which sums added to the $1,567,791 actually paid out in soliciting business aggregated $8,568,093 (R. Vol. III, p. 1334). The witness testified that the properties of cross-petitioners had a going concern value, in excess of the value of physical properties, of not less than the amount last stated (R. Vol. III, p. 1337).

Emery testified also that cross-petitioners had incurred other expenses in connection with the building up of the load and putting the business on a going basis (R. Vol. III, pp. 1334-6). These expenses included those incident to the building up of the organization and training the personnel of the organization in their duties, which represented both a substantial cost and a substantial value from the standpoint of cross-petitioners (R. Vol. III, pp. 1334-6). He also testified that the assembling, organizing and developing of a system of accounting and procedure represented a substantial cost and a substantial value (R. Vol. III, pp. 1334-6). He did not reduce those costs or elements of value to terms of dollars for the reason that he found it difficult to determine in terms of dollars just what the cost of assembling and training the organization and of developing cross-petitioners' system of accounts, forms and procedure had been (R. Vol. III, pp. 1334-6). In stating his conclusion as to the amount of going concern value he considered, therefore, just those items of out of pocket cost that he could definitely ascertain in terms of dollars from the records of cross-petitioners (R. Vol. III, pp. 1334-6). He testified that it would cost as much, if not more, to reproduce all the elements to which he had testified as making up the going concern value, as well as the elements not included therein, as the costs originally incurred in this connection (R. Vol. III, p. 1337).

On this subject Floyd C. Brown, general manager of cross-petitioners, testified at considerable length as to the character and ability of the personnel, the cost in time and money (without stating this cost in terms of dollars) of organizing and training the personnel, and the very substantial value to the organization of this trained personnel (R. Vol. III, pp. 1311-23; Exhibit 129, R. Vol. III, p. 1323; Vol. V, p. 2927).

We submit that there is no difference in principle in allowing a regulated company to capitalize interest, taxes, administrative expenses, and similar items incurred *during* the period of construction and in allowing cross-petitioners to capitalize the items submitted as making up the costs of their going concern value. The underlying reason, universally recognized and applied, for allowing interest, taxes, etc., during construction is that the owner has his money tied up during a period when he is not able to obtain an earning on it, and that it is proper and right to allow him to capitalize his out-of-pocket costs during that period so that he may earn compensation thereon after he puts his business in operation. Manifestly, in a case such as that presented here, where the owner on putting his business in operation still had approximately half of his facilities standing idle during the first two years, a fourth of them standing idle during the third year, and a percentage of them still standing idle in the fourth year, he is in exactly the same situation as to the idle capacity which is waiting to be put into use as he was with reference to all of his facilities during the period of construction. The Commission and complainant do not contest the right of cross-petitioners to capitalize interest, taxes, and similar items incurred during the period of construction. They impliedly admit that these items were properly capitalized in their petition to this Court (p. 10), in which they point out that such items were allowed by the Commission. It seems clear that the same reasoning which entitles the owner to have them allowed when incurred *during the period of construction* entitles him to have them allowed when incurred in carrying idle capacity *waiting to be put in use* after the business has been put in operation on a partially developed basis.

The uncontradicted testimony presented by cross-petitioners in support of this claim, all of which was based on historical facts established by the records of cross-petitioners' business, cannot be brushed aside by the Commission with the statement that it must be disallowed because it is an arbitrary claim and its allowance would mean the acceptance of a "deceptive fiction" (R. Vol. VIII, p. 3936). The figures are based on the facts. They are definite. They are certain. They represent the actual historical cost of acquiring this going concern value, which is a real and not a fictitious item of value.

There is no similarity between the items of cost here submitted and the theoretical losses claimed and condemned in the case of *Galveston Electric Co.* v. *Galveston*, 258 U. S. 388, cited by the Commission and complainant in support of their claim that this item of going concern value should not be allowed. The distinction between the facts in the *Galveston* case and those involved here is clearly set out in *Southwestern Bell Telephone Co.* v. *City of Fort Smith*, 294 Fed. 102, 104-6. In that case counsel for the City, like counsel for the Commission and complainant in this case, were relying on the *Galveston* case as authority for denying the claim of the company for going concern value. The facts on which the telephone company relied as the basis of its claim were exactly the same in character as those on which cross-petitioners base their claim in the case at bar. They included cost of attaching business, cost of training employees or building up organization, cost of records and administration, cost of maintenance and depreciation on idle plant, and interest and taxes on idle plant *after commencement of operations*. The trial court in that case so aptly expressed the claims and distinctions which we are here trying to make that we feel justified in quoting at length from that case, particularly since this court affirmed the judgment of the trial court in that case:

> "The city relies upon the decision in the case of *Galveston Electric Co.* v. *City of Galveston, et al.* * * * In that case Mr. Justice Brandeis, speaking for the court, said:
>
> "'The going concern value for which the master

makes allowance is the cost of developing the operating railway system into a financially successful concern. The only evidence offered, or relied upon, to support his finding is a capitalization of the net balance of alleged past deficits in accordance with what was said to be the Wisconsin rule.'

"After discussing the items taken into consideration by the master in arriving at going value, Mr. Justice Brandeis said:

" 'Going concern value and development cost, in the sense in which the master used those terms, are not to be included in the base value for the purpose of determining whether a rate is confiscatory.

"(1) The opinion in that case does not sustain the contention that going value should not be considered in a rate case. The decision in the case of *Des Moines Gas Co.* v. *Des Moines* was neither modified nor overruled by the decision in the *Galveston* case. The conclusion must be that going value is a proper element to be considered in a rate case. It is proper to state that this conclusion is opposed to the conclusion in the case of *Jacksonville Gas Co.* v. *City of Jacksonville* (D. C.), 286 Fed. 404.

"The valuation engineer of the plaintiff prepared and introduced an exhibit in which he stated how the cost of establishing the business was arrived at, as follows:

" 'In order to determine the going concern value of the plant at Ft. Smith, a detailed estimate of the cost of establishing the business has been made; in other words, the cost of putting the dormant physical plant into active going condition. This estimate covers only those costs incident to establishing the business, such as attaching the subscribers; training the organization necessary for the proper handling of the business; preparing the records necessary for conducting the business; maintenance and depreciation on the idle plant from the time of completion of various elements of plant until put into service; and taxes and interest on the idle plant after the exchange opens until all the plant is in service. This estimate of the cost of establishing the business, or making a going concern out of

> a dead physical plant, does not duplicate any portion of the cost of reproducing the physical property or any other costs included in the appraisal, and is predicated on the following:"

The court then referred to the various premises upon which the procedure was predicated, enumerating among others that the plant would be built in the most economical period, which in the particular case would cover a total of four years; that the exchange would be opened as soon as it was physically ready in order to receive the revenue then available; that it would be uneconomical to postpone the opening of the exchange until all the subscribers could be attached; that the most economical construction would be to build all the plant of sufficient initial capacity to care for the full number of subscribers now attached; and that *the program of placing the plant and connecting the subscribers would necessarily result in a certain percentage of the plant remaining idle for a period of time.*

After calling particular attention to the fact that no consideration had been given to any possible operating deficit during the period, the court quoted from the summary of the valuation engineer showing the items which had been taken into account and for each of which items a definite sum of money had been determined. It is of interest to look at this summary; for, as above stated, the items include the very items which the witnesses Emery and Hamilton have taken into account in arriving at the cost of the elements making up the going concern value of cross-petitioners' property. After considering at length the testimony, the court added:

> "The method followed in the foregoing quotations is not subject to the criticism made by the Supreme Court in the *Galveston* case. The above method does not undertake to capitalize past losses. It assumes a reconstructed plant without business, and gives the cost of securing business of the character and magnitude the company now has in Fort Smith."

That the court correctly decided that case is established by the circumstance that on appeal this Court affirmed that decision in *City of Fort Smith, Ark., et al.* v. *Southwestern Bell Telephone Co.*, 270 U. S. 627. With Justice Brandeis, author of the opinion in the *Galveston* case, still sitting, the Supreme Court, without dissent, in a per curiam opinion affirmed the judgment of the trial court in one sentence:

> "Affirmed with costs, upon the authority of *Newton* v. *Consolidated Gas Co.*, 258 U. S. 165, 175, 66 L. Ed. 538, 547, 42 Sup. Ct. Rep. 264; *Galveston Electric Co.* v. *Galveston*, 258 U. S. 388, 395, 66 L. Ed. 678, 682, 42 Sup. Ct. Rep. 351 * * *."

It is highly important to note that in affirming that decision, which upholds in every particular the contention cross-petitioners are making in this case, this Court cited as authority the *Galveston* case, upon which the Commission and complainant rely.

For many years, the courts have uniformly held that this intangible value is just as real as the element of physical value, and that a regulated enterprise is entitled to have this element of value considered in determining the amount upon which it is permitted to earn a reasonable return and in determining the amount to be amortized.

Some commissions have followed this pronouncement of the courts with apparent reluctance. Others have been quick to seize upon any opportunity to deny the allowance of going concern value and have concealed the fact that they did not actually allow it by stating that they have arrived at the present fair value after due consideration of all the elements of value submitted. Since in those cases, in which the operation of rate orders has been attacked by bills in equity, they have been restricted to a determination of whether or not the orders are confiscatory, the courts have upheld many of these orders in which the going concern value was not actually allowed, but not expressly disallowed, as an element entering into the fair value for rate making purposes; but in refusing to set aside orders of that character the courts uniformly have based their action upon the premise that the evidence is too indefinite, theoretical and speculative to form the basis of a judicial decree annulling the order of a commission, or that the record is not clear that the property was not valued as a part of a going concern rather than as separate items or components. The Commission and complainant rely upon cases of the character last mentioned, and in their petition to this Court have cited several such cases. Indeed, the Commission and complainant have resorted to the same tactics here as those to which we have just referred, namely, of implying, contrary to fact, that this element was considered in arriving at the fair value of the properties, notwithstanding the Commission's unequivocal statement in its opinion that the claim was "disallowed" (R. Vol. VIII, p. 3936). *We submit that the time has come when this issue should be met by the regulatory bodies, and met squarely. If the regulatory bodies are determined to refuse the allowance of going concern value, uniformly upheld by the courts for many years, they should be required to do so candidly, so that the right of review in the courts cannot be circumvented. Let us have an end of this ruse of denying such an allowance and then seeking to cover up the denial under the pretense that all elements of value were considered in arriving at the proper rate base and the amount to be amortized.*

The earliest case we have found which applied the principle of going concern value had to do, not with utility rates, but with the valuation of a railroad for taxation purposes. This case, *Cleveland G. C. & St. P. Ry. Co.* v. *Backus*, 154 U. S. 439, 444, was decided in 1893. The State of Indiana imposed an *ad valorem* tax on the railroad in the proportion to the entire value of its line which the mileage within the state bore to the entire mileage. There was nothing in the record to show any unusual structures outside the state which would render this apportionment unreasonable. The value so ascertained, however, was in excess of the value of the physical properties separately considered, and on that ground the railroad company attacked the levy as excessive. This Court upheld the levy, and in its opinion observed that the true value of a line of railroad is something more than an aggregation of the values of the separate parts of it. It added that this true value is the aggregate of the values of its separate parts plus that arising from a connected operation of the whole.

In another case, *Adams Express Co.* v. *Ohio State Auditor*, 166 U. S. 185, 219, this Court applied the same rule to the properties of an express company, and in the opinion used this language:

> "* * * Now, whenever separate articles of tangible property are joined together, not simply by unity of ownership, but in a unity of use, there is not infrequently developed a property, intangible though it may be, which in value exceeds the aggregate of the value of the separate pieces of tangible property."

The same principle has been applied in condemnation cases. *National Water Works Co.* v. *Kansas City*, 62 Fed. 853, 865, arose under a statute providing that at the expiration of the franchise of the company the city would purchase the property unless the franchise was extended. The franchise was not renewed at the time of expiration, and a controversy arose between the city and the company as to the value of the property. The city took the position that it was required to pay only for the value of the physical properties separately considered. Judge Brewer, then on the Circuit Court of Appeals, later a member of this Court, wrote an opinion upholding the contention of the water company that in valuing the property for the purpose of taking it over, the city must allow something in excess of the cost of reproduction to account for the difference in the value of a system in operation. Other cases holding that when a city condemns property of a public utility it must make a reasonable allowance for going concern value are *Gloucester Water Supply Co.* v. *City of Gloucester*, 60 N. E. 977, 179 Mass. 365; *Kennebec Water Dist.* v. *Waterville*, 54 Atl. 6, 97 Me. 185; *Newburyport Water Co.* v. *Newburyport*, 47 N. E. 533, 168 Mass. 541.

Omaha v. *Omaha Water Co.*, 218 U. S. 180, 202, was a condemnation case involving the price to be paid by the city to acquire the properties of a water company. The court held that the company was not entitled to an allowance on account of the value of an unexpired franchise or the value of good will, but that it *was entitled to an allowance for going concern value*, observing in that connection:

> "* * * But it did not limit the value to the bare bones of the plant, its physical properties, such as its lands, its machinery, its water pipes, or settling reservoirs, nor to what it would take to reproduce each of its physical features. The value, in equity and justice, must include whatever is contributed by the fact of the connection of the items making a complete and operating plant. The difference between a dead plant and a live one is a real value, and is independent of any franchise to go on, or any mere good will as between such plant and its customers. * * * That there is a difference between even the cost of duplication, less depreciation, of the elements making up the water company plant, and the commercial value of the business as a going concern, is evident."

The earliest case we have found which applies this principle in a rate case is *Spring Valley Water Works* v. *City of San Francisco*, 124 Fed. 574, 594, 595, in which the court held that *in a rate case the same rule applies as in a condemnation case.* The court observed that since the water company had an established business as a going concern in supplying water to customers, its plant had a value by reason of these advantages beyond the mere cost of reproducing the plant, and that such added value must be taken into consideration in determining whether authorized rates were reasonable.

In *Des Moines Gas Co.* v. *Des Moines*, 238 U. S. 153, 165, this Court upheld the right to include going concern value in the rate base, but held that "good will" in its ordinary sense had no place in the valuation of a plant for rate making purposes. In discussing going concern value the court said:

> "* * * That there is an element of value in an assembled and established plant, doing business and earning money, over one not thus advanced, is self-evident. This element of value is a property right, and should be considered in determining the value of the property, upon which the owner has a right to make a fair return when the same is privately owned although dedicated to public use."

In their application to this Court the Commission and complainant observe that the costs incurred by cross-petitioners on which the claim for going concern value is based were charged as expenses during the period of business development. We point out that during those four years the earnings of the system were not sufficient to meet the bond interest, and the companies were forced to borrow to meet ordinary cash requirements. No dividends were paid (R. Vol. II, p. 1279). In this connection it will be remembered also that during the period when these costs were incurred cross-petitioners were engaged as a private enterprise, and were not subject to public regulation. But for the necessity of paying out these costs in connection with building up their markets to the normal levels afterwards attained, the money thus expended could have been paid out as dividends to the owners. Cross-petitioners' revenues were derived from private contracts, *and their pur-*

chasers, paid not a penny more for the gas purchased from cross-petitioners during that period by reason of the charging of these out-of-pocket costs to expenses. That there is no merit in this contention by the Commission and complainant appears from the opinion of this Court in *Lincoln G. & R. L. Co* v. *Lincoln,* 250 U. S. 256, 267:

> "* * * Again, we question the propriety of the master's treatment of 'going value,' which he seems to have estimated at less than otherwise he would have placed it, on the theory that the company's business had been developed at the expense of the public, in the expenditure of past earnings exceeding a fair return upon the capital invested, and this without any finding or any clear evidence to which our attention has been called, that past earnings were excessive."

In numerous cases the courts have held that going concern value is *property,* which cannot be taken except by due process of law and hence must be considered in rate making proceedings. *New York & Richmond Gas Co.* v. *Prendergast,* 10 Fed. (2) 167; *Citizens Gas Co. of Hannibal* v. *Public Service Commission,* 8 Fed. (2) 632; *Mobile Gas Co.* v. *Patterson,* 293 Fed. 208 (modified on other grounds, 271 U. S. 131); *Monroe Gas Light & Fuel Co.* v. *Michigan Public Utilities Commission,* 11 Fed. (2) 319.

In *McCardle* v. *Indianapolis Water Co.,* 272 U. S. 400, 415, this Court said:

> "* * * The Commission's engineer made no appraisal of water rights or going value. The evidence is more than sufficient to sustain 9.5% for going value. And the reported cases showing amounts generally included by commissions and courts to cover intangible elements of value indicate that 10% of the value of the physical elements would be low when the impressive facts reported by the Commission in this case are taken into account."

In a footnote in this case, at page 415, this Court cited a number of cases from various states in which 10% to 16%

was added to the value of the physical properties as going concern value in arriving at the rate base. One of these cases was *Pioneer T. & T. Co.* v. *Westenhaver,* 118 Pac. 354, 360-1, 29 Okla. 429, in which the court very aptly discussed the point here under consideration. Since this Court cited the case with approval, we feel justified in quoting from the opinion at some length:

> "But subscribers are not obtained without expenditure of money, labor and time, during which the capital invested in the plant earns nothing, and often fails to pay operating expenses. The customers must be connected with the system of the plant; trained employees must be obtained; and a system of operation must be established. Few industries, if any, involving an investment of $90,000 or more, can be made self-sustaining from the first day of their operation. The uncontradicted evidence in this case discloses that appellant's plant, for the years preceding the first hearing, failed to produce revenue sufficient for operating expenses, current repair, and lay aside an amount for depreciation. During the time of development, there is a loss of money actually expended and of dividends upon the property invested. How shall this be taken care of? Must it be borne by the owner of the plant? Or by the initial customers? Or shall it be treated as part of the investment or value of the plant, constituting the basis upon which charges shall be made to all customers who receive the benefits from the increased service-rendering power of the plant by reason of these expenditures? It seems that the last solution is the logical, just, and correct one. If rates were to be charged from the beginning so as to cover these expenditures and earn a dividend from the time the plant is first operated, the rate to the first customers would be in many instances, if not in all, so exorbitant as to be prohibitive, and would be so at the time when the plant could be of least service to them. On the other hand, the public cannot expect as a business proposition, or demand as a legal right, that this loss shall be borne by him who furnishes the service; for investors in public service property make such invest-

> ments for the return they will yield; and, if the law required that a portion of the investments shall never yield any return, but shall be a total loss to the investor, capital would unwillingly be placed into such class of investments; but the law, in our opinion, does not so require. Private property can no more be taken in this method for public use without compensation, than by any other method. When the use of the property and the expenditures made during the non-expense-paying and nondividend-paying period of the plant are treated as an element of the value of the property upon which fair returns shall be allowed, then the burden is distributed among those who receive the benefits of the expenditures and the use of the property in its enhanced value."

Another case cited by this Court in the same footnote was *State* v. *Southwestern Bell Telephone Co.*, 223 Pac. 771, 782-3, 15 Kan. 236, in which the court quoted from the report of the commissioner as follows:

> "The telephone company has included in its appraisal an item for going concern value, or cost of establishing the business. The commission has allowed no such item. The commission's position is that taxes and interest during construction include all the elements entering into that charge."

After quoting from *Des Moines Gas Co.* v. *Des Moines*, 238 U. S. 153, the commissioner then continued:

> "That this is not compensated for by the mere allowance of taxes and interest during construction is apparent. Interest and taxes during construction are integral parts of building costs, and enter into the cost of the completed structure, whether it has an established business or not. * * *
>
> "I am very doubtful whether an operating loss in the early period of the company's business may be charged as an item of value. * * * I have therefore made no allowance as a part of the going concern value for early operating losses.
>
> "At the same time it seems clear that, no matter

> how excellent the management may be, it could not be expected that a newly constructed plant could commence operations on the date that the plant is ready for business with 100 per cent of its business attached and returning revenue. In other words, it is economical to start operations as soon as you can, getting what revenue you can, notwithstanding the fact that the entire business is not established nor the plant entirely completed. * * *
>
> "I have therefore arrived at this conclusion: *That the plant is not a fully completed plant until all the wires are run to connect the entire business, and that the construction period in reality covers a year after the plant has commenced operations.* I have figured that during that year 75 per cent of the plant was in use and earning a return and depreciation, and that taxes, return, reserve for replacements, and certain overhead operating expenses on the other 25 per cent should be capitalized as going concern value." (Italics ours.)

After considering the conclusions of the commissioner and citing several cases supporting these conclusions, the court approved the recommendation of the commissioner in these words:

> "No reason is apparent why this court should reach a conclusion concerning the going concern value different from that reached by the commissioner."

We refer now briefly to some of the cases illustrating the type of testimony that has been rejected as the basis of going concern value, and also some of the cases illustrating the difficulty in which the regulated concern finds itself in a court of review where the commission fails to pass squarely on the question of whether going concern value should be allowed.

In *Los Angeles G. & E. Co.* v. *Railroad Commission*, 289 U. S. 287, 313-14, 316, the Chief Justice discussed at some length many of the cases already cited. He observed that the court had held that there is an element of value in an assembled and established plant, doing business, over one not thus advanced; that this element of value is a property right which should be considered in determining the value of the property on which the owner has a right to a fair return; that going concern value is not to be confused with good will; and that this recognition does not countenance mere attempts to recoup past losses. He then commented upon the difficulty of applying the principle, stating in that connection that it does not give license to mere speculation but calls for a consideration of the *history and circumstances of the particular enterprise.* Once more he called attention to the distinction between legislative and judicial functions, pointing out that it is the appropriate task of the commission to determine the value as that of an integrated operating enterprise, while it is the function of the court in deciding whether rates are confiscatory only to examine the result of the legislative action in order to determine whether the total effect is confiscatory. He quoted from the opinion of the commission, in which it stated that the valuation at which it had arrived was considered to be:

> "* * * The fair value of the property here involved as a going property with business attached, giving full effect to the current level of prices and allowing for any intangible elements of value not fully cared for in the current and usual operating expense."

In view of the statement by the commission that it had made allowance for intangible elements of value, he continued that the court could not say that the final result was an inadequate rate base rendering the rates confiscatory. Obviously, that is no holding that going concern value, where properly proved, could be eliminated from the rate base by the commission. The Commission and complainant cite this case in their application for writ of certiorari; but it is obviously not in point in the light of the facts presented in this record to which we have already referred.

Another case on which the Commission and complainant rely is *Dayton P. & L. Co.* v. *Public Utilities Commission*, 292 U. S. 290, 308. In that case Justice Cardozo, far from holding that going concern value should not be considered, observed:

> "The decisions of this court show what the going value means, * * * distinguish it from good will, and hold that upon *proof of its existence* it may have a place in the base upon which rates are to be computed." (Italics ours.)

Justice Cardozo then pointed out that the commission took the view that whatever increment of value had emerged from the combining of the parts into one organism and causing them to work together was "sufficiently reflected in the allowance of the cost of developing 'new business' and in the appraisal of the physical assets as parts of an assembled whole." It thus appears that the cost of developing new business had been allowed in that case. It is clear that that is all we asked the Commission to allow in the present case.

Still another case on which the Commission and complainant rely is *Columbus G. & F. Co.* v. *Public Utility Commission*, 292 U. S. 398, 412-13, in which the court, in an opinion written also by Justice Cardozo, held that the record justified the holding by the commission that the going concern value was reflected in the other items and particularly in the appraisal of the physical assets as part of an assembled whole. The court pointed out also that some of the experts testifying on the point included interest or return unearned during the business development period as a factor contributing to going value, and observed that it was the same method of computation as that condemned in the Galveston case, to which we shall have occasion to refer later. To emphasize the clear distinction between the facts presented by that case and the facts here presented, we quote from the opinion:

> "* * * No evidence was offered by the appellant that expenses had been incurred 'in overcoming initial difficulties incident to operation and in securing patronage.' *Galveston Electric Co.* v. *Galveston, supra.* On the contrary there is evidence as to the business in Columbus that customers were clamoring for an extension of the service, to such an extent that a suit was begun for a mandatory injunction. * * *
>
> "Other experts, who reject the factor of interest unearned during the period of development, build their estimates of going value upon the cost of attaching new customers to the business, *a cost not taken from the books but merely presumed or estimated at widely variant amounts.* * * *
>
> "Other experts, testifying to an aggregate, without assigning a proportion to the contributory factors, give estimates so vague as to be little more than guesses, one of them, for illustration, holding to the opinion that ten would be a fair percentage, yet unable to give a reason why the amount should not be less or greater.
>
> "From the testimony as a whole one gains a definite impression that the opinions are derived for the most part from a professed experience and understanding of business conditions generally, *and very little from any knowledge of the 'history and circumstances of the particular enterprise.'* * * *
>
> "We cannot find that the commission and the court went beyond the bounds of a legitimate discretion in putting aside these estimates as too uncertain to be followed." (Italics ours.)

Thus it appears that in that case some of the testimony was rejected because it was founded on returns unearned as opposed to cost, and the remainder was rejected because it was based on mere conjecture and not on the history and circumstances of the particular enterprise. In the present case we have an entirely different situation.

It is obvious that the evidence in this case is subject to no such criticism as that expressed by this Court in any of the cases on which the Commission and complainant rely. The practical effect of the decisions is that, because of the difficulty of finding any better evidence thereof, the going concern value in rate proceedings is limited to the cost to the owner of developing that value. Where that cost is shown, as it is shown here, the constitutional administration of the Natural Gas Act requires that cross-petitioners be permitted to earn a reasonable return on such value along with the value of the physical properties, and that such value be returned to them through a proper allowance for amortization.

The Commission erroneously held that cross-petitioners are entitled to amortize only the original cost of their facilities, as contrasted with their present fair value. Even under that erroneous view, the cost of the going concern value, which is just as much a part of that which the operation of the Natural Gas Act subjects to public use as the physical properties, is a part of the original cost. It follows that to the $78,284,009, the original cost of cross-petitioners physical properties, allowed by the Commission as the proper amount to be amortized, must be added $8,500,000, the cost of the going concern value, bringing the total allowance up to $86,784,009.

Even if it be assumed for purposes of argument that cross-petitioners' proof of going concern value in the amount of at least $8,500,000 is inadequate (which assumption is utterly unwarranted), the Commission erred in not allowing *some* going concern value. This record shows beyond fair dispute that cross-petitioners' business has a going concern value over and above the value of the inert physical property. The Commission in its opinion expresses (without warrant) a dissatisfaction with cross-petitioners' evidence that such value is $8,500,000 (R. Vol.

VIII, pp. 3936-7). Because the Commission was dissatisfied with the figures testified to by cross-petitioners' witnesses, the Commission concluded that *no* allowance should be made. The Commission overlooks its duty to fix *fair* rates. Assuming the regulation to be valid, it is in the public interest that fair rates be maintained so that adequate service will be given consumers. In its haste to slash cross-petitioners' profits, the Commission has not performed its duty. If the Commission and complainant were dissatisfied with cross-petitioners' proof as to the amount of going concern value, they should have put on evidence as to the correct amount and the Commission should have ascertained the correct amount. But the Commission and complainant had no time for that. They had to get on with their "interim" order. The authorities discussed above in this section of the brief show beyond dispute that going concern value is property, which cannot be taken without due process.

The Commission and complainant in effect seek to place the burden of proof on cross-petitioners to show their going concern value. This is erroneous. Cross-petitioners did not have the burden of proof on this point, though they did in fact discharge it. They were not and are not plaintiffs in a District Court. The burden of proof is on complainant and the Commission. In *National Labor Relations Board* v. *Abell Co.,* 97 Fed. (2) 951 (C. C. A. 4), the court said with respect to the burden of proof on the charge that the respondent company had fostered a company union (p. 957):

> "* * * In this respect the burden of proof was upon the Union (complainant), and while the charge was supported only by conjecture and suspicion, it was refuted by positive and direct testimony. The failure of the Board to credit this testimony does not supply the lack of affirmative proof of unfair labor practice on the part of the employer."

This case is squarely in point here on the question of going concern value. The court pointed out that not only was the burden of proof on the complainant in that case but that the failure of the Board to credit the company's testimony did not supply the lack of affirmative proof.

On the authority of the cases we have cited, and in the light of the facts showing the actual incurring of every dollar of the costs claimed as making up this item of going concern value, we submit that the order of the Commission, in which that item is not allowed as a part of the rate base and a part of the amount to be amortized, operates to confiscate cross-petitioners' property in the amount claimed and in the amount representing a reasonable return thereon each year. In any event, the Commission's order is confiscatory in that it fails to allow *any* going concern value. Had the Commission not committed the other errors pointed out in this brief, this error alone required that the Commission's order be vacated, and on this ground the holding of the court below on this point should be affirmed.

II.

The Court Below Correctly Held That the Commission's Order Should Be Set Aside Because It Is Confiscatory in That the Commission Provided for the Amortization of Only the Original Cost of the Property and Fixed the Amortization Period at the Entire Life of Cross-Petitioners' Business, Which Commenced Long Prior to Regulation.

A. *The Necessary Operation and Effect of the Natural Gas Act, If Valid, Is to Condemn to Public Use Cross-Petitioners' Property Utilized in the Conduct of Their Business, Which, Prior to the Enactment of the Act, Was a Strictly Private Business.*

B. *A Valid Administration of the Natural Gas Act Requires That Cross-Petitioners Be Compensated by a Proper Amortization Allowance for the Present Fair Value of Their Properties, Including Going Concern Value, as of the Time They Were Condemned for Public Use.*

C. *The Proper Period of Amortization Is That Beginning With Regulation Under the Natural Gas Act and Ending With the Life of Cross-Petitioners' Enterprise.*

(Sec. 3, Summary of Argument, *supra*, p. 56.)

In the proceedings before the Commission cross-petitioners pointed out that the evidence shows conclusively that the reserves on which the life of their enterprise depends would be exhausted prior to the end of 1954. They pointed out also that prior to the enactment of the Natural Gas Act in 1938 they were engaged in a strictly private enterprise, and that only by the operation of that Act was their property subjected to public use. In the light of these facts, cross-petitioners urged that they were entitled to an allowance for amortization which, over the period beginning with the date of the Commission's order, or at the earliest at the date the Act became effective, and ending with the exhaustion of their reserves of natural gas, would return to them the fair value of their property, including going concern value, as of the time it was first subjected to public use, plus the cost, at present prices, of additional capital facilities necessary to carry on their present business, plus working capital, less salvage value at the end of operations. In Exhibit 211 (R. Vol. VII, p. 3902; Vol. IV, p. 2639) cross-petitioners presented the items making up the amount which they urged they were entitled to receive through amortization, as follows:

Reproduction cost new, excluding gas reserves	$56,302,250
Viewed depreciation (deduct)	2,866,758
Value of gas reserves	13,334,775
Cost of additional property	9,145,083
Going concern value	8,500,000
Working capital	975,000
	$85,390,350
Less salvage	1,049,132
	$84,341,218

The figures making up the total of $84,341,218 are not contradicted. The Commission accepted the reproduction cost new of cross-petitioners' property other than leaseholds in fixing the rate base (R. Vol. VIII, p. 3937). The figures for viewed depreciation are based on the testimony of engineer Biddison, whose testimony is uncontradicted (R. Vol. II, pp. 1284-1310; Exhibit 127, R. Vol. II, p. 1310; Exhibit 142, Vol. III, pp. 1411-12). The Commission accepted the figures submitted as to the present value of the gas reserves (R. Vol. VIII, p. 3937), the figures representing the cost of additional capital facilities (R. Vol. VIII, p. 3938), the figures representing the necessary working capital (R. Vol. VIII, p. 3937), and the figures representing the total liquidating salvage value as of the end of the period of amortization (R. Vol. VIII, p. 3938). The figures making up the item of going concern value are undisputed, as pointed out in the next preceding section of this brief.

In its opinion and order the Commission, in arriving at the amount to be amortized, refused to allow the present fair value of the facilities subjected to public use as of the time cross-petitioners' properties were first subjected to public use, and held that only the original cost thereof could be amortized, and refused any allowance for going concern value (R. Vol. VIII, p. 3938). It allowed as a part of the amount to be amortized the cost of additional property and the working capital. By deducting the liquidating salvage value of the properties at the end of the period from the sum of the original cost of the properties first subjected to public use by the enactment of the Natural Gas Act, the cost at present prices of additional capital property, and the working capital, the Commission arrived at the sum of $78,284,009, which it fixed as the amount to be amortized.

The Commission held also that the period of amortization should be 23 years, beginning, not with the date of the order or the date on which the Natural Gas Act became effective, June 21, 1938, but on January 1, 1932, thus distributing the amortization over a period including at least 6½ years during which cross-petitioners operated their business as a private enterprise (R. Vol. VIII, p. 3938).

The questions presented to the court below, therefore, were:

(a) Did the Commission err in holding that cross-petitioners were entitled to amortization of only the original cost of the properties subjected to public use by the enactment of the Act, and in refusing to allow the amortization of the value of such properties as of the time they were first subjected to public use?

(b) Did the Commission err in refusing to fix the period of amortization as beginning with the time cross-petitioners' properties were first subjected to public use by the operation of the Natural Gas Act, and in fixing the period as beginning at the time cross-petitioners commenced operations on January 1, 1932?

The questions presented, of course, were not questions of fact or questions of economics, as asserted by the Commission and complainant in their briefs and arguments in the court below. They were strictly legal questions—indeed, questions of constitutional rights. Without regard to whether the Commission stated its position on these several questions by couching it in terms of a finding of fact or of a conclusion of law, the court below and this Court, of course, are in no sense bound by the holding of the Commission on these questions of law.

The court below sustained the contention of cross-petitioners on both of these points, and held that the period of amortization should commence with the date on which the order was issued, or, in any event, at a date not earlier than the date when Congress subjected the industry to regulation, and in effect held that cross-petitioners are entitled to amortization of the value of their property as it existed and was valued at the time the Act was passed (R. Vol. VIII, pp. 4039-41).

The court below held also that cross-petitioners' position on these questions avoids conflicts with the Fifth Amendment to the Constitution—that the position of the Commission and complainant creates an unavoidable clash with that amendment. We submit that the holdings of the court below on these questions were sound and should be sustained.

In approaching the consideration of the questions presented by the propositions here under discussion it will be remembered, of course, that, prior to the enactment of the Natural Gas Act, cross-petitioners were engaged in a strictly private enterprise. The nature of their business was no different from that of a farmer, equipped with a combine and a truck, who grows his own wheat, harvests it with his own combine, and hauls it to the elevator of his selection in his own truck; or that of the owner of a forest who builds a sawmill and acquires a fleet of trucks and then cuts his timber, saws it into lumber, and trucks it away to purchasers at private sale; or that of the owner of valuable oil lands, who drills wells and builds a pipeline across country to his own refinery, and by that means produces his own oil and transports it to his own refinery to be processed and sold to his selected customers.

Beginning in 1930, cross-petitioners, at a cost of more than $15,800,000 (Exhibit 138, p. 2, line 21, R. Vol. V, p. 3007; Vol. III, p. 1397), acquired title to gas reserves in the Panhandle of Texas and began the development of those reserves. At the same time they commenced the construction of their pipeline. Their purpose was to develop their reserves of natural gas, produce and transport said gas to selected markets in the States of Kansas, Nebraska, Iowa and Illinois. At no time did cross-petitioners hold themselves out to sell gas to the general public. From the beginning their policy and practice has been to sell gas only to a few selected industrial customers along the line and at wholesale to a few selected distributors of natural gas for resale by the latter to the public. 98% of all the gas they have sold has gone to those purchasers at wholesale, only 2% having been sold to the selected industrial customers (Exhibit 9, R. Vol. V, p. 2681, Vol. I, p. 57).

Cross-petitioners invested their money in this enterprise on the theory that they would control their marketing policies; that they would select those to whom they would sell gas, pass upon the credit of such customers, and pass upon the question of whether or not any prospective customer would be able to purchase a sufficient volume of gas to justify the building of a lateral line, in view of the distance and the physical obstacles, to deliver gas to such particular customer. After prolonged negotiations they fixed the prices at which they sold gas for the various uses made of it by the ultimate consumers by private contracts for a limited term of years. Many of these contracts were for one or two or three years. Others extended for a period of years. Only one extended beyond the year 1946, and that for only an additional five years at the option of cross-petitioners (R. Vol. II, p. 685). Subject to their liability under those private contracts, cross-petitioners were free at any time to go out of the natural gas business should it develop that they could not continue in that business on a satisfactory basis. In other words, they launched this enterprise and invested the large amount of money representing the original cost of their reserves and facilities in a business which they expected and intended to operate in their own interest, just as any private business is operated in the interest of those who establish and own it.

The effect of the Natural Gas Act, if valid, is to change entirely the character of their ownership and the use of their property. They are not given the choice of dedicating their property to the public interest or discontinuing the business of producing, purchasing, transporting and selling natural gas. Upon this ground they have attacked the Natural Gas Act as invalid because in violation of the Fifth Amendment. But for the purposes of the propositions under discussion, let it be assumed that the Act is valid and that cross-petitioners are subject to its provisions. On that assumption cross-petitioners are no longer a private enterprise. Their property is no longer subject to use in the private interests of the owners, but must now be devoted to the public interest. Cross-petitioners are no longer at liberty to withdraw from the natural gas business, however undesirable it may be from their standpoint to continue in that business. They are no longer sole judges of the credit and the accessibility of any utility within reach of their line. They are no longer at liberty to discontinue the sale and delivery of natural gas to any utility now purchasing gas from them whose business turns out to be unprofitable or for any reason undesirable.

Under the provisions of the Act they must continue in the natural gas business and continue to devote their property to the natural gas business until the Federal Power Commission grants them permission to discontinue their business and to discontinue the use of their property in the public interest. Indeed, they must sell to any utility to which the Federal Power Commission shall direct them to sell; and, whatever the provocation, they are not at liberty, without consent of the Commission, to discontinue selling to any customer to which they are now selling, or to which they may hereafter sell, natural gas. By legislative fiat they have been changed from a strictly private enterprise, owning and operating property for their own private purposes and in their own interests, to the custodians of property which they must operate, whether they like it or not, for the benefit of the public, which has contributed nothing to the development of their property.

This is condemnation. Congress can condemn cross-petitioners' property only by a procedure consistent with due process of law under the Fifth Amendment. As an absolute condition to such a valid condemnation, cross-petitioners must be allowed to earn a reasonable return on the value of their property during the time it shall be subjected to the public interest, and must be allowed to set aside out of earnings over the period an amount which at the end of the period will return to them the value of their property at the time of condemnation.

The operation of the Natural Gas Act is no less a condemnation because cross-petitioners are not divested immediately of the title to their property. It is true they still have the legal title; but this title is subject to the requirement that this property be continued in the public use until such time as the Commission, designated as the agent of Congress, shall otherwise order. Under condemnation proceedings in the exercise of the right of eminent domain the legal title sometimes passes immediately, as in the case of a site condemned for the erection of a postoffice, a dam, or some other public structure; but often there is no divesting of the legal title, but only the conferring of an easement entitling the holder to the *use* of the property in the public interest. Illustrations of this character of condemnation are right of way easements condemned for the purpose of constructing and operating telephone lines, telegraph lines, electric highlines, railroads, public highways, electric railways and natural gas pipelines. The compensation allowed is only for the particular use of the property for which it was condemned. One who condemns and pays for an easement to build and operate a telephone line is not entitled under such easement to build and operate a railroad along such right of way without again condemning the same right of way and paying additional proper compensation therefor. In the case of condemnation for any of the purposes last enumerated the easement acquired continues only so long as the use continues. The moment that the use is abandoned the owner is immediately reinvested with the fee title. Indeed, he has owned the fee title all along, subject only to the right of the holder of the easement to use it for the purpose for which its use was condemned.

In practical effect, the Natural Gas Act operates to take cross-petitioners' property as well as the use of it; for cross-petitioners must devote this property to the public use so long as the Federal Power Commission directs. This means that as long as natural gas is available, cross-petitioners must continue to produce this gas and transport it through their facilities and sell it in the public interest. When the gas is exhausted cross-petitioners will then find themselves with the title to property out of which, under the undisputed testimony, they will be able to salvage only about a million dollars. The difference between the present value of the property and ultimate salvage value thereof must be paid to cross-petitioners over the period during which their property is devoted to the public interest.

It was not the money expended by cross-petitioners in 1930 and 1931 in the acquiring of their gas reserves and the construction of their pipelines, compressor stations and other facilities, or that spent for additional capital facilities added from year to year up until the enactment of the Natural Gas Act, which the Act operates to condemn. That money was expended and was beyond the reach of Congress, the Commission or cross-petitioners. It was *the property which cross-petitioners owned and used* in connection with the conduct of their business that Congress required cross-petitioners to subject and devote to the public interest. "It is that property and not the cost of it that is protected by the Fifth Amendment. * * * It is settled by the decisions * * * that just compensation is the value of the property taken at the time of taking." *Brooks-Scanlon Corp.* v. *U. S.*, 265 U. S. 106, 123.

Past earnings or losses, methods of bookkeeping, book entries for depreciation or depletion, failure to make provision in the accounts for amortization, all are immaterial. Original costs of the property and records of past operations and earnings are pertinent here only in so far as they assist in checking present values and in making estimates for the future. It is utterly immaterial what the properties cost cross-petitioners, or how much of that cost has been returned to them in earnings over the period during which they operated as a private enterprise. The property they owned and used in connection with the conduct of their business at the time the Natural Gas Act became effective was their property; and the *value* of that property belonged to them. They cannot be deprived of that property, or its value, or its use, without the compensation guaranteed to them under the operation of the due process clause of the Fifth Amendment; *nor can they be required to apply as a credit on that value any part of their earnings or revenues prior to the enactment of the Natural Gas Act.* It is just as necessary in fixing the amount to be amortized to provide for the return value *of* the property at the time of condemnation, as in fixing the rate base and the rate of return to provide for a reasonable return *on* that value; *and the compensation for the value of the property, as well as that for its use, must be provided out of earnings subsequent to the condemnation.*

The courts have often pointed out the analogy between condemnation proceedings in the exercise of the right of eminent domain and in the rate making process.

In *San Diego Land & Town Co.* v. *National City*, 74 Fed. 79, 84, the court said:

> "* * * And if, as said by Mr. Justice Brewer in *Ames* v. *Railway Co., supra,* the public were seeking to condemn the property in question for a greater public use, if that be possible, its present value, and not its cost, is that which the public would have to pay. It follows, I think, that where the public undertakes to reduce the rates to be charged for the use of such property, it is its present value, and not its cost, that must be taken as a basis upon which to fix reasonable and just rates."

In *Spring Valley Waterworks* v. *San Francisco*, 124 Fed. 574, 594-5, the court quoted from the case of *Monongahela Navigation Co.* v. *U. S.*, 148 U. S. 312, a condemnation proceeding. Commenting on that case, the court then added:

> "It is true that this was a condemnation proceeding, and the question was to determine what was just compensation for the appropriation of corporate property to a public use, while the case before this court relates to the fixing of water rates which shall be a just compensation for the appropriation of complainant's property to a public use. It is not perceived that there is

any difference in the principles applicable to the two cases, and this appears to have been the view of the Supreme Court in *San Diego Water Co.* v. *San Diego, supra.*"

In *Ames* v. *Union Pac. Ry. Co.*, 64 Fed. 165, 176-7, the court said:

> "* * * Property invested in railroads is as much protected from public appropriation as any other. If taken for public uses, its value must be paid for. Constitutional guaranties, to this extent, are explicit; and in such condemnation proceedings no inquiry is permitted as to how the owners have acquired the property, provided only it be legally held by them. * * * The protection of property implies the protection of its value. * * *
>
> "* * * Now if the public was seeking to take title to the railroad by condemnation, the present value of the property, and not the cost, is that which it would have to pay. In like manner, it may be argued that, when the legislature assumes the right to reduce, the rates so reduced cannot be adjudged unreasonable if, under them, there is earned by the railroad company a fair interest on the actual value of the property."

In *West* v. *Chesapeake, etc., Co.*, 295 U. S. 662, 671, this court said:

> "* * * When the property itself is taken by the exertion of the power of eminent domain, just compensation is its value at the time of the taking. So, where by legislation prescribing rates or charges the use of the property is taken, just compensation assured by these constitutional provisions is a reasonable rate of return upon that value."

The principle for which we are contending operates both ways. If the property condemned and subjected to the public use had cost more than its present fair value, we would expect the Commission and complainant to be here urging that the present fair value of the property, and not its cost, be made the basis of the allowance for amortization. The government has not hesitated to make that contention when the facts are reversed, and it is subject to no criticism in making that contention. In *Vogelstein & Co.* v. *U. S.*, 262 U. S. 337, 340, this Court had under consideration the condemnation of a quantity of copper taken by the government for war purposes. In sustaining the claim of the government that it should pay the value of the copper at the time taken, and not its original cost, which was higher, the court said:

> "* * * The market value of the copper taken at the time it was taken measures the owner's compensation. * * * The higher prices, if any, paid by appellant for the copper it was compelled to take on long-time purchase contracts is not evidence of the value of the copper at the time it was obtained by the United States. The United States is under no obligation to make good the loss. Appellant would be entitled to the gain if it had purchased at less than the market price at the time of taking."

Again, in *U. S.* v. *New River Collieries Co.*, 262 U. S. 341, 344, the government was required, on requisitioning 60,000 tons of coal, to pay the market price therefor, although the government was contending that it should pay only the cost of production plus a reasonable profit.

It is true that the particular question under consideration in the rate cases from which we have quoted was the proper rate base; but there is no difference in the constitutional principle involved between fixing the proper rate base and fixing the proper amount to be amortized. The due process clause of the Fifth Amendment guarantees to cross-petitioners a reasonable return *on* the value of the property as of the time it is subjected to the public use, and, as of the time such public use be terminated, to a return *of* such value less its then salvage value. In the case of a continuing utility of indefinite life, the return *of* the value of the property is secured by an adequate allowance for depreciation, sufficient in amount to replace the facilities as and when they have been worn out or become obsolete.

In the case of an extractive industry like that of cross-petitioners', the life of which is limited by a diminishing source of supply, the return of the value of the property is secured by a proper allowance for amortization which, together with the salvage, will return to them that value as of the time their business terminates. The application of the principle in the fixing of the so-called rate base and in the allowance for depreciation or amortization is clearly and emphatically stated by this Court in *United R. & E. Co. v. West*, 280 U. S. 234, 253-4:

> "The allowance for annual depreciation made by the commission was based upon cost. The court of appeals held that this was erroneous and that it should have been based upon present value. The court's view of the matter was plainly right. One of the items of expense to be ascertained and deducted is the amount necessary to restore property worn out or impaired, so as continuously to maintain it as nearly as practicable at the same level of efficiency for the public service. * * * Manifestly this allowance cannot be limited by the original cost, because, if values have advanced, the allowance is not sufficient to maintain the level of efficiency. * * * *It is the settled rule of this court that the rate base is present value, and it would be wholly illogical to adopt a different rule for depreciation.*" (Italics ours.)

In their briefs before the Commission, complainant and the Commission contended that this Court, in *Lindheimer v. Illinois Bell Tel. Co.*, 292 U. S. 151, 168, 176, in effect overruled its opinion in the West case, from which we have just quoted, and that the Lindheimer decision requires that the book cost, instead of present value, must be used in determining the amount to be amortized. They have stated that Justice Butler, in his concurring opinion in the Lindheimer case, admitted that that case was a departure from the West case. They may have been misled into making that contention by the assumption of the Supreme Court of Virginia, in *Alexandria Water Co. v. City Council of*

Alexandria, 177 S. E. 454, 163 Va. 512, that in the Lindheimer case the court sustained a depreciation allowance computed on the original cost instead of present replacement cost. An examination of the Lindheimer opinion discloses that this Court did not sustain any such allowance. The Commission and complainant have overlooked entirely the questions which were involved in the Lindheimer case. In the opinion, written by the Chief Justice (p. 168), this Court referred to the system of accounting under which depreciation is computed upon the actual cost of the property as entered on the books, less the expected salvage, and is allowed and set up on a straight line annual accrual basis. The Court was not deciding the question of a proper allowance for depreciation in his reference to that system of accounting. Justice Butler's reference (p. 176) was a criticism of the method of accounting employed by the telephone company. After observing that the court's opinion disclosed the principle followed for the ascertainment of the amounts annually charged for depreciation, namely, the straight line method calculated on cost less salvage, which had been prescribed by the Interstate Commerce Commission, he observed in a footnote:

> "This is not in harmony with the principle of our decision in *United R. & E. Co.* v. *West,* * * * which requires replacement cost to be taken as the basis of calculation."

He then pointed out that the rates upon which the company was insisting resulted in deductions which were far in excess of the depreciation being suffered. The company was not upheld in its contentions, and these references to its system of accounting and its setting up depreciation cannot be construed as overruling or modifying the principle announced in the West case. In the Lindheimer case this Court did not approve the charges against the book cost for which the telephone company was contending. Justice Butler was not criticising the opinion of the Chief

Justice, but the practice of the company. It was this practice of the company, and not the opinion of the Chief Justice, which he stated was not in harmony with the West case.

Since the going concern value is as much a part of the value of the property as the physical elements entering into that value, it goes without saying that in fixing the proper amount to be amortized the going concern value must be included. The courts have uniformly held that in condemnation proceedings compensation must be allowed for the going concern value.

In *Brooks-Scanlon Corp.* v. *U. S.*, 265 U. S. 106, 123, a case involving the requisition of a contract to build a ship, the court held:

> "The contract rights of claimant taken are to be distinguished from its expenditures for the production of the ship. The value of property may be greater or less than its cost; and this is true of contract rights and other intangibles as well as of physical things."

In *National Waterworks* v. *Kansas City*, 62 Fed. 853, 865, a condemnation case, the court, in passing upon the amount of the compensation, said:

> "* * * The original cost of the construction cannot control, for 'original cost' and 'present value' are not equivalent terms. Nor would the mere cost of reproducing the waterworks plant be a fair test, because that does not take into account the value which flows from the established connections between the pipes and buildings of the city * * *. A completed system of waterworks, such as the company has, without a single connection between the pipes in the streets and the buildings of the city, would be a property of much less value than that system connected, as it is, with so many buildings, and earning, in consequence thereof, the money which it does earn * * *. The city, by this purchase, steps into possession of a water works plant * * *. It steps into possession of a property which not only has the ability to earn, but is in fact earning.

> It should pay therefor not merely the value of a system which might be made to earn, but that of a system which does earn."

We have cited and discussed other cases on this point in presenting the proposition in support of an allowance for going concern value (pp. 84 to 98, *supra.*)

In fixing the amount to be amortized the Commission rejected cross-petitioners' contention and allowed only the original cost of the properties, to the exclusion of any going concern value. In this cost it included the cost of added facilities which will be required in the future and also the amount fixed by cross-petitioners' witnesses as necessary working capital. Cross-petitioners' complaint on this point is that in fixing the compensation for the existing properties the Commission adopted the original cost thereof, and not the present value including going concern value. Under the authorities above cited, this holding of the Commission was clearly erroneous.

We point out that the Commission in its opinion makes no reference to the circumstance that prior to the enactment of the Natural Gas Act cross-petitioners were engaged in a private enterprise and that by the operation of that Act cross-petitioners' properties have been condemned to a public use. That may be accounted for by the circumstance that in the main the opinion follows right along the lines of the brief of its counsel, in which brief no mention was made of that subject. The Commission and complainant did not discuss that subject in their briefs. The reason the Commission, complainant and their counsel ignore this question is manifest. *They cannot answer the position of cross-petitioners on this point.* The best they can do is to assert (R. Vol. VIII, p. 3937), "We believe that the total investment, in contradistinction to claimed fair value, should be amortized and that the amortization period should be the total estimated life of the business, namely, twenty-three years, rather than the remaining life, fifteen years." Under the authorities to which we have referred, they are clearly in error on both points.

The Commission observes in this connection that the allowances for amortization are recognized and treated as operating expenses and that operating expenses are stated on the basis of cost (R. Vol. VIII, pp. 3937-8). While annual allowances for amortization may be treated as operating expenses by the accountants, as a matter of fact they are not operating expenses in the true sense of the word, but installments on the return of the capital itself. But for the purposes of this argument let us pass that observation. The Commission then says, "There is no more reason to compute amortization expense on the basis of fair value or reproduction cost of the property than there is to substitute fair value or reproduction cost for all other expenses, such as labor, materials, supplies, etc." (R. Vol. VIII, p. 3938). That is an astonishing statement. The allowance for labor, materials and supplies entering into the maintenance and operating expenses is based on present cost of labor, materials and supplies. As applied to those items, present cost and present value are synonymous terms. It is upon these same costs that present value of the capital facilities is reached; for the figures submitted by cross-petitioners as the present value of the capital facilities are the cost of labor and material which enter into the existing capital assets at the present prices, less an offset representing the existing depreciation. Cross-petitioners are not inconsistent. It is the Commission which is inconsistent. Its allowance for maintenance and operation is based on the present cost or present value of the labor, materials and supplies; but in making an allowance for amortization it bases the allowance as to existing facilities on their cost in 1930, 1931, and from year to year as additional capital facilities were acquired.

No authority is cited by the Commission in support of its holding on the amount to be amortized or the period of amortization. Our searches convince us that no authority can be cited which will support those holdings. The same constitutional principle invoked to support our position that in fixing the amount of amortization at the value of the property as of the time it is first condemned to public use under the Natural Gas Act supports, with equal emphasis, our position that the compensation for the use of that fair value, or return to cross-petitioners *of* that fair value, must be paid at a time *subsequent* to the condemnation. The circumstance that this fair value is not returned to cross-petitioners now does not impair their right to payment of that fair value, less the salvage, during the period over which their property shall be subjected to public use.

During the intervening period, between the time their property is first condemned and the end of the economic life of their project, cross-petitioners are entitled to recover *all* of that difference between the present fair value at the time of condemnation and the salvage value, not 15/23 of that amount, as held by the Commission.

Suppose that cross-petitioners had sold their property shortly before the enactment of the Natural Gas Act for its present fair value. Could it be said that the purchaser, upon having his property condemned for a public use shortly after his purchase, would be required to lose the difference between that present fair value and the amount which the Commission has allowed by going back to the beginning of 1932 and computing the amortization allowance over the entire twenty-three years? Would the purchaser be permitted to come back on cross-petitioners for reimbursement for that difference? These questions answer themselves. Certainly cross-petitioners could be in no different position upon having their property condemned than would be their purchaser.

Suppose that cross-petitioners' line were just now completed and that its future life would be limited to fifteen years; could the Commission argue that under those conditions they would not be entitled to a return over that fifteen year period of the present fair value of their line, which, of course, under those conditions would be synonymous with the cost of their line? Would the gas produced from the reserves and transported through a new line just now completed be any more valuable than the gas which cross-petitioners are producing and transporting through their line at the present time? What justification could there be for making a distinction between the price of gas transported through a new line and sold at wholesale and the price of the same gas transported through a line, of the same value, which was completed and operated for several years prior to the enactment of the Natural Gas Act? It is the price of the commodity which cross-petitioners produce, transport and sell that the Commission is directed by Congress to regulate.

It is true that during the past years cross-petitioners have made book entries to cover depreciation, depletion and retirements affecting capital assets. The evidence is without contradiction, however, that these charges were made with no reference to amortization and with no reference to the life of the field (R. Vol. IV, pp. 2621, 2646, 2648). No issue is presented here by cross-petitioners as to whether those charges were adequate or otherwise. Cross-petitioners are making no claim for additional allowances on the theory that these charges were too small to cover the actual depreciation. In their figures they have deducted the existing depreciation and they have submitted the figures as to the present fair value of the gas reserves now remaining in their depleted condition. The Commission cannot impose regulation retroactively by going back to the beginning of 1932 and deducting from the proper amount to be amortized, which includes the present value of their properties, an amortization allowance, plus interest thereon, over eight or nine years prior to the time they were subjected to regulation under the Natural Gas Act. During the first three years cross-petitioners did not earn sufficient revenues to cover what the Commission finds to be a reasonable return plus a proper allowance for amortization. But that is neither here nor there. The past is now history. Whether cross-petitioners made too much or too little prior to regulation is utterly beside the issue. Whether their earnings were paid out as dividends or applied to a retirement of the capital is of absolutely no import; for, as we have stated, the property that was condemned under the Natural Gas Act was cross-petitioners' property. The value of that property belonged to cross-petitioners, and must be returned to cross-petitioners *under* regulation and not *prior* to regulation. Suppose that, instead of subjecting cross-petitioners' property to public use for the purposes of the Natural Gas Act, the government were now condemning cross-petitioners' pipeline and facilities for the purpose of acquiring them and using them to transport crude oil or gasoline in the interest of national defense. Would the government be heard to say that in compensating cross-petitioners for their properties it would be entitled to deduct from their present fair value accruals for depreciation or amortization prior to the time of condemnation? The answer is obvious.

In their brief before the Commission its counsel sought to meet cross-petitioners' proposition on this point by setting up a straw man. They assumed that a company just coming under regulation had only one-fifth or one-tenth of its life remaining, and then insisted that it would be ridiculous to allow the investment to be amortized over the remaining life of the field and thus set the rates at the very high levels that would be required to accomplish such an amortization. The language of this Court in *Willcox* v. *Consolidated Gas Co.*, 212 U. S. 19, 52, is directly in point:

"* * * We do not say there may not possibly be an

> exception to it where the property may have increased so enormously in value as to render a rate permitting a reasonable return upon such increased value unjust to the public. How such facts should be treated is not a question now before us, as this case does not present it. We refer to the matter only for the purpose of stating that the decision herein does not prevent an inquiry into the question when, if ever, it should be necessarily presented."

We point out, however, that no different situation from that assumed by counsel would obtain if cross-petitioners were just now completing their pipeline and it suddenly developed that their source of supply would be exhausted within the next four or five years. The evidence reveals an actual instance even more extreme than the one just stated. A line to Rochester, N. Y., was built in 1937, but in 1939 it developed that the field upon which the life of the line depended would probably be exhausted in 1940 (R. Vol. IV, p. 2567). The difficulty with counsel for the Commission and complainant is that they have proceeded all through this case on the assumption that under the Natural Gas Act the Commission is charged with regulating *profits* and not charges. Just and reasonable charges are not based entirely upon considerations of what would constitute a fair return. The public is entitled to be charged only what the commodity is reasonably worth; and the regulated company should not be required to sell it for less than it is worth, even if by good management it sells sufficient volumes to enable it to earn more than a barely nonconfiscatory return.

Thus, in *Covington & Lexington Turnpike Co. v. Sandford*, 164 U. S. 578, 596, this Court said:

> "The public cannot properly be subjected to unreasonable rates, in order simply that stockholders may earn dividends."

Again, in *Smyth* v. *Ames,* 169 U. S. 466, 547, the Court said:

> "* * * What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience. On the other hand, what the public is entitled to demand is that no more be exacted from it * * * than the services rendered by it are reasonably worth."

It follows, therefore, that if the charges necessary to yield a fair return and amortize the value of the property are so high as to be excessive *per se,* they will not be fixed at such high levels. That cross-petitioners' prices cannot be thus described is established conclusively by the fact that they were fixed by private negotiation, and that in negotiating the prices cross-petitioners were forced to compete with the prices of the competing fuels which were replaced by natural gas. The fact is that it would be futile for the Commission to fix a price at a level above that which cross-petitioners could obtain in competition with other fuels; for the purchasers would not pay that price.

When and if such a question as that presented by counsel in their straw man illustration shall confront the Commission, the Commission will then be forced to look, as it should have looked in this case, to evidence of what would constitute just and reasonable charges, and not, as it has done here, to evidence dealing solely with cross-petitioners' profits over and above a barely non-confiscatory return.

The regulation of natural gas pipelines is comparatively new and the cases dealing with the period of amortization are few; but the soundness of cross-petitioners' position is manifest.

However, we are not entirely without authority showing how commissions and courts have dealt with this subject in fixing the charges of those engaged in this industry. Two cases involving the United Fuel Gas Company are in point. In one of these cases the court held that amortization should begin at the time the company, by obtaining franchises *and selling gas to the public generally, first dedicated its property to public use.* In the other case the court held that amortization should be from the time the regulating commission *first set the rates* and made an allowance for amortization.

The United Fuel Gas Company was organized in 1903. Between that date and 1910 it acquired substantial gas reserves and properties. In 1910 it constructed a transportation system and, as a public utility, procured franchises under which it engaged in operating distribution systems in various towns and cities in West Virginia and Kentucky. Its rates in West Virginia were regulated commencing in 1913. In 1925 it applied to the commission in West Virginia for an increase in the existing rates. The increase was denied, whereupon a bill charging confiscation was filed with a Federal Court of three judges. That court held that confiscation had not been established. *United Fuel Gas Co.* v. *Public Service Commission,* 14 Fed. (2) 209, 225.

Regulation of the company's rates in Kentucky commenced in 1920. In 1924 it applied to the Railroad Commission of Kentucky for an increase in rates. The increase was denied and the company again attacked the commission's order in a Federal Court of three judges. That court also held that confiscation had not been established. *United Fuel Gas Co.* v. *Railroad Commission,* 13 Fed. (2) 510, 526.

The company appealed to this Court in both these cases. The two cases were submitted to this Court together and were finally disposed of in opinions written by the present Chief Justice. *United Fuel Gas Co.* v. *Public Service Commission,* 278 U. S. 322; *United Fuel Gas Co.* v. *Railroad Commission,* 278 U. S. 300.

In the West Virginia case the trial court specifically held that a natural gas company should be permitted to amortize the *present value* of its physical properties and its gas reserves, if that value could be proven. It is true that in that case the cost of the gas reserves was used as the best evidence of present value for lack of better evidence of present value; but it must be noted that original cost was *not used in lieu of* present value.

In the Kentucky case the trial court expressed the opinion that the reproduction cost less observed depreciation should be used as the present value of the property other than gas rights; that to this sum should be added $3,000,000 as going concern value; and that, as to gas rights, present value should be used if it could be determined, otherwise book value should be *treated as present value.* In the latter case this Court observed that it was assumed that the present reproduction value, if obtainable, would be taken as the rate base, and that depreciation or amortization would be calculated on the basis of present value of the property rather than on the original cost or investment (278 U. S. 313).

In fixing the allowance for depreciation and amortization in the Kentucky case, the Court found the life of the utility to be thirty-three years, fifteen years, beginning in 1910, having already elapsed. The amortization was distributed over the entire thirty-three years, and not over the eighteen years remaining in the future; *but it will be noted that it fixed the beginning of the period of amortization as of 1910, when the company voluntarily dedicated its properties to the public use* by entering upon the distribution of gas to the general public, under franchises as a public utility, and not as of 1903, when it was organzied, or 1909, when it purchased many of its properties.

In the West Virginia case the Public Service Commission held that the amortization period should start, not with the time the company first operated as a utility, but with the time its rates first became actually regulated by the commission, in 1916 (*In re United Fuel Gas Co.*, Case No. 1516, P. U. R. 1925B, 705), and in that connection said:

> "But it is the judgment of the Commission that instead of spreading this amortization and the adjusted sales over the life of the property, the retirement or amortization should be restricted to the period from 1916 to the present time."

In the language quoted the Commission, of course, was referring to the deduction from the present value to cover amortization already accomplished under regulation.

In the same opinion the commission stated that two questions presented themselves: (1) Should the amount which had thus been allowed and collected as amortization be deducted from the book cost of the property or from its fair value? and (2) Within what period should this amount be amortized? It answered the first question in these words:

> "It is the present fair value, as held in the decisions of the United States Supreme Court and our own Supreme Court of Appeals in cases hereinbefore cited, upon which the utility is entitled to earn a fair return; this value being regarded as actual money devoted to the use of the public by the utility. Therefore, it is that actual money, represented here by property, which has appreciated in value, which the gas company is entitled to have *returned to it through amortization*. We must be consistent; if we allow the fair value for one purpose, we must allow it for the other." (Italics ours.)

In answering the second question, the commission found that the future life of the field was not less than eighteen years and that 4.15% annually was "an amount sufficient and necessary for the amortization of the unamortized portion of the present fair value of the property." It also allowed 1.2% on the rate base, or fair value of the property, for depreciation and depletion.

The trial court (14 Fed. (2) 209) criticized the allowance for amortization by the commission and reduced it from 4.15% of the present fair value to 3.65%, but increased the allowance for depreciation and depletion to 1.5%. This reduction in the allowance for amortization was not due to any criticism of the circumstance that it had been distributed over the future life of the field, but to the fact that the commission had not made a deduction for ultimate salvage value and the fact that the company's witnesses had testified that it would probably have more than eighteen years of profitable business life ahead of it.

Thus it appears that in those cases the Kentucky and West Virginia commissions, the trial courts, and this Court, which affirmed the trial court in each case, upheld and applied the contention here made by cross-petitioners to the effect that the fair value of the properties must be amortized and that the period of amortization must begin as of the time the properties are first subjected to public use. The only question that can arise from a consideration of these cases is whether or not the amortization period applicable to cross-petitioners should commence on June 21, 1938, the date the Natural Gas Act was approved, or whether it should commence on August 1, 1940, the date on which the first regulatory order was served on cross-petitioners. Cross-petitioners believe that the rule announced in the Kentucky case is the correct one, for the reason that regulation did not actually overtake cross-petitioners until the order was served; but in no event could the period of amortization commence earlier than the date on which the Natural Gas Act was approved. In either event, the Commission is clearly in error in fixing the amount to be amortized at the original cost of the capital facilities and in fixing the period of amortization to commence on January 1, 1932, about six and a half years prior to the enactment of the Natural Gas Act, and more than eight and a half years before the first regulatory order.

The life of cross-petitioners' enterprise has a maximum span of fourteen years five months from August 1, 1940, the date of the order, or sixteen years six and a third months from June 21, 1938, the effective date of the Natural Gas Act. In arriving at the annual allowance for amortization, the Commission not only fixed the amortization period at twenty-three years, beginning January 1, 1932, but charged cross-petitioners interest on the annual installments of $1,557,852 from the date last mentioned at 6½%, compounded annually. The error of the Commission in charging 6½% interest, the same as the rate of return allowed, is discused elsewhere in this brief. Let us assume, however, for the purpose of the question under discussion, that it was proper to charge that rate of interest, and then determine the result of the Commission's error in wrongfully fixing the period of amortization to begin on January 1, 1932:

(1) Let us assume that the period should begin as of the date of the order. During the 14 years 5 months between August 1, 1940, and December 31, 1954, $1,557,852 a year would accumulate $22,459,034. Interest on the annual installments at the rate of 6½% per annum, compounded annually, during the period would accumulate an additional $13,018,302, or a total of $35,477,736, principal and interest. Thus it appears that of the $84,341,218, which the court below held cross-petitioners were entitled to amortize, there would be *a deficit over the period of $48,863,482,* which amount would be confiscated solely because of the error of the Commission in using a 23 year period of amortization. If the sum of $78,284,009, erroneously fixed by the Commission as the amount to be amortized, be

used in the calculation, there would be *a deficit over the period of $42,806,263.*

(2) Let us assume that the period should begin as of the date the Natural Gas Act became effective. During the 16 years 6⅓ months between June 21, 1938, and December 31, 1954, $1,557,852 a year would accumulate $25,753,641. Interest on the annual installments at the rate of 6½%, compounded annually during the period, would accumulate an additional $18,193,072, or a total of $43,946,713, principal and interest. Thus it appears that of the $84,341,218, which the court below held cross-petitioners were entitled to amortize, there would be *a deficit over the period of $40,394,505,* which amount would be confiscated solely because of the error of the Commission in using a 23 year period of amortization. If the sum of $78,284,009, erroneously fixed by the Commission as the amount to be amortized, be used in the calculation, there would be *a deficit over the period of $34,337,296.*

We respectfully submit that the court below correctly held that the holdings of the Commission on these questions are in conflict with the due process clause of the Fifth Amendment to the Constitution. It is manifest that the order of the Commission founded upon its erroneous holdings on these questions would inevitably operate to confiscate cross-petitioners' property to the amount of many millions of dollars.

III.

While the Court Below Did Not Pass on the Question, the Commission's Order Should Be Set-Aside on the Ground That It Is Confiscatory in That, in Computing the Annual Allowance for Amortization by the Sinking Fund Method, the Commission Charged Cross-Petitioners Compound Interest on the Annual Installments at the Rate of 6½% Per Annum.

A. *In Providing for Amortization the Commission Was Required to Allow Annual Installments for Accruals Out of Earnings Which, Added Together, Will Return the Proper Amount To Be Amortized by the Time Cross-Petitioners' Reserves of Gas Are Exhausted.*

B. *Under the Sinking Fund Method Adopted by the Commission in Computing the Annual Allowance, the Interest Rate Used in the Computation, Under the Uncontradicted Testimony, Must Be No Higher Than 2% Per Annum Compounded Semi-annually.*

(Sec. 4, Summary of Argument, *supra*, p. 58.)

Based on the uncontradicted evidence that the nearest to risk free securities available to them for investment of the annual amortization installments would yield a maximum of 2% per annum, compounded semi-annually, cross-petitioners urged the Commission to use 2%, compounded semi-annually, as the interest rate in the event the Commission adopted the sinking fund method of computing the annual allowance. Disregarding the evidence on this point, the Commission, in computing the allowance by the sinking fund method, used an interest rate of 6½% per annum, compounded annually, on the theory that such rate should be used because it had fixed 6½% per annum as a fair rate of return to cross-petitioners on the rate base allowed.

Cross-petitioners attacked the holding of the Commission on this point on the ground that it was erroneous and would result in confiscation of their property in violation of due process (R. Vol. VIII, pp. 3981, 4029-30).

Having determined that the order should be vacated on other grounds, the court below did not pass on the question; but cross-petitioners again raised the question in their cross-petition for writ of certiorari and assigned error to the court below for failing to sustain cross-petitioners' contention on this point (pp. 7-8, 19). We urge this error by the Commission as an additional reason why the decision of the court below, vacating the Commission's order, should be upheld.

For the purposes of the interim order, the Commission assumed that cross-petitioners' reserves will be exhausted by the end of 1954 (R. Vol. VIII, p. 3938). The context of the Commission's opinion shows that, in so assuming, the Commission purported to accept the testimony of cross-petitioners on this point, as suggested by its counsel and counsel for complainant. We have pointed out that the testimony is not to that effect, but rather to the effect that the economic life of cross-petitioners' reserves will fall short of that date by two or three years (R. Vol. II, p. 695). In extending the period of amortization to the end of 1954, the Commission, therefore, subjects cross-petitioners to the serious risk that a substantial part of the amount to which they are entitled through amortization will be lost entirely. In this connection it is pointed out that the figures offered by cross-petitioners and adopted by the Commission show that there will be *no* amount available for amortization during the full year 1954, and less than the amount allowed by the Commission in the year 1953 (Exhibit 142, p. 2, line 23, R. Vol. V, p. 303, Vol. III, p. 1414). For the purpose of this proposition, however, let it be assumed that cross-petitioners' reserves will permit them to operate to the end of 1954 with earnings sufficient to justify the distribution of the amortization allowance over the entire life, including 1954.

On that assumption it cannot be disputed that cross-petitioners are entitled to a return of the full amount to be amortized at a date not later than the end of 1954. For several reasons it is impracticable to wait until the end of 1954 to make provision for the return of that amount. In the first place, cross-petitioners' properties are subjected to the use of those to whom cross-petitioners will sell gas throughout the period of regulation, and it would be unfair to those purchasing gas at the end of 1954 to place upon them the whole burden of returning the more than eighty-four million dollars to which cross-petitioners are entitled. All those benefiting from the use of cross-petitioners' properties should contribute to the return of that amount. Also, it manifestly would be impracticable to defer the return of this amount, for the reason that cross-petitioners then would find themselves in a position where they could not recover it. They can recover it only through the charges they shall make for natural gas during the period of regulation. It is the settled law, therefore, that in providing for amortization, as in providing for depreciation and depletion, the burden is distributed over the entire period of regulation and is allowed in annual installments or accruals as a part of the revenues.

The simplest way to distribute this burden and arrive at the amount to be set aside each year is to divide the total amount to be returned by the end of the period by the number of years intervening. This is known as the straight line method of computation. For many years in computing depreciation and amortization this method of computation was used uniformly by regulatory bodies and approved by the courts. This method is based upon the theory that the property of the regulated company is continually being consumed in service and that the owners should be reimbursed therefor concurrently with the consumption. Under this theory the funds reserved from earnings by the depreciation or amortization charges are immediately made available to the company for use for all corporate purposes. It is important to note that where this method is employed the accruals from year to year will in the aggregate amount to the entire value of the property by the time the property is consumed in service.

In the case of the ordinary continuing utility these funds are accrued as depreciation reserves for the purpose of replacing the property as it is worn out in service, on the theory that the money will ultimately be invested in new property on which the owners will continue to receive a fair return. In the case of an enterprise of limited life, such as that of cross-petitioners, the funds are accrued, not for the purpose of replacing the properties, but for the purpose of providing at the end of the service life, a fund in cash to cover the value of the property subjected to public service.

The sinking fund method is based upon the theory that the regulated company is entitled to a fair return upon all property maintained in condition for proper service, regardless of the fact that a part of its service life has been consumed, and that the owners should receive no reimbursement for property consumption until the property shall have been finally retired. Funds reserved from earnings by the amortization charges are, therefore, segregated and allowed to accumulate at interest pending such ultimate reimbursement. It must be remembered that under this method the sum of the annual accruals over the period of service is less than the total value of the property, the amount of the difference depending, of course, on the interest rate applied to the accruals. The funds can not be used indiscriminately for corporate purposes but, if the owners are to be compensated to the amount of the full value of their properties, the reserves must be used to produce definite and reasonably assured earnings which, added to the annual accruals, will at the end of the project's life aggregate the full value of the property.

The only justification for employing a sinking fund method of computation is that cross-petitioners will receive an amount each year to apply on the total amount to be returned at the end of the period, and that, because the purchasers are paying annual installments on this obligation in advance, they are entitled to be compensated in the charges for the use of the amounts returned from the time of payment to the end of the period. The question immediately arises as to what compensation the purchasers should be allowed on these installments. The issue is squarely drawn between cross-petitioners and the Commission. Cross-petitioners urged before the Commission, and now urge, that this compensation should be the interest at prevailing rates obtaining on investments as nearly free of risk as can be obtained. Under the evidence this rate should not exceed 2%, compounded semi-annually; but the Commission used 6½% (R. Vol. VIII, p. 3938). It adopted this rate on the theory that if a rate of return of 6½% is fair and equitable for the company, by the same token it would seem to be fair and equitable in computing the amortization to be charged (R. Vol. VIII, p. 3938). In other words, the Commission held that if cross-petitioners are entitled to a return of 6½% on the value of their reserves, pipelines and other facilities, the purchasers are entitled to the same rate as interest on the amortization installments. How could the Commission arrive at any such conclusion? Why did the Commission allow cross-petitioners 6½% instead of 2%, the prevailing interest rate on risk free securities? The very fact that cross-petitioners were allowed 6½% as a rate of return shows that even the

Commission recognizes that they are entitled to some compensation for the risk assumed in placing their money in an investment beset with the hazards of the natural gas pipe-line industry. Do the purchasers assume any such risk? It is inconceivable that there is any risk involved to the purchaser of natural gas in paying over to cross-petitioners each year, through the charges, an annual installment on the obligation of such purchasers to return to cross-petitioners their capital by the end of the period of regulation. If there was ever a situation in which no compensation for risk is in order, this is such a situation.

If cross-petitioners take these installments and deposit them in the bank and allow them to lie idle until the end of 1954, the purchasers are not injured. If cross-petitioners invest this money in some hazardous enterprise in which they earn no interest or in which they lose a part or all of the principal, the purchasers are still not injured. If cross-petitioners are fortunate and invest these installments in some venture which turns out to be profitable, it is cross-petitioners, and not the purchasers, who take the risk, and all the compensation for risk involved in the returns from such investment should belong to cross-petitioners, and not to the purchasers. *The most that the purchasers could be entitled to is the compensation which cross-petitioners can obtain for their money in an investment which is the nearest to risk free that can be obtained. so that at the end of the period there will be available. in the annual installments set aside and the interest allowed on those installments, a sum equal to cross-petitioners' capital.*

The evidence is without dispute that in 1939 the yield on the highest grade of bonds was below 3% per annum (Exhibit 185, Chart 1, R. Vol. VII, p. 3579, Vol. IV, p. 2038; Exhibit 152, p. 1, R. Vol. VI, p. 3141, Vol. III, p. 1622); and that the average yield on all outstanding United States Treasury bonds was just above 2% (Exhibit 185, Chart 3, R. Vol. VII, p. 3603, Vol. IV, p. 2038).

The witness Zwiener, an officer of Harris Trust & Savings Bank of Chicago, which has resources of approximately $285,000,000 (R. Vol. III, p. 1367), testified as to the character of securities that would be available to a fiduciary in handling a trust fund and to the yields that could be expected from investments in such securities (R. Vol. III, p. 1368). He testified in substance that there is no security that is absolutely risk free; that the term "risk free security" means a security on which the investor can be absolutely certain that both principal and interest will be paid at the time it becomes due and payable. He stated that this was the only type of security that a fiduciary would consider in investing a trust fund to be administered under instructions that it must be so handled as that both principal and interest would be available at a definite time (R. Vol. III, pp. 1368-9); that he believed that United States Treasury notes and bonds are considered to be as close to risk free investments as are available in the market (R. Vol. III, p. 1369); that falling in the same classification are the high-grade municipal obligations of states, counties, cities and other municipal subdivisions that have a high credit rating, though the obligations of many of the larger cities could not qualify for such classification (R. Vol. III, p. 1368); that under such instructions as those above stated the investor would be limited almost entirely to United States government or municipal bonds; that under present conditions it is not possible to accumulate any sizable block of high-grade municipal bonds of relatively short maturities at any one time (R. Vol. III, p. 1368); that government bonds or notes are always available in blocks of three or four million dollars a year; and that, without keeping the money idle, the most practical investment for such a fund would be in direct government obligations (R. Vol. III, p. 1368).

He prepared and explained Exhibits 132 and 133, which were received in evidence (R. Vol. V, pp. 2951, 2953, Vol. III, p. 1377). Exhibit 132 contains the quotations and yields of United States Treasury notes and bonds at the close of the market on August 15, 1939, the date on which the witness' studies were prepared. Exhibit 133 shows what the yield would be on a fund invested on January 1, 1940, in securities maturing as close to the end of 1954 as could be obtained, at the quotations above-mentioned. He likewise took securities that would be available at annual intervals after January 1, 1940, with the same maturities and on the same quotations. Naturally, it was necessary for him to use the same quotations rather than speculate concerning quotations in the future. The best that he could do was to calculate the yields over the period between the time of investment and the end of 1954, using the latest quotations obtainable as the basis of the computation. It turned out that the average gross yield on such investments would be 1.52% per annum, from which he deducted .17% per annum as cost of administration, arriving at a net average yield to the investor of 1.35% per annum.

In preparing and submitting Exhibits 141 and 142 (R. Vol. V, pp. 3025, 3029, Vol. III, pp. 1411, 1414), cross-petitioners used this rate of interest in computing the annual allowance for amortization. However, shortly after August 15, 1939, the date on which the witness Zwiener obtained the quotations used in his exhibits, the European war broke out, with the result that the quotations on government securities and other high-grade bonds declined, with a resulting increase in the yields.

After the introduction by cross-petitioners of Exhibits 141 and 142, they called to the stand the witness Delafield, a man of wide financial experience as a banker, as a seller of securities, as a purchaser of securities, and as the financial executive of Columbia Gas & Electric Company, a very large natural gas and utility system (R. Vol. III, p.

1415). Delafield testified that the return to savings banks in New York on their bond investments was a good index of pure interest, and pointed out that these investments aggregated more than $2,000,000,000 in securities purchased under rigid laws designed to prevent investment in unduly risky securities. He stated that their investment account showed a gross return in 1938 of 2.87%, but that this return was subject to deduction for expense of administration (R. Vol. III, p. 1418). In response to a direct question he testified that under present conditions 2% compounded semi-annually would be a reasonable rate to use in computing an amortization reserve (R. Vol. III, p. 1433).

There is no testimony to the effect that any investment of the type approaching risk free securities is available which would yield a return in excess of 2% compounded semi-annually.

In the light of this testimony, cross-petitioners caused Exhibits 210 and 211 to be prepared as supplements of Exhibits 141 and 142, respectively, and in those supplementary exhibits they recalculated the proper annual allowance for amortization, using, instead of 1.35% compounded annually, an interest rate of 2% compounded semi-annually (R. Vol. VII, pp. 3901, 3902; Vol. IV, pp. 2637-9). Under the record in these proceedings no higher rate can be justified.

Courts and commissions have consistently recognized that the interest rate on the sinking fund should be substantially less than the rate of return allowed, and should approximate the rate of yield on the highest grade securities. The reason for this is obvious. Under the sinking fund method of computing the allowance, the total principal amount to be amortized is not returned to the regulated company, but only a portion thereof is returned, the difference being made up by the interest charges. If the regulated company is to be certain of receiving the full amount over the period of amortization, it manifestly must so invest the installments as to be sure that by the end of the amortization period the investment can be liquidated in an amount which, including the interest, will equal the total amount to be amortized. It can have no assurance that by the end of the period it will have the full value of the property to be amortized unless it avoid risk, as far as risk can be avoided, in the purchase of securities. To charge the regulated company a higher rate of interest than can be realized from the highest type of securities, and thus force it to put the installments to risk or lose a part of its principal, is confiscation.

In *Cheltenham & Abingdon Sewerage Co.* v. *Public Service Commission,* 186 Atl. 149, 160, 122 Pa. Sup. 252, decided in 1936, the court had under review an order of a commission fixing 4% as the interest rate, and, on that basis, $407 as the annual amortization allowance. We quote from the opinion:

> "When the commission fixed 4% as the rate of interest which is to be compounded annually, it did so without any evidence to support such finding. We find no evidence in the record that would warrant the conclusion that $407.00 could be promptly invested at the end of each year at the rate of 4%. Under the method employed by the commission, the stockholders have a right to demand that the fund should be invested in high grade securities. Bank interest as fixed by the Federal Reserve Board is now considerably less than the amount named, and Federal, State and Municipal bonds are selling at less rate. The difference becomes of great importance when it enters into the computation of compound interest. * * * It will readily be seen that the fixing of a rate which is too high is a matter of serious moment."

It is interesting to note that the testimony offered by the Commission shows that the rediscount rates of New

York and Chicago Federal Reserve Banks have not exceeded 2% since the beginning of 1935, and that in 1938 the rates in Chicago were 1½% and in New York 1% (Exhibit 185, Chart 15, R. Vol. VII, p. 3707, Vol. IV, p. 2038). To the same effect is Exhibit 180, p. 4, offered by complainant (R. Vol. VII, p. 3528, Vol. IV, p. 1984).

We refer briefly to some of the instances where courts and commissions have applied the sinking fund method in providing for amortization of depreciation.

In *Re Southern Counties Gas Co.*, P. U. R. 1921B, 705, the sinking fund allowance for the Ventura division of that utility was on a 6% basis, but the rate of return allowed was 8½%.

In *Re Southern Counties Gas Co.*, P. U. R. 1921E, 374, the sinking fund interest rate was 6%, but the rate of return allowed was 9½%. This hearing dealt with rates in the Long Beach area.

In *Re Los Angeles Gas & Electric Corporation*, P. U. R. 1922A, 283, the annuity was on a 6% basis, but the rate of return was 9%.

In *Re Southern California Gas Company*, P. U. R. 1922A, 277, amortization was fixed on a 6% basis, and a rate of return of 9% allowed.

In *Monahan* v. *Pacific G. & E. Co.*, P. U. R. 1916B, 609, the sinking fund rate was 6%, and the rate of return 9.24%.

In *East Bakersfield Improv. Assoc.* v. *San Joaquin Light & Power Co.*, P. U. R. 1916C, 830, the sinking fund rate was 6%, and the rate of return 8%.

In *Re Golden Gate Ferry Co.*, P. U. R. 1927A, 525, the sinking fund rate was 5%, and the rate of return allowed was 10.9%.

In *Re Wisconsin Telephone Co.*, P. U. R. 1925D, 661, the sinking fund rate was fixed at 5%, and the rate of return at 8%.

In *Re United Fuel Gas Co.,* P. U. R. 1925B, 705, the West Virginia commission allowed a straight line amortization for a period of eighteen years of 4.15%, annually plus 1½% for depreciation. This was the equivalent of 3¼% interest on sinking fund basis. It also allowed an 8% rate of return. The three judge court held (*United Fuel Gas Co.* v. *Public Service Commission,* 14 Fed. (2) 209) that this was more than it required since it only required $3.90 paid at the end of each year for eighteen years to amount to $100.00 when compounded at 4%. It pointed out that savings banks at that time would pay that rate. Therefore, it suggested the use of 3.65% as the annual amortization factor. This was the equivalent of 4¾% interest on sinking fund basis. That decision was rendered in May, 1926. Knapp's Exhibit 185 (R. Vol. VII, p. 3579, Vol. IV, p 2038) shows that in that month Moody's Aaa bonds had a yield of $4.71 (as compared with $2.92 in June, 1939). Moody's forty public utilities had bond yields of $5.08 (as compared with a yield of $3.42 in June, 1939).

In *United Fuel Gas Co.* v. *Railroad Commission,* 278 U. S. 300, this Court affirmed the judgment of the trial court, which had approved an order of the Kentucky commission fixing rates. The order had allowed an 8% return, and in addition thereto straight line allowances of 1½% for depreciation and 4½% for amortization over an assumed future life of eighteen years. This allowance was the equivalent of 2.3% interest on the sinking fund basis for amortization.

In *Central Ky. Natural Gas Co.* v. *Railroad Commission,* 60 Fed. (2) 137 (rev. on other grounds, 290 U. S. 264), a three judge court sustained an order which permitted 4% interest on the sinking fund for amortization, and a 7% rate of return. This order was entered in June, 1932. At that time, as appears from Knapp's Exhibit 185 (R. Vol. VII, p. 3579, Vol. IV, p. 2038), the yield on Moody's Aaa bonds was 5.26% (as compared with 2.92% in June, 1939). Yields on long time U. S. Treasury bonds were then 3.76% (as compared with 2.13% in June, 1939). Ostrander's Exhibit 190, p. 5 (R. Vol. VII, p. 3529, Vol. IV, p. 1984), shows that in 1932 the average yield on fifteen municipal bonds used as an index was 4.65% (as compared with 2.70% in 1939).

In *Clark's Ferry Bridge Co.* v. *Public Service Commission,* 291 U. S. 227, the sinking fund interest was 4% *simple* interest and the rate of return was 7%. The hearing was in 1932, at which time the yield on highest grade utility bonds was 4.81% (as compared with 2.55% in June, 1939). See Ostrander's Exhibit 180, p. 8 (R. Vol. VII, p. 3533, Vol. IV, p. 1984). The average yield on long time U. S. Treasury bonds in that year was 3.68%. See Knapp's Exhibit 185 (R. Vol. VII, p. 3603, Vol. IV, p. 2038). So the rate was lower than the average of U. S. Treasury bonds and the highest grade utility bonds

Thus it appears that, while in many cases an interest rate of 6% has been used in providing a sinking fund for amortization or depreciation, that rate has been arrived at by considering then existing earnings on securities of the highest quality. Courts have consistently allowed a < substantial spread between the rate of interest provided for sinking fund and the rate of return allowed the regulated company. This necessarily results from the fact that the rate of return is one determined as being fair to a concern facing the problems and risks of the company whose rates are under consideration, while the rate of interest on the sinking fund is comparable to the returns of securities of the highest class.

We have by no means cited all the cases where the sinking fund interest rate has been discussed. In some cases a sinking fund interest rate of 5% was used (*San Anselmo* v. *Marin Water & Power Co.,* P. U. R. 1916F, 782; *Re Great Western Power,* P. U. R. 1923C, 545; *Re Sweetwater Water Corp,* P. U. R. 1922B, 336; *Dept. Public Works* v.

Pacific Co Bridge Co., P. U. R. 1928D, 278); in some a 4% rate was used (*Re Portland R. Light & P. Co.*, P. U. R. 1916D, 976; *Re Coos & Curry Tel. Co.*, P. U. R. 1924E, 344; *Leighton Chamber of Commerce* v. *Leighton Water Sup. Co.*, P. U. R. 1930D, 198); in some a 3% rate was used (*Re Pierce County Tel. Co.*, P. U. R. 1919F, 92); and in some a 2% rate was used (*Bogart* v. *Wisconsin Tel. Co.*, P. U. R. 1916C, 1020). In practically all of those cases rates of return ranging from 7% to 8% were allowed.

In all the cases cited, the commissions and courts were dealing with pure utilities, holding franchises and facing few risks as compared with those faced by cross-petitioners. Their rates of return were fixed at rates comparable to those which then obtained with respect to other companies having comparable risks; but the interest rates on sinking funds were at approximately the rates then earned on highest types of investment—those which were practically risk free.

In Exhibit 185, Schedule 1 (R. Vol. VII, pp. 3579-89, Vol. IV, p. 2038), it appears that there is a wider spread at the present time between the yields on Aaa and Baa bonds than in former years. The witness Knapp testified that that circumstance indicated that the investor is demanding greater compensation for the risks he undertakes than he did formerly (R. Vol. IV, p. 2125). The same fact appears from Exhibit 180, p. 8 (R. Vol .VII, p. 3533, Vol. IV, p. 1984). In the light of this attitude, it is clear that there is at this time a greater spread between the cost of money raised through bonds and that raised through equity securities, which carry the principal risk, than obtained a few years ago when the cases we have reviewed were decided. On this basis there should be a wider spread between the rate of return allowed cross-petitioners in this proceeding and the rate of return used in computing the amortization reserve by the sinking fund method. They have a right to the benefit of an interest rate on the nearest to riskless securities that would be available for the investment of the sinking fund. Certainly they should not be required to go out and speculate in stock of any character with a fund like that. They are entitled to the return of the whole amount representing the present value of their property, and if less than that amount is to be returned by the application of the sinking fund method, an interest rate must be used in the computation which will make it certain that by the end of the project's life that full amount can be made available.

We have already pointed out in Section II of this brief (pp. 102 to 129, *supra*) that the trial court erred in spreading the amortization over a 23 year period; but for the purpose of testing the error now under consideration let it be assumed that 23 years was the proper period, and then let us test the effect of this error:

The setting aside of $1,557,852 annually would accumulate during the 23 year period only $35,830,596. The interest on the annual installments, compounded semi-annually at 2%, would in the 23 years accumulate an additional amount of only $9,157,915, or a total accumulation of principal and interest of only $44,988,511. Thus it appears that of the $84,341,218, which the court below rightfully held is the proper amount which cross-petitioners are entitled to amortize, there would be a deficit over the period of $39,352,707, which would be confiscated solely because of the error of the Commission in fixing the interest rate at 6½% instead of 2% in computing the amortization allowance. If the sum of $78,284,009, erroneously fixed by the Commission as the amount to be amortized, be used in the calculation, there would still be *a deficit of $33,295,498* over the whole period.

We submit, therefore, that, without regard to the other errors assigned, the order of the Commission based on this erroneous use of 6½%, compounded annually, as the interest rate in computing the annual allowance for amortization is confiscatory and should be set aside.

IV.

A. While the Court Below Did Not Expressly Pass on the Question, the Commission's Order Should Be Set Aside on the Ground That There Is No Substantial Evidence to Support the Commission's Finding that Cross-Petitioners' Present Charges Are Unjust and Unreasonable.

B. If by Implication It Overruled Cross-Petitioners' Contention on This Point, the Court Below Erred in Not Sustaining Cross-Petitioners' Contention That the Commission's Order Should Be Set Aside Because There Is No Substantial Evidence to Support the Commission's Finding That Cross-Petitioners' Present Charges Are Unjust and Unreasonable.

(Sec. 5, Summary of Argument, *supra,* p. 60.)

Cross-petitioners, before the Commission and before the court below, urged that there is no substantial evidence to support the Commission's finding that cross-petitioners' present rates are unjust and unreasonable. They pointed out that the Commission and complainant offered no evidence going to the question of whether or not the present rates are unjust and unreasonable, but based the finding entirely on the circumstance that the earnings of cross-petitioners exceed a 6½% rate of return on the rate base erroneously fixed by the Commission; and they urged that 6½% was a barely nonconfiscatory rate of return, even under the theory of the Commission, and that under the facts of this record the circumstance that cross-petitioners' revenues available for return exceed 6½% per annum on the rate base allowed is no evidence that the present rates are unjust and unreasonable.

In the court below the Commission and complainant contended that cross-petitioners did not raise this point in their application for rehearing and, therefore, were precluded from raising it in the court of review (R. Vol. VIII,

p. 4034). The court below overruled this contention of the Commission and complainant (R. Vol. VIII, p. 4034), pointing out that in their application for rehearing cross-petitioners assigned error on this point as follows:

> "The Commission erred in finding that the rates and charges presently charged by petitioners are unjust, unreasonable, unlawful, and violative of the provisions of the Natural Gas Act" (R. Vol. VIII, p. 3971).

The court below also pointed out other assignments of error in the petition in which cross-petitioners complained of related points, which supplement the assignment above quoted (R. Vol. VIII, p. 4034).

Another assignment of error raising this point squarely was presented in cross-petitioners' application to the Commission for rehearing. The sixth assignment of error read:

> "The Commission erred in not holding that the burden of proof rests upon complainant and counsel for the Commission to establish that applicants' existing rates are unjust and unreasonable, *and that such burden has not been discharged*" (R. Vol. VIII, p. 3970).

The court below did not expressly overrule cross-petitioners' contention on this question (R. Vol. VIII, pp. 4033-4, 4035). We assigned error on this point in our cross petition for writ of certiorari (pp. 11 and 19).

The contracts fixing cross petitioners' charges (Exhibit 11, Vol. V, p. 3685, Vol. I, p. 57), filed with the Commission and by reference made a part of the record, are prima facie evidence that such charges are reasonable. *St. Joseph Gas Co.* v. *Barker*, 243 Fed. 206, 213. The enactment of the Natural Gas Act did not overthrow these contracts or set aside the charges upon which the parties to such contracts agreed. The agreed charges will continue to be valid unless and until the Commission, after the completion of the hearing now pending, shall find such charges to be unjust and unreasonable and shall fix new charges in lieu thereof. *Kaul* v. *American, etc., Telephone Co.,* 147 Pac. 1130, 1131, 95 Kan. 1. The burden of producing substantial evidence that such charges are unjust and unreasonable lies with complainant and the Commission. *L. & N. R. R. Co.* v. *Commission,* 195 Fed. 541, 558. The Commission cannot discharge that burden by mere fiat in the form of a finding. It and complainant must offer substantial proof which will sustain a finding; otherwise the finding must be set aside on review.

The Kaul case was cited with approval in *Wichita R. R. & El. Co.* v. *Public Utilities Commission,* 260 U. S. 48, 58, in which case this Court, in an opinion by Chief Justice Taft, said:

> "The proceeding we are considering is governed by Section 13. That is the general section of the act comprehensively describing the duty of the Commission, vesting it with power to fix and order substituted new rates for existing rates. *The power is expressly made to depend on the condition that, after full hearing and investigation, the Commission shall find existing rates to be unjust, unreasonable* * * *. We conclude that a valid order of the Commission under the act must contain a finding of fact after hearing and investigation, upon whch the order is founded, and that, for lack of such a finding, the order of this case was void.
>
> "This conclusion accords with the construction put upon similar statutes in other states * * *. Moreover, it accords with general principles of constitutional government." (Italics ours.)

In *L. & N. R. R. Co.* v. *I. C. C.,* 195 Fed. 541, 545-6, the Commerce Court said:

> "* * * It is the duty and the privilege of the carrier in the first instance to fix the rates to be charged, and it is only where after due notice and a full hearing—whether on complaint of a shipper or upon investigation by the Commission of its own motion—*it is made to appear that the rate is unjust and unreasonable* that

> the Commission is empowered to fix another. The hearing which is so provided for is not a perfunctory one. The carrier is entitled to know and to rely on what is adduced at it, either for or against the existing rate, and the Commission is not authorized to disregard it and reach a conclusion not at all justified by it." (Italics ours.)

The decision in this case was reversed by this Court on a different point in *I. C. C.* v. *L. & N. R. R. Co.*, 227 U. S. 88, 92, but the legal principle announced by the Commerce Court was sustained in this language:

> "Under the statute the carrier retains the primary right to make rates, but if, after hearing, *they are shown to be unreasonable*, the Commission may set them aside and require the substitution of just for unjust charges. The Commission's right to act depends upon the existence of this fact, and if there was no evidence to show that the rates were unreasonable there was no jurisdiction to make the order." Italics ours.)

In *C. I. & L. Ry. Co.* v. *International Milling Co.*, 43 Fed. (2) 93, 96 (certiorari denied), the Eighth Circuit Court of Appeals held that a rate once legally established remains the rate *until changed in the manner provided by law*, and that where Congress has provided by statute the way in which changes in rates are to be made, the Commission, though enpowered to enact rules, cannot provide for a change in the rates in any other than the statutory manner.

Congress recognized the principle under discussion by expressly providing in the Natural Gas Act that the Commission must first find that the existing charges are unjust and unreasonable before proceeding to fix a different rate (15 U. S. C. 717d(a)). The Commission recognized the principle in its order instituting an investigation of cross-petitioners by declaring that the purpose of the hearing was to enable the Commission, first, to determine whether cross-petitioners' charges were unjust and unreasonable, etc., and, second, if it should find that the charges are unjust and unreasonable, to determine just and reasonable charges and to fix the same by order (R. Vol. I, p. 8). Counsel for the Commission and complainant recognized the abstract principle by alleging in the complaint and in their motion for interim order that the existing rates are unjust and unreasonable (R. Vol. I, p. 5). The Commission again recognized the principle in its order by entering a finding that cross-petitioners' charges are unjust and unreasonable (R. Vol. VIII, p. 3945); but both the Commission and complainant have wholly failed to *apply* the principle in the proceedings reflected by the record. It is manifest that they have assumed in effect that upon the filing of a complaint with the Commission and the instituting of an investigation by the Commission, the burden of proof is thereby placed upon cross-petitioners to justify the existing rates. In the development of the evidence complainant and the Commission have devoted themselves entirely to an effort to show what would constitute a fair rate of return. In other words, they have proceeded on the theory that the sole object of this proceeding is to reduce cross-petitioners' revenues to an amount yielding a fair return, which complainant and the Commission interpret to mean a barely nonconfiscatory return, notwithstanding the fundamental principle that before any new rate can be set up they must demonstrate by *substantial evidence* that the existing rates are unjust and unreasonable.

Evidence of a barely nonconfiscatory return is not evidence that a rate or charge which yields a higher return is unjust and unreasonable. There is a well-recognized twilight zone or margin between the level of earnings so low as barely to meet the ban against confiscation and a level of earnings so high as to raise a presumption that the supporting charges are unjust and unreasonable. In *Public Service Co. v. Board of Utility Commissioners,* 84 N. J. L. 463, 471 (aff'd 94 Atl. 634, 87 N. J. L. 597), the court said:

> "On the one hand, a just and reasonable rate can never exceed, perhaps can rarely equal, the value of the service to the consumer. On the other hand, it can never be made by compulsion of public authority so low as to amount to confiscation. A just and reasonable rate must ordinarily fall somewhere between these two extremes so as to allow both sides to *profit* by the conduct of the business and the improvement of methods and increase of efficiency.
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> "Justice to the consumer ordinarily would require a rate somewhat less than the full value of the service to him, and justice to the company would ordinarily require a rate above the point at which it would become confiscatory. To induce the investment and continuance of capital, there must be some hope of gain commensurate with that realizable in other businesses. The mere assurance that the investment will not be confiscated will not suffice."

In *Banton* v. *Belt Line Corp.*, 268 U. S. 413, 422-3, this Court held:

> "A commission or other legislative body, in its discretion, may determine to be reasonable and just a rate that is substantially higher than one merely sufficient to justify a judicial finding in a confiscation case that it is high enough to yield a just and reasonable return on the value of the property used to perform the service covered by the rate. The mere fact that a rate is nonconfiscatory does not indicate that it must be deemed to be just and reasonable. It is well known that rates substantially higher than the line between validity and unconstitutionality properly may be deemed to be just and reasonable, and not excessive or extortionate."

Later we shall demonstrate that under the facts presented by the Commission's own witness the rate of return allowed by the Commission is less than the actual cost of refinancing cross-petitioners' properties, and for that reason the charges based on such a rate of return are confiscatory. If it be assumed, however, for the purposes of the proposition now under discussion, that the rate of return fixed by the Commission is barely sufficient to render it nonconfiscatory, which, it is clear from the Commission's opinion, is all the Commission intended to allow, proof supporting that rate of return would be no evidence that charges which would yield a higher return are unjust and unreasonable.

The Commission found (R. Vol. VIII, p. 3945) that cross-petitioners' annual net revenues exceed the amount reasonably necessary (which is the amount yielded by applying a rate of return of 6½% to the rate base fixed by the Commission) by $2,966,852. We search in vain in the opinion, findings and order of the Commission for any evidence upon which the Commission could have relied in finding that cross-petitioners' charges are unjust and unreasonable. Manifestly, it must have proceeded on the theory that the fact that the earnings of cross-petitioners exceed a 6½% rate of return on the rate base allowed by the amount just stated would justify a finding that cross-petitioners' rates are unjust and unreasonable.

The rate of return is only one of the factors to be considered in fixing a rate. *Public Service Co.* v. *Board of Public Utility Commissioners*, 84 N. L. J. 463, 472 (aff'd 94 Atl. 634, 87 N. J. L. 597); *Cotting* v. *Godard*, 183 U. S. 79, 95-7. In the former case the court quotes from the language of Lord Selbourne in *Canada Southern R. Co.* v. *International Bridge Co.*, P. R. App. Cas. 723:

> "The principle must be, when reasonableness comes in question, not what *profit* it may be reasonable for a company to make, but what it is reasonable to charge to the person who is charged. That is the only thing he is concerned with."

It was pointed out in this connection that Lord Selbourne expressly excepted the case where the results to the company are so enormously disproportionate to the money laid out as to be some evidence that the charge is unreasonable with reference to the person against whom it is charged. We recognize that principle but call attention to the observation that the returns must be "enormously disproportionate" before they are even *some* evidence that the charge yielding the return may be excessive.

In *Cotting* v. *Godard*, above cited, the court said:

> "Pursuing this thought, we add that the state's regulation of his charges is not to be measured by the aggregate of his profits, determined by the volume of business, *but by the question whether any particular charge to an individual dealing with him is, considering the service rendered, an unreasonable exaction.* In other words, if he has a thousand transactions a day, and his charges in each are but a reasonable compensation for the benefit received by the party dealing with him, such charges do not become unreasonable because by reason of the multitude the aggregate of his profits is large. The question is not how much he makes out of his volume of business, but whether in each particular transaction the charge is an unreasonable exaction for the services rendered. He has a right to do business. He has a right to charge for each separate service that which is reasonable compensation therefor, and the legislature may not deny him such reasonable compensation and may not interfere simply because out of the multitude of his transactions the amount of his profits is large. Such was the rule of the common law, even in respect to those engaged in a quasi-public service, independent of legislative action. In any action to recover for an excessive charge, prior to all legislative action, who ever knew of an inquiry as to the amount of the total profits of the party making the charge? Was not the inquiry always limited to the particular charge, and whether that charge was an unreasonable exaction for the services rendered?
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> "The authority of the legislature to interfere by a regulation of rates is not an authority to destroy the

principles of those decisions, but simply to enforce them. Its prescription of rates is prima facie evidence of their reasonableness. In other words, it is a legislative declaration that such charges are reasonable compensation for the services rendered, but it does not follow therefrom that the legislature has power to reduce any reasonable charges because by reason of the volume of business done by the party he is making more profit than others in the same or other business. The question is always, not, What does he make as the aggregate of his profits? but, What is the value of the services which he renders to the one seeking and receiving such services? Of course, it may sometimes be, as suggested in the opinion of Lord Chancellor Selbourne, that the amount of the aggregate profits may be a factor in considering the question of the reasonableness of the charges, but it is only one factor, and is not that which finally determines the question of reasonableness. *Now, the controversy in the circuit court proceeded upon the theory that the aggregate of profits was the pivotal fact. To that the testimony was adduced, upon it the findings of the master were made, and in recognition of that fact the opinion of the court was announced. Obviously, as we think, in all this the lines of inquiry were too narrowly pursued.*" (Italics ours.)

In proceedings before many regulatory bodies the elementary principle announced in the above quotations is too often subordinated to a position that defeats its application or is ignored entirely. The rate of return is an essential factor to be considered in a proceeding in equity to enjoin an order alleged to be confiscatory. Unless the prescribed rate is confiscatory, the courts are without power, in an equity proceeding, to set them aside, if the findings of the commission are supported by substantial evidence. This limitation upon the courts' power presents a constant temptation to those who are interested only in rate reductions, and who give no thought or consideration to the doing of justice to those who have invested their money in regulated enterprises, to set as their objective the prescribing of a rate barely sufficient to justify a judicial finding that it it is not confiscatory. This practice by regulatory bodies was recognized by this Court in the concurring opinion of Justice Brandeis in *Missouri ex rel. S. W. Bell Tel. Co.* v. *Public Service Commission,* 262 U. S. 276, 296-7, which reads:

> "* * * And the tendency developed to fix as reasonable the rate which is not so low as to be confiscatory. Thus, the rule which assumes that rates of utilities will ordinarily be higher than the minimum required by the Constitution has, by the practice of the commissions, eliminated the margin between a reasonable rate and a merely compensatory rate; and in the process of rate making, effective judicial review is often rendered impossible. The result, inherent in the rule itself, is arbitrary action on the part of the rate-regulating body."

That the Commission, consciously or unconsciously, yielded to the temptation referred to in the above quotations is manifest. Instead of approaching the subject in its logical order, the Commission and complainant in developing the evidence went straight to the question of rate of return. After cross-examining cross-petitioners' witnesses on that subject and after offering their own testimony relating to rate of return, they immediately set in motion procedure looking to the entering of an interim order. The Commission made a finding that 6½% on the rate base fixed is a fair annual return to cross-petitioners; but an examination of the opinion (R. Vol. VIII, pp. 3938-40) shows conclusively that the Commission was interested only in fixing a rate of return that would equal the cost of refinancing cross-petitioners' properties. On that point it erred; for it based its findings upon the conclusion of its own witness that with earnings of 6.2% to 6.5% cross-petitioners could refinance their properties with 40% bonds, 20% preferred stock and 40% common stock. But the very figures adopted by the Commission from this witness' testimony and set out in the opinion (R. Vol. VIII, p. 3939) show that this conclusion was founded on a mathematical error in calculation, as we shall show in more detail later. If it be assumed, however, for the purposes of the proposition now under discussion, that cross-petitioners can refinance their properties on a basis of 6½% per annum, certainly it cannot be said under those circumstances that charges which will yield only 6½%, the cost of refinancing, are more than barely nonconfiscatory charges. It is perfectly clear that all the Commission intended to permit cross-petitioners to have was a barely nonconfiscatory earning as a maximum. It is significant that nowhere in the Natural Gas Act is there a reference to *earnings, profits, return or rate of return!* It is with *rates* and *charges* for natural gas that the Commission is directed to deal. But the latter has devoted its entire attention to the subjects not mentioned, and no attention at all to the subject committed to its hands.

The Commission did not from the evidence as a whole undertake to fix a just and reasonable charge and then apply, as a test of this charge, the 6½% per annum fixed as a fair rate of return to determine whether the charge allowed would yield such a return; but it started at the other end and applied 6½% to the rate base allowed and found the result to be $4,837,328 a year. It then deducted that amount plus the amount it had erroneously fixed as an annual allowance for amortization from the income of cross-petitioners available for amortization and return and reached the result, $2,966,852, which it termed an amount "available for reduction in net revenues" (R. Vol. VIII, p. 3941). In other words, the objective was clearly *to reduce cross-petitioners' revenues, and to determine the amount of the reduction by cutting the income down to a barely nonconfiscatory return!*

As we have already shown in this brief, the Commission erred in fixing the amount of the rate base. It erred in fixing the amount to be amortized. It erred in fixing the period over which the amount to be amortized should be accumulated. It erred in allowing for amortization each year only an amount which, with interest compounded annually at 6½%, would accrue the amount to be amortized. Later in this brief we shall demonstrate that the finding of the commission that 6½% is a fair rate of return to cross-petitioners is not supported by substantial evidence, and that, under the uncontradicted evidence, the rate of return should be substantially higher than 6½%. It will also appear conclusively that a correction of these errors will more than offset this difference of $2,966,852 which the Commission found to be "available for reduction in net revenues." But for the purposes of this proposition let us assume that there is a difference, in the amount stated, between cross-petitioners' earnings available for amortization and a barely nonconfiscatory return; and on that assumption let us test the finding of the Commission that cross-petitioners' charges are unjust and unreasonable.

We submit that this record discloses beyond question that the finding of the Commission that cross-petitioners' charges are unjust and unreasonable was based upon the mere fact that it reached the conclusion that cross-petitioners' earnings amount to $2,966,852 in excess of a barely nonconfiscatory return, and upon that circumstance alone. *We challenge the Commission and the complainant in their briefs to point out any other fact or circumstance offered in evidence by complainant or the Commission, or found in the evidence offered by cross-petitioners, which would justify any such finding by the Commission.*

Let us see what complainant and the Commission did in the development of this case. In the first place, the Commission directed that cross-petitioners proceed with their evidence before the Commission and complainant offered any evidence (R. Vol. I, p. 15). Cross-petitioners vigorously protested any such procedure, urging that they were before the Commission to defend themselves against the charges made by the complainant, and any charges which might be made by the Commission, and that the burden of proof did not rest upon them to develop the evidence. At first cross-petitioners declined to proceed with their testimony (R. Vol. I, pp. 16-23), whereupon the Commission offered one witness, who testified principally on questions bearing on the extent of the reserves of natural gas contained in the Panhandle field, where cross-petitioners' producing properties are located, and certain geological facts bearing upon that issue (R. Vol. I, pp. 35-57). He also produced Exhibits 3 to 11, inclusive, and 14 (R. Vol. V, pp. 2673-87, Vol. I, p. 57), dealing with certain general facts concerning cross-petitioners and their operations and certain operating figures and analyses dealing with the years 1934 to 1938 inclusive. (He also produced Exhibits 1, 2, 12 and 13, which were large maps not printed in the record.) *We point out in this connection that all these analyses excluded the years 1932 and 1933.* Complainant offered an accountant, who produced Exhibit 15 (R. Vol. V, pp. 2689-2755, Vol. I, p. 64), showing the earnings statements per books by calendar years from the commencement of cross-petitioners' operations to December 31, 1938. No other evidence was offered by the Commission and complainant at that time.

After cross-examining the Commission's witness, cross-petitioners proceeded with the development of their direct testimony under circumstances which amounted to duress in fact, if not in law; for repeated intimations were made by the Examiner and by counsel for the Commission that the Commission might not permit cross-petitioners to put on their evidence at all unless they proceeded as directed by the Commission (R. Vol. I, pp. 34, 65, 66).

About a month later complainant recalled the same accountant and offered Exhibit 54 (R. Vol. I, pp. 394-8), a balance sheet taken from cross-petitioners' books *covering the period from December 31, 1934, through 1938,* and at the same time through the same witness offered certain corrections to Exhibit 15 (R. Vol. I, p. 393). No other evidence was offered by either the Commission or complainant until after cross-petitioners announced on October 6, 1939, that they had concluded their direct testimony. Then the Commission and complainant offered testimony related solely to the subject of rate of return.

As soon as the Commission and complainant had developed their testimony going to the subject of rate of return, from which they erroneously arrived at a rate of 6½% as a fair annual return, the proceedings were stopped so far as they were concerned. They never called another of cross-petitioners' witnesses for cross examination. They never offered a witness to testify affirmatively on the question of whether or not cross-petitioners' charges are unjust and unreasonable, or on any other question. They rested their case upon the theory that all they had to do was to show that cross-petitioners' earnings exceeded 6½% per annum on the rate base fixed for the purposes of this order. We submit that that circumstance is not substantial evidence supporting their finding. For that reason this Court, for the purposes of this proposition, is not bound by the Commission's finding on that question. We are not here talking about confiscation. We are discussing the jurisdiction of the Commission to enter an order drastically reducing cross-petitioners' charges before substantial evidence has been produced which will support a finding that the existing charges are unjust and unreasonable.

As stated in the Cotting case (183 U. S. 79, 97), from which we have quoted above, the Commission could not proceed on the theory that the aggregate of profits was the pivotal point under consideration. Can it be said in the light of the facts reflected by this record that a return to cross-petitioners of $2,966,852 in excess of a barely nonconfiscatory return on a rate base of $74,420,424 is so "enormously disproportionate" as to justify a finding that cross-petitioners' rates are unjust and unreasonable? Standing alone, such an excess is not of sufficient consequence to justify even treating it as a factor in considering whether or not cross-petitioners' charges are unjust and unreasonable. To justify the finding of the Commission on this point it was necessary for the Commission and complainant to produce evidence showing that the charges which produce such excess are in fact unjust and unreasonable; and if they desired to use cross-petitioners' net earnings or profits as a factor going to that issue, it was necessary that they produce substantial evidence showing that such alleged excess above a barely nonconfiscatory return rendered the charges unjust and unreasonable—or that there are no facts justifying such alleged excess. For example, they might have proved, if they could, that cross-petitioners' business has been characterized by poor management or by merely ordinary management; that none of its earnings can be attributed to extraordinary management or skill in designing, constructing and operating its facilities; that they have passed through no period during which they earned less than a barely compensatory return; that in the future they will pass through no period during which they will earn less than a barely compensatory return—or, to state it differently, that cross-petitioners have sustained no losses in the past and will sustain no losses in the future; that cross-petitioners are charging more for natural gas than the prices at which that commodity usually sells at wholesale. The Commission has files showing the charges for natural gas of every company engaged in the business of selling natural gas in interstate commerce. It could have drawn upon those files and produced some figures both interesting and enlightening. In other words, the Commission and complainant were required to produce evidence that would negative the justification of the current excess above a barely nonconfiscatory return. They offered no such evidence.

No burden rested upon cross-petitioners to justify that difference. As above stated, they have abundantly justified their earnings and have demonstrated in this record that, on a proper rate base, after proper allowances for amortization, they will not have left as an annual return 6½% (Exhibit 142, R. Vol. V, p. 3029, Vol. III, p. 1414). But if it be assumed that there is such a difference, that difference is more than justified by the facts and circumstances under which cross-petitioners have operated and now operate their business.

Let us examine some of the evidence which conclusively demonstrates that cross-petitioners are entitled to more than a mere nonconfiscatory return from their operations. In the first place, cross-petitioners' pipeline system is the first ever organized and put into operation for the transportation of natural gas over such a long distance (R. Vol. I, p. 498). Those who first conceived the project found on thorough investigation that mechanical and other difficulties rendered it entirely inexpedient to build a pipeline with the type of thick-walled, lap-welded pipe commonly employed in the short distance pipelines then in operation, and transport gas as pressures of 300 to 400 pounds per square inch, as was the practice in the operation of these short pipelines. After exhaustive research and experimentation, they succeeded in designing and causing to be designed a thin-walled pipe capable of tremendously higher stresses than the old type of pipe through which they could transport gas at pressures of more than 700 pounds per square inch. As a result of this pioneering and investigation, those responsible for cross-petitioners' project were able to transport the largest volumes of gas per unit of steel and to transport gas at the lowest cost, per dollar of investment and per unit of distance traversed, that at that time had ever been accomplished in the pipeline industry.

Cross-petitioners were not satisfied with the annual load factor ordinarily achieved by the industry. By intense and sustained diligence they pursued the policy of promoting the sale of gas by their purchasers at wholesale to industrial plants for processing and for fuel, on an interruptible basis which permitted cross-petitioners to protect their obligations under firm contracts to deliver gas for domestic and commercial uses (R. Vol. II, pp. 683-4). By this means the annual load factor of cross-petitioners' pipeline was eventually built up to a much higher figure than that of any other large pipeline (R. Vol. III, p. 1467). Since 1936 they have maintained a load factor of more than 92% of the total rated capacity of the line, an attainment heretofore unheard of in the industry (R. Vol. II, p. 1046).

The result of the employment of higher pressures and higher stresses in the operation of their line, and of maintaining the higher load factor in the volume of gas handled, has been a substantially increased earning for cross-petitioners above that which they would have earned had they constructed and operated their facilities along the conventional lines at a load factor such as was commonly attained in the industry. One witness testified without contradiction that at least $1,207,067 of cross-petitioners' annual revenue is due to this skill in design and operation and to good management in developing and maintaining the load factor above stated (R. Vol. III, p. 1468). Can it be said that that part of the excess over and above a barely non-confiscatory return which is accounted for by this creative skill and efficient management is unjust and unreasonable? No witness so testified.

But that is not all. Cross-petitioners are engaged in an extractive industry. For their source of supply they rely on reserves of natural gas located 950 miles from their principal market in a great gas field in which thousands of operators are competing for the production (R. Vol. I, pp.

629-30). Eight other large pipelines and a large number of smaller ones are transporting gas from the same field (R. Vol. I, pp. 629-30). Dozens of natural gasoline plants and carbon black plants are producing and processing tremendous and increasing quantities of gas each day (R. Vol. I, pp. 631-46). Thousands of oil wells are now producing great quantities of gas in connection with oil production, substantial portions of which gas are wasted to the air (R. Vol. I, p. 630). A number of additional oil wells are being drilled and operated (R. Vol. I, p. 644). Refineries and other industries in and near the field utilize gas as fuel (R. Vol. I, pp. 631-45).

Cross-petitioners are transporting gas a distance of 950 miles, across thirty-one rivers, including the great Missouri and Mississippi Rivers. Some of these streams are extremely treacherous. Many other risks too numerous to discuss here have confronted and now confront cross-petitioners in the operation of their business. Can it be said with justice that because the return to cross-petitioners in an enterprise of such hazard exceeds that of a barely nonconfiscatory return on the value of their property that such return is unjust and unreasonable?

But that still is not all. Like all pipeline companies, cross-petitioners started their operations with a small market outlet. Four years were required to build their load up to the normal level at which it has since been maintained. The Commission in effect has held that a barely non-confiscatory return each year during the entire life of the project would be $6,395,180. The record shows without contradiction that in the year 1932 cross-petitioners' net earnings from operations before amortization and return amounted to only $3,665,594; that in 1933 they amounted to only $4,106,544; and in 1934 to only $6,193,069. After 1934 the earnings increased; but the average annual earnings for the first seven years has been only $7,629,298 (Exhibit 138, p. 1, line 36; R. Vol. V, p. 3005.

Vol. III, p. 1397). This is only $1,234,118.88 per year above the barely nonconfiscatory return allowed by the Commission. The evidence offered by cross-petitioners, which the Commission accepted for the purposes of the order, shows that the revenues remaining for amortization and return over the whole period from 1932 to 1954, inclusive, will be an average of only $7,993,442 per year, which is only $1,598,262 per year in excess of the amount allowed by the Commission for amortization and return. This evidence as to the losses sustained by cross-petitioners during the first three years of their operations, when they were earning less than the barely nonconfiscatory return fixed by the Commission, may not be considered by a court of equity in determining whether or not a rate is confiscatory; but in passing upon the question raised in this proposition and now immediately before the Court it is proper to consider these past losses. *Galveston Electric Co.* v. *Galveston*, 258 U. S. 388, 396.

The record shows that cross-petitioners are at the peak of their earning capacity. By reason of increased maintenance and operating costs incident to the aging of the line, the decline in the reservoir pressures in the field from which cross-petitioners produce their gas, and other circumstances, all fully shown by the record without contradiction, cross-petitioners' net earnings before amortization and return will steadily decline from the year 1940 through the year 1954, if cross-petitioners are able to continue in business to that date. The exhibit last referred to shows that during the year 1953 cross-petitioners will earn less than the barely nonconfiscatory return allowed by the Commission, and that in the year 1954 they will earn less than one-third of that amount. All these facts and circumstances negative the contention that cross-petitioners are entitled currently to no more than the barely nonconfiscatory return, and must be weighed in determining whether the Commission's finding that cross-petitioners' charges are unjust and unreasonable, based entirely upon the fact that cross-petitioners, at the peak of their earning capacity, earn $2,966,852 in excess of what the Commission determined to be a barely nonconfiscatory return, is supported by substantial evidence.

But cross-petitioners offered to go further than that. Three times they offered in evidence the contracts, on file with the Commission, of all pipeline companies taking gas from the Panhandle field (R. Vol. III, p. 1720, Vol. IV, pp. 2507-11, Vol. IV, pp. 2651-3). Twice they offered the schedules and contracts referred to in Paragraph A of Order 53 of the Federal Power Commission dated July 5, 1938, and the information requested in Paragraph D of the same order in so far as those companies were concerned (R. Vol. IV, pp. 2507-11, 2651-3). The evidence was rejected on objection by counsel for the Commission and complainant. Those companies own reserves in the same field from which cross-petitioners produce their natural gas. They produce this gas and transport it over varying distances, none exceeding and most greatly less than the distance over which cross-petitioners transport their natural gas. Some of these lines extend to the east and northeast in the same general direction as cross-petitioners' line and through the same character of country, crossing some of the same streams, though only one of them crosses the Mississippi River. Some of them cross comparatively few streams (R. Vol. IV, pp. 2635-6).

Such evidence was clearly admissible as going to the question of whether or not cross-petitioners' charges are unjust and unreasonable. *Cotting* v. *Godard*, 183 U. S. 79, 97; *L. & N. R. R. Co.* v. *U. S.*, 238 U. S. 1, 15-16; *I. C. C.* v. *U. P. Ry. Co.*, 222 U. S. 541, 549; *Western Papermakers Chemical Co.* v. *U. S.*, 271 U. S., 268, 271; *U. S.* v. *N. P. Ry. Co.*, 288 U. S. 490, 500; *Youngstown Sheet & Tube Co* v. *U. S.*, 295 U. S. 476, 480. We have not assigned as error the refusal of the Commission to receive such evidence, and are not here attempting to assign error on such refusal; but the circumstance of that offer, we submit, illustrates that the Commission had at hand sources from which it could have developed facts bearing upon the primary issue of whether or not cross-petitioners' charges are unjust and unreasonable, and bearing upon the question also of whether or not the alleged excess of cross-petitioners' current earnings above a barely nonconfiscatory return is of such proportions as to constitute it even a factor in determining whether or not cross-petitioners' charges are unjust and unreasonable.

We submit that in the light of these facts, which stand unrefuted, and which are not offset by any other evidence offered by the Commission and complainant, cross-petitioners' earnings constitute no more than a just and reasonable return on the value of their property. But the Court does not have to go with us that far to sustain this proposition, for *cross-petitioners have no burden of showing that they are earning no more than a just and reasonable return.* The burden is upon the Commission and complainant to show that the charges which yield this excess over and above a barely nonconfiscatory return *are unjust and unreasonable.* They have not discharged that burden. The finding of the Commission on that point is not supported by substantial evidence. A finding not supported by substantial evidence in legal effect is no finding at all. The doctrine announced by Chief Justice Taft in *Wichita R. R. & El. Co.* v. *Public Utilities Commission*, 260 U. S. 48, 58, must be applied. Under that case the power to enter an order reducing cross-petitioners' rates is expressly made to depend on a condition that the Commission shall find existing rates to be unjust and unreasonable. Since it has made no valid finding, and can make no valid finding, to that effect in the face of this record, the order must be set aside as void.

We submit, therefore, that, without regard to the other errors pointed out in this brief, the order of the Commission should be set aside upon the ground that there is no substantial evidence to support the Commission's finding that cross-petitioners' present rates are unjust and unreasonable.

V.

The Court Below Erred in Not Sustaining Cross-Petitioner's Contention That the Commission's Order Should Be Set Aside Because the Commission Did Not Fix New Rates as Required by the Natural Gas Act.

(Sec. 6, Summary of Argument, *supra*, p. 62.)

Section 5(a) of the Natural Gas Act (15 U. S. C. 717d) provides that whenever, after a hearing, the Commission finds that any rate is unreasonable, the Commission shall *determine the reasonable rate* and "*shall fix the same by order.*" Obviously the statute means that the Commission shall determine just and reasonable rates and charges from substantial evidence, which in this case it is the duty of the Commission and complainant to produce and offer. The Commission did not determine the just and reasonable rates for cross-petitioner's various classes of contracts; it ordered merely a reduction in operating revenues (R. Vol. VIII, p. 3945-3946). There is no evidence upon which the Commission could have made a determination of reasonable rates. There is no evidence in this record that could possibly throw any light upon that subject. The Commission has doubtless assumed that its evidence relating to the subject of rate of return is all that is required. As will be shown in a subsequent section of this brief, the Commission manifestly intended to fix a so-called fair rate of return at a rate that would barely yield (but which in fact does not yield) revenues sufficient to cover the cost of refinancing cross-petitioners' properties. Complainant and the Commission offered no affirmative evidence, nor did they develop any evidence by cross-examination of cross-petitioners' witnesses, concerning the charges fixed by the contracts under which cross-petitioners sell natural gas.

It is true that the Commission, by reference, made cross-petitioners' contracts for the sale of gas at wholesale a part of the record in this cause (Exhibit 11, R. Vol. V, p. 2685, Vol. I, p. 5). But neither complainant nor the Commission produced any testimony or evidence showing that the capacity charge was unjust or unreasonable, or that the charge as a whole which embraced the capacity charge, set out in any particular contract, was unjust or unreasonable. At the time the record was made, 47 different contracts were in effect (R. Vol. II, p. 625). Twenty of these are classified as "firm" contracts obligating cross-petitioners to deliver gas for domestic and commercial uses. Two covered the sale of natural gas at the well. The other 25 are classified as interruptible contracts; and each provides for the delivery of gas only when available for certain industrial processing uses or for use as industrial fuel, the price depending upon the use made of the gas by the ultimate purchaser. There is a wide spread between the price received by cross-petitioners for gas sold under firm obligation for ultimate domestic and commercial uses and the prices received for gas sold for other uses. There is likewise a wide spread between the prices received for gas to be used ultimately by different classes of industry for processing and between the latter and the price received for gas sold for ultimate use by industries as boiler fuel.

In the preceding section of this brief, it has been shown that the Commission has not determined, and from this record cannot determine, what would be just and reasonable as a capacity charge or as a commodity charge for gas sold for domestic and commercial consumption, for the various processing uses or for boiler fuel. The Commission and complainant have been content to direct their entire attack, not upon cross-petitioners' charges, but upon cross-petitioners' profits, based upon the Commission's conception of a proper rate base, proper provision for amortization and a fair rate of return. It seems never to have occurred to either of them that Congress had directed the Commission to determine the *just and reasonable charges* and that Congress has said nothing indicating the purpose to confer power on the Commission to regulate the *profits* of cross-petitioners and others engaged in the same business. Having reached the conclusion, by their erroneous processes of reasoning, that cross-petitioners' profits exceed a barely non-confiscatory return, counsel for the Commission and complainant were so impatient to slash these profits or net earnings that they did not wait to develop the evidence necessary to determine just and reasonable charges as directed by the statute. They proceeded forthwith to seek a so-called "interim" order; and the Commission actually issued such an order directing a reduction of $3,750,000 per annum in cross-petitioners' revenues. They did not determine reasonable rates and charges in cross-petitioners' various classes of contracts and, indeed, entered the order directing this drastic reduction in operating revenues without producing a scintilla of evidence from which such charges, or any of them, could be determined and fixed.

The Commission in its order directed cross-petitioners to file new schedules of rates and charges reflecting the ordered reduction in revenues, and expressly reserved "the right to reject all or any part of such new schedules and in lieu thereof to prescribe the same by further order" (R. Vol. VIII, p. 3946).

Upon which of their charges must cross-petitioners apply this reduction of $3,750,000 a year? Upon what will the Commission base its rejection or its approval of such schedule of rates? Suppose that cross-petitioners take the entire amount off the commodity charge, or make any other particular distribution of the reduction among their several charges. What has the Commission before it in this record to enable it to determine whether or not cross-petitioners will have applied the reduction where it should be applied? There is absolutely no evidence in this record upon which the Commission could approve or reject any charge which, in the new schedule of the charges, cross-petitioners might make for gas sold to any particular customer for any particular use. Is the purpose of the Commission, when these new schedules shall have been filed, to reopen the hearing and then hear evidence going to the question of whether these charges are just and reasonable? If so, the present order is premature. An order by the Commission based on evidence not now in the record, rejecting or approving the charges set up in the new schedules and directing that the new charges be made effective as to all bills regularly rendered after September 1, 1940 (the effective date provision of the Commission's order, R. Vol. VIII, p. 3946) would clearly be a retroactive order. Cross-petitioners present charges cannot be disturbed until a valid order be entered revising such charges; and the revision cannot be made retroactive.

Let complainant and the Commission complete this record and perform the duty which has been imposed upon them by the Act of Congress. It will then be time enough for the Commission to consider whether it should enter an order, not directing a reduction of cross-petitioners' profits, but fixing, as the statute requires, just and reasonable charges for gas sold by cross-petitioners for the various uses to which such gas is applied.

Cross-petitioners cannot properly be required in the midst of the regulatory proceedings to put into effect lower rates which have not been approved on evidence before the Commission, but which *may* subsequently be approved.

The regulatory process, as Congress in the Natural Gas Act recognizes, involves rates—not profits. Rates must be fixed—not profits determined.

The result of lowering cross-petitioners' *profits* could be attained by raising some rates and lowering others. If the Commission's order is a blanket authority to do this, perhaps as a matter of mere mathematical calculation it could be done, but such an action would be only temporary or tentative. The Commission's entire order is a mere direction that cross-petitioners submit a schedule of rates concerning which the Commission retains a veto power. When the veto power is exercised, what will be the next step? Will it be the submission by cross-petitioners of another proposal, and then others following that until finally the Commission agrees? Until then neither the Commission nor cross-petitioners will have "fixed the rates," except that each proposal of cross-petitioners will be an attrition of some customer's rates of which that customer may, of course, take advantage from the time of its effective date. Sometime, during this extraordinary method of rate making, the Commission would be impelled for the first time to fix the reasonable rates in substitution for such as might be found unreasonable. Congress did not intend that any such fantastic procedure should be called the determining by the Commission of just and reasonable rates and fixing the same by order.

One test of the procedure ordered by the Commission is its practical operation when applied to the rate making process in general; for if the Federal Power Commission can adopt such a procedure so can any other regulatory body having jurisdiction to determine and fix reasonable rates. What would be the result of applying such procedure to rate making in the railroad industry? If the Interstate Commerce Commission should enter an order requiring a given railroad so to adjust its schedule of rates as to "reflect a reduction" in its operating revenues of at least $3,750,000 per annum, every practical railroad man familiar with the fixing of rates would declare such an order impossible of performance. To carry out such an order would call for a postulate of prescience possessed by no mortal. The order in this case is just as impossible of performance. It is not only unauthorized by the statute, but is contrary to the express mandate of the statute. It is of such character as that on its face it is unfair, unreasonable and confiscatory.

The court below, in rejecting cross-petitioners' contention that the Commission's order is invalid because the Commission did not fix rates, stated that while the Commission's action was "irregular and unusual," it was in no way "harmful or prejudicial" to cross-petitioners and in fact was "favorable to them" (R. Vol. VIII, p. 4032). The court added:

> "We are convinced and so hold, that petitioners (cross-petitioners here) to successfully attack an order of the Commission, must show they are *aggrieved* by the part of the order assailed. We find no *prejudice* to petitioners (cross-petitioners) in the form which the order took" (R. Vol. VIII, p. 4032).

The court pointed out that cross-petitioners might have a little difficulty in convincing customers as to the fairness of the reduction, but that this difficulty is present whether the regulating commission or the companies make the adjustment. The court below in effect took the view that under the Commission's order, cross-petitioners would receive the same total return regardless of how the Commission subsequently adjusted the rates among cross-petitioners' several customers, and that, therefore, there was no prejudice to cross-petitioners in the method adopted by the Commission.

The court below fell into the error, pointed out by Mr. Justice Brandeis in his concurring opinion in *Missouri, ex* *rel. Southwestern Bell Telephone Co.* v. *Public Service Commission,* 262 U. S. 276, 296-298. There, Mr. Justice Brandeis, with whom Mr. Justice Holmes concurred, pointed out that the Commission and courts had carried over the tests for confiscation into the field of determining whether rates are reasonable or unreasonable. This resulted in the tendency to fix as reasonable, the rate which is barely above the line of confiscation. Thus, says Mr. Justice Brandeis,

> "The rule which assumes that rates of utilities will ordinarily be higher than the minimum required by the Constitution has, by the practice of the Commissions, eliminated the margin between a reasonable rate and a merely compensatory rate; * * *."

In the instant case, both the Commission and the court below looked no further than the tests of confiscation. As for the Commission, this is entirely clear from the record the Commission made, from the opinion and order of the Commission, and from its action in ordering a reduction in profits, and in its not fixing rates. The Commission did not seek to establish reasonable rates but to cut cross-petitioners' profits to a point barely above the line of confiscation. The court below, while recognizing that a rate substantially higher than a nonconfiscatory rate may be reasonable (*Banton Belt Line Corporation*, 268 U. S. 413) nevertheless stated:

> "Petitioners (cross-petitioners) say * * * (b) reasonableness of rates is determined 'not by what profit it is reasonable to make, but what it is reasonable to charge for the services rendered.' * * *
>
> "We reject, without extended discussion, the contentions * * * (b). They (these contentions) ignore well-established holdings, backed by reason and experience, to the effect that a fair rate of return on a fairly established rate base, supplies the correct test of reasonableness. (Citing *Los Angeles Gas Corporation* v. *Rd. Com.*, 289 U. S. 287.) The value of the

> service to users is neither a reasonable rule nor supported by judicial decisions.
>
> "This seems too elementary to require elaborate or supporting argument. Likewise it must be apparent, on this theory of correct rate-making, that the rate of return not only may, but, in a utility rate case, must be, the largely determinative factor of reasonableness" (R. VIII, pp. 4035-4036).

It will be noted that the court below states that the rate of return *must be* the largely determinative factor of reasonableness on this theory of "correct" *rate-making.* It is clear that the court below applies the tests of confiscation in determining the reasonableness of rates and rejects completely the idea of giving any consideration to the reasonableness of the charge for the service rendered.

The court below in effect adopted the philosophy, as did the Commission, that if, considering costs, prices of competing services, etc., the fair price to the purchaser gives, for example, a 3¢ net profit per cubic foot of gas to the regulated concern, and the concern, by skillful management extends its market or decreases its cost so as to increase its total net profit to more than a fair return, say 6½% for purposes of illustration, on the fair value of the property devoted to the public use, then the regulated concern must cut its rates so that its net profit per cubic foot of gas will allow only the 6½% return on the fair value of the property. Cross-petitioners submit that this philosophy is fundamentally wrong. It is contrary to the general principles of regulating utility concerns. It is contrary to the Natural Gas Act and to the Constitution. Such thinking is exactly that condemned by Mr. Justice Brandeis in the *Southwestern Bell Telephone* case. The true theory of rate regulation generally, and under the Natural Gas Act, is to prevent the regulated concerns from charging more than the service is reasonably worth.

The purpose of the regulation is not to destroy the profit motive. If by skillful management, the regulated concern can increase its profits without charging the customer more than the service is reasonably worth, the concern is entitled to those greater profits. The theory adopted by the court below, and by the Commission, amounts to public ownership of the regulated concern. It places the stockholders of the regulated concern in the position of mere money lenders. They advance the capital to the public for the operations of the enterprise, and are limited to a fixed return or interest rate. The profit motive is entirely lacking.

The Commission, in the case at bar, made a bald effort to cut cross-petitioners' profits to a point barely above the line of confiscation and the court below condoned that effort. The Commission, in the midst of the rate regulatory process, attempted to slash cross-petitioners' profits. The failure of the Commission to fix rates is fatal to the Commission's order. The conclusion of the Court below that cross-petitioners are not aggrieved or prejudiced by the order is fallacious and results only from the erroneous theory of the court below that the Natural Gas Act, and rate regulation in general, involves public ownership. If the Commission in this case had fixed reasonable rates on evidence, those rates might yield a higher return than the revenues remaining after the Commission's slash of profits. It is perfectly clear that cross-petitioners are aggrieved and prejudiced because the Commission has not fixed rates on evidence as required by the Natural Gas Act. Cross-petitioners are aggrieved by the slash in profits which has been ordered by the Commission without any regard to the reasonableness or unreasonableness of cross-petitioners' charges.

VI.

The Court Below Erred in Not Sustaining Cross-Petitioners' Contention That the Commission's Order Should Be Set Aside Because It Is Confiscatory in That It Denies Cross-Petitioners a Fair Rate of Return.

A. *There Is No Substantial Evidence to Support the Finding of the Commission That 6½% Per Annum on the Rate Base Allowed by the Commission Is a Fair Rate of Return for Cross-Petitioners.*

B. *Under the Evidence Submitted by Cross-Petitioners, Which Is Uncontradicted by Any Substantial Evidence, Cross-Petitioners are Entitled to a Rate of Return on the Rate Base Claimed by Them of Not Less Than 8% Per Annum.*

(Sec. 7, Summary of Argument, *supra*, p. 63.)

Cross-petitioners urged before the Commission (R. Vol. VIII, p. 3987) and the court below (R. Vol. VIII, p. 4017) that the finding of the Commission that 6½% per annum is a fair rate of return on the rate base allowed is not supported by substantial evidence and that, under the uncontradicted evidence, cross-petitioners are entitled to a return on the rate base claimed by them of at least 8% per annum. The court below held that there is substantial evidence to support the Commission's finding (R. Vol. VII, p. 4037). Cross-petitioners assigned error to this holding in their cross petition to this Court (pp. 8 and 19).

The record dealing with the subject of this proposition is voluminous. Substantially one-half of the record is devoted to the testimony of the eight witnesses who testified on subjects related to rate of return alone. The remainder of the 10,457 pages of the reporter's transcript is permeated with evidence going to elements and factors entering into a proper consideration of that subject. Of the 211 exhibits offered, about 64 were devoted to this subject. It is impossible, therefore, to discuss the testimony in any considerable detail in this brief. It is our purpose here to state summarily, with a minimum of discussion, the facts reflected by the evidence.

We recognize that, subject to the constitutional inhibitions against denial of due process and confiscation of property or of the use of property, and to the limitations imposed by law requiring regulatory tribunals to take into account all the proper elements in arriving at the result, the Commission's finding that 6½% per annum is a "fair annual rate of return upon the rate base allowed," if supported by substantial evidence, is binding on the Court. We do not recognize, however, that the Commission had jurisdiction to set aside the existing rates because they yield a return in excess of 6½% on the rate base allowed, without substantial evidence that the existing rates and charges are unjust and unreasonable; nor do we recognize that under the facts presented by this record a return of 6½% on the proper rate base is a reasonable return, the Commission having clearly proceeded on the theory that a return sufficient to cover the cost of financing cross-petitioners' capital structure is a fair return. We shall show that the return allowed does not cover cost of refinancing cross-petitioners' capital structure; but, if it did, a reasonable return to cross-petitioners must, under the facts, be higher than that barely required to cover cost of refinancing.

A regulated concern is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally made at the same time and in the same general part of the country on investments and other business undertakings attended by corresponding risks and uncertainties. Just compensation depends on many circumstances and must be determined by the exercise of a fair and enlightened judgment, having regard for all relevant facts. *Bluefield W. W. & I. Co.* v. *Commission*, 262 U. S. 679, 692.

What may be a fair return for one may be inadequate for another, depending on circumstances, locality and risk. *United R. & E. Co.* v. *West*, 280 U. S. 234, 249.

The compensation must depend greatly upon circumstances and locality, and, among other things, the amount of risk in the business is a most important factor. The less the risk, the less right the investor has to any unusual returns upon investments. *Willcox* v. *Consolidated Gas Co.*, 212 U. S. 19, 48-49.

Capital charges cover the allowance by way of interest for the use of the capital, the allowance for risk incurred, and enough more to attract capital. The reasonable rate to be prescribed by a commission may allow an *efficiently managed* utility much more than the amounts required to cover use of capital, risk, and the necessity to attract capital. *Missouri ex rel. S. W. Bell Tell. Co.* v. *Commission*, 262 U. S. 276, 291.

On cross-examination the Commission's witness Knapp, in response to a direct question as to the elements he thought important to study and develop in connection with arriving at a proper rate of return for cross-petitioners, read into the record ten elements copied from a study by employees of the Federal Communications Commission, referred to in the record as "Factors Underlying Rate of Return in Public Utility Regulation As Disclosed in Court and Commission Decisions" (R. Vol. IV, p. 2118). These ten elements appear to be in complete harmony with the authorities. We, therefore, quote them verbatim as the basis of cross-petitioners' position here:

"1. A proper return or rate of return is a flexible concept, and not a static rule.

"2. What return is proper necessitates the exercise of an enlightened judgment in each case.

"3. Current conditions are controlling and general conditions affecting all business should be considered.

"4. The return should be sufficient to assure confidence in the financial soundness of the utility to maintain its credit and to attract the required capital.

"5. The propriety of the allowed return depends largely upon the circumstances, locality and risk of the utility enterprise.

"6. The return should be equal to that generally being made at the same time and in the general region on investment in other enterprises which have corresponding risks.

"7. The historical cost of money to the utility and the current cost of money should be considered.

"8. A utility's capital structure, financial history and past operations should be considered.

"9. The return should accomplish, among other things, due recognition of efficiency, or lack of efficiency, in management.

"10. The future prospects of the utility, its taxes, its development, the potential stimulation from reduced rates, and the character of the service should be considered."

Later we shall point out specifically that the range of cross-petitioners' testimony covers all these elements. On the other hand, we shall point out that the testimony of the Commission and complainant took no such range. Their testimony was confined entirely to the current cost of money, principally capital raised through high grade bonds in the electric utility field and through short term financing, and to current business and financial conditions of a very general character. Perhaps we should add that they apparently gave effect to Point 2 with emphasis on the "exercise of an enlightened judgment in each case." Indeed, the result in view of the record would indicate that they gave effect to little, if anything, else than the exercise of their own "enlightened judgment." There is nothing in its opinion to indicate that the Commission took into account the risks inherent in the natural gas industry, those specifically applicable to cross-petitioners' business, or the returns necessary to attract overall capital to the natural gas pipeline business; or that it gave any recognition to the engineering and creative skill in designing and constructing the facilities and the highly efficient management which has characterized the conduct of cross-petitioners' business. An order predicated upon the allowance of a rate of return barely sufficient to cover cost of financing (in this case it does not cover such cost) does not permit the earning of a reasonable return, and in a review proceeding of this character should be held invalid and set aside, even if it did not operate to confiscate cross-petitioners' property and revenues. But it is not necessary for the Court ever to reach that question in this case: for the order is patently confiscatory.

Cross-petitioners' business is the most beset with uncertainties, risks and hazards of any regulated business. This has been recognized by the courts and by regulatory commissions since the natural gas business was first put under regulation.

Thus, in *Landon* v. *Public Utilities Commission*, 242 Fed. 658, 671 (rev. on other grounds, 249 U. S. 236), the court pointed out that no one can foretell whether gas fields will be fairly permanent or come to a sudden end, and that even the best informed men are liable to be sadly mistaken as to future supply.

Again, in *Wichita Gas Co.* v. *Public Service Commission*, 3 Fed. Supp. 722, 727 (modified on other grounds, 290 U. S. 561), the court observed that competition injects a hazard into the natural gas business which is not present in mortgages or bonds, and pointed out in that connection that electricity has almost entirely supplanted gas for lighting and is making serious inroads on gas for cooking, and that in the field of heating gas must meet the competition of coal and fuel oil.

In *Cary* v. *Corporation Commission*, 17 Fed. Supp. 772, 776, the court observed that no utility is more hazardous than that of furnishing natural gas, because its success depends not only upon finding and keeping a market for its gas in the face of vigorous competition by electricity, coal and fuel oil, but it depends also upon the life of the gas field from which it draws its supply.

So much of the court's language in *Wichita Gas Co.* v. *Public Service Commission*, 2 Fed. Supp. 792, 810-11 (modified on other grounds, 290 U. S. 561), is pertinent here that we quote from the opinion:

> "The pipeline company is subject to the hazards attendant upon the production of gas, and its transportation to distant markets. The amount of gas it may take from its own wells, and the price it may charge for its product, is subject to regulation by public authority. It must find a market in a highly competitive field. It competes with coal and fuel oil in household heating and for industrial purposes; the competition of fuel oil is particularly formidable for household heating. * * * Electricity has absorbed the household lighting and is making serious inroads on cooking. In short, it must search for and find its gas; transport it hundreds of miles without an hour's interruption; then find and satisfy its customers. The law contemplates that it make no more than a fair return in good times; it should not be forced to take less when times are hard. There is evidence that in years past the profits of the company exceeded 10%. We do not analyze those figures; in rate making, the past must bury its dead; a confiscatory rate cannot be ordered for the future because an exorbitant profit was made in the past. * * *

> "* * * In these times, when stock of the best utilities can be purchased on a 9% basis or better, certainly an 8% return on this hazardous enterprise is not unreasonable."

Another case in which it was recognized that the natural gas business is generally more hazardous than the business of an ordinary public utility is *Oklahoma Natural Gas Co.* v. *Corporation Commission,* 216 Pac. 917, 923-4, in which the court said:

> "* * * It should be borne in mind that a natural gas public service business is generally more hazardous than the business of any other public utility. The duration of the business is limited by nature, because the commodity in which the utility deals is supplied by nature alone. The supply is limited and is exhaustible, and when exhausted can never be recreated. * * * Artificial gas companies, electric light companies, telephone and telegraph companies, railroad and street railway companies create the basic element of their service; their business is stable and its duration is not limited. The only other public utility which deals in a commodity created by nature only is a water company, and its supply is constantly replenished by nature itself in the falling of rains and the melting of snows. An investment in any of these enterprises is not limited in its duration, but is permanent, and by competent and efficient management an investment therein will yield a permanent return and the company will earn in addition a sum sufficient to take care of depreciation caused by ordinary wear and tear upon the property and replace worn out equipment, so that the investment is at all times stable. But this is not true of a natural gas utility. When the supply of gas is exhausted, the equipment is worthless except for the price it will bring as junk."

Not only the courts but many of the commissions have recognized these extraordinary risks and have made allowances accordingly in fixing the rate of return. *In re Baker Natural Gas Utility,* P. U. R. 1921E, 609 (Montana);

Re West Virginia Central Gas Co., P. U. R. 1918C, 453 (W. Va.); *Municipal Gas Co.* v. *City of Sherman*, P. U. R. 1925E, 67 (Texas); *Re Southern California Gas Co.*, P. U. R. 1922A, 277 (Calif.). In the case last mentioned the commission, after finding the average cost to this company of money to date to be 7%, said:

> "In view of the present high cost of borrowed money it appears just and reasonable to permit a return of 9% in this particular case, especially when consideration is given to the greater hazard attaching to the service of natural gas and to the fact that applicant has made special efforts to reduce the cost of gas service to its consumers by the effecting of substantial economies."

The above cases had to do with companies distributing natural gas, which of all those engaged in the natural gas business are confronted with the least risk and hazard; for, as testified by the witness Gilman, when their source of supply shall be exhausted their facilities can be utilized in distributing artificial gas (R. Vol. III, pp. 1497-8). The changeover will involve some expense; but the capital assets are not lost. The same witness pointed out that a distributing company, upon acquiring production and transportation facilities, becomes more risky in that upon the exhaustion of the supply all the facilities except those devoted to distribution will have to be salvaged (R. Vol. III, p. 1498). Then he pointed out that as between two companies, one owning distribution, production and transportation facilities and the other owning no distribution but only production and transportation facilities, the latter is more risky for the reason that upon the exhaustion of the source of supply all of its capital assets will have to be salvaged (R. Vol. III, pp. 1498-9). Next he pointed out that as between two companies owning only production and transportation facilities, one producing from a number of different fields and the other, like cross-petitioners, producing from only one field, however large, the latter involves the greater risk and hazard in that upon the exhaustion of that field it will not have other sources of supply to enable it to continue in business (R. Vol. III, p. 1499). Thus it develops that, of all classes of those engaged in this hazardous business, cross-petitioners belong to that class faced with the most risk and hazard.

Cross-petitioners in their testimony pointed out many of the risks confronting the natural gas industry as a whole and cross-petitioners in particular. It is impossible to discuss these risks at length here. In the statement of facts in this brief (p. 13, *et seq., supra*) we have already pointed out and discussed briefly some of the risks and dangers confronting cross-petitioners, namely: (1) danger of failure in the supply of gas (p. 37); (2) danger of increased costs (p. 37); (3) dangers incident to employment of high pressures and high stresses (p. 38); (4) danger of pipeline failures (p. 39); (5) danger that another source of supply nearer to cross-petitioners' market may be discovered (p. 39); (6) danger of competition with other fuels (p. 40); (7) danger of increased taxes and of punitive legislation (p. 41); (8) danger of increasing costs of regulation (p. 43); (9) danger of inflation (p. 44); and (10) danger of varying demand (p. 45).

Another element developed by cross-petitioners' evidence and considered by their witnesses on their rate of return was the creative skill in designing, the engineering skill in constructing and operating, and the superior skill in managing cross-petitioners' pipeline system. In this brief we have already pointed out in some detail the investigations conducted under the direction of those who conceived cross-petitioners' pipeline project (pp. 13-15), the difficulties encountered (pp. 13-15), the creative researches directed to meeting these difficulties (pp. 14-15), the solving of the difficulties and the resulting increased efficiency and improved economic outlook (pp. 13-15), the extraordinarily high pressures and stresses at which cross-petitioners' facilities are operated (pp. 24-25), and the extraordinarily high load factor achieved and maintained through careful management (p. 25). Some of the very factors that enable cross-petitioners to undertake the venture—such as the thinner wall pipe and the increased operating pressures, with the resulting increased stresses were and are themselves factor of risk. In this connection we pointed out that a very substantial portion of the revenues of cross-petitioners ($1,207,067 of a total of $14,853,600) is realized from the sale of the additional volumes of gas which cross-petitioners have produced, transported and sold as a result of these efficiencies (p. 25). If there was ever a case in which the observation of this Court in *Missouri, ex rel. S. W. Bell Tel. Co.* v. *Commission*, 262 U. S. 276, 291, to the effect that the reasonable rate to be prescribed *may allow an efficiently managed concern much more than the amounts required to cover use of capital, risk and the necessity to attract capital*, would apply, this is that case.

There is no dispute about current financial conditions. The Court will take judicial knowledge of the fact that interest rates on government bonds, high grade municipal and corporate bonds, prime short term commercial loans, and Federal Reserve discount transactions are extremely low. Cross-petitioners' witnesses took note of these circumstances and considered them as far as they throw any light on the question of what would constitute a reasonable rate of return on money invested in a project like that of cross-petitioners' (R. Vol. III, pp. 1415-45, 1451-1635).

THE WITNESSES FOR CROSS-PETITIONERS ON RATE OF RETURN.

Cross-petitioners called four experts, namely, Emery, Delafield, Gilman and Dorau. These men were drawn from different fields of activity to the end that the subject be presented from every possible viewpoint.

The Testimony of Delafield.

The first witness, Delafield, for seventeen years was employed by the National City Bank and the National City Company of New York in the respective capacities of statistician, securities salesman and managing director of the latter company's business in New England; and a buyer of securities in New York. In 1931 he became financial vice president of Columbia Gas & Electric Corporation and associated companies, which position he still holds. In connection with his duties he has carried on extensive studies into the subject of rate of return and has made frequent appearances before regulatory bodies and courts to testify on that subject (R. Vol. III, p. 1416). He has personally negotiated the sale of all securities sold by his companies and has been in charge of the setting up of those securities (R. Vol. III, p. 1415). He named and analyzed most of the risks inherent in the natural gas pipeline business and stated the reaction of the investing public to these risks (R. Vol. III, pp. 1426, 1430-1, 1439). He prepared and explained Exhibit 147 (R. Vol. VI, pp. 3071-77, Vol. III, p. 1445), a list of 128 companies, each of which has some type of security listed on the Chicago stock exchange. These included all companies with securities listed on the exchange except regulated companies, finance companies, and companies in bankruptcy or receivership, without regard to whether or not the companies operated at a profit or otherwise (R. Vol. III, pp. 1421-4). He explained that his purpose in submitting this exhibit was not to compare the risks involved in any one of the undertakings listed with the risks of cross-petitioners; that his purpose was simply to show what rates of return were made by business in general, and by successful business, in the general area where cross-petitioners operate; and that he had taken the information therein shown into consideration only "for purposes of orientation" and to demonstrate to his own satisfaction the competitive demand for capital and the conditions under which capital was found during the years covered by the exhibit, namely, 1936, 1937 and 1938 (R. Vol. III, p. 1422). The average rate of return earned by all the companies listed was, in the year 1936, 9.30%, in 1937, 8.37%, and in 1938, 4.37%, or a three year average of 7.32%. Excluding the companies which over the period earned an average of less than the average of all companies, the remaining companies, which had an investment of somewhat more than $924,000,000, returned an average of 11.73% per annum (R. Vol. III, p. 1423).

The witness emphasized that the point in a rate of return study is not to determine the cost of financing and underwriting the best debt that the company has, but that it is necessary to arrive at the cost of financing its entire capital structure, including its preferred and common stock (R. Vol. III, pp. 1429-30). The overall earnings of Columbia's securities for 1938 amounted to 3.78%. In 1939 the earnings had increased to 4.25%. Notwithstanding its low earnings, however, the Columbian system, with assets aggregating $578,500,000, would be able, in the witness' judgment, to refinance its total indebtedness of $101,400,000 on a basis that would effect a substantial interest saving as compared with the interest on outstanding bonds, issued several years ago, bearing 5% (R. Vol. IV, p. 2563). That the low rate of interest at which the bonds could be refinanced is no criterion by which to judge the rate at which the preferred stock and common stock could be refinanced is evidenced by the circumstance that Columbia's 6% preferred stock was selling currently at a discount of 10%, that its 5% preferred stock was selling at 72, and that its common stock was selling at less than half of its book net worth (R. Vol. IV, pp. 2667-8). Stating his reasons, he testified that in his judgment preferred stock has no place in the financial structure of a natural gas pipeline company (R. Vol. IV, p. 2569). In the light of all the facts reviewed by the witness, he arrived at the judgment that in order to keep cross-petitioners on a sound financial basis a return of 8% would be required.

The Testimony of Emery.

The second witness, Emery, an engineer, is senior vice president and member of the executive committee of Ford, Bacon & Davis, an engineering firm of national reputation, which has designed, constructed and operated natural gas pipelines and has had considerable experience in financing companies engaged in that business (R. Vol. III, pp. 1324-5). He testified to the risks inherent in the natural gas business as compared with those confronting ordinary utilities such as electric, manufactured gas or water distribution utilities (R. Vol. III, pp. 1452-9), and to the cost of financing natural gas companies (R. Vol. III, pp. 1460-4). He mentioned and discussed most of the particular risks above listed (R. Vol. III, pp. 1452-9). He pointed out the difficulty of making later adjustments through regulatory processes to correct any mistake made at the present time, due to the impossibility of increasing the rates in the face of competition with other fuels over the remaining few years of the project's life to offset losses occasioned by mistakes made now (R. Vol. III, p. 1454). He stated that he had made a search of market and financial records, had obtained a list of all natural gas companies having transmission lines, all the securities of which were dealt with so that market prices can be obtained, and had found eleven companies which answered that description (R. Vol. III, pp. 1460-4).

He pointed out the distinction between a company which owns distribution facilities only and those which own facilities for producing and transporting gas, observing that there is less risk in the case of companies which distribute only, for which reason he did not include the latter in the list making up his studies (R. Vol. III, p. 1459). He reasoned that distributing companies have less risks than those having producing and transmission facilities because their property will be useful after the natural gas reserves are exhausted for distributing other kinds of gas, and that the distributing companies are less subject to competition than pipelines (R. Vol. III, p. 1459). He also pointed out that a transmission line owned by a distributing company is in a safer position than a pipeline confined to transmission and producing operations (R. Vol. III, p. 1459).

He produced Exhibit 148 (R. Vol. VI, pp. 3079-3104, Vol. III, p. 1465), showing the list of eleven companies above referred to. The exhibit is self-explanatory. In the first three columns after the listing of the companies and the statement of classification are shown the market appraisal of the value of the securities at the high price, at the low price, and at the average between the high and the low price, for the year 1938. The next column shows the earnings in 1938 applicable to return on investment, and the next three columns show the rate which the earnings bear to the market appraisal at the high price, at the low price, and at the average price (R. Vol. VI, p. 3081). It appears from the summary of the first page that the overall rate of return or demand of the public for the investment of money in these eleven companies, based on 1938 earnings and 1938 appraisal on quotations, was 7.98% (R. Vol. VI, p. 3081).

The exhibit is very significant in that it shows the distinction which the public makes in the risks involved in the various phases of the natural gas business. It appears that the public makes a substantial distinction between pure pipelines which have transmission facilities only and a pipeline which owns production in addition to transmission facilities. It also shows that the public is willing to take substantially less compensation for an investment in the securities of those companies owning distribution facilities, and that it makes a substantial distinction between the return demanded on securities in transmission and distribution companies and those which own production in addition to transmission and distribution facilities (R. Vol. III, p. 1463). The only company fitting the status of cross-petitioners entirely is Interstate Natural Gas Company, a production and transmission company, on whose securities the public demanded an overall return of 10.04% per annum. In the case of three transmission companies owning no production, the average rate of return required was 9.06%. Of the six companies owning distribution facilities also, it developed that for investments in the four which owned production as well as transmission facilities the public demanded a return of 7.55%, while in the instance of the two companies owning only transmission and distribution facilities it demanded only 7%. For the four pipelines owning no distribution facilities the unweighted average return was approximately 9.5%, or a weighted average of 9.3% (R. Vol. III, p. 1463). It was the judgment of this witness that the required rate of return for cross-petitioners was between 9% and 10%, if adequate compensation for creative skill, engineering, and exceptional management be included. If the rate of return cover only pure interest and compensation for risk, without any allowance for enterprise, his judgment was that not less than 8% would be required to attract the capital necessary to purchase the properties of cross-petitioners. (R. Vol. III, pp. 1470-1).

The Testimony of Gilman.

The third witness, Gilman, was for five years employed by Equitable Life Assurance Society, one of the five largest insurance companies in the United States, which invests many millions of dollars in securities each year (R. Vol. III, p. 1472). His duties were to investigate and make trips over and studies of the properties of public utilities and industrial companies, prepare reports thereon, and make recommendations to the treasurer and financial committee with reference to possible investments in their securities (R. Vol. III, p. 1472). In 1935 he organized, and for two years he directed, the Division of Public Utilities of the Securities and Exchange Commission (R. Vol. III, p. 1474). The staff, under his direction, numbering about one hundred persons, handled all the various applications filed with the Commission for registration of utility companies and their subsidiaries in connection with the issuance of securities, acquisition of assets, and all other related matters coming within the jurisdiction of the Commission under the Holding Company Act (R. Vol. III, p. 1474). After two years he left the employ of the Securities and Exchange Commission and returned to New York to enter the partnership of Gilman & Hickey, a firm practicing as financial consultants, primarily in the public utility field. They have appraised securities for public bodies and performed other services generally coming within the functions of consultants in financial work.

He has made considerable study of the subject of rate of return in connection with such employments; and in preparation to testify in this proceeding he made an exhaustive study of the affairs of cross-petitioners and the risks confronting them. He prepared and offered Exhibit 150 (R. Vol. VI, pp. 3106-3133, Vol. III, p. 1511), which contains financial data of various types considered by him to be of importance and value in checking his judgment as to a proper rate of return for cross-petitioners. He discussed the hazards which exist from an investor's point of view in cross-petitioners' natural gas production and pipeline enterprise. He maintained that the electric industry is a much safer industry from an investor's point of view than any of the natural gas industries (R. Vol. III, p. 1494). Step by step he demonstrated the increasing risks, in comparison with those confronting the electric industry, of (1) the businesses of manufacturing and distributing artificial gas, (2) distributing natural gas, (3) producing, transporting and distributing natural gas, and (4) producing and transporting natural gas with no distribution facilities or control over the policies involving sales to the ultimate user of natural gas (R. Vol. III, pp. 1494-1500).

He maintained that preferred stock has no place in the capital structure of a natural gas pipeline company, explaining in that connection that the bondholders always require that the latest maturity of bonds be substantially short of the estimated life of the source of supply (R. Vol. III, p. 1505). After making provision for the retirement of the bonds over such short period, the company ordinarily earns insufficient revenues to pay the interest on preferred stocks, rendering that class of securities undesirable from an investor's viewpoint (R. Vol. IV, pp. 2469-70). He explained that the yield on natural gas pipeline company bonds, representing only 40% to 50% of the total capitalization, with the high protection afforded by the amortization provisions, is no criterion by which to gauge the return that would be required by investors in common stock (R. Vol. IV, pp. 2608-9). In this connection he pointed out that few public issues of common stock have been floated in the natural gas pipeline industry (R. Vol. III, p. 1482). In the light of his experience covering the handling of securities from the viewpoint of the purchaser, the public, and the seller, the witness arrived at the judgment that, in view of the various risks and hazards confronting cross-petitioners, a reasonable or fair rate of return to them should not be less than 8% (R. Vol. III, p. 1504).

Called in rebuttal, the witness contradicted the views of complainant's witness Kleinman on the subject of risks (R. Vol. IV, pp. 2607, 2611-14). He also testified in rebuttal to some of the deductions of the Commission's witness Smith on the subject of overall cost of capital, to which it will be necessary to refer later in this brief (R. Vol. IV, pp. 2502-2505).

The Testimony of Dorau.

Cross-petitioners' fourth witness, Dr. Dorau, is an outstanding scholar and educator in the field of economics as applied particularly to public utilities and regulated enterprises. He has taught in the University of Wisconsin and in Northwestern University. In 1931, after engaging for two years in consulting work, he entered New York University, where he is now professor of economics and chairman of the department of public utilities and transportation in the School of Commerce. Throughout his teaching career he has engaged in consultation work to the extent that his university appointments permitted (R. Vol. III, p. 1513). He is the author of a number of books and published articles dealing with the subject of public utility financing and related subjects (R. Vol. III, pp. 1514-16). In order to prepare himself to express a considered opinion as to a just and reasonable rate of return for cross-petitioners, the witness made an exhaustive investigation of cross-petitioners' problems (R. Vol. III, pp. 1516-17). He pointed out that past investments are helpless before a harsh regulatory policy, but that such a policy would hurt the industry because it would discourage future investments and impair the power of the industry to attract additional capital (R. Vol. III, pp. 1542-3). On the other hand, he pointed out, if regulatory bodies recognize the desirability of holding out to prospective investors the possibility of substantial reward, it does not necessarily follow that rates will be higher; for rigid regulation, by repelling the investor, sometimes results in higher capital costs and hence in higher rates. His analysis of the risks, which was thorough and painstaking, led him to the conclusion that the natural gas pipeline industry, which depends for its very existence upon the continuance of its source of supply, is a highly hazardous business in comparison with other regulated industries (R. Vol. III, pp. 1551-1585).

In arriving at his final judgment as to a fair rate of return for cross-petitioners, Dr. Dorau considered, among other things, data set forth in Exhibit 152 (R. Vol. VI, pp. 3141-3304, Vol. III, p. 1622), which he prepared. This exhibit stands out particularly in that it presents the subject matter covered with such clarity that it speaks for itself; *and also in that no effort was made by complainant and the Commission to refute the facts reflected by it or even to cross-examine the witness concerning its contents.* One of the significant facts reflected by Exhibit 152 appears on page 7, which shows, among other things, the ratio of the yield on Baa bonds to that of Aaa bonds, which are of a substantially higher grade. The curve indicating that ratio is strong evidence, according to the witness, that "investors are placing a relatively higher significance on the risk differentials that exist" than in former years (R. Vol. III, p. 1595). We urge the Court to consider carefully this exhibit and the testimony of the witness in explanation of its contents (R. Vol. III, pp. 1591-1622). It is practical here to present only some of the high points.

Among the outstanding facts manifest from this exhibit are: (1) Since 1934 the yield on manufactured gas company bonds has been increasingly higher year by year than that of gas and electric company bonds (p. 10, R. Vol. VI, p. 3159). (2) The yield levels on all natural gas company bonds except the best quarter of the total volume "are not comparable with the experience of public utility securities" (p. 19, R. Vol. VI, p. 3177). (3) The overall weighted average yield of natural gas company bonds through the period 1928 to 1939 was 8.71% (p. 19, R. Vol. VI, p. 3177). (4) The yield at offering price on new electric and gas company bonds (not necessarily new financing) from 1932 through 1938 declines from year to year; but this curve is subject to misuse and misinterpretation, especially in view of the fact that "the yield might be declining simply because a larger proportion of the kind of bonds that yielded less were included" (p. 35, R. Vol. VI, p. 3209). (5) A much larger proportion of low yield or high class bonds has been included in the bond transactions in recent years (pp. 37, 38 and 50, R. Vol. VI, pp. 3213, 3215 and 3233). Thus "to a measurable extent the declining average yield in new financing was influenced by the changing quality of the securities which were included in the total" (R. Vol. III, p. 1617). (6) The yield on bonds issued by a company is in itself little evidence of the company's ability to command capital or of the hazard involved in an investment in the enterprise; for if the amount of the bonds in question, together with the amount of equal and prior security issues, is so small that the interest requirements are covered many times by the income, the yield will compare favorably with the yield on securities in less hazardous enterprises in which a larger proportion of debt results in the requirement of a larger percentage of available income for payment of interest. Therefore, yield ought to be related to earnings times interest coverage.

Such relation is shown by the exhibit (pp. 52, 53, 55, 56, 59, 60, 62, 63, 65, 66, 68 and 69, respectively, R. Vol. VI, pp. 3237, 3239, 3243, 3245, 3251, 3253, 3257, 3259, 3263, 3265, 3269 and 3271). (7) These charts and those on pages 72, 74, 76, 78, 80, 83, and 85, respectively (R. Vol. VI, pp. 3277, 3281, 3285, 3289, 3293, 3299 and 3303), show that, given comparable coverage, the yield on natural gas company securities is higher than the yield on public utility securities, and that, where the yields are comparable, the coverage on natural gas company securities is higher. From this it seems clear that investment in natural gas securities is regarded as relatively hazardous. The witness' conclusion is summarized in these words (R. Vol. III, p. 1623):

> "I would like to put my answer this way, if I might, that if there were an enterprise engaged in the natural gas business, having a large, substantial investment in natural gas resources and in specialized transportation facilities, which company had the protected position and status of a public utility, that I would consider 8% an adequate return, but I am of the opinion and conviction that the Natural Gas Pipeline Company of America and Texoma Natural Gas Company do not qualify economically as a public utility, that the conditions and circumstances of their operation are not comparable to what is found in a public utility, and that those distinguishing economic conditions deserve recognition, in fact must be recognized, in my opinion, if one is trying to judge what the necessary supply price of capital today would be for an enterprise of that character. Moreover, assuming that there is recognition to be given to the reward of enterprise in an undertaking of this sort, and that there is a desire to compensate and induce enterprise, I feel 9% is a more appropriate and fair return."

THE WITNESSES FOR THE COMMISSION AND COMPLAINANT ON RATE OF RETURN.

The Commission and complainant offered four witnesses on rate of return, namely, Knapp and Smith, employees of the Commission, and Ostrander and Kleinman, employees of complainant. All are expert accountants (R. Vol. IV, pp. 2004, 2041-2, 1977, and 2075). None has had any experience in the issuance, purchase, or sale of natural gas securities or any other securities (R. Vol. IV, pp. 2109, 2225, 2281-3, and 2386-7).

The Testimony of Knapp.

Knapp's testimony had to do principally with Exhibit 185 (R. Vol. VII, pp. 3576-3723, Vol. IV, p. 2038), a volume devoted entirely to statistical matter relating to bonds and some preferred stocks of utilities, mostly electric utilities but including some artificial gas, water and telephone companies, and some general statistics relating to wholesale commodity prices, industrial production, steel ingot production, building contracts, national income, cost of living, trend of corporate earnings, interest and rediscount rates on short term high class loans, ard similar data. There is no substantial conflict between the statistical matter submitted in this exhibit and that submitted by witnesses for cross-petitioners. Explaining his failure to include data on common stock transactions similar to that on bond transactions, he stated that he had made an attempt to compile new common stock issues but that he had found no representative issues (R. Vol. IV, p. 2111). He admitted that it has been very difficult to refinance through issue of common stock; that the fact that there have been comparatively few common stock issues in the last few years was attributable to the circumstance that investors have been primarily concerned recently with safety and security of investments, which would naturally lead them into bonds; and that they have been running away from risk in the making of their investments (R. Vol. IV, p. 2111). The witness admitted that his Chart 1 (R. Vol. VII, p. 3579) shows that there is a wider spread between the yields on the highest grade bonds and those on the lowest grade bonds at the present time than in 1932 or any year during the interval, and that this illustrates that investors are demanding a higher differential as risk compensation than in prior years (R. Vol. IV, p. 2125).

He admitted on cross examination concerning interest rates on short term or demand loans and United States Treasury bonds that there is a great deal of idle money in this country, the owners of which are not willing to invest it in the light of the compensation promised for the risk involved; that this congestion of money which is available for the type of loan portrayed in his charts has resulted in reduced interest rates (R. Vol. IV, pp. 2128-9). He admitted that the owners of money are seeking temporary investments in order to obtain some return, however low, pending the time when they can find an outlet that will offer a return more to their liking; and that there is so much capital seeking investment in absolutely liquid securities that the interest rate on that type of security has been driven down to the lowest level in the history of the country (R. Vol. IV, p. 2130). Asked on cross-examination to point out the factors that ought to be considered in a rate of return study, the witness named (R. Vol. IV, p. 2118) the ten elements enumerated by the staff of the Federal Communications Commission in "The Problem of Rate of Return in Public Utility Regulation," etc., dated June 15, 1938, among which was:

> "The return should accomplish, among other things, due recognition of efficiency or lack of efficiency in management."

The Testimony of Ostrander.

The testimony of Ostrander, in so far as it dealt with subjects related to rate of return, had to do principally with statistics of the same general character as those presented by Knapp in his exhibit. Exhibit 180 (R. Vol. VII, p. 3523, Vol. IV, p. 1984) dealt with interest rates and trends of interest on prime commercial paper, prime bankers' acceptances, 90 day time loans, interest rates charged customers in 36 principal cities, discount rates in New York and Chicago Federal Reserve banks, yields on "long term" Federal and municipal bonds, on ten *high grade* railroad bonds and on ten *high grade* utility bonds, and yields on domestic corporation bonds by industrial groups and ratings (R. Vol. VII, pp. 3523-3534). This exhibit shows, as did Knapp's Chart 1 in Exhibit 185 (R. Vol. VII, p. 3579) and Dorau's chart on page 7 of Exhibit 152 (R. Vol. VI, p. 3135), that at the present time the investors demand a higher differential to compensate for risk than they did in earlier years. Exhibit 183 dealt with statistics showing the total number of banks in the country over a period, the number of banks belonging to the Federal Reserve system, deposits in the banks, and similar data (R. Vol. VII, pp. 3559-3565, Vol. IV, p. 2002). Exhibit 181 is a running narrative statement dealing with recent financing through bonds by natural gas systems. No fault is found with that data; but it is apparent from a reading of the exhibit that it does not go far enough to indicate anything as to the overall cost of capital to natural gas companies or to reflect any other data bearing upon the compensation which investors demand for the risks involved in natural gas securities other than bonds (R. Vol. VII, pp. 3535-3552, Vol. IV, p. 1896).

The witness admitted that it would be just as important to determine the cost of raising the equity capital by common stock issues as to ascertain the cost of raising that part obtained through the issuance of bonds (R. Vol. IV, p. 2298); that full information concerning bond yields does not give sufficient information to arrive at the cost of overall financing of a given industry (R. Vol. IV, p. 2298); that the matter of cost of equity money is quite a different thing from the cost of bond money (R. Vol. IV, p. 2298); that it is difficult to determine the cost of equity money, and that to obtain a reasonable cost figure would involve a rather extensive study over a period of time (R. Vol. IV, pp. 2298-9); that no such figures are readily available (R. Vol. IV, p. 2299); and that he was not sure of any method of appraising the relation between bonds and stocks as regards cost (R. Vol. IV, p. 2299).

He testified that in financing through issuance of bonds there is a spread of about .2% between the yield to the investor and the cost to the company, though he admitted that he had known of its going as high as .4%. He also admitted that there would be a spread between the price earnings ratio of stocks sold in isolated transactions and the cost of financing through the issuance and sale of whole issues of common stock.

It is manifest that no basis for the finding of the Commission that 6½% per annum is a fair rate of return for cross-petitioners can be found in the testimony of the witnesses who testified for cross-petitioners or in the testimony of the witnesses Knapp and Ostrander, who testified against cross-petitioners.

The Testimony of Kleinman.

Of the four witnesses who testified for the Commission and complainant on subjects going to rate of return, only Kleinman, an employee of complainant, offered an opinion as to the proper rate of return in this case. He testified that 6% would be an adequate rate of return for cross-petitioners (R. Vol. IV, p. 2097). *This witness made no effort to relate his testimony to the exhibits prepared by Knapp, Ostrander and Smith. There is no evidence that he had even read them. He prepared no studies of his own dealing with the cost of capital or yields to investors among regulated industries or unregulated industries.* There is no evidence of an effort on his part to work out in any way the overall costs of financing for companies such as cross-petitioners. He gave no consideration to the enterprise of cross-petitioners and their founders in the conception and launching of their pipeline system, their creative skill in designing and engineering efficiency, or the extraordinary management, which have entered so largely into the success of cross-petitioners. Pressed on cross-examination, he admitted that he had made no formal study, stating in that connection that he had "given considerable thought" to the question of whether these companies should get a better return than other companies, whether this type of industry deserved a greater return or lesser return than large distributing utilities like Commonwealth-Edison or scattered distributing utilities like Central Illinois Public Service Company.

In his direct testimony Kleinman defined his conception of risk in business as something arising out of a decision which must be made by the management and which, when made, will affect the subsequent profits realized by the business (R. Vol. IV, p. 2082). The witness also mentioned a number of risks which, he contended, confront manufacturing plants, mercantile establishments and other unregulated business enterprises, but which do not confront cross-petitioners to any perceptible degree. He named in this connection the risk of converting cash into inventory, the risk of labor disturbances, the risk of overhead expense, credit risk, risk of competition between rival concerns for the same market with the same product, and risk due to technological changes (R. Vol. IV, pp. 2082-8). We do not know why the witness went into this subject, as no comparison was made by any of cross-petitioners' witnesses between the rates of return earned by unregulated industry and that to which cross-petitioners are entitled, the data dealing with that subject having been offered for purposes of orientation only, as already shown. Kleinman made no use of this data in arriving at his ultimate judgment. He did not produce and offer in evidence figures showing what the earnings of unregulated industries were or how much he had deducted from the level of such earnings in order to arrive at a proper return for cross-petitioners.

Kleinman knew nothing about the risks confronting the natural gas producing and pipeline business, much less about those confronting cross-petitioners. He did not discuss or attempt to refute the risks confronting cross-petitioners as outlined by their witnesses. He could not state how many pipelines were producing gas in the Panhandle field and transporting it in interstate commerce. He thought there were five (R. Vol. IV, p. 2423). As a matter of fact, the record had shown for several months that there were nine (R. Vol. I, pp. 629-30). He didn't know whether large investments were made in and around the Indiana gas field on the strength of the large reserve of gas believed to be contained in that field in the latter part of the last century (R. Vol. IV, p. 2426). ~~He knew~~ nothing about the recent failure of the Tioga field in southern New York (R. Vol. IV, p. 2427). He didn't know that the Illinois Senate had actually passed a bill levying a five cent tax on each thousand cubic feet of gas sold in Illinois (R. Vol. IV, 2457). That the witness was thoroughly biased and was giving expression to this bias and to prejudice against cross-petitioners is apparent from his own admissions on cross-examination. He took the absurd position that the business of cross-petitioners involves much less risk than that of ordinary business, notwithstanding the fact that courts and commissions and the public generally have recognized for many years that of all regulated industry the natural gas business is the most hazardous. He asserted that cross-petitioners are entitled to a lower rate of return than most electric utilities, basing that statement on his assertion that they have substantially less risk than most electric utilities. To use a specific sample, he pointed out Commonwealth Edison Company, asserting that it was an infinitely more risky enterprise than that of cross-petitioners, although it is a well known fact that that company is one of the strongest electric utilities in the country (R. Vol. IV, p. 2485). In this connection the witness said (R. Vol. IV, p. 2466):

> "I hope Mr. Morgan understands what I mean now in general. In other words, they have got 40 years to go. They have a risk until they go broke, because that is the end of all corporations, except yours, Mr. Morgan, because you are going to get your money back in 1954. Most corporations will ultimately wind up in bankruptcy. It happens to most of them. They cannot liquidate. Just as the end of most people is death, the end of most corporations is bankruptcy. But not yours. You will have your money back in 1954, maybe twice over. That is the reason I say that your company has less risk than the Commonwealth Edison."

What is Kleinman's objective? Does he want to put cross-petitioners in a situation where they too will go bankrupt? Is that regulation as Kleinman sees it?

On being pressed as to how he arrived at 6% as the proper rate of return, he stated (R. Vol. IV, p. 2467) that he got it primarily on the basis of what he thought cross-petitioners "could finance at, what I thought this company could sell its stocks and bonds for." He added (R. Vol. IV, p. 2467):

> "I made a few rough calculations and decided it would be a good company to finance with serial bonds, and what would they require, and then common stocks for the balance, and what would that take, and, as I remember it, I originally got about 4¾%, and *I upped it.*"

He doesn't tell us what kind of rough calculation he made or what he used as the basis of that rough calculation. It must have been extremely rough and the data must have been extremely meager in order for him to arrive at any such result as that in the light of the factual testimony then in the record.

Pressed further as to why he "upped it" from 4¾% to 6%, he said (R. Vol. IV, pp. 2467-8):

> "No, I did not, not from 4¾% to 6. From 4¾% to about 5½, for other factors, leeway, and to bring it some place, and finally I said there is a war on and I don't know whether they can do it for seven years, because when I was making this study the war was on and there had not been any security issues, prices were going haywire, nobody knew the future, and from the point of view of being absolutely sure that I was giving a liberal return, one that I could substantiate from any point of view, I finally decided on 6%, with a rough guess, and that certainly under the worst condition now prevailing this company's securities would sell at par, if their bonds are paying 4% and their stock is paying 8%, and I don't think anybody can deny that."

On further cross-examination the witness admitted that the fact that many electric utilities and some gas distribution companies had been allowed a 6% return and that he had grouped cross-petitioners among public utilities had something to do with his judgment (R. Vol. IV, p. 2468). He had already admitted that the Illinois Commerce Commission had recently allowed an electric utility a return of 6.3% (R. Vol. IV, p. 2466).

The state of the witness' mind is disclosed in his testimony (R. Vol. I, p. 2468), reading:

> "* * * You are right, I made no distinction between the character of these two pipelines, from the standpoint of the risks involved, and of electric utilities and of the distribution utilities, except that I reached the conclusion that they have less risks or fewer risks than do those distributing utilities. I did make a distinction. The distinction was that they are entitled to a lower rate of return than an electric utility or a gas utility."

Surely the Commission gave no weight to the testimony of this witness, though it mentioned in its opinion (R. Vol. VIII, p. 3940) that one of the witnesses testified that 6%

would be an adequate return. We insist that this testimony is not "substantial evidence" in the sense that it sustains the Commission's finding.

The Testimony of Smith.

It is perfectly apparent from the Commission's opinion that the real basis of the rate of return fixed was the testimony of its employee Smith. This witness has had a number of years' experience as an auditor in the United States Treasury Department, as chief auditor of the Public Service Commission of Maryland, and as a teacher for ten years of accounting and cost accounting (R. Vol. IV, p. 2042). His title with the Commission is chief of the bureau of accounts, finance and rates (R. Vol. IV, p. 2041). Smith did not testify as to a reasonable rate of return, or to facts as to any of the elements which must be considered in arriving at a fair rate of return, except that he did testify to *cost of capital* to certain natural gas companies listed in his Exhibit 186 (R. Vol. VII, pp. 3739-83, Vol. IV, p. 2072). This exhibit shows a list of all the natural gas companies having the characteristics: (1) were engaged in the production and transmission of natural gas, or (2) were engaged in the transmission of natural gas, and (3) had operating revenues in 1938 of $2,500,000 or more (R. Vol. VII, pp. 3740-5, Vol. IV, p. 2050). A number of these companies were engaged also in distribution, but all were engaged in transmission or in transmission and production of natural gas (R. Vol. IV, p. 2050).

The data contained in Schedule 5 are too general and incomplete to be of real service. Some general facts appear, however, which we think it worth while to point out. Of the total securities outstanding, aggregating in excess of $1,038,000,000, $418,882,000, or about 40% of the total, is represented by bonds, debentures and notes, $607,000, or 6% of the total, is represented by preferred stock. Of the total outstanding securities $729,000,000, or 70%, is held by affiliates, and only about 30% by the public, including institutions. Two important facts are indicated by these figures. First, the small representation of preferred stock corroborates the testimony of the witnesses Gilman and Delafield to the effect that the use of preferred stock in raising capital for natural gas companies is not practical or desirable (R. Vol. III, pp. 1681-2, Vol. IV, p. 2569). What people are willing to do is best indicated by what they do. The fact that this great industry has been able to finance only 40% of its total capitalization through the issuance of bonds and other funded indebtedness and only 6% by preferred stock indicates that that is all the investors are willing to invest in funded indebtedness and in preferred stocks. We point out in this connection that the bonded indebtedness is far less than 40% of the total capitalization. Smith testified that the bonded indebtedness was substantially 20.83% of the total capitalization (R. Vol. IV, p. 2262). The fact that only 30% of the securities have been purchased by the public is highly significant as indicating the difficulty of inducing the public to invest their moneys in the securities of natural gas companies at the existing levels of compensation.

Schedules 5A (Vol. VII, p. 3747), 5D (Vol. VII, p. 3763), and 5F (Vol. VII, p. 3767) are of special significance in that it was on these exhibits and the witness' testimony explaining them that the Commission based the statement in its opinion (R. Vol. VIII, p. 3939) that the cost of money to a sound pipeline company would be 3.75% for the bonds, 6.1% for the preferred stock, and 10% for the common stock. Schedule 5A (R. Vol. VII, p. 3747) contains several inaccuracies and is defective in that certain essential data are omitted. The result is that the schedule is entirely misleading. In the first place, in showing the approximate yield to maturity on the basis of 1939 prices, the "times fixed charges earned" should have been ascertained over the latest twelve months for which the figures were available at the time of the sales in September and October, 1939. The percentages used by the witness were based on the earnings for 1938. It is a matter of common knowledge that 1938 was a bad year from the standpoint of earnings, and that earnings materially improved during the first half or two-thirds of 1939. These increased earnings were known to those who purchased securities in September and October, 1939, and doubtless influenced the price which the purchasers were willing to pay during those months (R. Vol. IV, p. 2502). Not only should the figures have been based on the latest available published earnings, but it is totally misleading to use the figure representing "times fixed charges earned" in dealing with the yields on first mortgage bonds. An investor negotiating for the purchase of first mortgage bonds is not interested in the relation of the total earnings to the fixed charges, but is concerned only with the earnings in their relation to the interest on the particular issue of bonds under consideration and prior issues (R. Vol. IV, p. 2253). We may illustrate the difference from this schedule itself. For instance, in the case of *Houston Gulf Gas Company,* the earnings times fixed charges is stated to be 1.3. The interest on the first and collateral 6% bonds, on which the approximate yield to maturity is stated to be 5.13%, was very substantially less than the total fixed charges. When applied to the interest on these prior issues, it develops that the earnings times interest is 3.03 instead of 1.3 (Exhibit 209, R. Vol. VII, p. 3895, Vol. IV, p. 2504), from which it is apparent that the investor demanded 5.13% return on an issue of bonds the interest on which is earned more than three times. It is manifest that he would not have been willing to invest for that sort of yield had the coverage been only 1.3.

Another defect in this schedule is that the percentage of total property represented by the issue is not shown. Only the percentage of the total funded debt to fixed capital is set out in the schedule. It developed, however, that the total first mortgage issue represented only 23.24% of the fixed capital (Exhibit 209, R. Vol. VII, p. 3895, Vol. IV, p. 2504). Certainly an investor would regard a first mortgage bond issue representing only 23.24% of the capital as a safer security then one representing 43.8% of the fixed capital.

These discrepancies were called to the attention of the witness on cross-examination, as will appear from his testimony as follows (R. Vol. IV, p. 2250):

> "The $4,238,000 of First and Collateral Six Percent Mortgage Bonds, maturing in 1943, are undoubtedly senior to the Debentures, due at the same time. In showing there the times fixed charges earned in 1938 these senior bonds are grouped with the debentures. We would get a different result if we were to calculate the times interest on the First Mortgage Bonds. I wish we had the figure. We could not get it at the time this figure was prepared. We had the earnings and the income statement. We took the total interest requirements and that was covered 1.30 times. We did not have the interest in the income statement broken down. There may be some difference between the interest in the income statement and the interest on these particular items. It is simple enough to calculate interest on $4,238,000 at 6 per cent if those bonds were outstanding in that amount all the year. This 1.30 does not apply to the First Mortgage Bonds; it applies to the two issues, and we show that very clearly.
>
> "A purchaser interested in buying some of those First Mortgage Bonds would concern himself about the coverage for the First Mortgage Bonds only."

As a matter of fact, Exhibit 209 (R. Vol. VII, p. 3895, Vol. IV, p. 2504) shows that this coverage of 1.3 did not apply only to the interest on the first mortgage bonded indebtedness and the debentures, but also to a substantial amount of other junior indebtedness.

To cite another example of the misleading character of this schedule as it was originally put in, take the instance of the Oklahoma Natural Gas Company bonds shown in line 4. These bonds were issued in August, 1939, and of course they were not sold upon a "times fixed charges earned" of 1.91 for the year 1938 when the company had different securities outstanding from the bonds that were sold in 1939. As a matter of fact, based on the *pro forma* earnings statement for the twelve months ending August 31, 1939, interest on the new bonds which were sold to yield 3.55% was covered, not 1.91 times, but 4.53 times, and all fixed charges of the company were covered 3.25 times (Exhibit 209, R. Vol. VII, p. 3895, Vol. IV, p. 2504). Certainly an entirely misleading deduction would be made from this exhibit if it were assumed that the investor who purchased bonds of that company on September 30, 1939, at an approximate yield to maturity of 3.55% did it in the face of the circumstance that the times interest earned was only 1.9 instead of 4.53. Again, "percent of the total fixed capital" is stated to be 56.87, but when applied to the issue of mortgage bonds under consideration it turns out that the bonds actually represented only 38.8%.

Cross-petitioners caused a careful study of the full facts affecting these issues of bonds to be made and offered in evidence as Exhibit 209 (R. Vol. VII, pp. 2895-9, Vol. IV, p. 2504). The approximate yields to maturity are not substantially different in the two studies; but Exhibit 209 portrays the correct picture in that it shows that the actual earnings times interest coverage of the particular issues and the actual property coverage in each instance were substantially higher than the times fixed charges earned and the property coverage of all funded debt as reflected by the Smith exhibit. In other words, the investors, who purchased these securities on a basis of an approximate average yield to maturity of about 4%, invested their money in the light of the actual earnings times interest requirements and the actual property coverage, and no doubt would have demanded a higher yield had the property coverage or the earnings times interest been less.

Schedule 5D (R. Vol. VII, p. 3763) is subject to the same criticism as Schedule 5A. It deals with issues of preferred stock by four gas companies. It indicates a times dividend requirements earned and times fixed charges and dividends earned in 1938, and compares those earnings with the prices paid for this preferred stock in transactions on September 30, 1939, at which time, as already pointed out, the earnings had materially improved and published information was available to investors showing these improved earnings. Page 2 of Exhibit 209 (Vol. VII, p. 3837) shows the facts omitted.

Schedule 5F of Exhibit 186 (R. Vol. VII, p. 3767) is subject to the same defects as Schedules 5A and 5D. The result of the procedure used in the case of Schedule 5F is more distorted and misleading than in the case of the other two schedules. The witness computed the earnings price ratio by using, as he did in the other schedules, the 1938 earnings and the price as of September 30, 1939. Purchasers buying stock would, of course, avail themselves of the latest information on the subject of earnings. The earnings were available and had been published at much later dates than the end of 1938 and were substantially higher for the latest twelve months' period than for 1938 in most instances. For example, the figures used by Smith in his Schedule 5F (R. Vol. VII, p. 3767) showed the earnings of El Paso Natural Gas Company, at $3.30 per share. The latest published year's earnings at the time of the sales transactions reflected in Schedule 5F are shown to be $3.77 per share (Exhibit 209, R. Vol. VII, p. 3899, Vol. IV,

p. 2504). In the case of *Oklahoma Natural Gas Company* the earnings per share figure used in Schedule 5F was $1.70, whereas it appears from Exhibit 209 that the latest published figures were $2.56 per share. The Southern Natural Gas Company earnings per share figures used in Smith's exhibit were $1.37. Exhibit 209 shows that the latest published earnings were $1.79. In the case of those companies for which no later earnings statements had been published, an investor would doubtless have assumed that the earnings had improved in 1939 over 1938, and the price he was willing to pay was doubtless influenced by that circumstance. If the correct figures are used and if the two companies, Indian Territory Illuminating Oil Company and South Penn Oil Company, are taken out of the figures, as Smith himself stated they should be (R. Vol. IV, p. 2249), page 3 of Exhibit 209 (R. Vol. VII, p. 3839) shows that instead of a weighted average percentage of earnings to latest quotations of 7.33, the figure was actually 10.45!

At this point let us take the yields to the purchasers of bonds, preferred stock and common stock on the issue with which Schedules 5A (R. Vol. VII, p. 3747), 5D (R. Vol. VII, p. 3763), and 5F (R. Vol. VII, p. 3767) of Smith's exhibit deal, after supplying the omissions and correcting the erroneous figures used in Smith's exhibit, which omissions and corrections are reflected by Exhibit 209, and ascertain what it would cost to finance the capitalization of a natural gas company as indicated by those figures. Let us assume that the bonds represented 40% of the indebtedness, though Smith has stated that in the capitalization of the companies listed in his exhibit the bonds actually represented an average of only 20.83% of the total. Add to the 4% average yield reflected on page 1 of Exhibit 209 (R. Vol. VII, p. 3895) the .4 of 1% for cost of financing (R. Vol. IV, p. 2272), and it appears that the cost to the company for capital raised through bonds would be 4.4%.

Then take the 6% of the total capitalization represented by preferred stock, and add to the average yield to the public of 5.35% the cost of financing, which Smith testified would amounted to .4 of 1% (R. Vol. IV, p. 2272), or a total cost to the company of 5.75%. Then add to the 10.45 percentage of earnings on the common stock 15% for cost of financing by common stock (R. Vol. IV; pp. 2303, 2305), and it appears that such cost will be 12.01%. Thus it appears that of the total capitalization 40% will cost 4.4%, 6% will cost 5.75%, and 54% will cost 12.01%. Applying these figures to the total capitalization, it develops that the overall cost is 8.61%!

If the preferred stock be eliminated and the bonded indebtedness be assumed at 40% of the total capital and the equity capital at 60%, the overall cost would be 8.9%. If the bonded indebtedness be increased to 50% and the common stock be decreased to 50%, the overall cost would still be in excess of 8%. Even if Smith's own division of 40% to bonds, 20% to preferred stock, and 40% to common stock be used as the basis of computation, the overall cost to the company turns out to be 7.71%.

As we have already pointed out, Smith did not express an opinion or judgment as to a proper or reasonable rate of return for cross-petitioners. On cross-examination, however, he did volunteer that cross-petitioners would have no difficulty in financing at a low cost if they restrict their securities to a proper amount with reasonable ratio of bonds, preferred and common stock. He had testified that he had not the least doubt that the companies could finance on as favorable, if not more favorable, a basis than any other gas producing and transmission company in the United States.

That was a very far-reaching statement for a witness who made no pretense to qualifying as an expert on the subject of rate of return, or even on the subject of cost of capital, to make. From that statement alone, a reader might easily get the impression that this witness had a very extended knowledge not only of what it had cost other natural gas production and transmission companies to obtain overall capital but also all the facts and circumstances going to the risks confronting the natural gas pipeline companies and those investing in their securities. Did the witness have such knowledge? His qualifying testimony shows that he has been dealing with ordinary utilities in his experience with the Maryland Commission and, prior to the enactment of the Natural Gas Act, with electric transmission and distribution companies since he has been with the Federal Power Commission. So imperfect was Smith's knowledge of the gas pipeline companies in general that in Exhibit 186 he listed among the thirty-one companies, with which he dealt in that exhibit, two companies which he himself later stated should never have been included (R. Vol. IV, p. 2249), one because it was primarily an oil company, and the other because it did not have any producing or transmission facilities. On cross-examination he was asked if he knew whether certain named natural gas pipeline companies were built prior to 1926. Of the twenty-six companies about which he was asked he was able to answer that question as to only nine companies (R. Vol. IV, pp. 2237-9).

His further utter lack of knowledge of the ordinary elements of risk, about which he would have to know in order to reach the conclusion he expressed in his voluntary statement above referred to, is reflected by his testimony on further cross-examination, from which we quote (R. Vol. IV, p. 2635):

> "You ask if I am familiar with the physical conditions encountered by each of those companies listed in Exhibit 186 under Schedule 5 and the subdivisions thereof which I have classified as producing and/or transmission companies. I was familiar with the source

of supply but as to the topography, I have a general knowledge that any person who has read some geography would know about it in the United States. I have just the information that I would get from an atlas, except I have been to some of those places. I have made no detailed study, of course. For instance, I have been up along the Mississippi Valley. I know something about the pipeline company which serves St. Louis in a general way from having seen the territory in an automobile and from a train window; but I would not know anything about the details of the physical structure of the earth, of the rivers, the detail of them, the depth, the width and so on."

We quote also (R. Vol. IV, pp. 2635-6):

"* * * Lone Star has a wider source of supply than the other companies you have mentioned. I would classify it as a network. You are going beyond my depth when you ask me whether it can switch gas from one part of its system to another to meet shortages and things of that kind. I don't know which of these companies are in position to do that.

"* * * * * *

"The Colorado Interstate runs north out of the Panhandle, up through the northeast corner of New Mexico, and on into Colorado. I do not know of any large rivers that that line crosses. I don't know anything about any topography of the country there that would indicate that there were any extraordinary hazards confronting that company.

"The Cities Service Company runs out of the Panhandle to Kansas City and also takes from other fields in Western Kansas and Oklahoma. I do not know whether it crosses either the Missouri or the Mississippi River. You are getting out of my field when you get down to the topography of the country through which these pipelines pass. I do not know whether it delivers the gas to the Kansas City Company on the east or the west side of the Missouri River."

That Smith does not have that information is no reflection on him as an accountant or statistician. He just doesn't know the facts necessary to qualify him to express a judgment as to what it would cost cross-petitioners to refinance the value of their properties through the issuance and sale of securities. He may have read Moody's Manual and a dozen other publications of that character from cover to cover. He may have seen numerous reports and prospectuses concerning issues of securities. He may have audited the books of many companies and from that ascertained their earnings. But without practical experience in contacting the investing public and meeting the views and demands of investors, he cannot know, and does not know, what the attitude of the investing public would be if overall issues of securities were offered for sale by cross-petitioners. In the field of finance, as in the field of law or surgery, men must learn to do by doing. They cannot learn by looking on or by reading what others do. It is no reflection on a nurse who has seen a skilled surgeon perform a thousand delicate and difficult operations that she cannot qualify herself to practice in the field of surgery or to express an expert opinion concerning a surgical problem. Smith's opinion as to the overall cost to cross-petitioners of obtaining capital is just a guess of the wildest character. He makes no attempt to rest his statement in that connection on any factual basis. There is no connection between his opinion and the figures he brought in through his Exhibit 186. The latter figures, as we have shown, discredit his opinion and corroborate the opinions and judgments of the qualified experts who testified for cross-petitioners on this subject.

We submit, therefore, that, assuming a proper rate base, the finding of the Commission that a fair return to cross-petitioners would be 6½% per annum is not sustained by substantial evidence and that the Commission erred as a matter of law in so finding. Certainly the finding of the Commission that 6½% per annum is a fair return must be set aside in view of the figures used by the Commission itself on page 24 of its opinion (R. Vol. VIII, p. 3939). Taking the figures at their face value, their effect is that cross-petitioners could refinance on a basis of 40% in bonds, 20% in preferred stock, and 40% in common stock at a cost of 3.75% for the capital raised through bonds, 6.1% for capital raised through preferred stock, and 10% for capital raised through common stock. On this basis the cost of $100.00 would be:

Amount	Security	Rate	Annual Cost
$ 40	Bonds	3.75%	$1.50
20	Preferred Stock	6.10%	1.22
40	Common Stock	10%	4.00
$100			$6.72

In this connection we point out that cost of capital is but one of the elements which must be considered, and that cross-petitioners must be allowed compensation in addition to the cost of capital to cover risk, creative enterprise, engineering skill, and exceptionally efficient management. A finding made in total disregard of the substantial and uncontradicted evidence going to these additional elements cannot be sustained. In the light of the evidence as a whole, we submit that the Commission erred as a matter of law in refusing to find that cross-petitioners are entitled to 8% as a minimum annual rate of return.

Since the finding of the Commission that 6½% per annum is a reasonable return on the rate base allowed is not supported by substantial evidence, it follows, of course, that the order based on such finding should be vacated and set aside.

VII.

The Court Below Erred in Not Sustaining Cross-Petitioners' Contention That the Commission's Order Should Be Set Aside Because the Commission Is Without Power and Jurisdiction to Enter an Interim Order.

A. *The Power and Jurisdiction of the Commission to Fix Charges for Natural Gas are Derived Solely from the Natural Gas Act.*

B. *By the Enactment of the Natural Gas Act, Congress Neither Conferred nor Intended to Confer on the Commission Power and Jurisdiction to Enter an Interim Order in the Midst of the Hearing.*

C. *The Order Entered by the Commission Under the Assumption That it Had Power and Jurisdiction Under the Natural Gas Act to Enter an Interim Order Is Void.*

(Sec. 8, Summary of Argument, *supra*, p. 64.)

Cross-petitioners were required to proceed with their testimony before the Commission and complainants were required to develop any evidence in support of their contention that cross-petitioners' existing rates are unjust and unreasonable (R. Vol. I, pp. 15, 24). Complainant and the Commission have never developed such evidence. At the conclusion of cross-petitioners' *direct* testimony, before 30 of their 37 witnesses had been cross-examined, the motion for an interim order was filed with the Commission by complainant and counsel for the Commission. The hearing before the Commission has not been concluded. The Commission in its order specifically directed:

> "The record herein shall remain open for such further proceedings as the Commission may deem necessary or desirable." (R. Vol. VIII, p. 3946.)

We submit that Section 5 of the Natural Gas Act requires that the hearing be completed before an order reducing rates can be entered. Under the plain wording of the statute no authority is given the Commission to enter an order fixing rates until after the completion of a full hearing. There is no provision in the statute for the entering of an interim order.

It is elementary that a statutory commission being a creature of statute can derive no authority by implication or by common law. An order of a commission to be valid must be based upon some express provision or delegation of power made by statute (*State* v. *Sugar Land Ry. Co.*, 163 S. W. 1047, 1049 (Tex. Civ. App.)). In *Siler* v. *L. & N. Co.*, 213 U. S. 175, 194, this Court announced the same rule in a case involving the validity of an order of the Kentucky Railroad Commission fixing rates. In the opinion the Court said:

> "The Commission, as an extraordinary tribunal of the state, must have the power herein exercised conferred by a statute *in language free from doubt.* The power is not to be taken by implication; it must be given *by language which admits of no other reasonable construction.*" (Italics ours.)

The original Interstate Commerce Act required that all rates be reasonable, and delegated to the Interstate Commerce Commission power to determine whether or not existing rates were reasonable, but did not expressly authorize the commission to fix rates for the future. The commission sought to exercise the power to fix rates, however; but in *C. N. O. & T. P. R. Co.* v. *I. C. C.*, 162 U. S. 184, 196-7, this Court, in striking down the Commission's order, said:

> "We do not find any provision of the act that expressly or by necessary implication confers such a power.
>
> "It is argued on behalf of the commission that the power to pass upon the reasonableness of existing rates implies a right to prescribe rates. This is not necessarily so. * * * If the commission, instead of with-

> holding judgment in such a matter until an issue shall be made and the facts found, itself fixes a rate, that rate is prejudged by the commission to be reasonable."

Discussing the same question in *I. C. C. v. C. N. O. & T. P. R. Co.*, 167 U. S. 479, 494-5, this Court said:

> "The question debated is whether it vested in the commission the power and the duty to fix rates; and the fact that this is a debatable question, and has been most strenuously and earnestly debated, is very persuasive that it did not. *The grant of such a power is never to be implied.* The power itself is so vast and comprehensive, so largely affecting the rights of carrier and shipper, as well as indirectly all commercial transactions, the language by which the power is given had so often been used and was so familiar to the legislative mind and is capable of such definite and exact statement, that no just rule of construction would tolerate a grant of such power by mere implication." (Italics ours.)

Later the Court, in the same opinion, said:

> "The vice of this argument is that it is building up indirectly and by implication a power which is not in terms granted. It is not to be supposed that Congress would ever authorize an administrative body to establish rates without inquiry and examination. * * * *And if it had intended to grant the power to establish rates, it would have said so in unmistakable terms.*" (Italics ours.)

Under the Natural Gas Act (15 U. S. C. 717 d) the Commission is directed to perform two functions, namely, to determine whether or not the various existing charges are unjust or unreasonable, a *quasi*-judicial function; and, in those instances where it shall find that the existing charges are unjust or unreasonable, to determine just and reasonable charges and fix the same by order, a *quasi*-legislative function. We have shown that under no circumstances does it have jurisdiction to set up a lower and different charge until it has first performed its *quasi*-judicial function and made a finding, *after hearing pursued to point of final conclusion,* that the charges are unjust or unreasonable.

We have also shown that both the Commission and complainant have ignored the primary *quasi*-judicial function in that neither of them has offered any evidence showing that cross-petitioners' charges are unjust or unreasonable. All the affirmative testimony offered by them goes to the question of what is a fair and reasonable rate of return to cross-petitioners. In effect both assume that cross-petitioners' charges are unjust and unreasonable because, under their theory (which is erroneous, as we have shown), they determine that cross-petitioners' annual net revenues from operations exceed the amount they have allowed annually to apply on amortization and a 6½% return on the rate base which the Commission has fixed. Assuming that there is substantial evidence (which there is not) that 6½% per annum on the proper rate base would constitute a fair and reasonable return, such evidence would be no proof that the charges of cross-petitioners for natural gas are unjust and unreasonable. A charge may yield revenues in excess of an amount which would be fair and reasonable in the sense that it would not operate to confiscate cross-petitioners' property and at the same time not yield sufficiently in excess of that amount to constitute it an unjust and unreasonable charge.

The Commission, without waiting for complainant to offer any evidence, and without itself offering any evidence, showing that cross-petitioners' charges are unjust and unreasonable, proceeded at once with evidence looking to the construction of a new rate, and in that connection disposed of its *quasi*-judicial function by fiat in the form of a finding that the existing charges are unjust and unreasonable. This it cannot do in the midst of a hearing. The term "hearing" as used in the section of the Natural

Gas Act above cited, does not mean half a hearing, or any part of a hearing less than the entire hearing, including final arguments and briefs of counsel on the whole record developed by both sides of the controversy. "A full and fair hearing, a fair hearing, a formal hearing and a hearing all amount to the same thing in law." *Wisconsin Telephone Co.* v. *Public Service Commission,* 287 N. W. 122, 138.

For many years this Court has stressed the importance of allowing full, fair, and adequate hearings. Thus in *I. C. C.* v. *L. & N. R. R. Co.,* 227 U. S. 88, 91, 93, the Court said:

> "In the comparatively few cases in which such questions have arisen it has been distinctly recognized that administrative orders, *quasi*-judicial in character, are void if a hearing was denied; if that granted was inadequate or manifestly unfair; if the finding was contrary to the 'indisputable character of the evidence'."

The Court continued:

> "But the more liberal the practice in admitting testimony, the more imperative the obligation to preserve the essential rules of evidence by which rights are asserted or defended. * * * *All parties must be fully apprised of the evidence submitted or to be considered, and must be given opportunity to cross-examine witnesses, to inspect documents, and to offer evidence in explanation or rebuttal.* In no other way can a party maintain its rights or make its defense. In no other way can it test the sufficiency of the facts to support the finding." (Italics ours.)

In *Ohio Bell Telephone Co.* v. *Public Service Commission,* 301 U. S. 292, 304-5, the Court, in an opinion by Mr. Justice Cardozo, said:

> "Regulatory commissions have been invested with broad powers within the sphere of duty assigned to them by law. * * * All the more insistent is the need, when power has been bestowed so freely, that the

> 'inexorable safeguard' of a fair and open hearing be maintained in its integrity. * * * The right to such a hearing is one of 'the rudiments of fair play' assured to every litigant by the Fourteenth Amendment as a minimal requirement. * * * *There can be no compromise on the footing of convenience or expediency, or because of a natural desire to be rid of harassing delay, when* that minimal requirement has been neglected or ignored." (Italics ours.)

The pertinent portions of the statute on which the Commission relies for its authority here (15 U. S. C. 717 d) read:

> "Whenever the Commission, after a hearing * * * shall find that any * * * charge * * * is unjust, unreasonable, * * * The Commission shall determine the just and reasonable * * * charge * * * and fix the same by order. * * *"

It is inconceivable that Congress intended by the language above quoted to vest in the Commission the power to issue an interim order in the midst of a hearing. This language is not new, nor is it peculiar to the Natural Gas Act. The same language is contained substantially in the statutes dealing with the powers and duties of other regulatory bodies upon which Congress has placed the responsibility of regulating rates and charges.

The comparable portion of Section 15 (1), Title 49, U. S. C. A. (Interstate Commerce Act) reads:

> "Whenever, after full hearing, * * * the commission shall be of opinion that any * * * rate * * * is or will be unjust or unreasonable * * * the commission is authorized and empowered to determine what will be the just and reasonable * * * rate * * * to be thereafter observed in such case."

The statute defining the powers and duties of the Federal Communications Commission (Section 205 (a) of Title 47, U. S. C. A.) reads:

> "Whenever, after full opportunity for hearing,

> * * * the commission shall be of opinion that any charge * * * of any carrier or carriers is or will be in violation of any of the provisions of this chapter, the commission is authorized and empowered to determine and prescribe what will be the just and reasonable charge * * * to be thereafter observed."

The corresponding provision in the Packers and Stockyards Act (Section 211, Title 7, U. S. C. A.) reads:

> "Whenever, after full hearing, * * * the secretary is of the opinion that any rate * * * is or will be unjust, unreasonable or discriminatory, the secretary—(a) may determine and prescribe what will be the just and reasonable rate or charge * * *"

Also in the Motor Carriers Act (Section 316 (e), Title 49, U. S. C. A.) we find similar language:

> "Whenever, after hearing, * * * the commission shall be of the opinion that any individual or joint rate * * * is or will be unjust or unreasonable, * * * it shall determine and prescribe the lawful rate * * * thereafter to be observed."

In the act creating the Federal Power Commission (Title 16, U. S. C. A., Section 824 e(a) we find almost exactly the same language dealing with the authority of the commission to regulate electric power rates as that appearing in the Natural Gas Act:

> "Whenever the commission, after hearing * * * shall find that any rate * * * is unjust or unreasonable, * * * the commission shall determine the just and reasonable rate * * * to be thereafter observed and in force."

Just as in the Natural Gas Act the section from which we have quoted is preceded by a declaration that all rates and charges shall be just and reasonable and that any rate or charge that is not just and reasonable is declared to be unlawful, so in the case of each of the other regulatory acts above mentioned the section quoted is preceded by a similar declaration by Congress. In each of these acts Congress declares, in substance, that whenever the commission charged with the duty of administering the act shall find, after hearing, that any rate collected by the concern subject to regulation is unjust or unreasonable, the commission shall determine the just and reasonable rate thereafter to be observed. It is significant that in all of the regulatory acts to which we have referred Congress included a provision similar to the provision in 15 U. S. C. 717 c(e) authorizing the commission to suspend the operation of a *new* rate schedule filed by a regulated company for a limited period pending investigation by the commission. In the Natural Gas Act the period is limited to five months (15 U. S. C. 717 c(e)). In the Federal Power Act the period is also five months (16 U. S. C. A., Sec. 824 d(e)). In the Packers and Stockyards Act the suspension period is fixed at thirty days (7 U. S. C. A., Sec. 207 (e)). In the Motor Carriers Act the suspension period is ninety days, with a special provision that it shall not apply to schedules filed on or before July 31, 1938, by a carrier in bona fide operation when the Act took effect (49 U. S. C. A., Sec. 316 (g)). In the Federal Communications Act the suspension period is three months (47 U. S. C. A., Sec. 204). In the Interstate Commerce Act the period is 120 days, with power in the commission to extend the period an additional thirty days (49 U. S. C. A., Sec. 15 (7)).

An examination of these statutes reveals that in the Natural Gas Act the commission is vested with no new or extraordinary powers as distinguished from those vested in the regulatory bodies by other statutes enacted by Congress. In every instance Congress has recognized the right of the regulated company to promulgate new rates, but has specifically authorized the regulating body to suspend the new rates for a limited period. In none of these acts has it vested the regulatory body with any power to suspend the original rates or to establish temporary rates by interim order pending the completion of the hearing. *We have made a careful search and have found no reported case where any of the regulatory commissions created under act of Congress have assumed, under the acts from which they respectively derive their authority, to declare existing rates unjust and unreasonable before a hearing has been finally completed.* The fact that none of the commissions acting under similar statutes has heretofore assumed to exercise any such powers as those assumed by the Commission under the Natural Gas Act is highly significant in that it shows conclusively that none of the commissions has construed the statute as vesting in it any such power or jurisdiction. It must be assumed that Congress had in mind the construction that other commissions, to which it had delegated similar regulatory authority, had placed upon the similar Act at the time it repeated substantially the same langauge in the Natural Gas Act.

In their briefs before the Commission opposing counsel took the position that *Akron C. & Y. Co.* v. *U. S.*, 261 U. S. 184, is authority supporting the power of the Commission to enter an interim order. The Commission in its opinion relies upon this case (R. Vol. VIII, p. 3932). This case is not in point. No issue as to whether or not the existing rates were unjust and unreasonable was involved. The controversy had to do with the just divisions of joint rates, fares, and charges as between railroads operating west of the Hudson and those operating east of the Hudson. The proceeding was not under the section of the Interstate Commerce Act similar to the section of the Natural Gas Act here invoked, but under 49 U. S. C. 15 (6). The evidence was all in. The case had been argued, submitted, and reargued. The court entered an order based upon the whole record, reserving in the order the right to change or modify it, however, in the event further investigation should determine that its operation worked inequalities among the interested railroads. To issue an order based upon the whole record, after argument and submission by all parties, reserving the right to change or modify the order should inequalities develop as a result of its operation, which was the procedure under review in that case, is one thing; to issue an interim order in the midst of the hearing is an entirely different thing.

That Congress intended no such construction of the statute is evidenced by the proceedings in connection with the enactment of the Natural Gas Act. Cross-petitioners' position is that there is no ambiguity in the language of the Act; that under a fundamental rule of construction the language is controlling, and that it is not proper to consider discussions in Congress, reports of legislative committees, or views of those charged with the administration of the act, for the purpose of ascertaining the intent of Congress. *Commissioner* v. *Adams*, 54 Fed. (2d) 228; *Lansdown* v. *Faris*, 66 Fed. (2d) 939; *U. S.* v. *Hess*, 71 Fed. (2d) 78.

If the statute be viewed as ambiguous (which is untrue in this case), it is proper to determine the construction placed upon the Act by Congress itself, during the debate in connection with its enactment, and by the congressional committee which considered the Act before it was reported out for enactment.

The fact that there was common agreement in debate as to the general purpose of an act may be considered in determining what the purpose was, and as reflecting light upon the evils sought to be remedied. *Federal Trade Commission* v. *Raladam Co.*, 283 U. S. 643, 650; *Humphrey, Exr.* v. *U. S.*, 295 U. S. 602, 625. Discussions of an act when it was under consideration in the House may be consulted to ascertain the meaning of a doubtful proviso.

U. S. v. *Mullendore,* 35 Fed. (2d) 78, 82. Statements of the author of the bill as to its interpretation may be considered by the court in construing an ambiguous act. *U. S.* v. *Rehwald,* 44 Fed. (2d) 663. The rejection of a proposed amendment to a bill will be considered by the courts in construing an act as finally passed if its language is doubtful. *U. S.* v. *U. S. Shoe Machinery Co.,* 264 Fed. 138, 174.

In *Manhattan Properties* v. *Irving Trust Co.,* 291 U. S. 320, 335, the Supreme Court said:

> "In view of the extended consideration and discussion which preceded the passage of the act, the failure to include a provision for claims for loss of rent or for damages consequent on the abrogation of leases is significant of an intent not to depart from the precedents disallowing them."

The Natural Gas Act, as finally enacted, is substantially identical with H. R. 11,662, pending before the 74th Congress at its second session, on which hearings were held by a subcommittee of the Committee on Interstate and Foreign Commerce of the House on April 2, 1936. In substance, if not inexact words, the language on which the Commission relies as authority for the interim order was contained in that bill. The first witness in support of the bill was Mr. DeVane, solicitor of the Federal Power Commission, who appeared for the purpose of explaining the bill. (From this circumstance it may be inferred with reason that the Commission was interested in the enactment of the legislation.) He first pointed out that the bill was substantially the same as that relating to the regulation of the elecric industry. We quote from page 29 of the report of that hearing the following dialogue between Mr. DeVane and Mr. Cooper, a member of the Committee:

> "Mr. Cooper: And anyone who wants to file a complaint goes to the Commission; is that right?
>
> "Mr. DeVane: That is correct; and they can

change their rates, Mr. Cooper, by filing new schedules under Section 4(d). After they have filed them with the Commission and announced those new rates, the Commission has the power to suspend and investigate, and the suspending power extends for a period of five months.

"Mr. Cooper: Well, does the Commission have the power to suspend as soon as the protest has been filed?

"Mr. DeVane: Not in the case of protests, Mr. Cooper, no, sir. *The power of suspension only applies to a new rate.*

"Mr. Cooper: What I mean is this, if the gas company establishes a rate and someone files a complaint against that rate with the Commission, does the Commission automatically suspend the rate?

"Mr. DeVane: *It has no authority to suspend that rate.*

"Mr. Cooper: I see. They first have to consider the case.

"Mr. DeVane: That is correct.

"Mr. Cooper: Does it have authority, if it finds that the complaint is well founded?

"Mr. DeVane: If it finds the complaint is well founded, it has authority to prescribe a new rate. That is correct." (Italics ours.)

The following extract from page 45 of the report of the hearing before the subcommittee considering the Natural Gas Act clearly demonstrates that Mr. Booth, of counsel for complainant in this case, who appeared before the subcommittee on March 24, 1937, at that time did not consider that the language he now invokes was sufficient to empower the Commission to enter the order he now seeks to uphold:

"Mr. Booth: First I want to offer for the record a provision which would have the effect of authorizing the Federal Power Commission under any temporary rate situation to fix temporary rates.

"Mr. Bulwinkle: Fix temporary wholesale rates?

"Mr. Booth: Yes, the proposed temporary rate provision would read as follows:

> "The Commission may, in any proceeding involving the rates of any natural gas company brought either on its own motion or upon complaint, upon notice and after hearing, if it be of opinion that the public interest so requires, immediately fix, determine, and prescribe temporary rates to be charged by said company pending the final determination of said rate proceeding. Said temporary rates so fixed, determined, and prescribed shall be sufficient to provide a return of not less than 5 per cent upon the original cost, less accrued depreciation, of the physical property of said company used and useful in the gas service, plus a reasonable amount for working capital, and if the duly verified reports of said company to the Commission do not show the original cost, less accrued depreciation, of said property, the Commission may estimate said cost less depreciation and fix, determine, and prescribe rates as hereinbefore provided. In any such proceeding, whenever the annual depreciation expense is computed upon the sinking fund method, no depreciation shall be deducted from such original cost.
>
> "Temporary rates so fixed, determined and prescribed under this section shall be effective until the rates to be charged, received and collected by said company shall finally have been fixed, determined and prescribed. *The Commission is hereby authorized in any proceeding in which temporary rates are fixed, determined and prescribed under this section, to consider the effect of such rates in fixing, determining and prescribing rates to be thereafter charged and collected by said company on final determination of the rate proceeding.*" (Italics ours.)

The following day Chairman Maltbie of the Public Service Commission of New York joined in pressing on the committee the advisability of incorporating a temporary order provision. We quote from pages 114 and 115 of the report of the hearing before the committee:

> "Mr. Maltbie: * * * *Now, there is no provision in here regarding temporary rates.* I think Mr. Booth, of the Illinois Commission, made a suggestion yesterday suggesting that a section copied after the law in the State of New York regarding temporary rates should be added here, and we have found it very advantageous. * * * Now, the New York law permits us to issue a temporary order immediately. If we get the rate too low, below a fair return as the investigation shows, then it is adjusted in the final rate. That has worked satisfactorily and as I say has been upheld by the court of appeals * * *.
>
> "The Chairman: *Does not the fact that you subsequently award the utility the proper amount of compensation in case you under-compensate them in temporary rates save the constitutionality of your method?*
>
> "Mr. Maltbie: *Unquestionably it does. The opinion of the Court of Appeals pointed that out.*" (Italics ours.)

Mr. Booth's solicitude to amend the bill to provide for a temporary rate reduction, which is no different than an interim order reducing rates, may have been due to the holding of the Supreme Court of his own state, Illinois, that in the absence of a statute expressly authorizing it, the Illinois Commerce Commission could not fix a temporary rate. *State Public Utilities Commission* v. *Chicago & W. T. Ry. Co.*, 114 N. E. 325, 329, 275 Ill. 555. In that case the court said:

> "There is no provision that the original schedules shall not go into effect pending a hearing thereon before the Commission, but the provisions are expressly to the contrary * * * No authority is given the Commission anywhere in the statute to change the rates named in the original schedules filed except on evidence heard * * *. The Commission was without authority to make such an order except upon a *full* hearing * * *.

> "Whether or not the same rates were just and reasonable charges on and after January 1, 1914, is a question to be settled by the Commission after hearing, and until such question is decided by the Commission, *after a full hearing*, it has no jurisdiction or power to order appellants to collect the rates of July 1, 1913, which they insist are confiscatory * * *. Appellants ought not and cannot be legally required to return to such rates or to charge and collect such rates for any period of time before the *question is settled* as to whether or not they are just and reasonable." (Italics ours.)

In passing on the right of the New York Commission to fix temporary rates under the statute in force prior to the enactment of the present statute, the court in *New York* v. *New York Telephone Co.*, 189 N. Y. Sup. 701, 703, said:

> "'If the order of March 17th must be regarded as a provisional determination of the "just and reasonable rates, charges, and rentals to be thereafter observed and in force as the maximum to be charged, demanded, exacted or collected for the performance or rendering of the service specified," then the contention of the plaintiff is sound, for the power of the Public Service Commission to make such determination is conferred only by Sec. 97 of the Public Service Commissions Law, and that section gives the Public Service Commission power to determine such rates only after a "hearing," and does not expressly confer upon the Commission any power to make any provisional or conditional determination *pending the completion of the hearing*, nor can any power of such kind be inferred from the general provisions or intent of the act.'"

The only discordant note is found in the decisions of the Oklahoma Supreme Court; but, as pointed out in *Wisconsin Telephone Co.* v. *Public Service Commission*, 287 N. W. 122, 136:

> "The cases from the State of Oklahoma cited by the commission are not in point because of the peculiar

> constitutional and statutory provisions to be found in the State of Oklahoma. In that state when the court upon appeal reverses an order of the Corporation Commission, the court fixes the proper rate or charge. * * * In addition to that, the decision in *Oklahoma Gas & Electric Co.* v. *Corporation Comm.*, 201 Pac. 505, rests in part for its authority upon *Omaha & C. B. St. Ry. Co.* v. *Nebraska State Railway Comm., supra.* The propositions stated in that case were advanced to sustain an increase in rates whereas in the Oklahoma case the administrative order under consideration provided for a reduction in rates. The fundamental difference in the facts of the two cases seems not to have been observed."

The courts have recognized the difference in a situation presented by an application by a regulated concern for an increased rate, to meet an emergency pending a final hearing on the reasonableness of the rates set up in a new schedule, and that presented by an effort to reduce rates or charges during the course of a hearing over the objection of the regulated concern. *City of Cincinnati* v. *Public Utilities Comm.*, 117 N. E. 381, 96 Ohio St. 270; *Wisconsin Telephone Co.* v. *Public Service Comm.*, 287 N. W. 122. Congress in the Natural Gas Act recognized the distinction (15 U. S. C. 717 c, (d), and (e)). Under these provisions discretion is vested in the Commission to determine whether the new rates shall be suspended pending an investigation. As already pointed out, it wrote into this statute no provision for the suspension or reduction of existing rates pending the completion of the hearing. Had it intended for the Commission to exercise such power, it easily could have expressly so declared by the adoption of one of the amendments offered, which would have conferred express power upon the Commission to enter temporary or interim orders reducing rates.

Some statutes have provided general emergency powers in the commissions to promulgate temporary rates. Such statutes specifically require that the temporary rates be fixed at an amount that will yield a minimum statutory return on the value of the property reflected by the company records. It is highly significant, however, that the statutes which have been upheld provide that in fixing the final rate the commission shall provide for reimbursing the regulated concern for the difference in the temporary rate and the rate finally fixed if the latter be higher. *Bronx G. & E. Co.* v. *Maltbie,* 3 N. E. (2) 512, 515; *Driscoll* v. *Edison L. & P. Co.,* 307 U. S. 104, 114, 115; *Beaver Valley Water Co.* v. *Driscoll,* 28 Fed. Supp. 722, 725. To meet the decisions of the Illinois Supreme Court, one of which we have cited, the legislature of that state has enacted a statute providing in substance that when the commission finds from an inspection of the property of the utility or its books, records, or papers that the net income is in excess of a reasonable return upon its value, and that a hearing to determine the issues will require more than 120 days, it may enter a temporary order fixing rates to be effective no longer than nine months, with a further extension period of three months at the discretion of the commission. The statute provides, however, that in fixing the permanent rate the commission must make provision for recoupment by the regulated company of any difference between the rates finally determined and those temporarily in force in the meantime. It is necessary only to observe that if the order under review be upheld cross-petitioners will have no such protection, nor could the Commission, in the absence of a statute, make such provision, in the light of the established law that in fixing rates past losses or gains cannot be considered. *Galveston Electric Co.* v. *Galveston,* 258 U. S. 388, 396. The principle that an interim order fixing rates pending the outcome of the rate proceeding cannot be entered in the absence of statutory authority has been recognized by regulatory commissions as well as the courts. *Berg* v. *N. Y., etc., R. R. Co.*, P. U. R. 1933D, 462 (N. Y.); *Town of Irvington* v. *Commonwealth, etc.*, 10 P. U. R. (N. S.) 329 (N. J.).

Under the Natural Gas Act (15 U. S. C. 717 c(e)) the Commission has power to authorize increased rates or to suspend the operation of proposed increased rates for a limited time without a full hearing. At the end of the limited time, on motion of the regulated company, the increased rates immediately go into effect; but the Act provides that in such event the Commission may require the natural gas company to furnish a bond to refund any amounts ordered by the Commission not found to be justified at the conclusion of the hearing. If Congress had intended to empower the Commission to suspend an existing rate under investigation, would it not have taken the same pains expressly to outline the procedure and to provide for the recoupment by the natural gas company of the difference in the temporary or interim rate set up and that finally established? *Failure of Congress to incorporate provisions similar to those contained in the New York, Pennsylvania, and Illinois statutes, particularly in view of the amendments offered by Mr. Booth, of the Illinois Commission, and Mr. Maltbie, of the New York Commission, is highly significant and cannot be disregarded.* The New York amendment authorizing temporary orders on the basis finally upheld was enacted in 1934, the Pennsylvania act was passed in 1937, and the Illinois amendment was passed in 1933. These acts having been passed, and construed in the case of the New York statute, the failure of Congress to incorporate amendments authorizing temporary or interim rates conclusively establishes, we submit, that Congress did not intend to vest in the Federal Power Commission the authority to enter any such order as that here under review.

That the Commission had no authority to enter a rate regulatory order at the stage of the proceedings which has been reached is emphasized and demonstrated further by the complete lack of any evidence in the record upon which the Commission can determine reasonable rates. In a preceding section of this brief it has been shown that the Commission's order is merely an order reducing profits and does not fix rates on evidence as prescribed by statute. The so-called interim order entered in the midst of proceedings and before a record had been completed, which compliance with the statute required, is clearly invalid.

VIII.

The Court Below Erred in Not Sustaining Cross-Petitioners' Contention That the Commission's Order Should Be Set Aside Because the Natural Gas Act as Applied by the Commission to Cross-Petitioners' Business Is in Conflict With the Fifth Amendment to the Constitution of the United States.

A. *The Regulation Imposed Is Violative of the Fifth Amendment Because Cross-Petitioners' Business Is Not Affected With a Public Interest and Is Not Subject to a Price Regulation.*

(Sec. 9, Summary of Argument, *supra,* p. 65.)

This case squarely presents the question of whether Congress may, under the Fifth Amendment, fix prices on private sales of an ordinary commodity. The question is that broad. There are here no peculiar limiting factual circumstances. In every case in which this Court has upheld price fixing under the Fifth Amendment there have existed peculiar factual circumstances which are lacking here and which justified the legislative control. This Court has refused consistently and repeatedly to hold that a legislative body may, under the Fifth and Fourteenth Amendments, fix prices on private sales on an ordinary commodity. The decision of the Court below in upholding the price fixing here involved goes beyond any decision by this Court and beyond, cross-petitioners submit, the limitations of the Fifth Amendment on the powers of Congress under the Commerce Clause of the Constitution. The undisputed facts are:

1. Cross-petitioners' sales are sales of an ordinary commodity to a few selected buyers;
2. Cross-petitioners are not a common carrier;
3. They have not constituted themselves a public utility or dedicated their property to the public use by offering to sell their commodity to all who apply; and
4. The industry in which they are engaged is not one in which the "free competition had been 'degraded into anarchy'" (*Sunshine Anthracite Coal Co.* v. *Adkins,* 310 U. S. 381, 395).

We shall first discuss the factual situation here; second, the cases which this and other courts have decided with respect to price fixing under the Fifth and Fourteenth Amendments; and, third, the decision of the Court below on this issue.

Cross-petitioners' business is of a strictly private character. Cross-petitioners have never held themselves out to the public as common carriers; nor have cross-petitioners offered to sell their gas to the general public (R. Vol. I, p. 11). Ninety per cent of the gas transported by their pipeline is sold to Chicago District Pipeline Company for resale by the latter to the distributing utilities operating in the City of Chicago and environs, which in turn blend such natural gas with manufactured gas and distribute the resulting commodity to the ultimate consumer (R. Vol. VIII, p. 3943). Of the remaining 10%, about 8% is sold to other utilities along or near cross-petitioners' pipeline and about 2% is sold by cross-petitioners directly to industrial users (Exhibit 9, R. Vol. V, p. 2681; Vol. I, p. 57). Cross-petitioners have at all times sold their gas by private contracts negotiated at great expense to cross-petitioners, the negotiations sometimes extending over two or three years (R. Vol. II, p. 681). Since the commencement of their operations cross-petitioners have made a total of 161 contracts (R. Vol. II, p. 685). Of these contracts 47 are still in effect (R. Vol. II, p. 685). Under these 47 contracts cross-petitioners have 12 customers (Exhibit 11, R. Vol. V, p. 2685; Vol. I, p. 57). Cross-petitioners do not operate under any franchise; they have no monopoly. Cross-petitioners embarked upon and have maintained a private business with complete freedom and control of their contracts of sale. They are a private purveyor of a commodity.

By the enactment of the Natural Gas Act Congress undertook by legislative fiat to change completely the character of cross-petitioners' business and the use of cross-petitioners' facilities. The Act declares that cross-petitioners' business is affected with a public interest and that Federal regulation is necessary in the public interest (Section 1a). It declares all rates and charges for the sale of natural gas subject to the jurisdiction of the Commission (Section 4). Cross-petitioners' charges are, under the Act, subject to investigation by the Commission on complaint or on its own motion (Section 5a). If the Commission has a hearing and finds that cross-petitioners' charges are unjust or unreasonable, the Commission is directed to determine just and reasonable charges and to fix the same by order (Section 5a). The Commission may by order direct cross-petitioners to extend or improve their transportation facilities and to establish physical connection with the facilities of, and sell natural gas to, any person or municipality engaged, or authorized to engage, in the local distribution of natural or artificial gas to the public (Section 7a). Cross-petitioners cannot abandon all or any portion of their facilities, or any service rendered by means of such facilities, without permission or approval of the Commission (Section 7b). Cross-petitioners are subject to severe penalties or imprisonment and substantial fines if they fail or refuse to comply with the Commission's orders relating to their services or charges (Section 21). Thus, by the terms of the Act Congress attempts to transform cross-petitioners' business of producing, purchasing, and selling a commodity into a business as completely subjected to public regulation as that of a utility which voluntarily dedicates its property to the public use and holds itself out to serve all who may apply for service.

The Fifth Amendment imposes the same restriction upon the powers of Congress under the Commerce Clause as does the Fourteenth Amendment on a State legislature in the exercise of the State's police power (*U. S.* v. *Rock Royal Cooperative, Inc.*, 307 U. S. 533, 569-571).

This Court has consistently held that a state legislature has no power to convert by fiat a private business into a public utility. In *Michigan Public Utilities Commission* v. *Duke*, 266 U. S. 570, 577-8, this Court had under consideration a Michigan statute providing for the regulation as common carriers of any persons engaged in automotive transportation for hire. The plaintiff was engaged in transporting automobile bodies from Detroit, Michigan, to Toledo, Ohio, under three private contracts. He did not hold himself out to the public as a carrier. He engaged in no transportation business other than in pursuance of the three private contracts. In holding the Act unconstitutional, this Court said:

> "It is beyond the power of the state by legislative fiat to convert property used exclusively in the business of a private carrier into a public utility, or to make the owner a public carrier, for that would be taking private property for public use without just compensation, which no state can do consistently with the due process clause of the Fourteenth Amendment.

> * * * On the facts above referred to, it is clear that, if enforced against him, the act would deprive plaintiff of his property, in violation of that clause of the Constitution."

Cross-petitioners are in a stronger position on the facts than was the plaintiff in the case just cited. They are not transporting gas for hire under private contracts. They are transporting their own gas from their wells, and from the point where they purchase gas from a single producer under private contract, to points where they deliver gas at wholesale to those who distribute it to the general public. Cross-petitioners' position is more analogous to that of a farmer who buys a truck and uses it to transport his wheat, his corn, his potatoes, or his hogs to the local market, or of an oil company owning wells in one locality and a refinery at some distance away, which builds and operates a pipeline for the purpose of transporting its own oil from its own wells to its refinery, to be there processed and sold to selected buyers.

To the same effect as the *Duke* case are *U. S.* v. *Ohio Oil Co.*, 234 U. S. 548, 562-3 (Uncle Sam oil company angle), and *Producers Transportation Co.* v. *Railroad Commission*, 251 U. S. 228, 230-231.

In every case in which the issue as to price fixing is as broad as that presented here, this Court has struck down the statute. In *Williams* v. *Standard Oil Co.*, 278 U. S. 235, 239-40, this Court held invalid a Tennessee statute fixing prices at which gasoline might be sold within the State. This Court said:

> "It is settled by recent decisions of this court that a state legislature is without constitutional power to fix prices at which commodities may be sold, services rendered, or property used, unless the business or property involved is 'affected with a public interest.' *Chas. Wolff Packing Co.* v. *Court of Industrial Relations*, 262 U. S. 522, 67 L. Ed. 1103 * * *; *Tyson &*

> *Bro. United Theatre Ticket Offices* v. *Banton, supra; Fairmont Creamery Co.* v. *Minnesota,* 274 U. S. 1, 71 L. Ed. 893 * * *; *Ribnik* v. *McBride,* 277 U. S. 350, 72 L. Ed. 913. * * * Nothing is gained by reiterating the statement that the phrase is indefinite. By repeated decisions of this court, beginning with *Munn* v. *Illinois,* 94 U. S. 113, 24 L. Ed. 77, that phrase, however it may be characterized, has become the established test by which the legislative power to fix prices of commodities, use of property, or services must be measured. As applied in particular instances, its meaning may be considered both from an affirmative and a negative point of view. Affirmatively, it means that a business or property, in order to be affected with a public interest, must be such or be so employed as to justify the conclusion that it has been *devoted* to a public use and its use thereby in effect *granted* to the public. * * * Negatively, it does not mean that a business is affected with a public interest merely because it is large or because the public are warranted in having a feeling of concern in respect of its maintenance. * * *
>
> "In support of the act under review it is urged that gasoline is of widespread use; that enormous quantities of it are sold in the state of Tennessee; and that it has become necessary and indispensable in carrying on commercial and other activities within the state. But we are here concerned with the character of the business, not with its size or the extent to which the commodity is used. Gasoline is one of the ordinary commodities of trade, differing, so far as the question here is affected, in no essential respect from a great variety of other articles commonly bought and sold by merchants and private dealers in the country. The decisions referred to above make it perfectly clear that the business of dealing in such articles, irrespective of its extent, does not come within the phrase 'affected with a public interest'."

In *New State Ice Co.* v. *Liebmann,* 285 U. S. 262, 277, this Court struck down an Oklahoma statute prohibiting the manufacture, sale, and distribution of ice without a State license. In *Tyson* v. *Banton*, 273 U. S. 418, 431, this Court struck down a statute fixing resale prices of theater tickets, holding that the mere fact that a business is affected with a public interest, in the sense that police regulations may be imposed, does not mean that the interest is such as to justify price regulation.

In *Wolff* v. *Court of Industrial Relations*, 262 U. S. 522, 537, this Court said:

> "It has never been supposed, since the adoption of the Constitution, that the business of the butcher, or the baker, the tailor, the wood chopper, the mining operator, or the miner was clothed with such a public interest that the price of his product or his wages could be fixed by state regulation."

The business of cross-petitioner Texoma Natural Gas Company was expressly held not to be affected with a public interest in *Texoma Natural Gas Co.* v. *Railroad Commission*, 59 Fed. (2d) 750, 754 (D. C., Texas, C. J. Hutcheson, *D. JJ.* West and Bryant). The Court said:

> "The business of dealing in gasoline is held not to be affected with a public interest, so that a state legislature is powerless to fix prices at which it may be sold. *Williams* v. *Standard Oil Co.*, 278 U. S. 239, * * * 73 L. Ed. 287, * * * The gas under question here is not affected with a public interest. * * *"

In each case in which this Court has upheld price fixing there have been peculiar circumstances warranting the legislation. This Court has held that price regulation is justified in only two factual situations:

> 1. Where the concern itself has devoted its business to a public use by holding itself out to serve all who may apply.

Munn v. *Illinois*, 94 U. S. 113 (grain elevator) is an example in the State domain and *Stafford* v. *Wallace*, 258 U. S. 495 (Stock Yards Commission houses) is an example in the Federal domain. In *Munn* v. *Illinois*, this Court upheld a statute providing for the fixing of charges for the storage of grain in elevators in Chicago, the country's principal grain market. The record showed that the elevators handled the grain from all over the country and that they held themselves out to render the service of storing and handling the grain for any who might apply. The Court held that the service performed by these elevators was strictly analogous to that performed by common carriers. In *Stafford* v. *Wallace*, the same situation obtained with respect to the Stock Yards Commission houses; they held themselves out to serve all who applied and were in the position of common carriers in performing a service at the Stock Yards of Chicago. *Townsend* v. *Yeomans*, 301 U. S. 441, is another similar case. There the Court upheld the fixing of charges for storing tobacco in public warehouses which held themselves out to serve all who applied.

> 2. The second factual situation which this Court has held justifies price regulation is where chaotic economic conditions, price wars, etc., have caused free competition to be degraded into anarchy.

In *Sunshine Anthracite Coal Co.* v. *Adkins*, 310 U. S. 381, 395, the right of Congress to regulate prices of coal was upheld, not on the broad theory that the coal as a commodity is subject to price regulation, but on the ground that Congress had power to deal with the peculiar conditions obtaining in the coal industry which had become chaotic. The statute under consideration there did not in fact provide for complete price regulation, such as does the statute here, but provided for only minimum and maximum prices. The question before the Court was much narrower than the issue presented here. In *Nebbia* v. *New York*, 291 U. S. 502, 530, the New York statute providing for the regulation of milk prices was upheld on the same ground, to-wit, the legislature had power to deal with the evils and maladjustments existing in the milk business. The Court emphasized the destructive and demoralizing conditions in the industry and unfair trade practices which resulted in retail price cutting, and which reduced the income of the farmer below the cost of production. The decision was not based upon a holding that a legislative body may at will fix prices on the private sales of a commodity such as milk. The statute in that case, like the statute in the *Sunshine* case, provided only for minimum and maximum prices. In *United States* v. *Rock Royal Cooperative, Inc.*, 307 U. S. 533, 567-571, the Federal statute respecting milk regulation was sustained upon the same ground. In that case the statute provided for only minimum prices. The legislation was directed at and limited to alleviation of chaotic economic conditions. In each of the foregoing three cases, there was no effort on the part of the legislative body to convert the coal and milk businesses into public utilities. The effort in the case at bar is definitely to convert cross-petitioners into public utilities. The decisions of this Court in the *Sunshine, Nebbia,* and *Rock Royal* cases are not authority for the action taken by Congress. This case falls squarely within the holding of this Court in *Williams* v. *Standard Oil Co.*, 278 U. S. 235 (gasoline), *New State Ice Co.* v. *Liebmann,* 285 U. S. 262 (ice), and similar cases where this Court has rejected the broad contention that prices on the private sale of a commodity may be fixed. The case of *Olsen* v. *Nebraska,* 85 L. Ed. 820, is not authority for price fixing on sales of a commodity. The legislation there under consideration limited the maximum charges of employment agencies and was directed against frauds and unscrupulous dealings.

The Court below (R. Vol. VIII, p. 4030) conceded the force of the factual distinctions between the instant case and the *Nebbia* and *Sunshine* cases, but concluded nevertheless than the instant legislation was within the broad powers of Congress. We shall later discuss specifically the reasoning of the Court below, but first we shall point out that there are in this case no limiting factual circumstances justifying price regulation.

It has been pointed out that the cross-petitioners' business is not beset with economic difficulties and economic chaos. On the contrary, complainant and the Commission contend that cross-petitioners are too prosperous.

The fact that natural gas is a natural resource does not justify governmental price regulation. Numerous ordinary commodities are natural resources: gasoline, oil, salt, lumber, iron ore, tobacco are a few of numerous ordinary commodities which are natural resources or are derived from the soil. A party with the enterprise and initiative to mine or to produce or to raise these commodities and to market them is no more in a public business than a party processing or manufacturing and selling any article of wide use. This Court has never gone so far as to hold that the Commerce Clause or the State police power permits the fixing of prices on private sales of ordinary commodities whether they be products which are natural resources or not. The fact that the supply of natural gas in the field in which cross-petitioners' supply is located will some day be exhausted does not justify price regulation. Oil fields, salt mines, and iron ore mines will some day be exhausted. Cross-petitioners' business is no more a public business than that of the owner of a forest who erects his own saw mill and, by means of his own trucks or barges, transports his own lumber to selected dealers. Cross-petitioners might also be compared to a mine owner transporting his own coal by his own ships to Chicago for sale to retail coal dealers or to a public utility for use in the manufacture of artificial gas.

The fact that cross-petitioners sell natural gas to utilities which distribute the gas to the public does not justify price fixing. It is true that such utilities whose prices are subject to regulation must have natural gas. If such a utility does not own its own reserves, it must purchase this natural gas at wholesale from someone situated as are cross-petitioners, or from someone who owns or buys natural gas and pays to have it transported to the utilities' field of operation. But such a distributing utility cannot operate its business by purchasing natural gas alone. It must have offices, for which it must purchase furniture, mechanical equipment, stationery, ink, and pencils. It must purchase hammers, wrenches, waste, lubricants, bolts, nuts, and a thousand other items. It must purchase meters, compressors, valves, steel pipe, and other heavy equipment. Indeed, a very large proportion of the total costs which enter into the ultimate price charged by utilities to their consumers is represented by the fixed charges on their capital facilities and the operating expenses incident to the transportation and the service connected with the conduct of their business. In other words, much of the cost to the domestic or other consumer is represented by the charges made for facilities and for service. Often the domestic customer uses but a small quantity of natural gas during the month for which his bill is rendered by the utility. The charges for such services are subject to regulation, but on the ground, not that a great many people utilize those services, but that the utility holds itself out, with certain conditions, to serve all who apply and meet the conditions. There is no more reason for holding, because the business of the public utility which purchases natural gas at wholesale is affected with a public interest in the sense that its charges to the public are subject to regulation, that the government or the state can fix the price at which it purchases the commodity at wholesale than for holding that the government or the state has the right to fix the price at which the distributing utility purchases its steel pipe, its pumps, its engines, its meters, and the thousand other articles which go to make up its facilities.

Cross-petitioners' business is comparable to that of an electric power company manufacturing electric current and selling it at wholesale by private contract to utilities, which in turn distribute electricity to the public. Such an electric power company was held not to be a public utility in *Union Falls Power Co.* v. *City*. 265 N. W. 722, 723 (Wis. Sup. Ct.), in which case the Supreme Court of Wisconsin had under consideration a statute providing for a special tax levy applied to utilities. In holding that a wholesale electric power company was not entitled to invoke the benefits of this tax statute as a utility, the Court said:

> "'It was not the furnishing of heat, light or power to tenants or incidentally to a few neighbors that the legislature sought to regulate, but the furnishing of those commodities to the public, that is, to whoever might require the same. * * * The use to which the plant, equipment or some portion thereof is put must be for the public, in order to constitute it a public utility.' * * * The fact is that plaintiff does not hold itself out as being able, ready and willing to serve the public. In this case * * * the plaintiff * * * does not deal with the public directly or indirectly. It deals with a utility which in turn deals with the public. * * * We conclude that the plaintiff company is not a public utility and, therefore, it was properly assessable in accordance with applicable laws of the state and not assessable as a public utility."

Most of those who purchase gas from cross-petitioners blend the commodity with artificial gas manufactured at their own plants or purchased from others. This artificial gas is an essential constituent of the blended product sold to the public. What reasoning could justify the imposing of government regulation upon the price paid for natural gas, one of the constituents entering into the blended commodity, and at the same time leaving entirely unregulated the price paid for, or representing the cost of manufacturing, artificial gas, the other constituent?

If the fact that cross-petitioners' gas is blended with artificial gas, or sold as natural gas, by utilities, whose prices to the ultimate consumer are subject to regulation, be used as a ground for the construction of the commerce clause permitting regulation of cross-petitioners' prices, where, under such a construction, would price regulation stop? If the Government can fix the cost of natural gas, it can just as logically fix the cost of the artificial gas which these utilities purchase, or the cost of the buildings, boilers, engines, and other machinery and equipment which they utilize in the manufacture of artificial gas, if they make it for themselves.

Likewise, if on that theory the prices at which cross-petitioners sell natural gas are subject to regulation, the prices of those things which cross-petitioners must purchase in order to engage in the business of producing, transporting, and selling natural gas are subject to regulation. The Government could regulate the contract price for the drilling of wells, the price of the casing that goes into the wells, the price of the lumber which goes into the derrick above the well, and the price of the nails and bolts which hold this lumber together as a derrick, the price of the pipe, the meters and regulators out in the field, the field compressor stations, the main pipeline facilities, including compressor units, engines, housing facilities, bridges, gasoline plant facilities, the dehydrating plant facilities, and the thousand other things which cross-petitioners have purchased, and the cost of putting all these physical elements together to constitute their production and transportation facilities. Likewise, the Government could regulate the salaries of the six or seven hundred men who are employed by cross-petitioners in this connection. If such prices can be regulated, the prices of everything that enters into the acquiring and cutting of timber and sawing it into lumber, or acquiring and mining iron and processing it into steel—indeed, the cost clear back to the source of every element which enters into the facilities of cross-petitioners devoted to their business of producing, purchasing, transporting and selling natural gas—can be regulated.

The declaration of Congress in the Natural Gas Act that cross-petitioners' business is affected with a public interest is not binding upon cross-petitioners. The declaration of Congress is (Section 1):

> "As disclosed in reports of the Federal Trade Commission made pursuant to S. Res. 83 (70th Congress, First Session) and other reports made pursuant to the authority of Congress, it is hereby declared that the business of transporting and selling natural gas for ultimate distribution to the public is affected with a public interest, and that Federal regulation in matters relating to the transportation of natural gas and the sale thereof in interstate and foreign commerce is necessary in the public interest."

Such declaration is binding neither on this Court nor on cross-petitioners (*Wolff Packing Co.* v. *Court*, 262 U. S. 522, 536; *Tyson Bros.* v. *Banton*, 273 U. S. 418, 431). The facts respecting cross-petitioners' business refute the attempt by Congress to place cross-petitioners' business in a special category. The effort of Congress here is nothing more than an attempt to regulate the price at private sale of an ordinary commodity.

The Court below (R. Vol. VIII, pp. 4030-4031), after conceding the factual distinction between the case at bar and the *Nebbia*, *Sunshine*, and *Appalachian*[1] cases, stated:

> "Where a legislative determination is based upon a very extended administrative investigation, which concluded that an industry was affected with a public interest and that Federal regulation thereof was necessary and that said business or industry is producing and transporting natural gas to be sold to gas companies engaged in public utility business in cities and villages, there exists no basis for a successful attack on such determination."

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[1] *U. S.* v. *Appalachian Electric Power Co.*, 85 L. Ed. 201.

This statement is in part directly contrary to the decisions of this Court in *Williams* v. *Standard Oil Co.*, 278 U. S. 235; *New State Ice Co.* v. *Liebmann*, 285 U. S. 262, and similar cases. In those cases this Court held that there did exist a basis for a "successful attack" in spite of the legislative determination that regulation of the gasoline and the ice businesses was in the public interest. The statement of the Court below is based in part upon the fallacious proposition that cross-petitioners are subject to regulation because they sell to distributing public utilities. The Court below next said:

> "The natural gas industry controls the source of a commodity of great public importance and widespread consumption and therefore its regulation by Congress may well be required."

This illustrates the sweeping character of the decision below. The same statement and reasoning justify price regulation of iron ore, salt, oil, gasoline, clothing, food. lumber, brick, etc. The Court continues:

> "At least, Congress, in its wisdom, may so conclude. Courts cannot and should not assume a greater wisdom than Congress, and find otherwise."

It is submitted that the Fifth Amendment prohibits Congress from concluding in its wisdom that the price of meat on a private sale can be fixed, special circumstances such as chaotic economic conditions being absent. Cross-petitioners recognize the rule often reiterated by this Court that where Congress acts within its authority the wisdom of legislation is for Congress and not for the courts; but cross-petitioners insist that in this case the legislation is beyond the authority of Congress under the Constitution.

Despite the concession by the Court below that the facts in the *Sunshine* and *Nebbia* cases are different from the facts at bar, the Court quoted extensively from the opinions in those cases (R. Vol. VIII, pp. 4030, footnote 7).

Cross-petitioners do not ask this Court to retract anything there said. In the *Nebbia* case, 291 U. S. 502, 536, this Court said as to the test in determining validity of price fixing:

> "It is clear that there is no class or category of businesses affected with public interest, and the function of courts in the application of the Fifth and Fourteenth Amendments is to determine in each case whether *circumstances* vindicate the challenged regulation as a reasonable assertion of governmental authority or condemn it as arbitrary and discriminatory."

Cross-petitioners submit that the regulation in this case is arbitrary and discriminatory. The *circumstances* here show that the regulation is arbitrary and discriminatory. Cross-petitioners are in no different position from the ordinary purveyor of an ordinary commodity. The upholding of the Natural Gas Act as applied to these cross-petitioners necessitates a construction of the commerce clause which would permit of the price regulation and control of all American industry engaged in interstate commerce and all American commodities sold in interstate commerce.

B. *The Regulation Imposed Is Violative of the Fifth Amendment Because It Involves a Taking of the Use of Cross-Petitioners' Property for the Public and Prohibits Cross-Petitioners From Withdrawing Their Property From Such Use Except by Permission of the Commission.*

The Natural Gas Act not only subjects to regulation the prices charged by cross-petitioners to those with whom they have made private contracts, but it purports to delegate to the Federal Power Commission the right to select the purchasers for cross-petitioners to and require cross-petitioners to extend their facilities and to serve such purchasers (Section 7, 15 U. S. C. 717 f). Cross-petitioners organized their business on the assumption that they would be permitted to select their purchasers, to pass upon their credit, to pass upon the feasibility of extending their lines to serve such purchasers, and to pass upon the risks involved in view of the volume of gas which the purchasers would be in position to utilize. Cross-petitioners assumed that if it proved to be unprofitable to serve a particular customer they could discontinue the service at the end of their contractual obligation. But not so now, if the Natural Gas Act is valid. Under the operation of the Act, cross-petitioners must not only limit their charges to those fixed by the Federal Power Commission, but they must serve all whom the Federal Power Commission directs them to serve within their reach. They cannot discontinue the service to those whom they are now serving, regardless of whether they deem the services to be profitable or otherwise; nor can they discontinue the service to those to whom the Commission shall require them to extend their services, without first obtaining the permission of the Commission to do so.

Cross-petitioners' gas used in domestic consumption commands the highest price. That used in commercial consumption represents a higher price than that used for industrial purposes or for boiler fuel. Cross-petitioners' contracts for industrial sales have been negotiated on an interruptible basis, the obvious purpose of which was to permit them to discontinue this service at any time they may find a more profitable outlet for uses that would command higher prices. But under the Natural Gas Act they cannot discontinue the service to any now being served without permission of the Commission. It is obvious that the whole character of cross-petitioners' business is changed under the operation of the Natural Gas Act, if valid. This change in the character of cross-petitioners' business renders price regulation under the Natural Gas Act invalid because in conflict with the Fifth Amendment.

This question was discussed by this Court in *Chas. Wolff Packing Co.* v. *Court of Industrial Relations,* 262 U. S. 522, 534, 539. The Court had before it a state statute providing for the fixing of wages in a meat-packing plant. Under the Statute the employer was required to pay the fixed wages and the employees were prohibited from striking against the fixed wages. The Court held that it was not necessary to decide whether or not the meat-packing business is affected with a public interest since, under the Act, *the business was required to proceed on the wages fixed.* In effect the Court held that even if the packing business be affected with a public interest, the imposition of fixed wages from which the business could not withdraw was invalid regulation under the Fourteenth Amendment. The Court said (p. 534):

> "Under the construction adopted by the state supreme court the act gives the industrial court authority to permit the owner or employer to go out of business, if he shows that he can only continue on the terms fixed at such heavy loss that collapse will follow; but this privilege, under the circumstances, is generally illusory. *Block* v. *Hirsh,* 256 U. S. 135, 157, 65 L. Ed. 865, 871. A laborer dissatisfied with his wages is permitted to quit, but he may not agree with his fellows to quit, or combine with others to induce them to quit."

It is true cross-petitioners may quit business or discontinue service if the Commission, on the facts presented, sees fit to permit them to do so; but this privilege in the case at bar is just as "illusory" as in the *Wolff* case or the *Block* case.

Continuing, the Court said (pp. 539-44):

> "If, as, in effect, contended by counsel for the state, the common callings are clothed with a public interest by a mere legislative declaration, which necessarily authorizes full and comprehensive regulation within legislative discretion, there must be a revolution in the relation of government to general business. This

will be running the public interest argument into the ground, to use a phrase of Mr. Justice Bradley when characterizing a similarly extreme contention. *Civil Rights Cases*, 109 U. S. 3, 24, 27 L. Ed. 835, 843, 3 Sup. Ct. Rep. 18. It will be impossible to reconcile such result with the freedom of contract and of labor secured by the 14th Amendment.

"This brings us to the nature and purpose of the regulation under the Industrial Court Act. The avowed object is continuity of food, clothing, and fuel supply. By Sec. 6 reasonable continuity and efficiency of the industries specified are declared to be necessary for the public peace, health, and general welfare, and all are forbidden to hinder, limit, or suspend them. Section 7 gives the industrial court power, in case of controversy between employers and workers which may endanger the continuity or efficiency of service, to bring the employer and employees before it, and, after hearing and investigation, to fix the terms and conditions between them. The employer is bound by this act to pay the wages fixed; and while the worker is not required to work at the wages fixed, he is forbidden on penalty of fine or imprisonment, to strike against them, and thus is compelled to give up that means of putting himself on an equality with his employer which action in concert with his fellows gives him.

"There is no authority of this court to sustain such exercise of power in respect to those kinds of business affected with a public interest by a change in pais, first fully recognized by this court in *Munn* v. *Illinois*, 94 U. S. 113, 24 L. Ed. 77, where it said (p. 126):

> 'Property does become clothed with a public interest when used in a manner to make it of public consequence and affect the community at large. When, therefore, one devotes his property to a use in which the public has an interest, he in effect grants to the public an interest in that use, and must submit to be controlled by the public for the common good, to the extent of the interest he has thus created. *He may withdraw*

his grant by discontinuing the use; but so long as he maintains the use, he must submit to the control.' (Italics are the Court's).

* * * * *

"'But the chief and conclusive distinction between *Wilson* v. *New* (243 U. S. 332, 61 L. Ed. 755, L. R. A. 1917E, 938, 37 Sup. Ct. Rep. 298, Ann. Cas. 1918A, 1024) and the case before us is that already referred to. The power of a legislature to compel continuity in a business can only arise where the obligation of continued service by the owner and its employees is direct, and is assumed when the business is entered upon. A common carrier which accepts a railroad franchise is not free to withdraw the use of that which it has granted to the public. It is true that, if operation is impossible without continuous loss (*Brooks-Scanlon Co.* v. *Railroad Commission,* 251 U. S. 396, 64 L. Ed. 323, P. U. R. 1920C, 579, 40 Sup. Ct. Rep. 183; *Bullock* v. *Florida,* 254 U. S. 513, 65 L. Ed. 380, P. U. R. 1921B, 507, 41 Sup. Ct. Rep. 193), it may give up its franchise and enterprise; but, short of this, it must continue. Not so the owner when, by mere changed conditions, his business becomes clothed with a public interest. He may stop at will, whether the business be losing or profitable.

* * * * *

"'We think the Industrial Court Act, in so far as it permits the fixing of wages in plaintiff in error's packing house, is in conflict with the 14th Amendment, and deprives it of its property and liberty of contract without due process of law.''

From this opinion and the cases therein cited, it is plain that whether a business is affected with a public interest is a *question of fact* to be determined under the circumstances at the time and place. The legislature makes the determination in the first instance. If the legislature decrees that a business is public, the way must be left open for the owner to withdraw. The owner did not invest his money in a public business. The legislature cannot *compel* him to do so. Here the door is not left open. Cross-petitioners are required to proceed.

If it be thought that this issue is not involved in this case because cross-petitioners have not attempted to withdraw their property from the public use, attention is called to two points: (1) the employer in the *Wolff* case had not attempted to withdraw; and (2) in the case at bar, Section 21 of the Natural Gas Act (15 U. S. C. 717 t) imposes a fine or imprisonment, or both, upon any party who wilfully and knowingly violates the Act.

IX.

The Court Below Correctly Held, in Effect, That the Holding of the Commission That $6,395,180 Per Annum Is an Adequate Allowance to Cross-Petitioners for Amortization and Return Is Not Supported by Substantial Evidence and Is Contrary to the Law Applicable to Such Allowances.

X.

The Court Below Correctly Held, in Effect, That the Holding and Finding of the Commission that Cross-Petitioners' Annual Net Revenues Available for Amortization and Return Exceed the Amount Reasonably Necessary by $2,966,352, and That a Reduction in Cross-Petitioners' Annual Revenues of the Amount Last Stated, Together With the Consequent Reduction in the Applicable Federal Income Taxes, Would Permit a Reduction in Net Operating Revenues of $3,750,000 Annually, Are Not Supported by Substantial Evidence and Are Contrary to the Law Applicable to the Fixing of Proper Allowances for Cross-Petitioners.

XI.

The Court Below Correctly Held, in Effect, That the Holding of the Commission That the Rates and Charges of Cross-Petitioners, After Reflecting the Reduction Ordered, Will Be Just and Reasonable Is Not Supported by Substantial Evidence.

XII.

The Commission's Order, as Modified, Directing Cross-Petitioners, on or Before September 1, 1940, to File New Schedules of Rates and Charges for the Sale of Gas Which Shall Reflect a Reduction in Cross-Petitioners' Operating Revenues of Not Less Than $3,750,000 Per Annum, If Enforced, Would Result in Confiscation of Cross-Petitioners' Property and Revenues, in Violation of the Due Process Clause of the Fifth Amendment to the Constitution of the United States.

The last four propositions are of summary character and embody the various errors submitted and briefed in connection with the preceding propositions of law, and the subdivisions of such propositions. It is not necessary, therefore, to elaborate on the errors stated in the last four propositions, or to cite authorities in support thereof; for it follows, of course, that if the assignments of error raised in the preceding propositions, or any of them, be sustained by the Court, the assignments presented in the last four propositions will be sustained.

Summary.

A. *Going Concern Value* (pp. 68-101, *supra*).

The court below correctly held that the Commission erred as a matter of law in not allowing the claim of $8,500,000 as going concern value. The refusal of the Commission to include that value in the amount to be amortized manifestly would result in the *confiscation of cross-petitioners' property to that amount.* The refusal of the Commission to include that value in the rate base manifestly would result in the *confiscation of the reasonable return on that value* to which cross-petitioners are entitled. At 6½% per annum, the rate of return allowed, the amount thus confiscated *each year* would be $552,500. At 8% per annum, the rate of return to which cross-petitioners believe themselves entitled under the evidence, the amount thus confiscated each year would be $680,000.

B. *Amortization.*

(1) The Period of Amortization (pp. 102-129, *supra*).

The court below correctly held that the Commission erred as a matter of law in fixing the amortization period at 23 years, beginning January 1, 1932, the date cross-petitioners commenced operations as a private enterprise. Assuming no error by the Commission in using an interest rate of 6½% compounded annually in computing the annual allowance for amortization, and assuming that the period should have been 16 years 6⅓ months, beginning with June 21, 1938, the date the Natural Gas Act became effective, the error of the Commission on this point would result in the confiscation of $40,394,505 over the remaining life of cross-petitioners' enterprise (see p. 129, *supra*). On each of the two assumptions the amount confiscated would, of course, include the amount confiscated by failure to include the going concern value in the amount to be amortized.

(2) The Interest Rate in Computing the Annual Amount (pp. 130-144, *supra*).

Under the uncontradicted evidence the Commission should have used 2% compounded semi-annually as the interest rate in computing the annual allowance for amortization by the sinking fund method. In using the rate of return allowed, 6½% per annum compounded annually, as the interest rate in computing the annual allowance for amortization, the Commission erred as a matter of law. Assuming for the purpose of this question no error in fixing the period of amortization at 23 years, the error of the Commission on this point manifestly would result in the confiscation of $39,352,707 (see p. 144, *supra*).

(3) The Combined Result of the Errors in Fixing the Annual Allowance for Amortization.

In dealing with the subject of amortization the Commission erred as a matter of law in three particulars: first, in fixing the amount to be amortized, second, in fixing the period of amortization, and, third, in using a 6½% interest rate. It is necessary, therefore, to test the result of the order, giving effect to all three of these errors.

Should the Court find that the proper period of amortization is 16 years 6⅓ months, beginning with June 21, 1938, the date on which the Natural Gas Act became effective, it develops that $1,557,852, the annual allowance fixed by the Commission, together with interest on each installment at the rate of 2% per annum compounded semi-annually, would accrue a total of $30,189,843 by the end of 1954. Thus it appears that of $84,341,218, to which the court below held cross-petitioners to be entitled, there would be a deficit of $54,151,375, which amount would be confiscated over the period on account of these errors. The proper amount to be set aside each year in order to accumulate the total of $84,341,218 over the 16 years 6⅓ months is $4,330,818. *Thus as a result of these errors there is a confiscation each year of* $2,772,966, the difference between the correct amount and $1,557,852 actually allowed.

Should the Court find that the amortization period should begin on August 1, 1940, the date of the order, the period of amortization ending with the year 1954 would be 14 years 5 months. It develops that $1,557,852, the annual allowance fixed by the Commission, together with interest on each installment at the rate of 2% per annum compounded semi-annually, would accrue a total of $25,741,514 by the end of 1954. Thus it appears that of the $84,341,218 to which the court below held cross-petitioners to be entitled, there will be a deficit of $58,599,704, which amount would be confiscated over the period on account of these errors. The proper amount to be set aside each year in order to accumulate the total of $84,341,218 over the 14 years 5 months is $5,100,732. *Thus as a result of these errors there is a confiscation each year of* $3,542,880, the difference between the correct amount and the $1,557,852 actually allowed.

C. *Rate of Return* (pp. 175-215, *supra*).

The Commission fixed the rate of return at 6½% per annum on the rate base erroneously allowed by the Commission. Assuming a proper rate base, it appears from the evidence as a whole, which is not contradicted by substantial evidence, that a reasonable rate of return to cross-petitioners should be not less than 8% per annum. It conclusively appears that the Commission gave no effect to any of the elements entering into a proper rate of return except the one element, cost of capital, and even in its consideration of that element, on the erroneous figures adopted in its opinion, the Commission erred in that it failed by .22% to allow the overall cost to cross-petitioners of recapitalizing their capital assets. The error of the Commission in fixing the rate of return at 6½% per annum of itself manifestly would result in substantial confiscation of cross-petitioners' property and revenues.

D. *Jurisdiction.*

(1) The Present Rates (pp. 145-166, *supra*).

The Commission is without jurisdiction to enter an order reducing cross-petitioners' charges unless and until the

Commission and complainant discharge the burden of proving by substantial evidence that the existing charges are unjust and unreasonable. The Commission and complainant have wholly failed to discharge such burden; and there is no substantial evidence to sustain the finding of the Commission that the existing rates and charges are unjust and unreasonable.

(2) The Failure of the Commission To Fix New Rates (pp. 166-174, *supra*).

Under the Natural Gas Act it is the duty of the Commission, if and when it finds, after hearing, that the existing rates are unjust and unreasonable, (a) to determine just and reasonable charges, and (b) to fix the same by order. The Commission has made no effort to determine just and reasonable charges, has offered no evidence of what just and reasonable charges for cross-petitioners' gas would be for any of the uses to which such gas is subjected, and has entered no order fixing any different charges than those now fixed by the contracts between cross-petitioners and their purchasers. In the present state of the record the Commission has no jurisdiction to enter such an order. The order of the Commission that cross-petitioners file new schedules of rates effecting a reduction in their gross revenues is not a compliance with the mandate of the statute and is not authorized by the terms of the statute.

(3) The Power To Issue an Interim Order (pp. 216-234, *supra*).

The Commission has no power or jurisdiction except that derived from the Natural Gas Act. The Act confers no power or jurisdiction on the Commission to enter an order in the midst of the hearing. The so-called interim order for that reason is void.

(4) The Question of Constitutionality (pp. 234-254, *supra*).

The Natural Gas Act as applied by the Commission to cross-petitioners and to the business of the latter is in conflict with the due process clause of the Fifth Amendment to the Constitution of the United States; and the interim order purportedly issued under such Act is void.

XIII.

If This Court Should Reverse the Judgment of the Court Below and Uphold the Commission's Order, Cross-Petitioners Should Not Be Required to Refund to Their Customers the Amounts Representing the Ordered Reduction in Revenues Which Have Accrued Since the Commission's Order.

A. *No Public Interest Will Be Served by Requiring Cross-Petitioners To Pay Over as a Windfall to Their Wholesale Customers the Very Substantial Sums of Money Involved in Such a Refund, Which Amounts the Distributing Utilities Contracted To Pay Cross-Petitioners and Which, If Refunded to Them, Such Distributing Utilities Could Not Be Required by State Regulatory Bodies To Pass on to Their Customers, the Consumers.*

B. *The Existing Rates Are Valid and Enforcible Until the Commission Shall Determine the Just and Reasonable Rates and Fix the Same by Order; and Even If the Court Below Should Have Held that the Commission Could Require Cross-Petitioners To File New Schedules of Rates Effecting the Reduction Ordered, Such New Rates Could Not Be Made Retroactive, but Would Become Effective Only When Constituted the New Rates by Order of the Commission.*

(Sec. 10, Summary of Argument, *supra*, p. 67).

The Commission's order (R. Vol. VIII, pp. 3945-6), as amended (R. Vol. VIII, p. 3960), directed cross-petitioners to file new schedules of rates and charges on or before September 1, 1940, which new schedules should reflect a reduction of $3,750,000 per annum in cross-petitioners' operating revenues. The Commission expressly reserved the right "to reject all or any part of such new schedules and in lieu thereof to prescribe the same by further order" (R. Vol. VIII, p. 3946).

On August 30, 1940, Judge Sparks, one of the judges of the court below, entered a temporary restraining or stay order (R. Vol. VIII, p. 4026). On November 1, 1940, the court below, in proceedings initiated by the Commission and complainant, entered a stay order under Section 19(c) of the Act (15 U. S. C. 717r(c); R. Vol. VIII, pp. 4025-6). As a condition of stay, cross-petitioners were required to file, and did file, with the clerk of the court below their bond in the penal sum of $1,000,000, conditioned on the payment by cross-petitioners to their customers, as their several interests appear, the amounts representing the ordered reduction in revenues accruing pending judicial review, in the event that the Commission's order be sustained. Cross-petitioners urge that, if this Court should disagree with *all* of the contentions of cross-petitioners, and should uphold the order, cross-petitioners should not be required to make refunds to the distributing utilities, which have purchased gas from cross-petitioners under contracts in existence long prior to the enactment of the Act, of the amounts representing the ordered reduction from August, 1940, to the date on which the Commission shall actually fix new rates in lieu of existing charges.

Construing the Natural Gas Act, the Circuit Court of Appeals for the Eighth Circuit, in *Mississippi Fuel Corporation* v. *Federal Power Commission,* 121 Fed. (2) 159, 164 (advance sheet), said:

> "Protection of the ultimate consumer and not the intermediate utility was the manifest purpose of the Act."

Cross-petitioners sell 98% of their gas to distributing utilities, which resell it to the ultimate consumers. The other 2% is sold directly to industrial users at prices not affected by the order. Only the gas sold to distributing utilities is subject to regulation by the Commission. Section 1(b) of the Act specifies that with respect to sales it applies only

> "to the *sale* in interstate commerce of natural gas *for resale for ultimate public consumption* for domestic, commercial, industrial, or any other use. * * *"

If cross-petitioners be required to refund the difference between the charges which the Commission shall ultimately fix as just and reasonable and the existing charges, the distributing utilities, and not the ultimate customers of those utilities, will benefit. It may be that the new schedule of rates will effect such savings in the cost to the distributing utilities as that under all the facts they might be required to pass the saving under the new rates on to their ultimate customers from and after the time when the state regulatory bodies having jurisdiction of the retail rates should order a reduction; but the amounts received in the meantime by the respective utility distributing companies, from a refund by cross-petitioners of amounts representing the accrued reductions, could not be considered by the regulatory bodies in fixing future retail rates for the sale of gas. The principle that future rates can not be based on past profits or losses is well established. *Knoxville* v. *Knoxville Water Co.*, 212 U. S. 1, 14; *Galveston Electric Co.* v. *Galveston*, 258 U. S. 388, 395; *City of Minneapolis* v. *Rand*, 285 Fed. 818, 823. In the latter case the court thus aptly stated the principle:

> "The claim that past profits justify a present rate that is not reasonable is no more tenable than the converse contention that if a public service corporation has operated at a loss in prior years it is therefore entitled to more than a reasonable rate of return in order to make up the deficits."

In any rate proceeding that may arise after the Commission finally fixes new rates and charges at which cross-petitioner may sell their gas, the refunds covering gas sold prior to that time would fall in the category of past profits, and thus could not enter into the rate fixed for future retail sales. The utility distributing companies purchasing gas from cross-petitioners are not entitled to a windfall through which they would receive back from cross-petitioners substantial sums of money paid to cross-petitioners in pursuance of contracts voluntarily negotiated with cross-petitioners long prior to the enactment of the Natural Gas Act. As between cross-petitioners, which have collected only those sums which the distributing utilities contracted to pay for gas, and the distributing utilities, which have contracted to pay the money, cross-petitioners are clearly entitled to retain the sum representing the ordered reduction up until the time when new rates shall have been actually established by order of the Commission.

On the matter of refunds, in rate cases, the courts are guided by equitable principles in making disposition of the fund. In *U. S.* v. *Morgan*, 307 U. S. 183, 190-1, this Court, in a decision concerning the disposition of moneys paid into court in a rate case, stated "two cardinal principles." One of these cardinal principles is that a court

> "in exerting its extraordinary powers to stay execution of a rate order and in directing payment into court of so much of the rate as has been found administratively to be excessive, it assumes the duty of making disposition of the fun in conformity to equitable principles."

We submit that in equity there is no basis for taking out of the pockets of cross-petitioners revenues that have accrued from the sale of gas under contracts voluntarily executed by the purchasing utilities and transferring this money to the pockets of the distributing utilities, thus enriching the utilities at the expense of cross-petitioners, with no benefit whatever accruing to the ultimate consumers of the utilities, for the protection of whose interests the legislation was enacted. No public interest would be served by thus penalizing cross-petitioners.

There is another sound legal basis for the contention that no such refund should be required of cross-petitioners. In Subdivision V of this brief (*supra,* pp. 166-174) we have pointed out that the existing rates are presumed to be just and reasonable and must be continued in effect until superseded by new rates established by constitutional administrative procedure. *C. I. & L. Ry. Co.* v. *International Milling Co.*, 43 Fed. (2nd) 93, 96. The order of the Commission directing cross-petitioners to file new schedules of rates effective retroactively as to all bills regularly rendered on or after September 1, 1940, which in practical effect means that the new rates shall affect all gas sold on or after August 1, 1940, does not fix new rates. As above pointed out, the Commission expressly reserved the right to reject the new rates or any of them and to fix new rates for those rejected by further order. If it is conceivable that the Commission, in violation of the plain mandate of the statute, can require cross-petitioners to submit a new schedule of rates, all of which the Commission must examine and any or all of which it may reject or approve, we submit that the rates tendered by cross-petitioners do not supersede the existing rates until such time as the Commission shall have examined and approved them. It is equally clear that the new rates would be effective only from and after the time of the approval. They cannot be made retroactive to August 1, 1940. It follows, of course, that up to the time of the approval of the new rates the purchasing utilities should pay for the gas purchased from cross-petitioners at the prices fixed by their contracts.

Conclusion.

For each of the reasons above reviewed the interim order of the Commission is void and should be set aside, and for the same reasons the order of the Commission manifestly would operate to confiscate cross-petitioners' property and revenues to the amount of $3,750,000 each year.

Cross-petitioners respectfully submit that, upon the grounds discussed and upon each of said grounds, the judgment of the court below that the order of the Commission be vacated should be in all things affirmed, and that this Court should direct that this cause be remanded to the Commission with directions that it be dismissed. In the alternative, cross-petitioners respectfully submit that, in the event the order of the Commission be upheld, this Court should decree that the existing rates shall continue in operation and effect to the date on which the Commission shall have determined just and reasonable rates and fixed the same by order.

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APPENDIX A.

PERTINENT SECTIONS OF THE NATURAL GAS ACT.

(15 U. S. C. 717.)

SECTION 1. (15 U. S. C. 717.) (a) As disclosed in reports of the Federal Trade Commission made pursuant to S. Res. 83 (Seventieth Congress, first session) and other reports made pursuant to the authority of Congress, it is hereby declared that the business of transporting and selling natural gas for ultimate distribution to the public is affected with a public interest, and that Federal regulation in matters relating to the transportation of natural gas and the sale thereof in interstate and foreign commerce is necessary in the public interest.

(b) The provisions of this Act shall apply to the transportation of natural gas in interstate commerce, to the sale in interstate commerce of natural gas for resale for ultimate public consumption for domestic, commercial, industrial, or any other use, and to natural-gas companies engaged in such transportation or sale, but shall not apply to any other transportation or sale of natural gas or to the local distribution of natural gas or to the facilities used for such distribution or to the production or gathering of natural gas.

SECTION 4. (15 U. S. C. 717c.) (a) All rates and charges made, demanded, or received by any natural-gas company for or in connection with the transportation or sale of natural gas subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges, shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful.

(b) No natural-gas company shall, with respect to any transportation or sale of natural gas subject to the jurisdiction of the Commission, (1) make or grant any undue preference or advantage to any person or subject any person to any undue prejudice or disadvantage, or (2) maintain any unreasonable difference in rates, charges, service, facilities, or in any other respect, either as between localities or as between classes of service.

(c) Under such rules and regulations as the Commission may prescribe, every natural-gas company shall file with the Commission, within such time (not less than sixty days from the date this Act takes effect) and in such form as the Commission may designate, and shall keep open in convenient form and place for public inspection, schedules showing all rates and charges for any transportation or sale subject to the jurisdiction of the Commission, and the classifications, practices, and regulations affecting such rates and charges, together with all contracts which in any manner affect or relate to such rates, charges, classifications, and services.

(d) Unless the Commission otherwise orders, no change shall be made by any natural-gas company in any such rate, charge, classification, or service, or in any rule, regulation, or contract relating thereto, except after thirty days' notice to the Commission and to the public. Such notice shall be given by filing with the Commission and keeping open for public inspection new schedules stating plainly the change or changes to be made in the schedule or schedules then in force and the time when the change or changes will go into effect. The Commission, for good cause shown, may allow changes to take effect without requiring the thirty days' notice herein provided for by an order specifying the changes so to be made and the time when they shall take effect and the manner in which they shall be filed and published.

(e) Whenever any such new schedule is filed the Commission shall have authority, either upon complaint of any State, municipality, or State commission, or upon its own initiative without complaint, at once, and if it so orders, without answer or formal pleading by the natural-gas company, but upon reasonable notice, to enter upon a hearing concerning the lawfulness of such rate, charge, classification, or service; and, pending such hearing and the decision thereon, the Commission, upon filing with such schedules and delivering to the natural-gas company affected thereby a statement in writing of its reasons for such suspension, may suspend the operation of such schedule and defer the use of such rate, charge, classification, or service, but not for a longer period than five months beyond the time when it would otherwise go into effect: *Provided*, That the Commission shall not have authority to suspend the rate, charge, classification, or service for the sale of natural gas for resale for industrial use only; and after full hearings, either completed before or after the rate, charge, classification, or service goes into effect, the Commission may make such orders with reference thereto as would be proper in a proceeding initiated after it had become effective. If the proceeding has not been concluded and an order made at the expiration of the suspension period, on motion of the natural-gas company making the filing, the proposed change of rate, charge, classification, or service shall go into effect. Where increased rates or charges are thus made effective, the Commission may, by order, require the natural-gas company to furnish a bond, to be approved by the Commission, to refund any amounts ordered by the Commission, to keep accurate accounts in detail of all amounts received by reason of such increase, specifying by whom and in whose behalf such amounts were paid, and, upon completion of the hearing and decision, to order such natural-gas company to refund, with interest, the portion of such increased rates or charges by its decision found not justified. At any hearing involving a rate or charge sought to be increased, the burden of proof to show that the increased rate or charge is just and reasonable shall be upon the natural-gas company, and the Commission shall give to the hearing and decision of such questions preference over other questions pending before it and decide the same as speedily as possible.

Section 5. (15 U. S. C. 717d.) (a) Whenever the Commission, after a hearing had upon its own motion or upon complaint of any State, municipality, State commission, or gas distributing company, shall find that any rate, charge, or classification demanded, observed, charged, or collected by any natural-gas company in connection with any transportation or sale of natural gas, subject to the jurisdiction of the Commission, or that any rule, regulation, practice, or contract affecting such rate, charge, or classification is unjust, unreasonable, unduly discriminatory, or preferential, the Commission shall determine the just and reasonable rate, charge, classification, rule, regulation, practice, or contract to be thereafter observed and in force, and shall fix the same by order: *Provided, however,* That the Commission shall have no power to order any increase in any rate contained in the currently effective schedule of such natural-gas company on file with the Commission, unless such increase is in accordance with a new schedule filed by such natural gas company; but the Commission may order a decrease where existing rates are unjust, unduly discriminatory, preferential, otherwise unlawful, or are not the lowest reasonable rates.

SECTION 7. (15 U. S. C. 717f.) (a) Whenever the Commission, after notice and opportunity for hearing, finds such action necessary or desirable in the public interest, it may by order direct a natural-gas company to extend or improve its transportation facilities, to establish physical connection of its transportation facilities with the facilities of, and sell natural gas to, any person or municipality engaged or legally authorized to engage in the local distribution of natural or artificial gas to the public, and for such purpose to extend its transportation facilities to communities immediately adjacent to such facilities or to territory served by such natural-gas company, if the Commission finds that no undue burden will be placed upon such natural-gas company thereby: *Provided,* That the Commission shall have no authority to compel the enlargement of transportation facilities for such purposes, or to compel such natural-gas company to establish physical connection or sell natural gas when to do so would impair its ability to render adequate service to its customers.

(b) No natural-gas company shall abandon all or any portion of its facilities subject to the jurisdiction of the Commission, or any service rendered by means of such facilities, without the permission and approval of the Commission first had and obtained, after due hearing, and a finding by the Commission that the available supply of natural gas is depleted to the extent that the continuance of service is unwarranted, or that the present or future public convenience or necessity permit such abandonment.

(c) No natural-gas company shall undertake the construction or extension of any facilities for the transportation of natural gas to a market in which natural gas is already being served by another natural-gas company, or acquire or operate any such facilities or extensions thereof, or engage in transportation by means of any new or additional facilities, or sell natural gas in any such market, unless and until there shall first have been obtained from the Commission a certificate that the present or future public convenience and necessity require or will require such new construction or operation of any such facilities or extensions thereof: *Provided, however,* That a natural-gas company already serving a market may enlarge or extend its facilities for the purpose of supplying increased market demands in the territory in which it operates. Whenever any natural-gas company shall make application for a certificate of convenience and necessity under the provisions of this subsection, the Commission shall set the matter for hearing and shall give such reasonable notice of the hearing thereon to all interested persons as in its judgment may be necessary under rules and regulations to be prescribed by the Commission. In passing on applications for certificates of convenience and necessity, the Commission shall give due consideration to the applicant's ability to render and maintain adequate service at rates lower than those prevailing in the territory to be served, it being the intention of Congress that natural gas shall be sold in interstate commerce for resale for ultimate public consumption for domestic, commercial, industrial, or any other use at the lowest possible reasonable rate consistent with the maintenance of adequate service in the public interest.

SECTION 19. (15 U. S. C. 717r.) (a) Any person, State, municipality, or State commission aggrieved by an order issued by the Commission in a proceeding under this Act to which such person, State, municipality, or State commission is a party may apply for a rehearing within thirty days after the issuance of such order. The application for rehearing shall set forth specifically the ground or grounds upon which such application is based. Upon such application the Commission shall have power to grant or deny rehearing or to abrogate or modify its order without further hearing. Unless the Commission acts upon the application for rehearing within thirty days after it is filed, such application may be deemed to have been denied. No proceeding to review any order of the Commission shall be brought by any person unless such person shall have made application to the Commission for a rehearing thereon.

(b) Any party to a proceeding under this Act aggrieved by an order issued by the Commission in such proceeding may obtain a review of such order in the circuit court of appeals of the United States for any circuit wherein the natural-gas company to which the order relates is located or has its principal place of business, or in the United States Court of Appeals for the District of Columbia, by filing in such court, within sixty days after the order of the Commission upon the application for rehearing, a written petition praying that the order of the Commission be modified or set aside in whole or in part. A copy of such petition shall forthwith be served upon any member of the Commission and thereupon the Commission shall certify and file with the court a transcript of the record upon which the order complained of was entered. Upon the filing of such transcript such court shall have exclusive jurisdiction to affirm, modify, or set aside such order in whole or in part. No objection to the order of the Commission shall be considered by the court unless such objection shall have been urged before the Commission in the application for rehearing unless there is reasonable ground for failure so to do. The finding of the Commission as to the facts, if supported by substantial evidence, shall be conclusive. If any party shall apply to the court for leave to adduce additional evidence, and shall show to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for failure to adduce such evidence in the proceedings before the Commission, the court may order such additional evidence to be taken before the Commission and to be adduced upon the hearing in such manner and upon such terms and conditions as to the court may seem proper. The Commission may modify its findings as to the facts by reason of the additional evidence so taken, and it shall file with the court such modified or new findings, which if supported by substantial evidence, shall be conclusive, and its recommendation, if any, for the modification or setting aside of the original order. The judgment and decree of the court, affirming, modifying, or setting aside, in whole or in part, any such order of the Commission, shall be final, subject to review by the Supreme Court of the United States upon certiorari or certification as provided in sections 239 and 240 of the Judicial Code, as amended (U. S. C., title 28, secs. 346 and 347).

(c) The filing of an application for rehearing under subsection (a) shall not, unless specifically ordered by the Commission, operate as a stay of the Commission's order. The commencement of proceedings under subsection (b) of this section shall not, unless specifically ordered by the court, operate as a stay of the Commission's order.

Section 20. (15 U. S. C. 717s.) (a) Whenever it shall appear to the Commission that any person is engaged or about to engage in any acts or practices which constitute or will constitute a violation of the provisions of this Act, or of any rule, regulation, or order thereunder, it may in its discretion bring an action in the proper district court of the United States, the District Court of the United States for the District of Columbia, or the United States courts of any Territory or other place subject to the jurisdiction of the United States, to enjoin such acts or practices and to enforce compliance with this Act or any rule, regulation, or order thereunder, and upon a proper showing a permanent or temporary injunction or decree or restraining order shall be granted without bond. The Commission may transmit such evidence as may be available concerning such acts or practices or concerning apparent violations of the Federal antitrust laws to the Attorney General, who, in his discretion, may institute the necessary criminal proceedings.

(b) Upon application of the Commission the district courts of the United States, the District Court of the United States for the District of Columbia, and the United States courts of any Territory or other place subject to the jurisdiction of the United States shall have jurisdiction to issue writs of mandamus commanding any person to comply with the provisions of this Act or any rule, regulation, or order of the Commission thereunder.

Section 21. (15 U. S. C. 717t.) (a) Any person who willfully and knowingly does or causes or suffers to be done any act, matter, or thing in this Act prohibited or declared to be unlawful, or who willfully and knowingly omits or fails to do any act, matter, or thing in this Act required to be done, or willfully and knowingly causes or suffers such omission or failure, shall, upon conviction thereof, be punished by a fine of not more than $5,000 or by imprisonment for not more than two years, or both.

(b) Any person who willfully and knowingly violates any rule, regulation, restriction, condition, or order made or imposed by the Commission under authority of this Act, shall, in addition to any other penalties provided by law, be punished upon conviction thereof by a fine of not exceeding $500 for each and every day during which such offense occurs.

APPENDIX B.

Summary Sheet of Exhibit 140.

EXHIBIT 140

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL COMPANY

(Combined)

Earnings Statement Covering Entire Life of Project

Line No.		Total 1932–1938 Inclusive	Total 1939–1954 Inclusive	Total 1932–1954 Inclusive	Aver 1932-1 Inclu
	Revenue				
1	From Domestic Sales	$59,480,464	$164,835,603	$224,316,067	$ 9,75
2	From Industrial Sales	14,781,390	46,190,085	60,971,475	2,65
3	From Texoma Field Sales	145,358	256,591	401,949	17
4	Total Gas Sales	$74,407,212	$211,282,279	$285,689,491	$12,42
5	From Gasoline Sales	3,764,769	8,974,017	12,738,786	55
6	From Other Operating Income	113,563	193,531	307,094	13
7	Total Revenue	$78,285,544	$220,449,827	$298,735,371	$12,98
	Operation, Maintenance and Retirement Expense				
8	Operation Expense	$24,053,765	$ 80,994,386	$105,048,151	$ 4,56
9	Company Used Gas (Deduct)	1,730,164	6,272,871	8,003,035	34
10	Maintenance Expenses	2,514,019	13,785,303	16,299,322	70
11	Expense of Retiring Property	42,832	109,449	152,281	6
12	Maintenance Contingencies (10%)	—	1,389,473	1,389,473	60
13	Net Operation, Maintenance and Retirement Expense	$24,880,452	$ 90,005,740	$114,886,192	$ 4,99
14	Revenue Remaining for Amortization and Return	$53,405,092	$130,444,087	$183,849,179	$ 7,99
15	Capital Expenditure Excluding Cost of Gas Reserves	$50,305,248	$ 11,900,174	$ 62,205,422	$
16	Replacement Contingencies (10%)	—	256,406	256,406	—
17	Cost of Gas Reserves	15,893,513	2,800	15,896,313	—
18	Working Capital	975,000	—	975,000	—
19	Total Capital Expenditure and Working Capital	$67,173,761	$ 12,159,380	$ 79,333,141	[illegible]
20	Liquidating Salvage Value of				
21	(a) Capital Expenditures	—	—	457,452	—
22	(b) Warehouse Stocks	—	—	24,314	—
23	(c) Working Capital Cash	—	—	567,366	—
24	Total Liquidating Salvage Value	—	—	$ 1,049,132	—
25	Total Capital Expenditure and Working Capital Less Total Liquidating Salvage Value (Total Amortization)	—	—	78,284,009	$ 3,40
26	Revenue Remaining for Return	—	—	105,565,170	4,58
27	Average Rate of Return	—	—	—	6

APPENDIX C.

EXHIBIT 210.

9. (Revision of Pg. 1, Exhibit 141).

Federal Power Commission. Docket No.
Exhibit No. 210 (For Identification)

Natural Gas Pipeline Company of America and Texoma Natural Gas Company (Combined)

Earnings Statement Based on Book Cost as of January 1, 1939.

e mber	As of Jan. 1, 1939	Total 1938–1954	Average 1939–1954.
evenue			
From Domestic Sales	—	$164,835,603	$10,302,225
From Industrial Sales	—	46,190,085	2,886,880
From Texoma Field Sales	—	256,591	16,037
Total Gas Sales	—	$211,282,279	$13,205,142
From Gasoline Sales	—	8,974,017	560,876
From Other Operating Income	—	193,531	12,096
Total Revenue	—	$220,449,827	$13,778,114
peration and Maintenance			
Operation Expenses	—	$ 80,994,386	$ 5,062,149
Company Used Gas (deduct)	—	6,272,871	392,054
Maintenance Expense	—	13,785,303	861,581
Maintenance Contingencies (10%)	—	1,378,533	86,158
Net Operation and Maintenance	—	$ 89,885,351	$ 5,617,834
Revenue Remaining for Replacements, Amortization and Return	—	$130,564,476	$ 8,160,280
eserve for Replacements			
Capital Expenditure for Replacements	—	$ 3,105,244	$ 194,078
Cost of Retiring Capital Replaced	—	109,449	6,841
Salvage Value of Retirements (deduct)	—	541,253	33,828
Replacement Contingencies (10%)	—	267,346	16,709
Total of Reserve for Replacements	—	$ 2,940.786	$ 183,800
Capital Expenditures per Books, excluding Gas Reserves	$ 49,830,479		
Viewed Depreciation (deduct)	2,485,079		
Cost of Gas Reserves less Depletion to January 1, 1939	12,402.884		
Cost of Additional Property	—	$ 9,338,988	—
Going Concern Value	8,500,000	—	—
Working Capital	975,000	—	—
Total	69,223,284	$ 78,562,267	—
Total Rate Base	—	—	$75,305,459
Liquidating Salvage Value of			
(a) Capital Expenditure	—	$ 457,452	
(b) Warehouse Stocks	—	24,314	—
(c) Working Capital Cash	—	567,366	—
Total Liquidating Salvage Value	—	$ 1,049,132	—
Total to be Amortized	—	$ 77,513,135	—
Amortization Allowance	—	66,152,816	$ 4,134,551
(Sinking fund, 2% interest compounded semi-annually)			
Revenue Remaining for Return	—	61,470,874	$ 3,841,929
Rate of Return			5.10%

Federal Power Commission
Docket No. G-109 & G-112
Hearing Exhibit No. 210

APPENDIX D.

EXHIBIT 211.

2820 Revision of p. 1 of Ex. 142

Federal Power Commission. Docket N
Exhibit No. 211 (For Identificatio

Federal Power Commission
Docket No. G-109 & G-112
Hearing Ex. No. 211

Natural Gas Pipeline Company of America and Texoma Natural Gas Company (Combined)

Earnings Statement Based on Reproduction Cost New Less Existing Depreciation as of June 1, 1939

Line Number		As of June 1, 1939	Total 6-1-39 to 12-31-54 Inclusive	Averag Yearly 6-1-39 to 12-31-54 Inclusiv
	Revenue			
1	From Domestic Sales		$160,370,063	$10,291,
2	From Industrial Sales		44,811,352	2,875,
3	From Texoma Field Sales		247,567	15,
4	Total Gas Sales		$205,428,982	$13,182,
5	From Gasoline Sales		8,698,468	558,
6	From Other Operating Income		190,161	12,
7	Total Revenue		214,317,611	$13,753,
	Operation and Maintenance			
8	Operation Expense		$ 79,054,616	$ 5,073,
9	Company Used Gas (deduct)		6,107,808	391,
10	Maintenance Expense		13,536,004	868,
11	Maintenance Contingencies (10%)		1,353,603	86,
12	Net Operation and Maintenance		$ 87,836,415	5,636,
13	Revenue Remaining for Replacement, Amortization and Return		$126,481,196	$ 8,116,
	Reserve for Replacements			
14	Capital Expenditure for Replacements		$ 3,086,671	$ 198,
15	Cost of Retiring Capital Replaced		109,063	6,
16	Salvage Value of Retirement (deduct)		531,642	34,
17	Replacement Contingencies (10%)		266,411	17,
18	Total of Reserve for Replacements		$ 2,930,503	$ 188,
19	Reproduction Cost New Excluding Gas Reserves	$ 56,302,250	$ —	$ —
20	Viewed Depreciation (deduct)	2,866,758	—	—
21	Value of Gas Reserves	13,334,775	—	—
22	Cost of Additional Property	—	$ 9,145,083	—
23	Going Concern Value	8,500,000	—	—
24	Working Capital	975,000	—	—
25	Total	$ 76,245,267	$ 85,390,350	—
26	Total Rate Base	—	—	$82,291,
27	Liquidating Salvage Value of			
28	(a) Capital Expenditure	—	$ 457,452	—
29	(b) Warehouse Stocks	—	24,314	—
30	(c) Working Capital Cash	—	567,363	—
31	Total Liquidating Salv. Value	—	$ 1,049,132	—
32	Total to be Amortized		$ 84,341,218	$ —
33	Amortization Allowance (Sinking fund, 2% interest compounded semi-annually)	—	$ 72,304,635	$ 4,639,
34	Revenue Remaining for Return	—	$ 51,246,058	$ 2,288,
35	Rate of Return			4.

IN THE

Supreme Court of the United States

OCTOBER TERM, 1941.

No. 265

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COMMERCE COMMISSION,
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vs.

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AND TEXOMA NATURAL GAS COMPANY,
Respondents.

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vs.

FEDERAL POWER COMMISSION AND ILLINOIS
COMMERCE COMMISSION,
Respondents.

REPLY BRIEF FOR NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY.

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REPLY BRIEF FOR NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY.

Cross-petitioners do not agree with the statement of the questions in the brief of the Commission and complainant. In particular, they do not agree with the statement of question 3 (Brief, p. 2), in which the Commission and complainant omit to state that the Commission's order required that the new schedules be put into effect immediately, with prospective retroactive approval or disapproval; and of question 4, on the same page, in which they repeat the erroneous statement persistently made by the Commission and complainant that cross-petitioners contend that a *separate* allowance must be made for going concern value. The Commission and complainant fail to mention the issue of whether or not there is substantial evidence to support the Commission's finding that the present rates are unreasonable. They also fail to mention the alternative question of whether or not in the event the Commission's order should be sustained, cross-petitioners should be required to refund the ordered reduction in revenues accrued since the effective date of the Commission's order.

The statement of facts by the Commission and complainant contains erroneous assertions which are contrary to the record and numerous assertions which are utterly irrelevant to the issues here.

For the sake of brevity and clarity, cross-petitioners will treat all of the foregoing under the various appropriate headings to follow.

I.

The Commission and Complainant Err in Their Contention That the Natural Gas Act Is Valid as Applied to Cross-Petitioners.

The Commission and complainant assert (Brief, p. 25) that regulation of charges for gas, light, and heat has "traditionally been an appropriate legislative purpose." The fact is that "tradition" has limited legislative regulation of charges for gas, light, and heat to charges of a public utility. Tradition does not have it that prices of a wood-peddler, who chops the trees on his farm in Wisconsin and peddles the wood from door to door in Chicago for heat, may be fixed. So with candle and kerosene purveyors. The argument of the Commission and complainant proceeds with the assertion (Brief, p. 25) that the regulation of rates charged to the local distributor by gas pipeline companies is "plainly a reasonable if not an essential step" toward protection of the public against unreasonable charges for gas, light, and heat. By the same token, regulation of the prices of steel, furniture, valves, pipe, pencils, etc., purchased by the local distributor of gas is "reasonable if not essential."

The sweeping character of the contentions of the Commission and complainant is apparent. They urge this Court to do what it has consistently refused to do, and they go far beyond the limitations imposed by the Constitution. The Commission and complainant assert that price fixing is proper, provided that it bears "a reasonable relation to a proper legislative purpose" (Brief, p. 24). The "reasonable relation" found by this Court in the cases cited by the Commission and complainant (Brief, pp. 24, 25) is entirely absent in this case. All of the cases there cited are discussed and distinguished in cross-petitioners' original brief (pp. 241-243), with the exception of *U. S.* v. *Darby,* 312 U. S. 100. In that case, the legislation prohibited the shipment in interstate commerce of goods made under substandard labor conditions. The act there involved set up minimum wages and maximum hours. The prescribing of minimum wages is a far cry from the fixing of commodity prices in a private business.

II.

The Contention That the Commission Had Jurisdiction and Authority to Enter an Interim Order Is Erroneous.

The Commission and complainant urge in support of the interim order that Congress "evidently" intended the Commission to have this "salutory" power (Brief, p. 29).

The Commission and complainant disregard the settled law that the powers of a statutory commission are derived solely from the statute, and that those powers must be conferred ' in language free from doubt'' or "by language which admits of no other reasonable construction'' (Cross-Pet. Original Brief, pp. 217-218). The Commission and complainant urge (Brief, p. 29) that "the construction urged by the companies would serve no substantial purpose for the Commission could legitimately achieve the same result by the cumbersome process of opening and closing a succession of hearings.'' Cross-petitioners submit that the proper construction of the Act is to be determined from the plain language of Congress, from the legislative proceedings, etc. (See Cross-Petitioners' Original Brief, pp. 219-234), and not by what the Commission could or could not do "legitimately.''

Despite the "vast distinction'' asserted by the Commission and complainant (Brief, p. 29) between the interim order in the present case and the provisions in the New York and Pennsylvania statutes respecting the fixing of temporary rates, the plain fact is that amendments empowering the Commission to fix temporary rates were rejected by Congress during the proceedings on the legislation resulting in the Natural Gas Act (Cross-Petitioners' Original Brief, pp. 226-234). By rejecting these amendments and failing otherwise to confer such authority, the Congress consciously withheld from the Commission authority to enter an interim order.

III.

The Contention That a Mere Reduction of Profits Is a Compliance With the Act Is Erroneous.

The Commission and complainant assert (Brief, p. 21) that at the time of the entry of the interim order "no one was then concerned'' with "the details of a precise schedule" fixing rates. This statement is partly correct. There is no doubt that the Commission was not then concerned with fixing rates; neither was complainant. There is no evidence in the record upon which new rates can be fixed, assuming a finding based on substantial evidence that the present rates are unreasonable. The Commission did not fix reasonable rates among cross-petitioners' various classifications of charges, but sought to cut cross-petitioners' profits to a point barely above the line of confiscation—an error pointed out by Mr. Justice Brandeis, with whom Mr. Justice Holmes concurred, in *Southwestern Bell Telephone Co. v. Public Service Commission,* 262 U. S. 276, 296-298. The Commission and complainant assert (Brief, p. 30) that "details" can wait. A subsequent order approving the charges on cross-petitioners' bills regularly rendered after September 1, 1940, would be a retroactive order and invalid under the Act. The present order is clearly invalid. The Commission and complainant seek comfort in the *New England Divisions* case, 261 U. S. 184, 201-202 (Brief, pp. 30-31); but that case does not support their position. In that case the Interstate Commerce Commission fixed by order how much of the joint rate should go to carriers east of the Hudson River and how much to carriers west of the Hudson River. The subdivisions for the east and the subdivisions for the west were likewise fixed "in the same proportions as at present or otherwise as they (the carriers) may agree, or failing such agreement, as may be determined by the Commission upon application therefor" (p. 202).

The Commission and complainant cite (Brief, p. 31) *Driscoll v. Edison Co.,* 307 U. S. 104, 107, for the proposition that a mere reduction in profits is "accepted practice." The opinion in that case indicates otherwise. This Court stated the facts in part as follows (pp. 107-108):

> "Acting under Sec. 310, the commission, after notice and argument, issued a temporary rate order on July 13, 1937, requiring the utility to file rate schedules

> which would effect a reduction of approximately $435,000 in annual gross operating revenues. This order was replaced by another on July 27, 1937, which commanded an identical reduction. *This time the commission itself prescribed a schedule of rates.*" (Italics ours.)

The Pennsylvania statute there involved required the commission to "fix, determine, and prescribe * * * rates" (307 U. S. 110, footnote 9).

IV.

A. Cross-Petitioners' Reply to the Contention That the Commission Properly Refused to Make a "Separate" Allowance for Going Concern Value.

1. The Facts on Which the Claim Is Based.

In their brief the Commission and complainant repeatedly assert that cross-petitioners complain because the Commission refused to make a "separate" allowance for going concern value (Brief, pp. 2, 13, 16, 17, 19, 39-68). Cross-petitioners pointed out in their original brief (p. 68) that this is not a correct statement of the question presented. Cross-petitioners are not complaining because the Commission refused them a *separate* allowance for going concern value; their complaint is that the Commission made *no* allowance for going concern value, notwithstanding the uncontradicted evidence showing clearly that they were entitled to such an allowance.

The Commission and complainant assert that, while cross-petitioners disavow any contention that the physical and intangible values must be separately appraised, "their claim for an allowance additional to that which they claim for the physical properties obviously comes to the same thing." The effect of this contention by the Commission and complainant is to deny the existence of any such element of value as that commonly referred to as going concern value, notwithstanding the fact that this Court and every court in the country, so far as we are advised, have recognized for generations that going concern value is an actual element of value just as real as the value of a building, a compressor unit, a joint of pipe, or any other physical element going to make up a great plant like that of cross-petitioners. Not only would the Commission and complainant have this Court overrule and set aside the hundreds of decisions of this Court and other courts, both Federal and state, to the effect that, where such value exists and is proven, it must be allowed as a part of the rate base, but they would also have this Court blind its eyes to a generally well-recognized fact and hold that there is no such element of value!

In the discussion of this subject in their original brief cross-petitioners have cited many cases, including several of the very cases on which the Commission and complainant rely, in which this Court has held that upon proof of its existence going concern value has a place in the rate base. *Dayton Power & Light Co.* v. *Public Utilities Commission*, 292 U. S. 290, 308; *Columbus G. & F. Co.* v. *Public Utilities Commission*, 292 U. S. 398, 413; *Los Angeles G. & E. Co.* v. *Railroad Commission*, 289 U. S. 287, 313-14, 316. The cases are uniformly to the effect that this real, though intangible, value is something in excess of the *aggregate of the value of the separate pieces of tangible property. Adams Express Co.* v. *Ohio State Auditor*, 166 U. S. 185, 219.

As pointed out in cross-petitioners' original brief, the witnesses who appraised the physical properties, including the gas leases, of cross-petitioners dealt with the value or cost of reproducing the "separate pieces of tangible property." They expressly excluded from their figures any intangible value incident to the circumstance that these separate pieces of property had been put together into an assembled whole. In adopting the testimony and figures of these witnesses, the Commission necessarily excluded this intangible value, and the cost to cross-petitioners of acquiring this value (Original Brief, pp. 69-75). It is true the Commission used the expression that the rate base allowed was liberal and that it had allowed more than an adequate amount to cover all elements of value; but this language of the Commission must be read and construed in the light of the context of its opinion (R. Vol. VIII, pp. 3936-7), which, as pointed out by the court below (R. Vol. VIII, p. 4039) shows clearly that the Commission refused to recognize going concern value as an element to be considered, and that it consciously excluded from its consideration in arriving at the rate base any allowance for such intangible value.

The desperate attempt which the Commission and complainant are now making to show that such element of value was included in the rate base clearly implies a recognition that proof of the existence of this element of value was established by the evidence. With or without such admission, the evidence does establish as a matter of law the existence of such value and the cost of establishing that value. The language in their brief (p. 40) to the effect that cross-petitioners claim the right to capitalize costs allegedly incurred during the early period of operations until the development of *subsequent capacity* is misleading. Cross-petitioners are not making any such contention. Their contention is that, having provided the capacity at the time the pipeline was completed to transport 175 million cubic feet of gas daily, they are entitled to capitalize the costs incident to holding the unused portion of the capacity of their facilities until the market could be developed up to such original capacity. In other words, cross-petitioners had the capacity, which it was necessary from considerations of ordinary business prudence to provide in advance of the actual development of their markets; but they were not able to use this capacity until the markets were developed, and they sustained actual costs incident to maintaining this capacity and building up their market outlets to the amount of $8,500,000. In their discussion the Commission and complainant in effect admit the existence of the facts upon which cross-petitioners rely as the basis of their claim, but stand on the alternative and inconsistent contentions either that the Commission, contrary to what it said in its opinion, did make an allowance for going concern value, or that no going concern value exists, notwithstanding the uncontradicted evidence.

The Commission and complainant again call attention (Brief, p. 40) to the fact that allowances were made in the rate base for overhead, interest, taxes, administrative, legal and supervisory charges, and expenses of preliminary operations during the construction period. It is true that such allowances were made. They were clearly proper in the light of the decisions of the courts and regulatory commissions and the practice of regulated companies from time immemorial. The basis of the allowance is clear. The regulated company is using none of its facilities during the period of construction, and, unless compensated in the rate base for interest, taxes, and other charges above enumerated, it would absolutely lose those costs. The courts have recognized that it should have no such burden imposed upon it and have uniformly approved the capitalization of such costs. Far from being a reason why the contention of cross-petitioners as to going concern value should be refused, the proper allowance of these items is an unanswerable argument for the allowance of cross-petitioners' claims here presented. This is evident, for all of these claims are based upon actual costs incurred by cross-petitioners on account of that portion of their facilities and capacity not yet put into use. There is no more basis for imposing on cross-petitioners the burden of losing these costs incurred in connection with facilities and capacity provided in advance of use after they commenced limited operations than for imposing such burden upon them during the period of construction. *Pioneer T. & T. Co.* v. *Westenhaver*, 118 Pac. 354, 360-1; *State* v. *S. W. Bell Tel. Co.*, 223 Pac. 771, 782-3; *Monroe Gaslight & Fuel Co.* v. *Michigan Public Utilities Commission*, 11 Fed. (2) 319, 322.

The Commission and complainant observe that the claim is not limited to the two-year period when the companies were operating at a loss but embraces the entire period during which cross-petitioners were not operating at their full capacity. Why should it be limited to the first two years of their operations? Cross-petitioners are not trying to capitalize losses, but *costs* incident to maintaining this unused capacity and to the building up of their market outlets to the original capacity. These costs have no relation to profits or losses.

The observation of the Commission and complainant (Brief, pp. 41-2) that on cross-examination the witness Emery conceded that the going value, referring to the elements of cost forming the basis of such value, would have been correspondingly increased if operating charges had been greater because of inefficiency, or if the costs in terms of interest and taxes had been larger, or if the existing depreciation had been greater than that shown by the evidence, begs the question. There is absolutely no evidence that the operating charges, the interest, the taxes, or the other elements of cost involved were excessive. The evidence establishes the contrary. The Commission would have full power and authority to deal with any such excessive costs, and to reduce the allowance to costs which were reasonable, should it appear that any of these costs were improperly incurred. It is the universal practice to reimburse a lawyer who travels to a distant city on business for his client for the reasonable and necessary expenses incurred on the trip. Would his client be justified in refusing to allow a reasonable and proper bill for such costs on the ground that if the attorney had been less efficient and had thus spent more time on the trip than was necessary, or if he had been a scoundrel and had included items of cost which were not actually incurred, his bill would have been too high?

The Commission and complainant again beg the question in asserting (Brief, p. 42) that the claim of cross-petitioners that they should be permitted to capitalize the development costs as a part of the rate base is absurd because there was never any real risk that such costs would not be amortized out of subsequent earnings or any real potential difficulty in creating a sufficient consumer demand within a short period. The record presents no basis for any claim that cross-petitioners did not develop the consumer demand as rapidly as it could be developed, or that they incurred any unnecessary costs in connection with its development. Of course they hoped to amortize this cost over the life of their natural gas reserves; but their hopes were based upon probable earnings over the whole period on the basis of private contracts, which were made long prior to regulation under the Natural Gas Act.

The fact that one of the principal ultimate purchasers of natural gas transported by cross-petitioners is a minority stockholder of cross-petitioners is utterly beside the issue. This is true also of the observation (p. 42) that in their early estimates submitted to the Illinois Commerce Commission in 1931, a witness, who happened at one time to have been a director of cross-petitioners, testifying for another company, expressed the opinion that over the whole period of their operations cross-petitioners would realize an average return of only 6.2%. The Commission and complainant wholly ignored the fact, though the record shows it, that this testimony was offered in the latter part of 1931 and was based on the observation made in the same connection that at the time the project was conceived, and at the time the owners put their money into the project, they did not realize that the economic depression which had befallen the country beginning in 1929 would continue indefinitely. The fact that one of the former directors of the companies at the time he testified did not expect a return, over the whole period, of more than 6.2% is no evidence of what cross-petitioners and their owners expected or hoped at the time they put their money into the project, nor can it be said with any degree of certainty, with the conditions now confronting this country, that even in the absence of regulation they would be able to earn 6.2% over the period ending with the exhaustion of their gas reserves.

The argument beginning on page 43 of the brief of the Commission and complainant based on the earnings and rate of return during the years 1936 to 1938 is as misleading as it is irrelevant. *Why did the Commission and complainant go to the trouble to set out the figures and the rate of return over only this three years' period, 1936 to 1938?* The exhibits from which they took the figures set out in the footnote on page 44 show the same data for the entire period 1932 to 1938, inclusive. Their reason for selecting the figures of only three years appears at once upon an examination of the figures for the whole period. If the whole period be considered, the item, "Total Undepreciated Cost of Property, Plus Working Capital," shown in the footnote as $181,109,414.72 for the years 1936 to 1938, turns out to be $426,963,939.83 (Exhibit 137, p. 2, line 20, R. Vol. VII, p. 2993; Exhibit 141, R. Vol. VII, p. 3025). The item "Total Net Earnings Available for Return (1936, 1937 and 1938)" in the footnote becomes $34,040,882.34 for the period 1932 to 1938 (Exhibit 136, p. 1, lines 5, 9, 10 and 11, R. Vol. VII, p. 2959), and the "Average Return on the Undepreciated Rate Base (%)" *is not 11.9% but 7.9%*. Also the "Net Earnings Available for Return, Less $8,500,000 Claimed by the Companies for Going Value" turns out to be $23,540,882.34, and the "Average Return on Undepreciated Rate Base After Deducting from the Return the Total Amount Claimed for Going Value (%)" turns out to be, *not 7.28 %, but 5.5%*. Thus it appears that during the period prior to regulation the earnings of cross-petitioners fell far short of an aggregate sufficient to return to cross-petitioners their costs in the amount of $8,500,000 and a return of 6½% per annum, the rate of return allowed by the Commission!

But their whole argument on this point is irrelevant. Since during the years prior to the enactment of the Natural Gas Act cross-petitioners were an unregulated concern, engaged in a strictly private enterprise, their earnings belonged to them. Notwithstanding a manifest desire to do so, as evidenced by the argument now under discussion and by other similar efforts to defend the order on account of the earnings record of cross-petitioners prior to regulation, the Commission is without jurisdiction to exercise any control over the disposition of the revenues earned by cross-petitioners prior to the enactment of the Natural Gas Act. It has no more power to exclude from the rate base, and from the amount to be amortized, this $8,500,000, representing costs which cross-petitioners are entitled to capitalize, on account of the earnings record of cross-petitioners during the period prior to regulation than it would on that account to exclude from the rate base the interest, taxes, and other similar charges during construction, or the compressor units utilized by cross-petitioners in transporting their gas, or the gas wells from which cross-petitioners produce their natural gas. Cross-petitioners are entitled to a return of this $8,500,000, and in addition thereto they are entitled to earn a reasonable return on that amount pending its return. This right the Commission must effectively recognize by placing the amount in the rate base and in the amount to be returned through amortization just as it must handle any other proper capital assets. *Board of Public Utility Commission v. New York Tel. Co.*, 271 U. S. 23, 31.

In the footnote beginning on page 45, the Commission and complainant state that cross-petitioners admit that their average annual earnings for the first seven years of operation were in excess by $1,234,118.88 of the annual amount allowed by the Commission. The statement in cross-petitioners' brief to which they refer was in no sense an admission. It was a statement in connection with an argument going to the rate of return allowed; and it must be read in the light of the contention by cross-petitioners in the same connection that the amount allowed by the Commission is grossly inadequate by a sum greatly in excess of $1,234,118.88.

2. The Decisions of This Court Dealing With the Right to an Allowance for Going Concern Value.

In their argument on this point (Brief, p. 46) the Commission and complainant admit that this Court has held in the *Dayton* case and in the *Los Angeles Gas Company* case that "'going value' must be considered by the rate-making agency 'upon proof of its existence.'" They then refer to the *Columbus, Dayton, Denver Stockyards,* and *Des Moines* cases as authority for the proposition that a separate or additional allowance for such value is not required where the physical assets have been appraised "as part of an assembled whole." Cross-petitioners have no quarrel with this principle. Their complaint is that because the Commission did not allow going concern value as an element entering into its consideration of the rate base, which it did not, as clearly appears from its opinion, the Commission did not value cross-petitioners' properties as part of an assembled whole. Nowhere in its discussion of this subject in its memorandum opinion (R. Vol. VIII, pp. 3935-7) does the Commission assert, or even intimate, that it is adopting as a part of the rate base the fair value of cross-petitioners' properties "as part of an assembled whole." *After rejecting and "disallowing" cross-petitioners' claim for $8,500,000 as going concern value,* and also the allowance sought by cross-petitioners under the principle of average investment for necessary capital additions after the end of 1942, which will be required in order to carry on their present volume of business, the Commission then added: "We are convinced that we are allowing in our rate base more than an adequate amount to cover all elements of value" (R. Vol. VIII, pp. 3936-7). It then enumerates these elements of value and accepts and adopts the figures submitted by cross-petitioners' witnesses for four separate items:

"Reproduction cost new of physical properties (exclusive of gas reserves)	$56,302,250
Value of gas reserves	13,334,775
Capital additions for the period June 1, 1939, to December 31, 1942	3,808,399
Working capital	975,000
Total	$74,420,424"

As pointed out above and in cross-petitioners' original brief (pp. 69-74) and by the court below in its opinion (R. Vol. VIII, p. 4039), these items did not include any allowance for intangible value, but expressly excluded any such intangible value. The figures for the physical properties other than gas reserves clearly constituted the aggregate or total cost of reproducing the separate pieces of tangible property, and not as parts of the assembled whole (R. Vol. II, p. 1236). The figures as to leases clearly referred to the value of these leases aside from the consideration that they were connected up to cross-petitioners' pipeline system (R. Vol. III, p. 1355). The effect of the Commission's opinion was to accept cross-petitioners' evidence, which was not disputed, as to the aggregate value of the separate pieces of tangible property, based on reproduction cost new, the present value of the reserves, treated as separate pieces of tangible property, the cost of capital additions through the year 1942, and the working capital. The Commission went no further than that. In excluding the going concern value as an element to be considered, the Commission in effect held that only the reproduction cost new of the separate pieces of tangible property, including the gas reserves, the cost of future capital additions, and the working capital were proper elements of value to go into the rate base, and that it was not proper to include in the rate base the value of the physical properties as part of an assembled whole.

There is no basis for the argument (Brief, p. 47) that the rationale of the decisions is that when the physical properties and incidental rights have once been appraised, both as to primary valuation and deduction for depreciation, the result in itself reflects a going concern value. The effect of these decisions is nothing more nor less than a holding that when the regulatory body arrives at a rate base equal to present value, including going concern value, which the Commission clearly did not take into account, then the regulated company is not entitled to an additional allowance for going concern value. There can be no question of the soundness of that holding, for the regulated company is not entitled to a double allowance for going concern value; but the Commission cannot exclude it as an element and add up the reproduction costs or the value of the separate pieces of tangible property with no allowance for the circumstance that they are parts of an assembled whole, and then, when confronted with the established law, avoid the consequences of its rejection by asserting that it did take into account this intangible value. Under the hypothesis of the Commission and complainant there never could be any value assigned to the property of a going concern, such as cross-petitioners, in excess of the aggregate of the values of the separate pieces of tangible property. The fallacy of such a hypothesis is clearly demonstrated by the opinions of this Court over and over again. *Adams Express Co.* v. *Ohio State Auditor,* 166 U. S. 185, 189.

There is no merit in the suggestion that, but for the fact that cross-petitioners are a going concern, the separate pieces of their physical property would have no value except as salvage. Value for rate-making purposes does not require that there be a market value for each piece of separate property at the place where located equal to the cost of acquiring and installing it. On the other hand, value, as that term is used in the rate-making process, is based upon several elements, as this Court has held from the time of its decision in *Smyth* v. *Ames* down to the present time. These elements include cost of reproduction new of the separate pieces of tangible property, the original cost of those separate pieces of tangible property, the intangible element of going concern value, and other elements which may arise in a particular case, and which in the aggregate reflect the worth or value of the property to one who would take it and use it as an assembled whole.

It is manifest that one desiring to purchase such a project as that of cross-petitioners, or to purchase securities dependent upon the property and earnings of such a project, would find cross-petitioners' property or securities much more attractive now, since they are a part of a concern which has demonstrated its earning power, than they would have at the beginning of 1932 when cross-petitioners first commenced their operations. This added value over the aggregate cost at the present time of the separate pieces of physical property, in the case of cross-petitioners, might well be greatly in excess of the amount claimed here as going concern value; but under the decisions of this Court cross-petitioners are limited as a practical matter to that value which they can demonstrate and state in terms of cost from consideration of the history and circumstances of their particular enterprise. *Dayton P. & L. Co.* v. *Public Utilities Commission*, 292 U. S. 290, 309. Certainly in the case of cross-petitioners that additional value would be equal to the cost actually incurred in acquiring it. The witnesses who testified for cross-petitioners so testified, and their testimony stands uncontradicted. The testimony shows also without contradiction that it would cost at least that much to acquire this going concern value if cross-petitioners were at the beginning of their operations, and the development of their markets now confronted them. It follows, therefore, that in considering the cost of reproducing the properties new, the cost of reproducing this going concern value must be considered along with the cost of the separate pieces of physical property. In considering the original cost of cross-petitioners' properties, the costs incident to developing this going concern value are just as certainly a part of the total original cost as is the cost of each separate piece of physical property utilized by cross-petitioners in their business.

The Commission and complainant assert (Brief, p. 49) that cross-petitioners include "in the cost of attaching business the charges thus attributed to unused capacity during years in which there was no deficit as well as during those in which operating deficits were allegedly incurred, presumably in the view that the utility is entitled as a matter of economic fact and constitutional right to commence operations with a full complement of business instantaneously attached." Cross-petitioners make no such contention, nor do they make any contention which is susceptible of any such construction. The basis of their claim for going concern value has nothing to do with operating deficits. It is based on costs of acquiring business which, when acquired, gave value to cross-petitioners' properties which they would not have had but for the attaching of sufficient business to put into use all of their facilities. The Commission and complainant would like to drive cross-petitioners into the position of asking this Court to hold that they are entitled to capitalize past deficits. In their brief in the court below and in their brief here they desperately strive to bring the contention of cross-petitioners in this case within the doctrine of *Galveston Electric Co.* v. *Galveston,* 258 U. S. 388, 394-5.

Cross-petitioners distinguished this case from the *Galveston* case in their original brief (pp. 84-87), and they will not repeat here what they said there. In the same connection they called attention to *Southwestern Bell Tel. Co.* v. *City of Fort Smith*, 294 Fed. 102, 104-6, in which items of the character here urged in support of the claim for going concern value were expressly held to be of an entirely different character from those rejected in the *Galveston* case. They also pointed out that this Court affirmed the trial court in *City of Fort Smith* v. *Southwestern Bell Tel. Co.,* 270 U. S. 627, citing as authority several decisions, including the *Galveston* case. The Commission and complainant seek to void the controlling effect of the two cases last cited on the theory that this Court affirmed the trial court on some other ground; but cross-petitioners submit that there is nothing in the one sentence *per curiam* opinion of this Court affirming the decision of the court below which justifies any such conclusion.

Cross-petitioners do not contend that the Constitution guarantees them the *ability* to earn a fair return or the *ability* to reach their full earning capacity immediately or at any time. They do submit, however, that the Constitution guarantees to them the *opportunity* to earn a fair return upon the proper rate base, which must include an allowance for the costs paid out of pocket in connection with the development of their markets to the point where the full capacity of their facilities was put into use.

The Commission and complainant quote from the opinion of this Court in *Los Angeles Gas Co.* v. *Railroad Commission,* 289 U. S. 287, 313, in which this Court aptly held that, "Deficits in the past do not afford a legal basis for invalidating rates otherwise compensatory *any more than past profits can be used to sustain confiscatory rates for the future.*" (Italics ours.) Cross-petitioners recognize the validity of all that is said in the language quoted. They are not here contending for an additional allowance because of the losses and deficits sustained during the first two years of their operations. The Commission and complainant are quick to invoke and seek to apply the first part of this language; but manifestly they do not feel themselves bound by the italicized portion thereof. As already pointed out, they would deny cross-petitioners an allowance for going concern value on the ground that their past earnings would have enabled them, prior to regulation, to amortize the costs forming the basis of this value. They dwell at length in their statement of the facts (pp. 8-11) on the dividends and earnings history of cross-petitioners during the period prior to regulation. There is no basis for their repeatedly adverting to the earnings of cross-petitioners prior to regulation except that they would have this Court allow such past earnings to influence it in considering the validity of the Commission's order here under attack. In the consideration of other questions presented here it will be necessary to point out other instances in which the Commission and complainant fall back on past earnings in an effort to justify the order of the Commission.

3. The Contention of the Commission and Complainant That, on Principle, the Inclusion in the Rate Base of an Allowance for Going Concern Value Is Not Required by the Constitution.

Under this contention the Commission and complainant assert (Brief, p. 54) that cross-petitioners suggest "that in view of the confusion in regulatory practice resulting from the ambiguities in the opinions of this Court, the subject of going concern value in rate regulation should now be reviewed on principle." Cross-petitioners make no such suggestion, nor do they concur in the view of the Commission and complainant that any confusion in regulatory practice has resulted from "the ambiguities in the opinions of this Court."

As pointed out in cross-petitioners' original brief (pp. 74, 84-98), this Court has consistently held that going concern value must be allowed as a part of the rate base where there is proof of its existence, and that going concern value is protected as property by the due process clause. In other cases the Court has held that the proof of going concern value must be definite and that it must be consistent with the history of the particular enterprise. Its holding in the *McCardle* case that there must be a separate allowance for or a separate consideration of going concern value in addition to the value of the separate pieces of physical property is in no sense inconsistent with its holding in the other cases cited by the Commission and complainant (Brief, pp. 55-6) that where there has been a valuation of the property as a whole, as contrasted with a valuation of the separate pieces of its physical property, no additional allowance for going concern value is required. This Court has also refused to set aside orders of regulatory bodies on account of a failure to allow going concern value based on speculative opinion evidence which has no relation to the experience or history of the enterprise, particularly where the regulatory body in its opinion and order claimed to have given effect or consideration to going concern value in arriving at the present fair value of the properties viewed as an assembled whole, and there was no positive proof in the record that the Commission did not in fact so consider it.

The confusion that has developed is traceable, not to any ambiguity in the decisions of this Court, but to the refusal of some commissions to recognize and give effect to the law and to the constitution in conformity with the pronouncements of this Court on the subject. It was of this refusal, and of the efforts of some commissions deliberately to circumvent a review by the courts of the refusal, to allow or consider going concern value in fixing the rate base and the amount to be amortized on which cross-petitioners commented in their original brief (p. 88).

The Commission and complainent (Brief, p. 56) ask this Court now to hold that "inclusion in the rate base of going concern value of customers attached is not required under any permissible theory of rate regulation." Cross-petitioners are not seeking to capitalize the "going concern value of customers attached," as stated by the Commission and complainant, but rather the added value to the *properties* of cross-petitioners resulting from actual expenditures in defraying the costs in connection with maintaining unused facilities during the period of attaching customers and the costs of promotional activities in procuring customers. Such a holding as that requested by the Commission and complainant, cross-petitioners submit, could not be justified any more than could a holding that the value of gas leases, of steel pipe, of compressor units, of rights of way, or any other element of value, shall be excluded from the rate base and the amount to be amortized. So long as the Fifth and Fourteenth Amendments continue in the Constitution, no regulatory body can deprive cross-petitioners of the value of their property or take the same for public use without due process of law and without just compensation. Due process requires that the Commission ascertain all the elements of value and give effect to all the elements of value, the going concern value no less than any other element of value; and just compensation requires that the Commission allow earnings sufficient to provide for the return of this value over the period of service for public use and to pay a reasonable return thereon during such use. *Board of Public Utility Commissioners* v. *New York Tel. Co.*, 271 U. S. 23, 31. The request of the Commission and complainant for a holding that inclusion in the rate base of going concern value is not required is nothing short of a request that this Court ignore and refuse to be governed by the Constitution!

The Commission and complainant start out (Brief, p. 56) on the alleged premise that any value attributable solely to the monopoly position of the regulated company need not be included in the rate base. In the first place, cross-petitioners deny that they occupy a monopolistic position. As pointed out in their original brief (pp. 40-41), the record shows that cross-petitioners are in keenest competition with electricity, coal, oil, and other fuels. In the second place, the going concern value claimed is not attributable to any alleged monopolistic position. It is attributable solely to costs incurred in connection with maintaining and holding in readiness temporarily unused facilities and capacity until the market could be developed, and in advertising and other promotional costs[1] incident to procuring those using some one or more of the other fuels with which cross-petitioners are in competition to utilize natural gas as fuel. If cross-petitioners enjoyed a monopolistic position, that position would tend to reduce, and not increase, such costs, for the reason that but for the competitive fuels it would be comparatively easy for cross-petitioners to induce potential users of natural gas to utilize their commodity. The whole argument of the Commission and complainant on this point falls of its own weight. It is absurd to assert that the allowance in the rate base and the amount to be amortized of the costs forming the basis of this claim for going concern value is an evil caused by the monopolistic position of cross-petitioners. *Indeed, these costs resulted from the fact that there was competition and not from a lack of it.*

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[1] Due to difficulties in procuring customers to change over to natural gas, the volume handled in 1933 was less than in 1932. To meet this situation cross-petitioners made cash contributions to the new business activities on the part of the utilities purchasing gas from cross-petitioners at wholesale (R. Vol. II, p. 677). These contributions and other load building expenditures aggregated $1,567,791 (R. Vol. III, p. 1329).

In addition, cross-petitioners made contributions to the load building campaigns of their purchasers by furnishing natural gas under special contracts for limited periods of time at concession prices (R. Vol. II, p. 677). Such contributions, however, were not included in the figures making up the claim for going concern value.

The second alleged premise presented by the Commission and complainant (Brief, pp. 57-60) is that any value which is based, directly or indirectly, on the earning power of the regulated company need not be included in the rate base. The discussion is purely academic for the reason that it has no application to the facts presented by this record, it appearing, as just pointed out, that the costs were incurred in connection with overcoming sales resistance caused by the presence of competitive fuels and had nothing to do with the earning power of cross-petitioners. Cross-petitioners are not asking the allowance of going concern value *because* of their earning power. They are not asking the allowance of that value which their earning power has created as a part of the rate base or the amount to be amortized. They are asking only for the value which has been added to their separate pieces of physical property by reason of out-of-pocket costs incurred during the period of development in maintaining temporarily unused facilities and in promoting the sale of their commodity. A prospective purchaser of the properties or of securities would recognize the added value created by these expenditures for the reason that, but for the fact that they were incurred and the business thus put on a going basis, it would be necessary now to incur these expenditures in order to put the facilities into full use. *In other words, the value claimed exists because these costs were incurred and paid and because they will not have to be paid now or in the future in order to put the business on a going basis.*

The argument of the Commission and complaint (Brief, p. 61) that any item of present value based on good will should be excluded is wholly academic. Cross-petitioners are presenting no claim for an allowance in the rate base or in the amount to be amortized for the element of good will.

The Commission and complainant take the position (Brief, p. 63) that the cost of bringing the business to the state of a going concern "is obviously not a proper item in a 'present fair value' rate base measured by reproduction cost new, for reproduction cost new seeks to establish value irrespective of historical cost." They confuse the terms "present fair value" and "reproduction cost new." The terms are not synonymous. If by "reproduction cost new" they mean the reproduction cost of the separate pieces of physical property, such reproduction costs fall short of the present fair value, for present fair value contemplates the value of the property as a part of a going concern, which necessarily includes its intangible or going concern value. Reproduction cost new is only one of the elements or factors to be considered in arriving at present fair value. It is entirely proper for the regulatory body to consider also the historical cost of separate pieces of physical property. By the consideration of the two factors or elements together, the Commission can and should adjust the historical cost figures to prevailing conditions as reflected by the costs of material and labor entering into the purchase and installation of the separate or component parts making up the whole. But neither the reproduction cost new nor the historical cost of the component parts making up the whole presents the entire picture necessary to arrive at present fair value. If it appears, as in the present case, that included in the historical cost of building up that which the regulated company owns, necessary costs were incurred after the commencement of business for the purpose of putting the business on a going basis, such costs are just as directly a part of the historical costs as the cost of pipe, engines, gas wells, or any other physical property utilized. In calculating the reproduction cost of all the elements of value belonging to the property of the regulated company, it is likewise necessary to ascertain the reproduction cost which would have to be incurred in order to put the business on a going basis if it were now at the beginning of its operations.

The theory of the Commission and complainant (Brief, pp. 63-4) that, unless there were the actual and continuous demand for services, there would be no justification in assuming the reconstruction of cross-petitioners' property, and that the valuation of the properties presupposes the existence and continuance of the present demand without requiring a development period, discloses a woeful lack of understanding on their part of the practical obstacles confronting cross-petitioners at the time they built and put into operation their pipeline system for the purpose of selling gas in competition with the other fuels then in general use in the territory now served by cross-petitioners. A similar lack of comprehension is disclosed in their observation that the valuation assumes that the actual operating organization is immediately available and that the existing demand and ability to supply the demand through a suitable organization are already predicated when the physical elements are assumed to be reproduced, and that, therefore, there need be no further expenditures to develop the demand or the efficiency to supply it. In other words, their contention is that, because at the time of the reproduction cost study the lines were loaded, a continuing demand was present, and the companies were manned with an organization capable of producing and delivering gas to the full capacity of the facilities on an efficient basis, cross-petitioners would be entitled to have no greater allowance in the rate base and in the amount to be amortized than the value of the separate pieces of physical property going to make up the plant.

On this theory why include the latter? It is true cross-petitioners have developed their business to the point where they have a continuing demand for all the gas they can deliver through their facilities. It is also true they have assembled, trained and organized a personnel of such exceptional training, competence and efficiency as that they have accomplished the unheard of in the production of natural gas and the transportation of that commodity over long distances to market. But it cost cross-petitioners a lot of money to put this business on that basis, and the cost or value of converting an assembly of physical components into a system such as cross-petitioners now own and operate is just as certainly a part of the property which the Natural Gas Act subjects to the public use as the cost or value of any physical facility belonging to the system. Under the theory of the Commission and complainant, why make any allowance for the value of gas wells, the pipeline, the compressor stations, the rights of way, or any other of the physical properties? Cross-petitioners already have these things and can go on delivering gas throughout the life of their gas reserves without reproducing them. They have no more occasion now to reproduce these physical facilities than they have to reproduce their operating organization or to reproduce the intangible or going concern value through which they converted their business from its small beginning into a business employing the full capacity of their facilities.

Next the Commission and complainant contend (Brief, p. 64) that "If the 'investment' rather than the 'present fair value' test is used, there can of course be no allowance for going concern value considered simply as the amount of the total value of a going concern over and above the physical and tangible properties." They assert that this is a value concept which has no place in a rate base measured by actual cost. The observation is academic, for cross-petitioners submit that the going concern value for which allowance is here sought is a cost concept and must be taken into account in any computation of the actual costs of the various elements which go to make up the value of the assembled whole.

This assertion by the Commission and complainant is wholly at variance with an express declaration of this Court in *Galveston Electric Co.* v. *Galveston,* 258 U. S. 388, 394. The opinion of the Court was written by Justice Brandeis, recognized as a leading exponent of the prudent investment theory. We quote:

> "If the rule were that a prescribed rate is to be held confiscatory in case net earnings are not sufficient to yield 8 per cent on the amount prudently invested in the business, there might be propriety in counting as part of the investment such amount, if any, as was necessarily expended at the start in overcoming initial difficulties incident to operation and in securing patronage. But no evidence of any such expenditure was introduced; and the claim of the company does not proceed upon that basis. What was presented by the witnesses are studies, on various theories, of what past deficiencies in net income would aggregate, if 4 per cent were allowed as a depreciation annuity and 8 per cent compound interest were charged annually on the value of the property used."

It is clear that the costs presented here as the basis of the going concern value differ entirely from those condemned by this Court in the *Galveston* case, and that they are just such costs as this Court there approved as constituting a part of the investment.

The Commission and complainant get themselves into difficulty (Brief, p. 64) by conceding that this might not be true of going concern cost considered as a development cost necessary to bring the business to the state of a going concern. Characteristically, they resort to the earnings history of cross-petitioners during the period prior to regulation and assert that, where the development cost consists of operating or capital charges which have been returned through earnings calculated on the basis of a reasonable rate of return, they may not be charged again to the consumer by inclusion in the rate base. It must be remembered that prior to regulation cross-petitioners were not limited to the Commission's conception of a reasonable return. They were a private enterprise, and the measure of their earnings was that which they could realize from a sale of their commodity by private contracts in competition with the other fuels which had to be supplanted in order to develop a market for natural gas.

The Commission and complainant concede (Brief, pp. 64-65) that where the utility fails to obtain a reasonable return during the development period, any necessary development costs to the extent that they are represented by actual deficits and earnings may theoretically be considered as a going concern cost and as a part of the total investment in the business.[2] They express the view, however, that this would not be good accounting practice, thus implying that accounting practice should prevail over constitutional rights. They then contend that while such developmental costs may theoretically be capitalized, the Constitution does not require that they be so treated. Cross-petitioners submit that the existence of a deficit or a profit during the development period has nothing to do with the right of the regulated company to capitalize the costs of development. The Comission and complainant go on to say: "All the Constitution requires, we believe, is that the investors be allowed a return sufficient to give them a fair opportunity to recoup these costs. This might be done by including the costs in the rate base as part of investment." This is exactly what cross-petitioners are contending the Commission should have done in the instant case. They are asking going concern value only in the amount of the actual costs incurred in acquiring it. The Commission and complainant go on to say, however, that, "It might also be done, and under good accounting practice should be done, by fixing the rate of return at such a figure as to take account of the risk of loss in the development period." This is indeed a very practical suggestion, coming from the Comission ten years after cross-petitioners entered their development period and six full years after all the "developmental" costs incident to the load-building period have been incurred! Just as ridiculous is the observation that if the rates imposed from the outset of the business allowed a rate of return based on the risk of early loss, the inclusion of such deficits in the investment would obviously permit a double return. Since cross-petitioners were not under regulation, they necessarily received no such allowance. They spent the money necessary to put their business on a going basis, hoping that over the whole period of their operations they would be able to recoup it, together with a reasonable return for its use.

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[2] As a matter of fact, cross-petitioners did not earn a reasonable return during the development period, 1932 to 1935 inclusive. Referring to the table shown at page 44 of the brief of the Commission and complainant and to the sources there cited, it appears: if the development period 1932 to 1935, inclusive, be considered, the item "Total Undepreciated Cost of Property Plus Working Capital," as of the beginning of 1935, is $245,607,246.19 (Exhibit 137, p. 2, line 20, R. Vol. VII, p. 2993); the item "Total New Earnings Available For Return" for the same four years becomes $12,362,860.14 (Exhibit 136, p. 1, lines 5, 9, 10 and 11, R. Vol. VII, p. 2959); and the item "Average Return on the Undepreciated Rate Base (%)" turns out to be 5.03%. Also the "Net Earnings Available for Return, less $8,500,000 claimed by the Companies for Going Value" turns out to be $3,862,860.14; and the "Average Return on Undepreciated Rate Base, After Deducting from the Return the Total Amount Claimed for Going Value (%)" turns out to be 1.57%!

The argument (Br., pp. 66 *et seq.*) that "If a rate regulation imposed at the outset is valid so long as it permits the investors a reasonable opportunity to recoup losses, a rate imposed after the development period may ignore losses so long as the investors had a reasonable opportunity to amortize the amount of such losses prior to the commencement of regulation," begs the question here under consideration. Cross-petitioners are not asking any allowance in the rate base for past losses. They are not asking an allowance for going concern value because of any past losses. The value for which they contend is not any value incident to past losses, but a value obtained through the actual expenditure of large sums of money as interest, taxes, and other items in maintaining temporarily unusued capacity and in defraying costs of advertising and other promotional expense.

In footnote 18 (Br., p. 67) the Commission and complainant assume "for the purposes of argument that a regulatory body cannot retrospectively reduce past excessive profits by reducing present rates," and then insist that past earnings may be considered in determining whether past losses must be treated as part of the investment. This observation, of course, again begs the question, since cross-petitioners are asking no allowance for past losses. The observation indicates, however, that it is only "for purposes of argument" that the Commission and complainant were willing to assume that a regulatory body cannot retrospectively consider and deal with past earnings. That they would have this Court consider past earnings is manifest from their adverting once more to cross-petitioners' earnings from 1936 to 1938 and their insistence that the revenues from those years were sufficient to amortize the entire going concern value and give the companies an average return of 7.28% on their undepreciated investment. Without waiving the principle that past earnings can not be taken into account in fixing rates for the future, cross-petitioners again point out that the average return over the whole period from 1932 to 1938, after deducting the $8,500,000, was not 7.28% but 5.5%.

On page 68 the Commission and complainant state that the total book cost of the existing properties as of December 31, 1939, was $60,950,000 and that there was a difference of approximately $13,500,000 between the companies' present investment and the rate base allowed. That statement is wholly contrary to the record, as pointed out by cross-petitioners in their original brief (pp. 71-2). They doubtless seek to justify themselves in this statement by the circumstance that (see footnote 19) prior to June 1, 1939, cross-petitioners, as a matter of bookkeeping, had charged to expense retirements of gas leases in the amount of $6,526,160. The record clearly, unequivocally and without contradiction shows that this book entry of $6,526,160 did not represent the cost of leases which were surrendered or retired. It is necessary to refer to the testimony on this point.

Floyd C. Brown, vice president and general manager of cross-petitioners, testified in detail as to the purchase of cross-petitioners' gas leases in the Texas Panhandle field (R. Vol. I, pp. 536-41). He explained that in the years 1929, 1930 and 1931, when these leases were being assembled, it was known that a great reserve of gas was located in the general area of the Panhandle field as now known. He pointed out, however, that the field was in a comparatively undeveloped stage of its history and that there was then no way of determining accurately the boundaries of the field; that in addition to the sweet gas utilized by pipelines there was a large portion of the field in which the gas was sour, or contaminated with sulphur compounds. The exact extent and location of these sour gas areas was not then known. Portions of the field were already productive of oil. Prospecting for additional oil deposits in the area was still continuing, and it could not be known where other oil producing areas would be developed. In these oil field areas, both known and unknown, it was a matter of common knowledge that tremendous quantities of gas would be produced in connection with the oil production, resulting in the creation of low pressure areas which would rapidly drain surrounding gas producing areas of their natural gas content.

He further pointed out that at that time practically the whole field was leased up by large oil companies which held leases producing both oil and gas, and that it was impossible to go out and purchase from the land owners gas reserves sufficiently extensive and in sufficiently large blocks to justify pipeline development. It was necessary, therefore, in assembling reserves adequate to supply a pipeline of the magnitude of that of cross-petitioners to purchase their gas rights or reserves from these large companies. It was known that some portions of the field were extremely productive of natural gas and that in other portions of the proven field the wells were very small and for that reason undesirable from the standpoint of a pipeline company. The state of the development, however, made it impossible to determine in advance where all of the choice production would turn out to be or what portions of the undeveloped areas would prove undesirable because of small productivity. The best that cross-petitioners could do, therefore, was to acquire their acreage over a wide area so as to be certain to acquire adequate reserves in areas which would turn out to be desirable from a productivity standpoint. It was impossible to concentrate on the areas then known to be highly productive for the reason that the owners of the gas rights refused to dispose of their gas in the more desirable areas unless the purchaser would take all of their gas reserves off their hands. They were forced, therefore, as a practical matter and as a matter of prudence, to purchase a great deal more acreage than they intended to retain and develop. However, they felt justified in expending the entire cost of the 316,000 acres originally acquired on the theory that included in this wide spread of acreage would be areas of such productivity and desirability as that cross-petitioners would have reserves adequate to all their needs during the economic life of the Panhandle gas field. They were purchasing, not acres, but gas reserves, and at all times intended to release to the land owners gas leases which might turn out to be undesirable because located in areas of non-production or small production, leases in the sour gas area, leases too small to justify the cost of developing, leases so near oil fields as that they would be depleted of their gas through oil field operations and other types of undesirable leases, retaining only those leases which could be consolidated and developed in comparatively large blocks, located in the more productive areas and containing adequate reserves of gas.

J. G. Dickinson, superintendent of production, who has had charge of assembling, consolidating and developing cross-petitioners' acreage in Texas, testified in detail to the same facts as those covered by the testimony of Mr. Brown (R. Vol. I, pp. 616-623). He pointed out that it is the usual practice of oil and gas companies, when a discovery of oil in large quantities is made, to try to buy some acreage close to the well, for which they usually had to pay a high price, and in addition to buy spreads of acreage out over the undeveloped territory with the hope that some of this acreage would turn out to be productive; that the greater part of the entire area believed to contain oil and gas had been so leased up by oil companies by 1930, when cross-petitioners' reserves were acquired. He, too, called attention to the necessity under those circumstances of purchasing their acreage in large blocks made up of non-contiguous smaller leases. Included in the blocks of leases purchased were 1,009 separate leases, on which there were 69 scattered wells. More than 900 of these leases had not yet been drilled and their protentialities were not known. He testified that it was never the intention of the companies to retain all of these 1,009 leases, embracing 316,000 acres; that it was the purpose of the companies, as development of the field progressed, to cull out and select from this acreage to the end that cross-petitioners consolidate and retain only the quantity deemed adequate to meet their future equirements. To illustrate the point that these leases were not purchased on any theory that every acre covered by these 1,009 leases had the same value as every other acre, he described the negotiations with Magnolia Petroleum Company covering leases embracing an aggregate of about 50,000 acres. On this point he testified (R. Vol. I, p. 621):

> "We could not have traded with the Magnolia, for instance, on the basis of picking out what we thought was the best acreage they had and buying it for $50.00 or $40.00 an acre. They demanded $2,000,000 for their acreage. They were willing for us to take what we wanted of it, but that is what it would cost. We would have all of it for that or just a part of it for that."

He then explained that none of the oil companies was willing to sell its choice acreage and have left on its hands the other part. When they sold their gas acreage in the field they sold all of it.

In the light of this evidence, which the record shows presented the usual and not an unusual situation, it manifestly would be unfair to assume that these reserves were purchased on a per acre basis and that, upon the surrender back to the land owner of the small and undesirable tracts, the cost of cross-petitioners' reserves would be reduced by the product resulting from multiplying the total number of acres surrendered by the average cost per acre; and it manifestly would be utterly unjust to assume that the desirable acreage remaining after the surrender of these small and practically worthless tracts cost only the average price per acre paid for the whole 316,000 acres multiplied by the number of acres finally retained.

The record shows without dispute that the charges to retirements on a per acre basis as these undersirable leases were surrendered were never intended to reflect either the value or the cost of the acreage surrendered, nor was the balance remaining after the charges intended to reflect either the value or the cost of the acreage retained, consolidated and developed.

John A. Cooke, an independent accountant, who has been auditing the books of cross-petitioners from year to year over the whole period of their history, testified (Vol. IV, pp. 2622-3) that the practice of charging off the surrendered acreage at the average cost per acre was commenced at his suggestion; that he understood at the time he made the suggestion that the average cost per acre did not represent at all the true value of the acreage surrendered or of the acreage retained. In this connection he said (R. Vol. IV, p. 2623):

> "At that time, it was contemplated that other acreage would be surrendered. It was not known how much would be surrendered. It was not my thought in recommending the setting up of the accounts on that basis that when this acreage was surrendered it was worth $65.548 per acre. That was obviously not considered at all. An average doesn't represent true value; and by any process of reasoning, that which you give away as valueless to you is obviously of less value than that which you keep, so that the very fact that it was surrendered was an indication that it was worth little or nothing, and certainly not anywhere near $65 an acre. The value would lie in what was left."

He then continued:

> "We were not concerned with the problems insofar as the accounting cost of the retained acreage was con-

> cerned. We were concerned only with the result of a method of accounting. It was my understanding at the time I recommended that method of accounting that *in acquiring that acreage they considered that the acreage which turned out to be desirable would cost them the full amount that they paid for all of it.* That was the understanding they put up to me in that discussion. If they had only had half of the acreage left after the weeding out process was completed, that was all that they were after originally in their acquisition—all that was useful to them."

S. E. Campbell, secretary of cross-petitioners, who has direct charge of the accounting and records, testified to the same effect (R. Vol. IV, p. 2647):

> "* * * It was not our thought at that time that the acreage which we had released during 1933 and 1934 and which would be released after the time we adopted this policy was on the first day of January, 1933, worth $65.548 per acre. That we had no such thought is substantiated by the fact that we released it in place of selling it. We would have sold it if it had had value.
>
> "The amount of $65.548 set up on the books was the total cost of all of the acreage divided by the number of acres on hand at that date, namely, January 1, 1933. As far as the books are concerned, we have reduced the book costs for the acreage retired since January 1, 1933, at the rate of $65.548 per acre. Charging that off the books as we released it does not get our money back. The property account, so far as that creage is concerned, in my opinion, does not reflect the cost of the acreage which we still retain."

It was upon the basis of this undisputed testimony, which conclusively establishes the facts, that cross-petitioners in their original brief (pp. 71-2) took the position, and now take the position, that in figuring the original cost of cross-petitioners' gas reserves this item of $6,526,160 charged to retirements should not be deducted. Clearly, therefore, the Commission and complainant are without justification for their contention that the cost of cross-petitioners' present physical facilities as of December 31, 1939, was only $60,950,000. The correct figure is $67,476,160. When $8,500,000, the cost of the intangible or going concern value, is added to these figures, the original cost of what cross-petitioners now own turns out to be $75,975,160.

B. Reply to the Contention That the Commission Made a Proper Allowance for Amortization.

1. The Commission Erred in Holding That Cross-Petitioners Are Entitled to Amortize Only the Investment in the Property, Without Regard to the Value of the Existing Property at the Time They Were Subjected to Regulation.

The Commission and complainant begin their argument on this question (Br., p. 70) with the observation that, under their theory that it is only the investment and not the fair value of a utility's property which the Constitution protects—in other words, that the doctrine of *Smyth* v. *Ames* is wrong—there can be no possible doubt as to the validity of the Commission's action in using investment as the amount to be amortized. Cross-petitioners emphatically disagree with that observation. They reserve argument on the contention that *Smyth* v. *Ames* should be overruled for discussion in their reply to Point VI of the brief of the Commission and complainant; but if this Court should overrule *Smyth* v. *Ames*, which American investors have for generations regarded as the settled law of this country and in the light of which billions of dollars have been invested by the American people in the properties and securities of regulated concerns, cross-petitioners insist that their special status and that of other companies first subjected to regulation under the Natural Gas Act requires that the value of their properties, as of the time they were first converted from the status of a private enterprise to that of a regulated enterprise, must be allowed in the rate base and in the amount to be amortized, and that the period of amortization must commence as of that time.

Cross-petitioners discussed this point at length in their original brief (pp. 102-129). They there attempted to demonstrate, and, they submit, did demonstrate, that the enactment of the Natural Gas Act operated to subject their property, and not its cost seven or eight years before, to the public use. They pointed out that the character of the ownership and use of their property was necessarily changed, and that they were themselves, in fact, converted from a private enterprise into a regulated enterprise. Both in the court below and in their original brief before this Court they urged that under those conditions the Commission was required to take notice of the value of their property as of the time regulation was imposed upon them, and that a constitutional administration of the Natural Gas Act required the Commission to make provision, not only for a reasonable return *on* the value of that property, but for the return *of* the value of that property. The Commission and complainant have not met the issue. The court below upheld the contentions of cross-petitioners, observing in its comments upon the Natural Gas Act (R. Vol. VIII, p. 4040):

> "* * * That legislation looks to the future protection of the public. It deals with conditions which existed at the time the legislation was enacted. It neither gave, nor took away, value to going concerns, whose lives were short and limited by fact conditions which neither the producer nor the consumer could change."

It also observed in the same connection (R. Vol. VIII, p. 4040):

> "* * * the date when the business enterprise became subject to governmental regulation is of dominant significance. It is important, too, as bearing on the rate making power of Congress. Avoidance of conflicts with the Fifth Amendment of the Constitution is involved. Petitioners' (cross-petitioners) position avoids the conflicts; respondents' (the Commission and complainant) creates an unavoidable clash."

The Commission and complainant have begged the question, and have proceeded throughout their argument on this point just as if cross-petitioners were an ordinary continuing utility which had invested its money in an enterprise already subjected to regulation, thus voluntarily dedicating its properties to the public use.

Since, as pointed out in cross-petitioners' original brief, the Natural Gas Act operated to condemn to public use the property of cross-petitioners, which had been acquired and put into operation as a strictly private enterprise, all that the Commission and complainant say in their argument on this point is irrelevant. Whatever the practice of unregulated businesses in matters of bookkeeping, and whatever the attitude of state regulatory bodies to the pronouncement of this Court in *United Railways* v. *West,* 280 U. S. 234, 253, due process requires that the Commission provide for the return to cross-petitioners of the value of their property as of the time it was first condemned to public use through the operation of the Natural Gas Act. In making their book entries for depreciation, the unregulated business is not concerned with the protection of its rights under the due process clause. It may be conceded that the keeping of accounts will be facilitated by charging the accruals for depreciation on a basis of original cost. The making of such charges, however, in the case of an unregulated concern does not take away the property. If that principle be applied here, the difference between the original cost of the property and its value as of the time subjected to public use will be lost by the owner; for it is only the original cost, and not its value, which will be returned through amortization. In adopting as the rate base the reproduction cost new, and not the original cost, the Commission necessarily found that the property of cross-petitioners as of the time of the hearing would cost more than it cost at the time the facilities were purchased and put into service.

The Commission and complainant admit that their position here is directly opposed to the decision of this Court in *United Railways* v. *West*, 280 U. S. 234, 253. In an effort to extricate themselves from their difficulty, they resort to their characteristic suggestion that this Court overrule its decision in that case. They also seek to distinguish the *West* case on what they term "the narrow ground that the court was there dealing with the depreciation of a utility with an indefinite life and which was therefore faced with the necessity of replacing physical properties the service life of which was exhausted." The distinction weakens rather than strengthens the position of the Commission and complainant; for here cross-petitioners are urging their right to realize the *value* of their property over the life of their reserves of natural gas. Unless they realize this value through the allowance for amortization, they will lose it. It is highly important, therefore, that in fixing the allowance for amortization full provision be made for the return of this value by the end of 1954.

The Commission and complainant admit, however, that the distinction is not satisfactory from their standpoint, and reassert that the *West* case is wrong in principle. To this contention cross-petitioners do not agree. *It is property which depreciates, and not the cost of the property. It is the property, and not the cost of the property, which much be replaced if the utility is to continue in business after its facilities have been worn out in service.* It is for these reasons that this Court decided in the *West* case that the allowance for depreciation must be based on the value of the property and not on its cost. The *West* case does not stand alone among the decisions of this Court. In *Clark's Ferry Bridge Co.* v. *Public Service Commission*, 291 U. S. 227, 240-241, this Court, in an opinion by Chief Justice Hughes, recognized the principle in this language:

> "Considering the nature of the property, and upon facts shown by the evidence, the state court has

allowed appellant to reserve annually, and use for its own purposes, an amount which according to common experience may be expected to produce a sum *adequate to replace the property* on the expiration of its life." (Italics ours.)

Again, in *Georgia Railway Power Co.* v. *Railroad Commission,* 262 U. S. 625, 663, this Court, in an opinion by Mr. Justice Brandeis, said:

> "The amount of the depreciation charge is also objected to on the ground that the percentage should have been figured on a larger value. This objection depends upon the *value to be placed upon the physical property*, which has already been discussed." (Italics ours.)

The principle was again recognized in *Lindheimer* v. *Illinois Bell Telephone Co.*, 292 U. S. 151, 167, in which this Court, in an opinion by Chief Justice Hughes, after observing that depreciation is the loss, not restored by current maintenance, which is due to the factors causing the ultimate retirement of the property, added:

> "It is proper to include in the operating expenses, that is, in the cost of producing the service, an allowance for consumption of capital in order to maintain the integrity of the investment."

Let us assume that a continuing utility is utilizing a compressor unit costing in 1930 the sum of $45,000, but that at this time the price of that unit has advanced to $65,000. Would an allowance for depreciation spread over the life of that compressor unit, based on a cost of $45,000, replace that equipment? Apply that same illustration to every other unit utilized by the regulated concern. Would the integrity of the investment be maintained if at the end of the service life of its facilities it shall have received through depreciation only $45,000 of every $65,000 required to replace its facilities?

The *West* case is not in conflict with the *Lindheimer* case, as contended by the Commission and complainant (Br., p. 77). The question was not before this Court in the *Lind-*

heimer case, and this Court in its comment upon the method of accounting of the telephone company neither approved nor disapproved that method of accounting. The Chief Justice, in the majority opinion, observed that the company was using the "straight line method of computation, a method approved by the Interstate Commerce Commission," citing 177 I. C. C. Rep. 408, 413. He observed that by this method the annual depreciation charge is obtained by dividing the estimated service value by the number of years of extended service life. Does the Commission contend that by this observation this Court approved the straight line method of amortization? If so, and if the Commission is interested in following a method approved by this Court, why did it reject the straight line method of computation approved by the Interstate Commerce Commission, and adopt a method of computation expressly rejected and condemned by the Interstate Commerce Commission in the report cited by this Court in its opinion? The fact is that the depreciation charges of the telephone company were rejected by this Court in the *Lindheimer* case. It held they were too high, and on that ground refused to set aside an order of the Illinois Commerce Commission. Justice Butler wrote a concurring opinion, in which he observed that the straight line method, calculated on cost less salvage, employed by the company, was not in harmony with the principle of this Court's decision in the *West* case; but he did not state, as contended by the Commission and complainant that "the method of depreciation approved by the majority" was not in harmony with the principle of the *West* case. Manifestly, he would not have done that for the reason, as already stated, that this Court did not approve or disapprove the method of computation used by the telephone company. Its decision was based on excessive charges and not the method of computation.

It is true that the Virginia court, in *Alexandria Water*

Co. v. *City Council of Alexandria*, 163 Va. 132, assumed that the *Lindheimer* case was in conflict with the *West* case. Cross-petitioners pointed this out in their original brief (p. 157). This circumstance, however, is without importance, since there is no such conflict. Cross-petitioners disagree with the Commission and complainant that it is significant that, despite the *West* case, utility commissions have continued to follow cost accounting for depreciation. That is a unique argument to present to this Court as to why its solemn pronouncement on a constitutional principle should be set aside and overruled.

2. The Commission Erred in Fixing the Amortization Period as the Entire Life of the Enterprise Beginning Several Years Before the Enactment of the Natural Gas Act.

In their argument on this point (Br., p. 79) the Commission and complainant once more assume, contrary to fact, that there is no distinction between the case presented here and the case of an ordinary continuing utility under regulation from its inception. In their original brief (pp. 102-129) cross-petitioners made the point that, because they operated for years as a private enterprise and were first subjected to regulation through the operation of the Natural Gas Act, the Commission was required so to administer that Act as to restore through an allowance for amortization, and not depreciation, the value of their property subjected to public use, together with the value of future capital additions computed on a basis of costs at the time of the hearing. They demonstrated, they submit, that a denial by the Commission of a return of that full value necessarily would operate to deprive cross-petitioners of that value without due process and without compensation, in violation of the Fifth Amendment. The Commission and complainant have not answered that argument. They can not answer it. They proceed, therefore, on the premise that there is no distinction between the consideration of the constitutional rights of cross-petitioners, whose business was converted from that of a strictly private enterprise to one which must devote its property to the public use, and a utility which voluntarily dedicated its properties to public use and enjoyed the privileges of a public utility from the beginning. It must be remembered that cross-petitioners enjoyed none of the privileges of a public utility during the first seven years of their operations, but were forced to develop their business as a private enterprise.

The question here presented is not the amount of the *total cost* cross-petitioners are entitled to charge for *depreciation* in the future, as stated by the Commission and complainant. It is rather the period over which the *value* of their properties will be returned through allowances for *amortization.* Cross-petitioners do not agree that the answer to the question depends on the nature of the depreciation and the proper method of accounting for it. The nature of the charge is not subject to question. The charge is for amortizing the value of the property, and cross-petitioners submit that no method of accounting for this value which requires cross-petitioners to draw on their past earnings can be applied without a head-on conflict with the Fifth Amendment.

Whatever the theories presented by the proceedings of the National Association of Railroad and Utilities Commissioners or the various pamphlets and books by accountants and economists cited by the Commission and complainant may be as to whether depreciation is the diminution of service capacity or of service value, the Commission and complainant are still confronted with the fact that at the time cross-petitioners' properties lost their private character and were first subjected to public use through the enactment of the Natural Gas Act they had a value, together with the cost of properties to be added in the future, in excess of $80,000,000.

Cross-petitioners do not agree that this Court expressed the view in the *Lindheimer* case that it is service value and not monetary value for which depreciation compensates. In that case Chief Justice Hughes observed that:

> "Broadly speaking, depreciation is the *loss* not restored by current maintenance which is due to all the factors causing the ultimate retirement of the property." (Italics ours.)

He did not say loss of service value. His language must be construed in the light of the multitude of decisions by this Court to the effect that it is the loss of the property and its monetary value for which the allowance for depreciation is designed to compensate. If a compressor unit costing $65,000 goes out of service, the manufacturer of a new one is not concerned with the number of years the replaced engine has been in service, nor is he interested in the original cost of said engine. If the regulated company replaces that engine, it must pay the amount representing the monetary value of the new one. In the case of an ordinary continuing utility depreciation charged against the old engine is for the purpose of enabling the owner to buy a new one when the old one wears out.

The Commission and complainant get farther away from the real question presented by raising still another question (Br., p. 83). They assert that the real question is not the period of *amortization* but what amount should be charged for *depreciation* for the period prior to the rate order. Again cross-petitioners point out that it was an allowance for amortization which they presented to the Commission; it was an allowance for amortization which the Commission purported to make; and it was cross-petitioners' claim for amortization and not one for depreciation which the court below sustained.

The one question under discussion here is the period of amortization. There can be no question, unless the Fifth Amendment is to be totally ignored and set aside, as to whether any part of this allowance for amortization can be charged out of earnings prior to regulation. Even in the case of depreciation the allowances were for the future. The Commission and complainant so admit (Br., p. 84). In footnote 26 they cite authority for the statement that if past charges for depreciation have been excessive, the utility retains the benefit, and if they have been inadequate the utility bears the loss. This means simply that charges for depreciation prior to a new rate order are wholly immaterial. They assert that on the theory of *Smyth* v. *Ames* it is the property and not the investment which the Constitution protects, *the actual past depreciation of the property must be deducted in order to determine what property must be returned to the companies in the future.* They cite the *Knoxville Water Company* and *Lindheimer* cases and the *Minnesota Rate* cases on this point. That is exactly what cross-petitoners have contended, and that is exactly what cross-petitioners have done in this case. They have deducted the actual past depreciation, established by uncontradicted evidence from a careful inspection of their properties, from the reproduction cost thereof adopted by the Commission as correct, and have submitted the difference as evidence of the present fair value of their properties. The deduction referred to in the *Knoxville Water Company* case and the other cases cited had nothing to do with book entries or computations for depreciation. The deductions were made solely for the purpose of arriving at the *fair value* of the properties and were in no sense used as the measure of the allowances for future depreciation.

This Court has specifically approved the inspection method of arriving at actual depreciation and has pointed out the difference between the actual depreciation and that set up on the books, observing in that connection that the book entries usually exceed in amount the actual depreciation. *McCardle* v. *Indianapolis Water Co.,* 272 U. S. 400, 416; *Lindheimer* v. *Illinois Bell Telephone Co., supra; New York Telephone Co.* v. *Prendergast,* 300 Fed. 822, 825, affirmed in *Prendergast* v. *New York Telephone Co.,* 262 U. S. 43. Wholly ignoring the holdings of this Court in those cases, and in numerous other cases, that it is the actual depreciation which must be deducted, that the purpose of the deduction is in order to arrive at the present fair value of the property, and that it is improper to deduct in arriving at the value of the property the book entries for depreciation, the Commission deliberately proceeded, in effect, to deduct past theoretical depreciation based on book entries which it now directs be made to cover future amortization allowances. This it accomplishes by distributing the allowances over the whole life of cross-petitioners' project, including seven or eight years of their operations prior to regulation. The Commission and complainant seek to defend this action on the ground that the charges to amortization for past operations conform roughly to the charges for depreciation entered on the books of cross-petitioners during the years prior to regulation. Since these book entries are wholly without materiality in arriving at the actual depreciation, they are likewise wholly without materiality as a basis of comparison for a deduction by the Commission not based on actual depreciation. During the first two years of cross-petitioners' operations they entered on their books no charges for depreciation and depletion. Not until their records had been criticized by an outside auditor (R. Vol. IV, pp. 2618-20) and by the Federal Trade Commission (R. Vol. IV, p. 2644) did these companies set up on their books any such charges. As already pointed out (*supra,* p. ....), those book entries were never intended to make provision for the return of the value of cross-petitioners' property or its cost during the life of cross-petitioners' reserves of natural gas. The charges for retirements of gas leases had no relation to the cost of the gas reserves acquired, developed and retained by cross-petitioners (R. Vol. IV, pp. 2623, 2646). The charges for depletion were based on the withdrawals of cross-petitioners from their leases, and not the total withdrawals of all producers in the field, which will determine its ultimate exhaustion (R. Vol. III, p. 1410). The charges for depreciation were based on the physical life of the facilities and not the life of the gas reserves (R. Vol. IV, p. 2646). None of these entries was intended to reflect either the cost or the value of cross-petitioners' facilities.

The Commission and complainant argue that under the undisputed facts it would have been reasonable to conclude that an equal amount of service capacity is lost each year from the beginning of cross-petitioners' operations; but they again overlook the essential fact, which must be taken into account, that when cross-petitioners' properties were first put under the jurisdiction of the Commission they had a *value*, and that it was the number of years lying out in the future over which these properties would be utilized prior to the exhaustion of cross-petitioners' gas reserves that measured the period over which the Commission must provide for the return to cross-petitioners of that value.

The Commission and complainant conclude their discussion of Subdivision (a) under this point (Br., p. 88) with the observation that the companies have drawn the indefensible conclusion that no further depreciation will occur throughout the life of the properties, assuming proper maintenance. Cross-petitioners have drawn no such conclusion. They recognize that there will be some physical depreciation on their facilities during the period over which their reserves will be exhausted. They have not computed that depreciation for the reason that they are not asking any allowance to cover that depreciation. In the main, the facilities will not be replaced within that time and, therefore, there is no occasion to make provision for depreciation except as to certain items of short life concerning which there is no issue. The issue goes to the provision for the amortization of the value of cross-petitioners' properties, to which cross-petitioners are entitled without regard to the actual depreciation occurring prior to the end of 1954.

Beginning on page 90, the Commission and complainant contend that "on the investment theory of rate making it is equally clear that the amount in effect deducted by the Commission for past depreciation is reasonable." The contention is wholly academic. The prudent investment theory of rate making is not involved here. The Commission did not adopt that theory of rate making. It can not come into this Court and complain of its own act in adopting another theory. The complainant filed no motion for rehearing, nor did it raise any question as to the method employed in the court below or in the application for writ of certiorari to this Court. It, therefore, can not be heard to complain of the failure of the Commission to adopt the prudent investment theory of rate making. Cross-petitioners will discuss these points further in their reply to Point VI presented by the Commission and complainant.

Whatever the purpose of depreciation under the investment theory of rate making, the purpose of the amortization allowance in the case at bar is to return to cross-petitioners the value of their property over the remaining life of the field from and after the time the character of that property is changed through its being subjected to the public use under the Natural Gas Act. The allocation of any part of the past earnings to the return of that value is a clear attempt on the part of the Commission to control the revenues and earnings of cross-petitioners during the period when they were a private enterprise not under regulation. Sound business accounting, so far as past earnings are concerned, has nothing to do with the problem of providing for amortization in the future.

The Commission and complainant assert that if regulation had been imposed at the outset of the business it would have been reasonable to distribute the amortization over the whole life of the enterprise, either on a straight line basis or a sinking fund basis. If this be granted for purposes of argument, the fact remains that regulation was not imposed at the outset of the business. Cross-petitioners were not under regulation and the benefits accruing to an ordinary utility were not available to them prior to the enactment of the Natural Gas Act. They were not given a monopoly over the markets as is an ordinary utility. They invested their money and put the property acquired to risk, taking their chances that they would be able to negotiate the sale of natural gas in their markets, approximately 900 miles from their source of supply, *in competition with other fuels.* They had a chance, by building up their markets and putting them on an earning basis, to realize substantial enhancement of the value of their properties, just as would any other unregulated company which by diligence, skill and good management might build up its earnings to an attractive level. Since the enactment of the Natural Gas Act they are still in competition with other fuels; but they are denied the opportunity to enhance the value of their property by building up their earnings to a maximum under the contracts privately negotiated for the sale of their gas. Their prices are now fixed by the Commission, and any value based upon earning power is absolutely frozen within the limits resulting from the rates fixed by the Commission. The only opportunity they have for realizing any benefit from enhanced value is the increase reflected by a revaluation of their properties for rate making purposes in the administration of the Natural Gas Act. The investment theory of rate making would deny them even that enhancement. In the situation confronting the country for an indefinite period in the future, cross-petitioners, if subjected to regulation on the investment theory, would be paid a return on, and through amortization be compensated in, dollars of very substantially less purchasing power than the dollars which they invested in this project.

The Commission and complainant impliedly admit the weakness of their position in the observation (Br., p. 91) that, where rate regulation is directly imposed for the first time after part of the life of the enterprise has expired, the same methods of amortization may validly be employed, *at least so long as their use does not defeat any legitimate past expectations of investors.* If there is any principle of law well settled by this Court and by courts throughout the country, it is that past hopes, past expectations, past losses, or past profits can not be taken into account in fixing rates for the future. *Board of Utility Commissioners* v. *New York Telephone Co.*, 271 U. S. 23, 31; *Knoxville Water Co.* v. *Knoxville,* 212 U. S. 1, 13-14; *Galveston Electric Co.* v. *Galveston,* 258 U. S. 388, 395; *Newton* v. *Consolidated Gas Co.*, 258 U. S. 165, 175.

Cross-petitioners submit that the *Knoxville* case is susceptible of no such construction as that stated by the Commission and complainant on page 92 of their brief. In that case this Court was dealing with actual depreciation in the past as going to the value of the property at the time of the rate investigation, and the holding was that the company could not ask for additional allowances in the future for depreciation because in the past it had not set up charges equal to the actual depreciation. In that case this Court was dealing with a utility already under regulation during the period when the company was claiming it had failed to set up sufficient allowances to cover its actual depreciation. Its rates were necessarily directly affected by the amount of these charges, and had it made suitable provision for depreciation during the prior period of regulation it would have been allowed earnings to cover those charges. In the present case cross-petitioners' book entries for depreciation and depletion during the period prior to regulation had nothing to do with their rates or their earnings. Their charges were fixed by private contracts and their earnings resulted from the sale of gas at the contract prices. *No customer of cross-petitioners paid a penny more or less for gas by reason of the book entries for depreciation and depletion.*

At the conclusion of their argument on this point (Br., pp. 94-95) the Commission and complainant are forced to fall back on the past earnings of cross-petitioners in their attempt to justify the Commission's order. They say that the companies must have earned enough to return a reasonable portion of their investment, unless their enterprise was improvidently conceived, or the management was either inefficient or imprudently failed to maintain a proper reserve to keep the investment unimpaired. Cross-petitioners agree that they could not resort to mistakes in bookkeeping as the basis for a claim for additional amortization allowances because of past actual depreciation. They could have made no such claim under the *Knoxville* and *Lindheimer* cases cited by the Commission and complainant, and they are here making no such claim. Of course the Constitution does not guarantee cross-petitioners against loss of their investment due to past improvidence. No such issue is in this case. The record shows a maximum of creative skill in construction and operation and efficiency in management on the part of cross-petitioners, as pointed out in their original brief (pp. 13-15, 160-161). These facts are impressively reflected throughout the record. Cross-petitioners are not invoking the

Constitution in an effort to recoup any losses of the past; but they do invoke the Constitution for the protection of their right to a return through amortization of the value of their property, the use of which was changed from that of strictly private character to a public use through the operation of the Natural Gas Act.

3. The Commission Did Not Use a Proper Rate of Interest in Computing the Amortization Allowance.

At the beginning of their argument on this point (Br., p. 95), the Commission and complainant observe that cross-petitioners contend that the amortization allowance should have been computed on the basis of 2% interest compounded semi-annually rather than on the basis of 6½% interest compounded annually, and that the Commission's failure to do this invades their constitutional rights. That is a correct statement of the contention of cross-petitioners.

The Commission and complainant assert (Br., p. 95) that cross-petitioners, after construction had begun, planned for amortization of their investment by the use of the sinking fund method, using an interest rate of 6%. They base this statement on an exhibit offered by the Peoples Gas Light & Coke Company in a proceeding before the Illinois Commerce Commission to which cross-petitioners were not even parties. Mr. Gallagher was formerly a director of cross-petitioner Natural Gas Pipeline Company of America; but he appeared in the proceeding last above mentioned as a witness for the Peoples Gas Light & Coke Company. The Commisison and complainant ignored the fact that cross-petitioners were not parties to the proceedings and that they did not offer the testimony. Indeed, the Commission and complainant stated affirmatively (Br., p. 91, footnote 31) that "the companies" (meaning cross-petitioners) presented evidence of the estimated earnings of the project in that proceeding. This statement has absolutely no foundation in fact. Mr. Gallagher, testifying for Peoples Gas Light & Coke Company, did prepare and testify concerning certain exhibits in which the amortization was computed by the sinking fund method using an interest rate of 6% per annum. The irrelevance of this circumstance is apparent; but it is noted in passing that at the end of 1931 a very different situation obtained than that obtaining at the time of the hearing in the present case. The Commission's employee Knapp produced and testified to a chart taken from the well-known Moody publication, from which it appears (R. Vol. VII, p. 3579) that near the end of 1931 the yields on bonds classified as Aaa exceeded 5.25%; that the yields on Aa bonds reached 6.25%; and that the yields on bonds of lower classifications were correspondingly higher, those on Baa bonds exceeding 8%. Another chart (R. Vol. VI, p. 3141), introduced through the witness Dorau, shows Moody's indices of 40 public utility bonds from which it appears that the yields on the four classes of bonds used in the computation ranged from approximately 5% to approximately 8¾% at the end of 1931, and that these yields were advanced substantially by the middle of 1932. These charts show also very distinct declines in yields between the end of 1931 and the middle of 1939, the time of the hearing. It also appears from another chart (R. Vol. VI, p. 3177) offered by Dorau that the average yield on interest paying natural gas company bonds on the weighted average of total par value was above 14% at the end of 1931. This chart shows that this weighted average had declined to approximately 6½%, the overall rate of return allowed by the Commission to cross-petitioners, by the middle of 1939, the time of the hearing. By what course of reasoning can the Commission and complainant argue that, if 6% would have been a fair interest rate on which to compute the amortization allowance under the conditions obtaining at the end of 1931, the interest rate in 1939 should be 6½%? No effort is made to show the pertinence of this observation. It was manifestly thrown in for some other purpose.

The Commission and complainant seek to justify the use of a 6½% interest rate, the same as the rate of return, in computing the amortization reserve on the theory that cross-petitioners are in no position to complain, for the reason that over the whole period of cross-petitioners' operations they would receive an amount sufficient to return to them the full amount to be amortized, erroneously fixed at too low an amount as pointed out in our discussion of that subject (*supra*, pp. 6-39), and to pay a 6½% return on the unamortized annual balances. In support of their contention they refer to Sheet 3 of Exhibit 182 (R. Vol. VII, p. 3557; Vol. IV, p. 1994; this brief, Appendix A, p. 103). This theory is unsound, and it necessarily operates to confiscate cross-petitioners' properties and revenues for two reasons: (a) cross-petitioners can not be limited to a reasonable return on the unamortized balances from year to year; and (b) *the earnings allowed do not operate to return to cross-petitioners the full amount to which they are entitled through amortization and a yield of 6½% on the annual unamortized balance each year.*

(a) An order limiting cross-petitioners' earnings to an amount which will return the value of their property and a reasonable return on the unamortized balances from year to year necessarily operates to confiscate cross-petitioners' property in violation of due process.

As pointed out in cross-petitioners' original brief, the proper amount to be amortized is $84,341,218 (p. 103) and the proper rate base is $82,291,553 (p. 6). The potential physical life of the facilities would normally extend far beyond the prospective period at the end of which cross-petitioners' reserves of natural gas will be exhausted (R. Vol. IV, p. 2646). In the interest of safety and efficiency in handling a commodity like natural gas, it is necessary for cross-petitioners so to maintain their facilities as to keep them in a very high state of repair. It is obvious, therefore, that cross-petitioners' physical facilities will be in substantially as good condition at the end of the project's life as at the present time. *If natural gas were available, they doubtless would be able to transport as much gas through their facilities at the end of the project's life as they are now transporting.*

This Court has consistently held that a regulated concern is entitled to earn a reasonable return on the value of its property as of the time it is subjected to public use. *Los Angeles G. & E. Corp.* v. *Railroad Commission*, 289 U. S. 287, 305. During the approximately 16½ years, the period between the enactment of the Natural Gas Act and the exhaustion of cross-petitioners' supply of natural gas, cross-petitioners will have property of the value of more than eighty million dollars devoted to the service of those they supply with natural gas. Their investment had been made prior to the subjecting of their property to public use through the operation of the Natural Gas Act. They had made this investment upon the basis of having this property employed in this project so long as they had available a supply of natural gas.

The Natural Gas Act can not be so administered as to deprive them of this property or of their right to earn a reasonable return on its value while they have a supply of natural gas available. Their position is strictly analogous to that of an investor, A, who makes a loan of $10,000 to B, taking the latter's note for the same amount with interest at 6% per annum for a period of ten years. After executing and delivering his note, B might decide that it would suit his convenience to pay back the principal in annual installments of $1,000 a year instead of allowing the whole amount to mature in a lump sum at the end of ten years; but A could not be required to forego his right to keep the full amount invested and receive his interest over the whole period. This principle is frequently invoked in the common practice, of which the Court will take judicial notice, among bond holders and mortgage holders of refusing to accept payment, in whole or in part, before maturity in the absence of special contractual provisions.

On the same principle cross-petitioners can not be required to forego their right to a reasonable return on the value of their property, which they are required to devote to the public interest, merely because the equities among present and future purchasers of natural gas render it expedient, if indeed not necessary, that the burden of returning their capital be distributed over the whole period of amortization. Of course, upon re-examining cross-petitioners' properties in other rate proceedings in future years the Commission will re-establish the rate base at a figure reflecting the value of such properties as of the time of the investigation, taking into account the actual depreciation and depletion up to that time.

The theory of limiting the return of a regulated company to unamortized balances is predicated on the assumption that the property represented by each annual amortization installment is actually retired from service. There may be some basis for such an assumption in the case of a telephone company, for instance, where the allowance is not for amortization but for depreciation. The allowances for depreciation are immediately put back into the business, with the practical result that the owner continues to have a property of substantially the same value as that with which he started out, on which he continues to earn a reasonable return. Thus he is not deprived of his right to continue his property in the telephone business indefinitely into the future. It is doubtless on this assumption that the Interstate Commerce Commission has adopted the practice of computing the depreciation reserve on the straight line method and allowing a return only on the unamortized balance (Interstate Commerce Commission Reports, Vol. 177, pp. 408-13).

An entirely different result would obtain in the case of cross-petitioners if their earnings were decreased from year to year as the accumulations for amortization accrue over the period of approximately 16 years. Their property will not be retired from service until the end of their operations, at which time it will be salvaged. They must continue to serve all their purchasers, whether they desire to do so or not; for under the Natural Gas Act they can discontinue service to any customer only with the permission of the Commission. In order to serve all their purchasers they must continue to utilize all their properties. So long as they have natural gas available they have the same right to a return on the value of their properties devoted to the service of their customers as does a telephone company to such a return. Obviously, they would be denied the principal fruits of their enterprise if forced to accept a steadily declining return on the value of their properties.

It is not necessary that they be thus harshly treated in order to protect the rights of their purchasers and of the ultimate consumers of natural gas. They are not here insisting on the return as principal of the full amount to which they are entitled through amortization. They are perfectly willing to accept annual accruals for amortization at a rate that will return to them ultimately as principal less than the full value of their properties, the difference to be made up in compound interest at a rate which these accruals would earn if invested in the nearest to risk-free securities obtainable, so that when their gas reserves shall have been exhausted they will have available a total amount, represented by the accruals to principal, the charges to interest, and the salvage, which will return to them the full amount to which they are entitled; but they are not willing to forego their right to the benefits of this gigantic enterprise, in which they have invested so many millions of dollars, so long as they have natural gas available to carry on their business.

It is manifest that the practical effect of applying the theory that cross-petitioners are entitled to earn a reasonable return on only the unamortized balance from year to year through the life of their project is so to reduce the return during the last few years, when the unamortized balance will have greatly declined, as that cross-petitioners would be operating this great enterprise practically for the privilege of recovering their capital. Indeed, during the last year cross-petitioners would be required to operate an eighty million dollar enterprise for a return of 6½% on less than five million dollars, the amount of the last installment for amortization, the balance of their earnings all going to a return *of* their capital. This is not regulation. *It is forced liquidation.* Cross-petitioners submit that such procedure is clearly in violation of the due process clause.

(b) The calculation of the amortization reserve by the method employed, using a compound interest rate equal to the rate of return, does not provide for the return of the amount to be amortized and for a return each year at the allowed rate on the unamortized balance.

The Commission and complainant assert (Br., p. 95) that the sinking fund method as applied by the Commission in this case is similar to the usual accounting and financial treatment of this device, citing R. pp. 2096 and 1910, *et seq.* The record cited does not bear out that statement. The accountant Cooke, at R. p. 1910, was discussing the operation of the sinking fund method of computing reserves; but nowhere in his testimony did he assume that the interest rate should be the same as the rate of return. The same is true of the witness Kleinman. He was not testifying about the formula used by the Commission. Nowhere in their discussion of this subject (Br., pp. 95-100) do the Commission and complainant point out any case in which a regulatory commission has ever used the method of computing amortization reserves adopted by the Commission, or in which any court has ever approved such a method of computation. Cross-petitioners confidently assert that there are no such cases, and in this they are supported by a formal declaration of the Interstate Commerce Commission. After approving the real sinking fund method of computing amortization reserves, such as that submitted by cross-petitioners here, the Interstate Commerce Commission expressly rejected the method employed by the Commission, referring to it, not as the sinking fund method, but as the "annuity" method. 177 *I. C. C. Rep.* 409-413. After explaining and discussing this method at some length, the Interstate Commerce Commission said:

> "The annuity method presents similar difficulties with respect to interest rate, or at least so it seems to us. Its proponents appear to feel that no difficulty would arise on that score, but we have seen no wholly satisfactory elucidation of this matter. Moreover, if we grasp the idea underlying this method, it would import into public regulation of utilities a theory with respect to property values *which, even if economically sound, seems impracticable of application to such regulation. At all events, it never has been applied, so far as we are aware.* That theory is that value is dependent upon capacity to produce income. The difficulty of using such value as the basis of determining what income public regulation shall allow has many times been pointed out.. The further complications which would arise in the case of properties, like those of the railroad companies, which have widely varying earning power, even under public regulation, are evident." (Italics ours.)

The Commission and complainant admit (Br., p. 100) that the method employed by the Commission requires cross-petitioners to look for their interest on the amortization reserve to the earnings of the business, which involves "some risk to them." They admit also that if the straight line method, or an actual sinking fund rate of 2%, compounded semi-annually, had been employed, this risk would not be present. Cross-petitioners submit that they should not be subjected to such risk. The purchasers are subject to no risk in the payment, through rates, of the annual allowances for amortization, and, therefore, are entitled to no more than the yield on risk-free securities.

The method employed by the Commission not only requires cross-petitioners to look to their risky earnings for the recovery of that part of their capital charged up as interest on the reserves, but requires them to look to the most uncertain and risky bracket of their earnings for such interest. The operating expenses must be paid first. Next in order would follow the reduced annual allowance for amortization. The interest would have to come from the remainder, which is extremely hazardous because of fluctuations from year to year, as indicated by the drop of more than $1,000,000 in the revenues of 1938 below those of 1937.

Assuming, but denying, that the Commission can limit cross-petitioners to a return of 6½% on the annual unamortized balances, cross-petitioners submit that they are entitled to that reasonable return *each year* of the period. They can not be required to take the allowed return on less than the unamortized balance in 1940, 1941, and each of several years thereafter, on the theory that during the later years of the period the allowed return will tend to make up the deficiency. That clearly is the practical effect of computing the amortization reserve by the method adopted by the Commission.

In regulating a business of such limited life, and of such uncertain life, as that of cross-petitioners, it is inconceivable that the Commission would be permitted to defer many millions of dollars of the accruals for amortization to the later part of the estimated life. Such a procedure would subject cross-petitioners to the extreme danger of losing a very large part of their capital, running into millions of dollars, if by reason of any of the contingencies confronting them the life of their project should be short, by any substantial period, of that now estimated. An order unnecessarily subjecting cross-petitioners to such peril would clearly be a denial of due process.

Manifestly, therefore, if cross-petitioners can be limited to a reasonable return on only the annual unamortized balances, the amortization allowances must be computed by the straight line method to insure as far as practicable the return of their capital. This principle is recognized by the Interstate Commerce Commission, which allows a return on the undepreciated balances, but computes the depreciation allowances by the straight line method, in the regulation of telephone and railroad companies, continuing utilities, as already pointed out. 177 Interstate Commerce Commission Reports 413. It necessarily follows that in testing the method of computation employed by the Commission to determine whether or not it, in fact, allows a return of the full amount to be amortized plus an earning *each year* on the unamortized balance, the amortization allowance must be determined by the straight line method.

For the convenience of the Court, cross-petitioners have caused a copy of Sheet 3 of Exhibit 182 (R. Vol. VII, p. 3557), on which the Commission and complainant rely, as above pointed out, to be included in this brief as Appendix A (*infra*, p. 103). A tabulation which, cross-petitioners submit, shows the fallacy of this theory is also included as Appendix B (*infra*, p. 105). An examination of Sheet 3 of Exhibit 182 (*infra*, p. 103) discloses that the investment used in the illustration was assumed to be $1,000,000 and the period of amortization to be ten years. If the entire $1,000,000 is to be returned through amortization, it would be necessary, then, that $100,000 be set aside each year as an amortization reserve. From Column B of this exhibit it appears that only $69,029 is actually allowed in the earnings for amortization, and at the end of ten years the total amount returned through that allowance is only $690,290. It appears from Columns C and D that the difference between the sum last mentioned and $1,000,000, *amounting to $309,710*, is made up of interest charges on the accruals at 8%, the assumed rate of return. Column I of the exhibit shows the purported return of 8% per annum on the entire $1,000,000, or an aggregate of $800,000 during the ten years; but Column J shows that Ostrander, who prepared the exhibit, was contending that the 8% should be calculated, not on $1,000,000, but on a steadily declining rate base, which was reduced each year, not by the annual accruals actually paid into the amortization fund, *but by those accruals plus compound interest thereon at the rate of 8%*, so that at the end of the ten year period the actual return would be, not $800,000, but $490,200. Column K shows that the rate of return on the so-called net investment, resulting from the subtraction each year of the accrued allowances for amortization *plus compound interest thereon at 8%* from the original sum of $1,000,000, is 8%, and that the average return over the entire period is 8%.

The fallacy of the computation when applied to the year to year operations is demonstrated in Appendix B (*infra*, p. 105). Column A of this computation shows an actual return to the investor of his $1,000,000 over the ten year period at the rate of $100,000 a year. Column B shows the unamortized balance at the beginning of each of the ten years. Column C shows the return on the unamortized balance for each of the ten years at 8%. Column D shows the total of the annual allowance for amortization, shown in Column A, and a return of 8% on the unamortized balance for each of the ten years, shown in Column C. Column E shows the annual allowance for amortization and return assumed by Ostrander in Sheet 3 of Exhibit 182 (*infra,* p. 103). Column F shows the deficit resulting from subtracting the annual totals shown in Column E from those shown in Column D.

Thus it appears that for the first year there is a deficit in the earnings allowed below an earning of 8% on the unamortized balance of $30,971. In the second year there is a similar deficit of $22,971; in the third year a similar deficit of $14,971; and in the fourth year a similar deficit of $6,971. Not until the end of the fifth year does the amount allowed in Ostrander's calculation equal the necessary allowance for amortization plus a return of 8% on the unamortized balance for the year. It is true that the allowances used in Ostrander's illustration for the last five years of the ten year period exceed the amount necessary for those years by a total amount sufficient to wipe out the deficit for the first five years; but, cross-petitioners submit, the Commission can not require a regulated company to accept less than a reasonable return on the unamortized balance for each of the first five years on the theory that such company *may* recoup the deficits during the last five years of the period.

Due process protects the regulated company against its being required thus to gamble with its right to a reasonable return on the value of its property in use during 1940 on the theory that the deficit will be made up in 1949. Many things may intervene before the end of the ten year period which would prevent the recoupment of such deficits. In the case of a natural gas company the source of supply might be exhausted well in advance of the date assumed by the Commission. Indeed, in the present case the record shows conclusively that the reserves of gas will be exhausted prior to that date, though there is no way of estimating accurately the exact date of their exhaustion (R.

Vol. II, p. 695). The record also shows without contradiction that during the last two years of cross-petitioners' operations their earnings will be reduced far below those allowed for amortization and return under the order of the Commission (Exhibit 142, p. 2, line 23, R. Vol. V, p. 3031, Vol. III, p. 1414). Any number of other contingencies might make it impossible for cross-petitioners to earn the net revenues allowed, such, for illustration, as increased taxes incident to the life and death struggle in which our country finds itself.

Now let us apply the erroneous assumption that cross-petitioners are entitled to a return on only the annual unamortized balances, and determine the effect of the Commission's order upon the operations of cross-petitioners. To illustrate this result cross-petitioners have caused Appendix C (*infra*, p. 107) to be prepared and inserted in this brief. This exhibit consists of three blocks of five columns each. In these computations cross-petitioners use as the proper amount to be amortized $84,341,218, and as the proper rate base $82,291,553, and for purposes of comparison the sum of $6,395,180, the amount allowed by the Commission in its order for amortization and return.

In Block 1 an amortization period of 16½ years, the approximate time between the effective date of the Natural Gas Act and the exhaustion of cross-petitioners' reserves of natural gas, is assumed. By dividing $84,341,218, the amount to be amortized, by 16½ we arrive at $5,111,587, the amount which must be set aside each year for amortization on the straight line method of computation. The return is calculated on a basis of 6½% per annum, the rate of return allowed by the Commission in its order. Each of the five columns bears a caption which is self-explanatory. The column "Interim Order Deficiency," of course, refers to the deficiency resulting from the subtraction of $6,395,180, the amount allowed by the Commission each year for amortization and return, from the amount necessary to set aside $5,111,587 for amortization each year and to pay a 6½% return on the unamortized balance each year, which last figure is reflected in the column captioned "Total Requirements Amort. & Return." From these figures it appears that for the last half of the year 1938 (the Natural Gas Act was approved June 21, 1938) the return on $82,291,553, which cross-petitioners contend is the proper rate base, at 6½% per annum would be $2,674,475. If this sum be added to half of $5,111,587, the required amortization allowance, the result is $5,230,270. Half of $6,395,180, the amount allowed by the Commission, is $3,197,590. *This amount subtracted from the figure representing the requirements for amortization and return leaves a deficit for that six months' period of $2,032,680!*

In 1939 the unamortized balance shown is $79,737,758. A 6½% return on that amount would be $5,182,824, which added to the amount necessary for amortization makes a total required for amortization and return of $10,294,413. The deficit for the first full year turns out to be $3,899,233, which, added to the deficit for the second half of 1938, makes an accrued deficit of $5,931,913. As the rate base goes down, the deficit from year to year slowly decreases; but the accrued deficit mounts. For the year 1940, the year in which the order was entered, the deficit is $3,566,980, and the accrued deficit at the end of that year is $9,498,893. In the current year, 1942, cross-petitioners will receive $2,902,473 less than 6½% on the unamortized balance; and the accrued deficit at the end of this year will have mounted to $15,636,093. Not until the year 1951 does the amount allowed equal the requirement for amortization and a 6½% return on the unamortized balance at the beginning of that year; and at the end of that year the accrued deficit below a return of 6½% on the successive annual unamortized balances has increased to the staggering sum of $26,806,956. The returns for the last four years decrease the accrued deficit from year to year; but at the end of the project's life an accrued deficit of $24,550,018 still remains. *That means that over the period cross-petitioners will have been deprived, by the amount last stated, of a 6½% return on the unamortized balance during each year!*

Block 2 is similar to Block 1 except that in this group of figures the amortization period is assumed to be 14 years 5 months, the period intervening between the date of the order, August 1, 1940, and the end of 1954, when cross-petitioners' reserves will have been exhausted. The annual amount for amortization resulting from the division of the amount to be amortized by 14-5/12 is $5,850,258. An examination of these figures shows that for the remainder of 1940 the deficit below a 6½% return on the rate base is $2,001,660. In 1941 the deficit is $4,265,584, with an accrued deficit of $6,647,244. In 1942 the deficit is $4,265,318, and the accrued deficit has mounted to $10,912,562. *Not until the last year of the project's life does the amount allowed by the Commission pay a return of 6½% on the unamortized balance for any year, and at that time the accrued deficit will be $32,435,565!*

Block 3 was added merely for the purpose of showing that, even if it were proper for the Commission to spread the amortization over the entire 23 years of the project's life, which cross-petitioners deny, the order still operates to reduce cross-petitioners' returns below a 6½% return on the unamortized balance each year by an aggregate of many millions of dollars. Thus in 1940, the year in which the order was entered, the amount allowed falls short by $713,935 of 6½% on the unamortized balance; and as of the end of that year the accrued deficits will have mounted to $15,006,218. Not until near the end of 1943 will the amount allowed for amortization and return be sufficient to cover the required amortization allowance plus a return of 6½% on the unamortized balance; and as of the end of that year the accrued deficit will have mounted to $15,717,891. The earnings for the succeeding years gradually reduce these deficits; *but it is not until 1954 that the deficit is wiped out!*

It is obvious that substantial deficits will obtain without regard to the amount allowed for amortization and for rate base, whether the period of amortization be 10 years, 14 years 5 months, 16½ years, 23 years, or any other number of years. *The trouble is with the method employed by the Commission.* It is unsound, and its operation is disastrous from the standpoint of cross-petitioners. If this Court finds that 14 years 5 months is the proper period of amortization, as did the court below, the operation of the Commission's order limits cross-petitioners' earnings to an amount $32,435,565 less than the rate of return allowed if applied to the unamortized balances each year. If the Court finds that 16½ years is the proper period of amortization, the operation of the Commission's order limits cross-petitioners to $24,550,018 less than the allowed rate of return if applied to the unamortized balances each year. Even if the 23 year period, erroneously adopted by the Commission, were proper, the effect of the order is to limit cross-petitioners to a return from year to year which at the end of 1942 will aggregate $15,719,022 less than the rate of return allowed if applied to the unamortized balances each year. It is no answer to say that this deficit of almost sixteen million dollars may be made up during the years 1943 to 1954 inclusive. Even if it could be certain that it would be made up over that period, the order would be invalid. Cross-petitioners had property and facilities of the value of more than $80,000,000 in the year 1940. They are entitled to a reasonable return on the value of that property, not $4,645,584 less than such a reasonable return (Appendix C, Block 2, *infra*, p. 107), *and they are entitled to such return in 1940, not in 1950 or 1951.* They are entitled to use that money from and after 1940, and can not be made to wait ten years or twelve years before receiving compensation for the use of their property in 1940.

It will avail the Commission and complainant nothing to take the position that it is the amortization rather than the return on the unamortized balances that is deferred until later years, as suggested in their brief (p. 91). Under that view the fact still remains that the deficit is there, whether it be called a deficit in earnings or a deficit in amortization allowance. During the first years of operation the allowance falls short of the proper provision for amortization and a return of 6½% on the unamortized balance. Cross-petitioners have already pointed out (*supra*, p. 62) that the Commission is without authority to limit cross-petitioners to an unnecessary gamble for a return of their capital by deferring a large part thereof to the last years of their operations.

Cross-petitioners may never recoup these deficiencies. As already suggested, the gas reserves may be exhausted earlier than now anticipated. Their cost of delivering the gas, their taxes, and other expenses may make it impossible for them to earn the amount necessary to recoup these deficiencies, even if their gas holds out over the whole period. Many contingencies may intervene to make it impossible for them ever to get their money. The Commission gives them only a gamble that by the end of 1954 they might, if they can earn it, recoup the deficits which are accruing and mounting up from year to year during the first years of the period of amortization. The Fifth Amendment protects cross-petitioners against being subjected to any such gamble.

The limiting of the return allowed cross-petitioners to a reasonable return on the annual unamortized balances on the straight line method is unfair as between present and future purchasers of natural gas.

Cross-petitioners submit that they have demonstrated that the Commission is without power, under the Fifth Amendment, to limit cross-petitioners' returns to a reasonable return on the unamortized annual balances. They have shown that the method of calculating the amortization reserves employed by the Commission does not allow even that inadequate return. If it be assumed, however, that cross-petitioners can not complain if allowed earnings sufficient to return to them the proper amount to be amortized plus a reasonable return on the annual unamortized balances, then cross-petitioners submit that such a procedure is unfair as between present and future purchasers of natural gas. The rate base on which the reasonable return must be allowed in 1938 was $82,291,553. Referring to Block 1 of Appendix C (*infra*, p. 107), it is noted that the rate base for the year 1954 will be $3,061,923. Thus it appears that under the application of the principle of allowing a return only on the unamortized balance each year, after providing for amortization by the straight line method, the purchasers in 1938 would be required to pay a 6½% return on a rate base higher by $79,229,630 than would the purchasers of gas in 1954. This means that the purchasers would pay $5,156,500 more money for the same quantity of gas in 1938 than would the purchasers in 1954, although both groups of purchasers would be purchasing gas of the same quality from the same reservoir, transported through the same system over the same distance.

This inequity among present and future purchasers must be avoided by distributing the cost of gas evenly over the whole period; but this must be done in such manner as to protect the constitutional right of cross-petitioners to receive the value of their property devoted to the public interest as of the termination of the project's life, plus a reasonable return on the property during the time that it is subjected to public use. They have an absolute right to an allowance which will reimburse them for the value of their property as of the end of 1954, when their supply of gas will have been exhausted. It is only to meet the practical situation that the reimbursement is provided by annual installments allowed in fixing the rates. *If it were practical for the purchasers of gas to retain the money represented by the annual amortization installments, how would they have to handle these funds, which manifestly would be trust funds?* They could not speculate with it, or even put it to risk. It would be necessary for them to put the money in the bank and allow it to remain there idle, or to invest it in securities of such high order as that they could be certain of their ability to liquidate these securities on December 31, 1954. If they took the latter course it would be necessary, as this record shows, for them to invest this money in securities which would pay a return of not more than 2% per annum, compounded semi-annually. By so doing, they could use the interest earned from such an investment to apply on the total amount to be returned to cross-petitioners at the end of the period. *They are not hurt, therefore, if the funds be turned over to cross-petitioners as they accrue, so long as they are protected to the amount of this interest in the fixing of the annual allowance for amortization.* They are so protected in the amortization allowance for which cross-petitioners contend. Cross-petitioners submit that there is no other basis upon which the annual allowance for amortization can be calculated which will at once protect the constitutional rights of cross-petitioners, compensate the purchasers for the payment in advance of these annual installments, and equitably distribute the cost of gas over the whole period of amortization.

C. The Rate of Return Fixed by the Commission Is Confiscatory.

In their original brief (pp. 175-215), cross-petitioners undertook to demonstrate, and, they submit, did demonstrate, that the allowance of a 6½% return on the rate base allowed is confiscatory as a matter of law. They went into the evidence at considerable length. The Commission and complainant have not answered the argument there presented. Cross-petitioners will not burden the Court here with a repetition of the argument; but they still insist that, in view of the fact that they are engaged in a business of extraordinary perils and hazards, recognized by regulatory bodies and by the courts as subjected to much greater risks than any other of the regulated industries, all of which they pointed out in their original brief, the order must fall because predicated upon this inadequate and confiscatory rate of return.

The Commission clearly gave no consideration to any elements entering into a proper rate of return except that of cost of capital; and in its zeal to reduce cross-petitioners' earnings to the level which would leave them not one penny in excess of the cost of capital, it failed to analyze the testimony in the light of the admissions of its own witness Smith on cross-examination and the figures revealed by Exhibit 209 (R. Vol. VII, pp. 3895-99) correcting the admitted errors contained in Smith's Exhibit 186. This cross-petitioners pointed out in detail in their original brief (pp. 204-214).

Notwithstanding there were several thousand pages of testimony and exhibits dealing specifically with rate of return, and notwithstanding the fact that cross-petitioners set out and analyzed the testimony throughout 40 pages of their original brief, the Commission and complainant are able to set down all they can find in the record which they assert supports the findings of the Commission in less than six pages of their brief (pp. 101-106), and on these six pages numerous statements concerning the facts are so at variance with the record that they disclose an utter lack of memory as to what the record shows. For instance, they state (p. 102) that, "Specifically securities of natural gas companies were being sold at rates of from 3 to 6 per cent with the yields on the bulk of the bond issues falling between 3 and 4 per cent." Those figures are not borne out by the inaccurate facts submitted by Smith, which were corrected by Exhibit 209, prepared by Gilman. Smith's Exhibit 186, Schedule 5A (R. Vol. VII, p. 3747) shows that the approximate yield to maturity on bonds of natural gas companies sold in 1939 ranged from 3.55% to 6.35%, and that the average yield was 4.02%. In Schedule 6 of the same exhibit (R. Vol. VII, p. 3777) it appears that the average yield to the public on the issues of bonds listed there was 3.9%; but other figures on the same page show that the cost to the company ranged from .23% to .85% in excess of the yields to the public.

The Commission and complainant assert (Br., p. 102) that interest rates were at a low level on all forms of long and short term investments, and that rates of return demanded by investors were among the lowest that ever existed. They overlook entirely the circumstance that their own witness Knapp admitted on cross-examination that these interest rates reflected yields on the highest types of liquid loans, and that the figures indicated to him that the investor was demanding a greater compensation for the risks he undertook in 1939 than in 1936 or 1927. He added that the investor is willing to accept a lower yield in order to secure safety of principal and income (R. Vol. IV, p. 2125). Obviously, that situation created an oversupply of capital seeking investment in types of securities that were reflected in the studies of bankable notes and other liquid securities. It is just as obvious that under these conditions it would have been more difficult, and not less difficult, to accomplish the overall financing of a natural gas company in 1939 than in those earlier years. This is clearly demonstrated by page 8 of Exhibit 209 (R. Vol. VII, p. 3899), from which it appears that on stocks sold in 1939 investors were demanding a yield in terms of per cent earnings to latest quotations of 10.45%, which, when added to the cost of financing through issues of common stock of at least 10%, brought the cost of raising capital through common stock issues by natural gas companies to about 11½%. Contrast that figure with the finding of the Commission that financing through common stock issues would cost only 10% (R. Vol. VIII, p. 3939).

The Commission and complainant assert (Br., p. 102) that the evidence shows that profits earned by industrial corporations declined from 11.3% on invested capital in 1929 to 5.1% in 1938; that utility corporation profits declined from 7.2% to 5.1%; and that for railroad corporations the decline was from 6.4% to 2.3%, citing Exhibit 185, Schedule 17. A reference to that schedule reveals an interesting fact of common knowledge which they did not deem it necessary to point out, namely, that 1938 was the worst year from a business standpoint of any year after 1934. It discloses that in 1937 the profits of industrial corporations were 10.1% and that the recession in 1938 cut these profits practically half in two. It is a matter of common knowledge, of which this Court will take judicial notice, that following the recession in 1938 conditions improved and that in 1939 the earnings were back to the approximate level of 1937. The figures quoted by the Commission and complainant (Br., p. 103) from the earnings history of cross-petitioners emphasize the unfairness of using 1938 as a basis of comparison. In 1937 cross-petitioners' net profits aggregated $4,547,717. In 1938 they dropped more than a million dollars to $3,514,249.97. By August 31, 1939, they were back at substantially the same level as in 1937.

Is it fair to cross-petitioners to cut their earnings in 1939 or 1940, when conditions had changed entirely, in order to conform them to the level of earnings in the recession year 1938?

The argument (Br., p. 103) that the evidence shows that cross-petitioners faced no extraordinary risks, but even less risk than is confronted by the ordinary utility, shows the desperate straits in which the Commission and complainant find themelves. Not only does this record abound with testimony to the contrary, as pointed out in cross-petitioners' original brief (pp. 175-215); but, in the absence of any testimony, this Court would take judicial notice that the risks confronting continuing utilities, such as electric companies, telephone companies, or even distributors of manufactured gas, are in no sense comparable to the risks confronting this extractive industry, whose very life depends upon the continuance of an irreplaceable natural resource. Particularly is this true of a company like cross-petitioners, whose source of supply is located approximately 900 miles from its principal market and whose transportation problems in bringing this gas across 31 rivers and over every type of terrain are obvious.

Cross-petitioners submit that an examination of this record shows clearly that the finding of the Commission that 6½% is a reasonable rate of return to them is not supported by substantial evidence.

V.

Reply to the Argument That the Commission's Findings That Cross-Petitioners' Existing Rates Are Unreasonable and That the Level of Rates Fixed by the Commission Is Reasonable Are Supported by Substantial Evidence.

The Commission and complainant begin their discussion of this point (Br., p. 106) by an erroneous statement of the contentions of cross-petitioners. In their discussion of the point in their original brief (pp. 145-166) cross-petitioners plainly stated their contentions. In substance, cross-petitioners contend that there is a distinction between a barely nonconfiscatory return and a fair return; that the rate of return is only one of the elements to be considered in determining whether or not an existing rate is unreasonable. Among the necessary elements to be considered are overall cost of capital, extraordinary risks, unusual creative skill in design and operation, extraordinary efficiency in management, and the value of the service to the consumers. Cross-petitioners demonstrated in their original brief that the Commission's objective clearly was *to reduce cross-petitioners' revenues,* and to determine the amount of the reduction by cutting the income down to a barely nonconfiscatory return; that the record shows clearly that the Commission gave no consideration to any of the elements entering into a fair rate of return, or a reasonable return, except the single element of cost of capital, and that it did not make provision even for the necessary overall cost of capital. They demonstrated also that a large percentage of the claimed excess over and above, not a fair return as stated by the Commission and complainant, but the Commission's conception of a return which would cover only the cost of capital, is accounted for by creative genius and engineering skill in the design and construction of cross-petitioners' facilities, through which they transport a very substantially greater volume of natural gas per unit of steel employed than was ever known to the business prior to the construction of their facilities, and by the sustained efficiency in management through which cross-petitioners have operated, and are operating, with an annual load factor very substantially in excess of that ordinarily attained by natural gas pipeline companies. Those purchasing gas from cross-petitioners must be satisfied with the prices they are paying for such gas; for none of them is here complaining of such prices.

Cross-petitioners' contention was, and is, that their returns are not *per se* unreasonable because they exceed the Commission's conception of the return barely necessary to cover the cost of refinancing cross-petitioners' properties; that the Commission and complainant must prove that the excess, in the light of the risks, the engineering skill, the efficiency in management, and the value of the service to cross-petitioners' customers, constitutes the rates unjust and unreasonable; that no effort was made by the Commission and complainant to demonstrate, by evidence, that in the light of those circumstances the alleged excess constituted the existing charges unjust and unreasonable.

The Commission and complainant set out the history of Section 6 of the Natural Gas Act and its predecessor, Section 208 of the Federal Power Act, with which it is identical, and arrive at the conclusion that the Commission is authorized under that section of the Act to establish reasonable rates on a prudent investment basis. Cross-petitioners submit that that argument is neither relevant nor logical. In the first place, the Commission did not adopt the prudent investment theory in this case, but purported to fix the rate base on the present fair value theory. This it was required to do under the decisions of this Court, including not only *Smyth* v. *Ames* but numerous other decisions, in which that doctrine has been reaffirmed over and over, until the American people have come to regard it as the settled law of the land. In the second place, far from showing that the Congress intended to invade the province of this Court in construing the Constitution or to set aside the operation of the Fifth Amendment as construed by this Court, the history set out by the Commission and complainant (Br., pp. 107-9) shows conclusively that the Congress did not attempt to do any such thing. Let it be granted for the purposes of argument that the original Utility Act, of which the Federal Power Act is a part, was so worded as clearly to import a purpose on the part of its author to substitute the prudent investment theory of rate making for that based on present value, and let it be assumed also that the Senate Committee on Interstate Commerce recommended that course. The fact remains that the Congress did not pass the bill as originally written; but by adding language to Paragraph (a) of Section 208 and striking out entirely Paragraph (c) thereof, it clearly approved the existing law and rejected the suggestion that it attempt to change it. It will be noted that to Paragraph (a) was added the language: "and, when found necessary for rate-making purposes, other facts which bear on the determination of such cost or depreciation and the fair value of such property." The addition of that language itself is tantamount to a recognition by Congress that when it came to a matter of rate-making it was necessary for the Commission to determine the fair value of the property. It was Paragraph (c) of the proposed bill which, had it been enacted, would have constituted an attempt to substitute the prudent investment theory for the fair value basis of regulation, and that paragraph was stricken out entirely. How the Commission and complainant could reach the conclusion that the rejection by the Congress of Paragraph (c) and the amendment of Paragraph (a) of Section 208 was intended by the Congress to confer on the Commission the authority to ignore the present fair value basis of rate regulation and substitute therefor the prudent investment theory is inconceivable.

Cross-petitioners feel that they have covered the subject fully in their original brief, and they submit that the Commission and complainant have not met the argument there presented.

VI.

THIS COURT SHOULD NOT OVERRULE SMYTH v. AMES.

A. The Validity of the Rule of Smyth v. Ames Is Not Here Involved.

The validity of the rule of *Smyth* v. *Ames,* 169 U. S. 466, as to rate base and amount to be amortized is not here involved for three reasons:

(1) This case involves condemnation to public use of the property of a strictly private enterprise in 1938 when the Natural Gas Act was passed or in 1940 when regulation was imposed upon cross-petitioners. This, of course, assumes the validity of the Natural Gas Act. There was then an actual taking of the use of cross-petitioners' *property* and not of the investment made in 1930 and 1931. Just compensation for the use of that property must be given. This is not the case of an investor who furnishes money for the conduct of a public utility operating under a franchise. It is a case of condemnation of the use of *property*.

(2) The rule of *Smyth* v. *Ames* is a rule of constitutional protection. It may furnish basis for a principal issue in a case in a Federal District Court in which the utility as plaintiff attacks rates imposed by a regulatory body as confiscatory under the Fifth or Fourteenth Amendments. In such a case the plaintiff utility has the burden of proving confiscation. Here, however, this case arises not from a District Court, but from a regulatory proceeding before the Commission under the Natural Gas Act and a review of those proceedings by the Circuit Court of Appeals. Under Section 19 of the Natural Gas Act the review involves not only errors resulting in confiscation,

but any errors of law and errors resulting from the failure of the Commission to follow the statute creating and empowering it. It is submitted that the statute does not empower the Commission to fix rates on the basis of the prudent-investment theory. This question of statutory power does not involve the constitutional-protection issue of *Smyth* v. *Ames.*

(3) The validity of the rule of *Smyth* v. *Ames* was not raised in the court below and is not open here.

Cross-petitioners discuss briefly each of the foregoing reasons as to why *Smyth* v. *Ames* is not involved on this record.

1. This Is a Case of Condemnation of the Use of Property; It Does Not Involve Investment in a Franchised Public Utility.

The Commission and complainant argue (Br., pp. 20, 23-24, 112-133) that *Smyth* v. *Ames* should be overruled; that the proper basis for rate base and amount to be amortized is "prudent investment"; and that on such basis the Commission's order does not result in confiscation. This argument, whatever its validity, is applicable only to a public utility operating under franchise into which the investor puts his money knowing that he is committing it to a public enterprise. Even if it may be validly said that it is money and not the then money's worth in property which is invested in a public utility, such a proposition does not apply to this case.[8] Cross-petitioners invested their money in a property in 1930 and 1931. This was a private property. It was the property as it existed in 1938 or 1940 which the Government condemned to public use. In determining just compensation therefor as of that time and since, no prudent-investment theory can be properly applied. It is this property and not contemplations of investment in a public utility which is involved. There is, therefore, no occasion on this record to consider whether *Smyth* v. *Ames* should be overruled and the prudent-investment theory adopted as the sole measure of constitutional protection. It is the property which cross-petitioners had in 1938 or 1940 which the Constitution protects, and not a theoretical non-existent past choice to invest.

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[8] In his concurring opinion in *Missouri ex rel. Southwestern Bell Telephone Company* v. *Public Service Com.*, 262 U. S. 276, Mr. Justice Brandeis, advocating the prudent-investment theory, said (p. 290):

> "The thing devoted by the investor to the public use is not specific property, tangible and intangible, but capital embarked in the enterprise."

This statement obviously does not apply to the instant case.

As to period of amortization, the rule of *Smyth* v. *Ames* is plainly not involved. Clearly the period must be from the date of the taking of the use of cross-petitioners' property to the end of the project's life. The rate base must include the fair value of the property as of the taking. The amount to be amortized must include the fair value of the property as of that date. Both the rate base and the amount to be amortized must include the *cost* to cross-petitioners of developing their inert properties into a going concern.

2. Since the Natural Gas Act Empowers the Commission To Fix Rates Only on the Basis of Smyth v. Ames, the Error of the Commission in Not Following the Statute In Fixing the Amount to Be Amortized Is Plain and There Is No Occasion to Consider the Measure of Constitutional Protection Set Out in Smyth v. Ames.

The Natural Gas Act, Section 4(a), provides that "all rates and charges made * * * by any natural gas company * * * shall be just and reasonable." Section 5(a) provides that whenever the Commission, after a hearing, shall find that any rate is "unjust, unreasonable * * * the Commission shall determine the just and reasonable rate." In Section 6(a) it is provided:

> "The Commission may investigate and ascertain the actual legitimate cost of the property of every natural gas company, the depreciation therein, and, when found necessary for rate-making purposes, other facts which bear on the determination of such cost or depreciation and the fair value of such property."

At the time this Act was passed (1938) a reasonable rate, as this Court had repeatedly declared for 40 years, was a rate above the line of confiscation established by *Smyth* v. *Ames.* It is perfectly clear that Congress in specifying "reasonable rate" meant a reasonable rate as was established by the law of the land and did not mean a rate which is reasonable in the eyes of some legal writers. If Congress had intended that the Commission follow some other standard, as for example the "prudent-investment" standard, it could and would have said so in plain and unmistakable language. It must be kept in mind that the Commission as a statutory creature has only those powers which are clearly and unmistakably by the statute granted to it (See cross-petitioners' main brief, pages 216-218).

The rejection by Congress, in enacting the Federal Power Act, of a proposal for express authority to fix rates on the prudent-investment theory, is particularly pertinent. See the preceding section of this brief, pp. 78-79.

The language of Section 6(a) of the Natural Gas Act quoted above gives the Commission and complainant no comfort in trying to spell out an attempt by Congress to empower the Commission to fix rates on the prudent-investment theory. This language is not inconsistent with the application of the rule of *Smyth* v. *Ames.* Original cost is one of the factors to be considered under *Smyth* v. *Ames.* Likewise, reproduction cost new is to be considered under that case. However, the evidence as to reproduction cost new may be lacking entirely or so lacking in probative value as to make its consideration unnecessary "for rate-making purposes." Cf: *Los Angeles Gas Co.* v. *R. R. Commission*, 289 U. S. 287, 312. The language of Congress in Section 6(a) does not empower the Commission to follow the prudent-investment theory. The language of the Act directs the Commission to fix "reasonable rates" which must be taken in the absence of anything clearly to the contrary to mean reasonable rates under the law of the land as it existed in 1938. The failure of the Commission to follow the statute in fixing the amount to be amortized constituted error and the decision of the court below is plainly right—regardless of any issue as to constitutional protection.

It is likewise clear that "reasonable rates" under the statute cannot be rates that will change entirely the character of the investment which cross-petitioners made in 1930 and 1931. That was an investment in a private enterprise; but even on the hypothesis that cross-petitioners should have foreseen regulation, they made the investment on the basis of the law as declared by this Court in *Smyth* v. *Ames* and the long line of decisions following that case. It is now urged by the Commission and complainant that it is "reasonable" to cut cross-petitioners' rates on the prudent-investment theory. Plainly Congress did not so intend. Assuming without admitting that Congress intended to empower the Commission to follow the prudent-investment theory, Congress at the very most could have intended that that theory be applied to investments in natural gas properties made subsequent to the Act. There is no basis for any other construction of the word "reasonable" as used in the Act.

Even ardent advocates of the prudent-investment theory recognize the unreasonableness of retroactive application of that dogma. Kauper, WANTED: A NEW DEFINITION OF THE RATE BASE, 37 Mich. L. Rev. 1209, 1233 *et seq.;* Cook, FAIR VALUE—A STATUTORY DEFINITION, 7 Geo. Wash. L. Rev. 475;

Bonbright, VALUATION OF PROPERTY (1937) 1155; New York Commission on Revision of Public Service Commission Law, Minority Report (1930, pp. 393-5).

3. The Validity of the Rule of Smyth v. Ames Is Not Here Involved Because This Issue Was Not Raised in the Court Below.

This Court in this case is reviewing a judgment of the Circuit Court of Appeals to determine the correctness of that judgment. As shown by the petition for review (R. VIII, pp. 3997-4019) and by the opinion of the Circuit Court of Appeals (R. VIII, pp. 4025, 4042), the question of the validity of the rule of *Smyth* v. *Ames* was neither raised nor decided in that Court. This Court should not consider issues not raised below.

Denver Union Stockyard Co. v. *U. S.*, 304 U. S. 470, 484-5.

Duignan v. *U. S.*, 274 U. S. 195, 200.

Virtue v. *Creamery Package Mfg. Co.*, 227 U. S. 8, 38-39.

The overruling of *Smyth* v. *Ames* clearly should not be considered on a record such as this where there is no evidence as to the practicalities of alternative suggestions. The assertions of the Commission and complainant as to the practicalities of the prudent-investment theory are based not on evidence as to the facts concerning utilities, but only on hearsay. The assertions of the Commission and complainant are lacking the ordinary tests of cross-examination.

B. The "Present-Value" Rule of Smyth v. Ames Is Sound.

The Commission and complainant, in their brief (pp. 112-133) and in their supplement to their brief, attack *Smyth* v. *Ames.* Among their arguments is that that case is contrary to "the overwhelming weight of professional opinion" (Br., 113). In Appendix A to the supplement to their brief (pp. 42-94) the Commission and the complainant set out quotations from periodicals and other sources attacking the doctrine of *Smyth* v. *Ames.* Cross-petitioners deny that the opinion referred to is "overwhelming" and deny that it is sound. This is not the first case in which this so-called "overwhelming weight of professional opinion" has been presented to this Court. The controversy has raged in the periodicals for years. This Court, although the arguments against *Smyth* v. *Ames* have been urged upon it with much explanation, has consistently held to the views expressed in *Smyth* v. *Ames.* In the footnote are cited cases in which this Court has followed the rule of *Smyth* v. *Ames.*[4]

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[4] *San Diego L & T Co.* v. *National City,* 174 U. S. 739 (1899); *San Diego L. & T. Co.* v. *Jasper,* 189 U. S. 439 (1903); *Stanislaus Co.* v. *San Joaquin Co.,* 192 U. S. 201 (1904); *Knoxville* v. *Knoxville Water Co.,* 212 U. S. 1 (1909); ***Willcox* v. *Consolidated Gas Co.,*** 212 U. S. 19 (1909); ***Cedar Rapids etc. Co.* v. *Cedar Rapids,*** 223 U. S. 655 (1912); ***Minnesota Rate Cases,*** 230 U. S. 352 (1913); ***Des Moines Gas Co.* v. *City,*** 238 U. S. 153 (1915); ***Galveston Electric Co.* v. *Galveston,*** 258 U. S. 388 (1922); ***Missouri ex rel. S. W. Bell Telephone Co.* v. *Public Service Commission,*** 262 U. S. 276 (1923); ***Bluefield Water Works Co.* v. *Public Service Commission,*** 262 U. S. 679 (1923); ***Georgia Railway & P. Co.* v. *Railroad Commission,*** 262 U. S. 625 (1923); ***McCardle* v. *The Indianapolis Water Co.,*** 272 U. S. 400 (1926); ***St. Louis and O'Fallon Railway Co.* v. *U. S.,*** 279 U. S. 461 (1929); ***United Railways* v. *West,*** 280 U. S. 234 (1930); ***Los Angeles Gas & Electric Corp.* v. *R. R. Com.,*** 289 U. S. 287 (1933); ***West* v. *Chesapeake & Potomac Telephone Co.,*** 295 U. S. 662 (1935); ***St. Joseph Stockyard Co.* v. *U. S.,*** 298 U. S. 38 (1936); ***R. R. Com.* v. *Pacific Gas & Electric Co.,*** 302 U. S. 388 (1938); ***Denver Union Stockyards Co.* v. *U. S.,*** 304 U. S. 470 (1938); ***Driscoll* v. *Edison Co.,*** 307 U. S. 104 (1939).

Before taking up the many criticisms of *Smyth* v. *Ames* made by the Commission and complainant, cross-petitioners urge two broad considerations against the overruling of *Smyth* v. *Ames*, particularly at this time.

1. To eliminate the plurality of factors enunciated in *Smyth* v. *Ames* as employable in the determination of a proper rate base and the amount to be amortized, and to substitute therefor the single one of original cost or "prudent investment", will result in continuous exaction of high rates from consumers on investments during periods of high prices and inflated values. If the investor is so prudent or so favored by chance as to make his investment in such a period, the public must continue to pay high rates throughout the remainder of the property's life. We are now in an era of rising prices. A further rise in prices in the next few years is indicated. If this Court should set up prudent investment as the sole constitutional protection, utilities built in the next few years will be enabled to saddle war prices on rate payers over the next generation. They will also be enabled to collect substantially higher compensation for their services than will others whose facilities were built some time ago and who are rendering the same services.

2. Investments have been made in utilities on the basis of a return on the principle of *Smyth* v. *Ames*. An overthrow of this principle at this time may seriously disrupt and disorganize these utilities. Many such utilities are vital to the Country's present needs.

The Commission and complainant argue first (Br., 113-116) that the "fair value" rule of *Smyth* v. *Ames* is based on eminent domain concepts. Cross-petitioners submit that this is correct. The *use* of the property is taken.[5] From this premise, the Commission and complainant argue that this Court has acted on inconsistent principles in following *Smyth* v. *Ames;* to-wit, this Court has said on the one hand that rate regulation is valid and on the other hand that rate regulation must secure to the property owner "just compensation" in the sense in which that term is used in the law of eminent domain (Br., 122). The Commission and complainant arrive at this inconsistency by asserting that in the law of eminent domain, value depends upon earning power and that this method of determining value is inapplicable to rate regulation because earnings are the very thing in issue.

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[5] *West* v. *Chesapeake & Potomac Tel. Co.*, 295 U. S. 662, 671.

The Commission and complainant thus create a dilemma. They assert that the "present fair value rule created but offers no way out of this dilemma" (Br., 116). The dilemma which the Commission and complainant create is, in fact, nonexistent. Other factors than earnings enter into a determination of value both for purposes of eminent domain or exchange value and rate regulation. This Court has not been misled by the assertion of this so-called "dilemma", which has been much discussed by academic writers. In *Los Angeles Gas Co.* v. *R. R. Com.*, 289 U. S. 287, this Court, speaking through Chief Justice Hughes, said (p. 305):

> "* * * when rates themselves are in dispute, earnings produced by rates do not afford a standard for decision."

Having erroneously attempted to rid rate regulation of all concepts of or analogy to eminent domain, the Commission and complainant next argue that regulation is based not on a "taking", but on an exercise of the police power. It has already been pointed out that regulation does involve a taking of the *use* of property. This is particularly true with respect to cross-petitioners. They were a private enterprise, exercising a normal freedom of private contract. They did not hold themselves out to serve all who might apply. The use of their property was clearly taken in 1938 when the Act was passed, or 1940 when actual regulation commenced. Under Section 7 of the Act, cross-petitioners cannot, without risk of criminal penalties (Sec. 21 of the Act), abandon their properties without the permission of the Commission, which permission this Court has termed "illusory". *Wolff Packing Co.* v. *Court,* 262 U. S. 522, 534. Cross-petitioners cannot, without risk of criminal penalties, fail to obey an order of the Commission directing them to extend their services and facilities (Sec. 7 of the Act). Cross-petitioners cannot extend their facilities to a market which is already being served by another natural gas company without the permission of the Commission (Section 7).

Despite these facts, the Commission and complainant assert (Br., 126, footnote 41) that

> "no question of forbidding abandonment or compelling an extension is involved here."

Because cross-petitioners have not sought to abandon facilities and have not been compelled to extend facilities, the Commission and complainant would have these powers over cross-petitioners ignored on the question of the taking of the use of cross-petitioners' property. The Commission and complainant further say (Br., 126, footnote 41):

> "The duty to continue or extend service is based upon the community's dependence *for which the utility is responsible.*"

This statement is contrary to fact as applied to cross-petitioners. By no stretch of the imagination can it be said that the Chicago area is the responsibility of cross-petitioners. It could as well be said that a Texas grapefruit peddler who has supplied the Chicago market is responsible for the community's dependence on grapefruit. Cross-petitioners started their enterprise as a purely private business. They obtained no franchise from the Chicago area or from others. They are not responsible for the Chicago area's alleged dependence upon them. Certainly this alleged dependence, for which cross-petitioners are not responsible, is no ground for saying that it can be the basis for requiring cross-petitioners to continue or extend their service.

The plain fact is that by virtue of the Act, or by virtue of regulation thereunder, the use of cross-petitioners' property was taken. Just compensation under the Constitution demands a fair return on the fair value of the property at the time it was taken and a return to cross-petitioners of that fair value by the end of the project's life. The Commission and complainant cite numerous cases (Br., 124-125) in which the valid exercise of police powers are alleged to diminish the value of property without compensation. It is sufficient to point out that cross-petitioners are not violating fish protection statutes, are not manufacturing oleomargarine, etc.

The Commission and complainant next urge that under the police power it is not unreasonable to limit the earnings of a utility to a fair return upon the capital prudently invested (Br., 127-132). The Commission and complainant are quick to point out that in urging prudent investment as the sole protection afforded by the Constitution, they do not urge "that a legislature may not lawfully select other standards suggested by sound business practice" (Br., 128). By their argument, however, they do necessarily contend that the Constitution protects only against rates which yield less than a fair return on the prudent investment. The Commission and complainant say that their argument for prudent investment "requires little elaboration" (Br., 128). This is true, because the arguments advanced are the same arguments which this Court has, over the years, consistently rejected as unsound.

The Commission and complainant acknowledge that the prudent-investment theory does not allow the investor in utility property "the same *appreciation* in values which owners of other property enjoy in times of prosperity," but assert that the prudent-investment theory saves utility investors "from the depreciation in values from which investors in other types of business suffer in times of depression" (Br., 131). Before analyzing this further, cross-petitioners wish first to point out that the prudent-investment theory makes the utility investor a mere money lender, who is bound by maximum rates of return but not guaranteed *any* return. His rate of interest varies but the amount of principal involved, as measured by the dollar value when the investment is made, remains the same. The prudent-investment theory also destroys initiative in management. The Commission and complainant assert (Supplement, 77) that any increase in values is due to the community and, therefore, the utility should not have the benefit. They deny any credit to management for creative skill in the design and development of the properties of the utility. If at the time of the first investigation as to the feasibility of constructing cross-petitioners' pipeline, the prudent-investment theory had obtained, a quite different story might be presented on this record. Under the prudent-investment theory there would have been no reason for doing anything other than taking the available instrumentalities—taking the old heavy, expensive pipe; there might be no story on this record of the work and effort that resulted in the thin-walled, electric-welded pipe and the seamless pipe. The original cost might have been vastly higher. There would have been no inducement for progress and savings. The determination of values as of the time of construction breeds lack of efficiency and carelessness to the point just short of imprudence. It takes away the inducement for improvement, for cheaper original cost, and for advancement in whatever arts the enterprise employs. The prudent-investment theory would remove all incentive to do more than hold the *status quo*. It is submitted that the development and progress of this Country have been built upon the foundation of some reward for creative skill, enterprise, and initiative. Particularly are creative skill, enterprise, and initiative needed in all of our undertakings at the present time. They are part of our essential means. Indeed, their preservation is one of our objectives.

Continuing with the proposition that the rule of *Smyth* v. *Ames* allows appreciation but protects the investor against depreciation, the Commission and complainant assert (Br., 131):

> "This is so because, in periods of deflation, regulatory agencies cannot undertake to fix values in strict conformity to *Smyth* v. *Ames* without throwing many utilities into receivership, and this would, of course, deprive consumers of necessary utility service."

The argument is refuted by *Smyth* v. *Ames*, itself. In that case the State of Nebraska on behalf of the public argued for the reproduction cost basis because it would result in a lower valuation than original cost. The statement by the Commission and complainant that to follow *Smyth* v. *Ames* in periods of deflation would throw many utilities into receivership is a mere unsupported generality.

The fallacy of the argument that the prudent-investment theory protects the investor against a fall in the general price level and gives him a constant return is pointed out by Dorety in "*The Function of Reproduction Cost in Public Utility Valuation and Rate Making*", 37 Harvard Law Review 173, 183 (1923) as follows:

> "The discussion in the preceding paragraphs assumes that the utility constructed during a high cost period could continue to collect a return upon its original cost, notwithstanding a subsequent fall in the general price level. This assumption is of the essence of the original cost doctrine, which would induce the investment of capital in public utilities by assuring the investor a constant return upon his actual investment. ~~However, the proponents of original cost~~ suggest no public guaranty of such a return and, as a matter of fact, no utility could continue to sell its

> service for substantially more than it would cost another company to duplicate such service. If it attempted to do so, it would soon find itself in competition with a new private or municipal plant. The forces of competition would tend to force rates in low price periods down to the cost of duplicating the service. The doctrine of original cost, therefore, would prevent the investor from ever earning a return on more than his original investment, but it would give him no assurance against a smaller return. He could lose by a fall in prices but could not gain by a rise. No prudent investor would trust his savings in such an enterprise. The proponents of this doctrine, therefore, face a dilemma. If they are right in assuming that a return on a high construction cost can be collected in a subsequent low price period, they will impose an intolerable burden upon the reduced capacity of the shipper for payment. If such a return cannot be collected, the utility will not be built, for the investor will not face the possibility of loss with no possibility of gain."

That there is no guarantee of a return on the original cost was pointed out by this Court in *Los Angeles Gas Co.* v. *R. R. Com.*, 289 U. S. 287, opinion by Mr. Chief Justice Hughes, where the Court said (p. 306):

> "* * * while cost must be considered, the Court has held that it is not an exclusive or final test. The public have not underwritten the investment."

In Appendix D hereto (pp. 109-151, *infra*) are set out extracts from legal writers pointing out the soundness of the position of this Court and the fallacies of the prudent-investment theory. Among the principal reasons for the soundness of the "fair-value" rule are the following:

1. The prudent-investment doctrine would in theory force the rate payers to pay throughout the life of a property high returns on any property built during a period of high prices and inflated values.
2. If the high return could not, as a practical matter, be exacted from the public, investment in utilities would be stifled because the investor would face the possibility of loss with no possibility of gain.

3. That the high return may not, as a practical matter, be exacted from the public is apparent because (a) the public in a period of low prices would not pay abnormally high prices, and (b) competition of other services would require a low price. Imagine a gas utility, built in a period of inflation and therefore charging abnormally high prices, competing with an electric utility built in period of low prices and therefore charging low rates.

4. The prudent-investment theory is manifestly unfair to the investor who puts his money into a plant during a period of low prices. During a subsequent period of high prices, when the purchasing power of the dollar has gone down (and it may go down considerably), he still gets a return based on the *number* of dollars he put in.[6]

Two arguments against this proposition are advanced by the Commission and complainant (Supplement, 51-54). First, it is said that a large percentage of the capital of most public utilities is represented by fixed income-bearing securities, *i. e.*, bonds and preferred stock. There is no showing that this is true of *all* utilities, and it is clearly not a sound argument with respect to cross-petitioners. Here the same few investors own the bonds and common stock of cross-petitioners, each stockholder owning bonds in proportion to its stock (R. VII, p. 3781). The total proportion of bonds to common stock means nothing as between the owners of cross-petitioners. Second, it is said that under *Smyth v. Ames* "rates are too high after a period of inflation and too low after a period of deflation" (Supplement, 54). This is another way of stating the argument that present rate regulation is slow. Perfection in the matter of speed may not have been realized, but it is believed that proper protection of constitutional rights should not be sacrificed for speed.

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[6] In the brief presented herein by the National Association of Railroad and Utilities Commissioners, it is stated (p. 46):

> "* * * if we should come into a period of extreme inflation, when a rate base equal in dollars only to the original cost incurred prior to the period of inflation would be *manifestly unjust*, the commission would adopt means to make the rate base reflect the decreased value of the dollar, or it would permit reproduction cost estimates to be shown. If it failed to do this, the Court, upon review could grant relief."

This statement should be taken in connection with the assertions of the Commission and complainant herein that the "overwhelming weight of professional opinion" favors the prudent-investment theory (Br., 113). The National Association of Railroad and Utilities Commissioners embraces within its membership the members of the regulatory commissions and boards of the several States except Delaware, which has no regulatory commission, and New York (Motion of said Association, p. 1).

5. Under the fair-value rule of this Court, the investor's income is more stable. When prices go up and the purchasing power of the dollar goes down, the investor receives more dollars.

6. There is no merit in the suggestion that the fluctuations in the purchasing power of the dollar may be taken care of by a sliding scale for the rate of return. This would involve only a change of the language used with respect to the determination of fair value, and would continue the introduction of the same character and volume of proof as that which would be offered to show the reproduction cost new.

7. Fair value rewards efficiency in construction because the return is not limited to the actual amount spent.

8. The prudent-investment theory encourages inefficiency in construction to the point just short of imprudence.

9. There is no merit in the argument that the fair-value rule encourages the utility to keep old, outmoded equipment which would be costly to reproduce, rather than switch to new, better, and cheaper equipment. Competition forces such changes. The competition which most utilities face cannot be overemphasized. The competition between gas and electricity, coal, oil, etc. for heating, cooking, and other purposes is not imaginary.

10. The fair-value rule encourages utilities to build during low price periods, whereas the prudent-investment theory encourages building at peak prices.

11. The prudent-investment theory would cause social unrest. In a period of depression the public would not understand why it should pay a return to

utility investors on costs incurred during periods of inflation.

12. Most important of all, the prudent-investment theory would tie the courts to one set formula or dogma which manifestly would work injustice in particular cases. The fair-value rule avoids this difficulty. *Los Angeles Gas Co.* v. *R. R. Com.*, 289 U. S. 287, 305.

In the supplement to their brief the Commission and complainant principally attack the "fair value" rule on three alleged grounds: (1) the time necessary to make appraisals; (2) the unreliability of results of that method; and (3) the enormous expense involved. At the outset, it should be observed that time and expense are not primary factors where protection of constitutional rights is involved. It is hardly appropriate to argue that we should forget constitutional rights because to protect them would take time, energy, and funds.

As to the alleged time factor, Commission and complainant point out the number of years sometimes involved in rate cases. It is significant that the figures given are from the initiation of the regulatory proceedings to the conclusion of the final court decree (see Supplement, 22). The time consumed in court litigation can hardly be charged to the time for making reproduction cost new estimates. It is true that by the time the litigation in court is concluded that such estimates might be out of date, but time consumed in court is hardly an argument for doing away with courts. Time spent in litigation is not a proper basis for interpretation of the Constitution.

The Commission and complainant also refer (supplement, 22) to the length of time consumed in the *Illinois Bell Telephone* case and the *New York Telephone* case, as outlined by Mr. Justice Brandeis in his concurring opinion in *St. Joseph Stock Yards Co.* v. *U. S.*, 298 U. S. 38, 90. There is nothing to show what time would have been involved in these cases had the element of reproduction cost new been eliminated. There is no showing as to how much time was spent on reproduction cost new in actual hearings before the commissions, in the presentation of evidence in court, or in the argument on review. If the element of reproduction cost new should be eliminated, there would still remain numerous issues such as rate of return, income, expenses, etc., which require time and effort. It is significant that in the case at bar the evidence respecting reproduction cost new was submitted in less than two days (R. VII, pp. 1191-1276). It should likewise be observed that evidence as to original cost may be lengthy, and argument of issues in respect to original cost may require lengthy presentation. The Commission and complainant would have it appear that the determination of original cost involves only opening the companies' books and taking out a figure. The original cost of many utilities in this Country is not available and is not shown by the companies' books. The determination of original cost in such instances would involve the very same or more difficult considerations than are involved in reproduction cost new. There might also be involved issues as to what is prudent and what is not prudent. Even where the books of the company show original cost, the issue as to what is and what is not prudent might require a great amount of time. The regulation of utility rates may be a difficult and troublesome administrative job for the commissions. The preservation of constitutional rights by the courts in rate cases is likewise sometimes difficult and troublesome. It does not appear, however, that the elimination of reproduction cost new and all other factors involved in the "fair value" rule and a substitution therefor of prudent investment will remove the difficulties and trouble. The time required for the settlement of disputes is always a difficulty in the functioning of the judicial processes. In this respect rate regulation does not stand alone. In many fields of law the time factor presents a difficulty. When time is required for the proper solution of a problem, the necessary time must be spent. The suggestions of the Commission and complainant offer no panacea.

The same observations apply to the suggestion of the Commission and complainant that rate litigation is too expensive. The figures set out in the supplement to the brief of the Commission and complainant (p. 26, footnote 13) obviously are not applicable to all utilities or regulated concerns. What proof is there that the elimination of evidence as to reproduction cost new would solve the problem of expense? Other issues in a rate case, such as original cost, may involve tremendous expense. The prudent-investment theory is no cure-all for the expense of rate litigation. On pages 58-60 of their supplement the Commission and complainant refer to the expense of high priced legal, engineering, and accounting talent. The advocates of the prudent-investment theory seem to think that book cost can be arrived at by simply turning to the books of the company. Might not legal, engineering, and accounting talent be required for an inquiry into the books? The aid of legal, engineering, and accounting talent is clearly desirable in determination of rate disputes involving millions of dollars.

The third criticism of *Smyth* v. *Ames* is the unreliability of its results. Evidence of reproduction cost new does present difficulties, so does book cost, so does the question of prudence, so does any evidence of value; but in its use to form sound judgments in no case is the ease of unfairness a sound condemnation of fairness. Evens in *"Valuation in the Supreme Court,"* 30 Am. Bar Assoc. Journal 485, 488 (1930) well states:

> "The requirements of that decision (*Smyth* v. *Ames*) are that all competent evidence of value be received and that each bit of such evidence be given such consideration as under all the circumstances of the case under investigation is 'just and right.' *This is but*

> *the elemental rule as to receiving and weighing evidence in any litigation.*"

Evens continues (p. 488):

> "It may be under the circumstances disclosed by the evidence in a particular case that the original cost less depreciation is a fair measure of present fair value. It may be, as the Supreme Court said in the Indianapolis Waterworks Company Case, that under certain conditions reproduction cost less depreciation furnishes a fair measure of value. It may be under the facts shown in one case a valuation for taxation purposes is important evidence of value and under the facts shown in another case such valuation has practically no probative worth. In other words, *Smyth* v. *Ames* does not require that a valuation be made by ascertaining value by means of various formulae, adding these values together and dividing by the number of component valuations in order to get an average which is called fair value. Neither does it attempt to say that the weight to be given to any one factor shall in all cases be in any definite ratio to any other factor. It recognizes that the weight which should be given to any evidence in reaching value varies as the conditions vary. It requires the consideration of all competent evidence but it requires the valuing tribunal to give to each piece of evidence such consideration, and only such consideration, as is 'just and right' under the facts in that case."

The criticism by the Commission and complainant, that valuation is sometimes a perplexing problem, applies to every field of law where values are involved. The difficulties in determining value in rate regulation are the same difficulties that are met in suits for the reasonable value of services rendered, in suits for goods sold and delivered, in suits for breach of warranty, in suits for damages for crops, buildings, etc. In such cases proof of value may be adduced. Usually it comes and must come from experts. Their testimony involves expense. They often disagree. Tribunals daily meet the problems in making determinations in respect to these matters where witnesses disagree. There is no royal road to a determination of value.

On page 41 of their supplement the Commission and complainant speak of the "exactness" and "ease of application" of the prudent-investment theory. It seems to be assumed that original cost is easily ascertainable. In some instances this may be true but many public utility concerns are made up of units bought by the present owner. In respect to many of these units no one now knows the original cost. Even after original costs are ascertained there is much room for inexactness in determining what is or is not prudent.

On page 128 of their brief, the Commission and complainant assert:

> "It is significant, too, that practical experience in Massachusetts, California, and elsewhere shows that this method is just to the utilities, has attracted capital, and has secured adequate service."

There is nothing in this record and no means of taking judicial notice as to the justness to the utilities of the methods followed in Massachusetts, California, and elsewhere. In fact, Massachusetts has not followed the prudent-investment theory. The Commission there has held only that reproduction cost new is not the sole basis for fixing present fair value and that the weight to be given to prudent investment, reproduction cost new, etc., depends upon the facts of the particular case.[7]

With respect to cases from California, this Court has not relaxed the rule of *Smyth* v. *Ames* (see *Los Angeles Gas Corporation* v. *Railroad Commission*, 289 U. S. 287).

The many quotations from writers and commissions set out in Appendix A, pages 42-94, of the supplement to the Commission's brief, are in general restatements of the same points which are urged in the main brief of the Commission and complainant and in Sections I and II of the supplement; but cross-petitioners point out that they are not bound by the testimony of Chairman Cortelyou of the Consolidated Gas System, Vice-president Nickerson of the same company, and President Sloan of the New York Edison Company in another case, and that what is true with those companies is not necessarily true with cross-petitioners or other concerns (see supplement, 86-87).

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[7] Northampton Gas Petition, P. U. R. 1915 A. 618, 626.

Summary of Cross-Petitioners' Position With Respect to "Fair Value."

It is manifest that the prudent-investment theory offers no cure-all for rate regulation. That *present* value should be used rather than original cost is plain in view of the constantly changing purchasing power of the dollar. *Present fair value is nothing more than a translation of original cost into present day dollars.* The prudent-investment theory would bind the courts to a hard and fast formula which, as the National Association of Railroad and Utilities Commissioners say (Br., 46), would in some cases be "manifestly unjust." Cross-petitioners submit that the true and common sense basis for rate regulation has been consistently applied by this Court. In *Los Angeles Gas Co.* v. *Railroad Com.*, 289 U. S. 287, opinion by Chief Justice Hughes, this Court, in a thorough analysis of the problems, made it abundantly clear that the ascertainment of value in rate regulations

> "* * * is not a matter of formulas, but there must be a reasonable judgment having its basis in a proper consideration of all relevant facts" (p. 306).

The Court there also emphasized that the valuation must be made upon the particular facts in each case. At pages 307-308, the Court said:

> "* * * We have emphasized the danger in resting conclusions upon estimates of a conjectural character. We said, in *Minnesota Rates Cases, supra*, p. 452,—'The cost-of-reproduction method is of service in ascertaining the present value of the plant, when it is

> reasonably applied and when the cost of reproducing the property may be ascertained with a proper degree of certainty. But it does not justify the acceptance of results which depend upon mere conjecture. It is fundamental that the judicial power to declare legislative action invalid upon constitutional grounds is to be exercised only in clear cases. The constitutional invalidity must be manifest and if it rests upon disputed questions of fact, the invalidating facts must be proved. And this is true of asserted value as of other facts.' The weight to be given to actual cost, to historical cost, and to cost of reproduction new, is to be determined in the light of the facts of the particular case: *McCardle* v. *Indianapolis Water Co., supra.*''

This test, it is submitted, is sound. In the case at bar it is plain that upon present value, the true constitutional test, the order of the Commission is confiscatory.

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APPENDIX A

Table III. Computation of the Rate of Return on Net Investment After Amortization Reserve When a Return of 8% is Allowed on the Total Amount of the Investment Together with an Annual Amortization Allowance Computed on an 8% Sinking Fund Basis. Computations are Illustrated by Reference to an Investment of $1,000,000 Over a Ten Year Period.

A	B	C	D	E	F	G	H	I	J	K
				Amortization Reserve		Investment Less Reserve				
Year	Annual Allowance For Amortization On an 8% Sinking Fund Basis	Annual Interest Accrual On Amortization Reserve (8% of E)	Total Annual Addition to Amortization Reserve (B + C)	At First of Each Year	At End of Each Year	At First of Each Year	At End of Each Year (G — D)	8% on Total Investment (8% of $1,000,000)	8% on Total Investment Less Annual Interest Accrual On Amortization Reserve (I — C)	Rate of Return Net Investment (i. e., Investment Less Reserve) (J + G)
1.........	$ 69,029‡	$ 0	$ 69,029	$ 0	$ 69,029	$1,000,000	$930,971	$80,000	$ 80,000	8.00%
2.........	69,029	5,523	74,552	69,029	143,581	930,971	856,419	80,000	74,477	8.00
3.........	69,029	11,487	80,516	143,581	224,097	856,419	775,903	80,000	68,513	8.00
4.........	69,029	17,929	86,958	224,097	311,055	775,903	688,945	80,000	62,071	8.00
5.........	69,029	24,885	93,914	311,055	404,969	688,945	595,031	80,000	55,115	8.00
6.........	69,029	32,398	101,427	404,969	506,396	595,031	493,604	80,000	47,602	8.00
7.........	69,029	40,512	109,541	506,396	615,937	493,604	384,063	80,000	39,488	8.00
8.........	69,029	49,275	118,304	615,937	734,241	384,063	265,759	80,000	30,725	8.00
9.........	69,029	58,739	127,768	734,241	862,009	265,759	137,991	80,000	21,261	8.00
10.........	69,029	68,962	137,991	862,009	1,000,000	137,991	-o-	80,000	11,038	8.00
Totals...	$690,290	$309,710	$1,000,000	xxxxxx	xxxxxx	xxxxxx	xxxxxx	$800,000	$490,290	8.00%*

‡$69,029 set aside at the end of each year with interest at 8% compounded annually will amount to $1,000,000 at the end of ten years.

*Average, obtained by dividing the total of column J ($490,290) by the total of column G ($6,128,686).

APPENDIX B

Computation illustrating the fallacy in the assumptions underlying Sheet 3 of Exhibit 182 (Appendix A, supra, p. . . . .), prepared by Ostrander

	A	B	C	D	E	F
	Amortization Reserve	Annual Unamortized Balance	8% of Unamortized Balance	Allowance for Amortization and Return on Unamortized Balance at 8%	Allowance Assumed in Appendix A, (supra, p. 103)	Annual Deficit
First Year . . .	$100,000	$1,000,000	$80,000	$180,000	$149,029	$30,971
Second Year .	100,000	900,000	72,000	172,000	149,029	22,971
Third Year . .	100,000	800,000	64,000	164,000	149,029	14,971
Fourth Year .	100,000	700,000	56,000	156,000	149,029	6,971
Fifth Year . . .	100,000	600,000	48,000	148,000	149,029	1,029
Sixth Year . . .	100,000	500,000	40,000	140,000	149,029	9,029
Seventh Year	100,000	400,000	32,000	132,000	149,029	17,029
Eighth Year .	100,000	300,000	24,000	124,000	149,029	25,029
Ninth Year . .	100,000	200,000	16,000	116,000	149,029	33,029
Tenth Year . .	100,000	100,000	8,000	108,000	149,029	41,029

APPENDIX C

		BLOCK 1					BLOCK 2					BLOCK 3				
		Un-amortized Balance	Ret on Bal. 6½%	Total Require-ments Amort. & Return	Interim Order Deficiency	Deficiency Accumu-lated	Un-amortized Balance	Ret. on Bal. 6½%	Total Require-ments Amort. & Return	Interim Order Deficiency	Deficiency Accumu-lated	Un-amortized Balance	Ret. on Bal. 6½%	Total Require-ments Amort. & Return	Interim Order Deficiency	Deficiency Accumu-lated
		From date of Act 7/1/38—16½ years					From date of Order Aug. 1, 1940 14 years 5 months					23 years—1/1/32 to 12/31/54				
mortization Base	84,341,218															
mortization Allowance —straight line		5,111,587					5,850,258					3,667,009				
ate Base	82,291,553															
mortization and Return Interim Order	6,395,180															
1932												82,291,553	5,348,951	9,015,960	2,620,780	2,620,780
1933												78,624,544	5,110,595	8,777,604	2,382,424	5,003,204
1934												74,957,535	4,872,240	8,539,249	2,144,069	7,147,273
1935												71,290,526	4,633,884	8,300,893	1,905,713	9,052,986
1936												67,623,517	4,395,529	8,062,538	1,667,358	10,720,344
1937												63,956,508	4,157,173	7,824,182	1,429,002	12,149,346
1938		82,291,553	2,674,475	5,230,270	2,032,680	2,032,680						60,289,499	3,918,817	7,585,826	1,190,646	13,339,992
1939		79,735,758	5,182,824	10,294,413	3,899,233	5,931,913						56,622,490	3,680,462	7,347,471	952,291	14,292,283
1940		74,624,169	4,850,571	9,962,160	3,566,980	9,498,893	82,291,553	2,228,731	4,666,340	2,001,660	2,001,660	52,955,481	3,442,106	7,109,115	713,935	15,006,218
1941		69,512,580	4,518,318	9,629,907	3,234,727	12,733,620	79,853,944	5,190,506	11,040,764	4,645,584	6,647,244	49,288,472	3,203,751	6,870,760	475,580	15,481,798
1942		64,400,991	4,186,064	9,297,653	2,902,473	15,636,093	74,003,686	4,810,240	10,660,498	4,265,318	10,912,562	45,621,463	2,965,395	6,632,404	237,224	15,719,022
1943		59,289,402	3,853,811	8,965,400	2,570,220	18,206,313	68,153,428	4,429,973	10,280,231	3,885,051	14,797,613	41,954,454	2,727,040	6,394,049	1,131	15,717,891
1944		54,177,813	3,521,558	8,633,147	2,237,967	20,444,280	62,303,170	4,049,706	9,899,964	3,504,784	18,302,397	38,287,445	2,488,684	6,155,693	239,487	15,478,404
1945		49,066,224	3,189,305	8,300,894	1,905,714	22,349,994	56,452,912	3,669,439	9,519,697	3,124,517	21,426,914	34,620,436	2,250,328	5,917,337	477,843	15,000,561
1946		43,954,635	2,857,051	[illegible]	1,573,460	23,923,454	50,602,654	3,289,173	9,139,431	2,744,251	24,171,165	30,953,427	2,011,973	5,678,982	716,198	14,284,363
1947		38,843,046	2,524,798	[illegible]	1,241,207	25,164,661	44,752,396	2,908,906	8,759,164	2,363,984	26,535,149	27,286,418	1,773,617	5,440,626	954,554	13,329,809
1948		33,731,457	2,192,545	7,304,134	908,954	26,073,615	38,902,138	2,528,639	8,378,897	1,983,717	28,518,866	23,619,409	1,535,262	5,202,271	1,192,909	12,136,900
1949		28,619,868	1,860,291	6,971,880	576,700	26,650,315	33,051,880	2,148,372	7,998,630	1,603,450	30,122,316	19,952,400	1,296,906	4,963,915	1,431,265	10,705,635
1950		23,508,279	1,528,038	6,639,627	244,447	26,894,762	27,201,622	1,768,105	7,618,363	1,223,183	31,345,499	16,285,391	1,058,550	4,725,559	1,669,621	9,036,014
1951		18,396,690	1,195,785	6,307,374	87,806	26,806,956	21,351,364	1,387,839	7,238,097	842,917	32,188,416	12,618,382	820,195	4,487,204	1,907,976	7,128,038
1952		13,285,101	863,532	5,975,121	420,059	26,386,897	15,501,106	1,007,572	6,857,830	462,650	32,651,066	8,951,373	581,839	4,248,848	2,146,332	4,981,[illegible]
1953		8,173,512	531,278	5,642,867	752,313	25,634,584	9,650,848	627,305	6,477,563	82,383	32,733,449	5,284,364	343,484	4,010,493	2,384,687	2,597,019
1954		3,061,923	199,025	5,310,614	1,084,566	24,550,018	3,800,590	747,038	6,097,296	297,884	32,435,565	1,617,355	105,128	3,772,137	2,623,043	26,024

APPENDIX D.

COMMENTS ON THE PRESENT FAIR VALUE RULE OF SMYTH v. AMES AND THE PRUDENT INVESTMENT THEORY:

Dorety, "*The Function of Reproduction Cost in Public Utility Valuation and Rate Making,*" 37 Harvard Law Rev. 173-191:

The legislative power to restrict rates charged for services of public utilities in this country has been firmly established since the decision of the United States Supreme Court in *Munn* v. *Illinois.*[1] And since the decision in *Reagan* v. *Farmers' Loan & Trust Co.*[2] it has been recognized that this power of restriction is not unlimited, and that rates cannot be reduced below a point sufficient to pay necessary operating expenses and, in addition, some element of profit as compensation for the use of the property. In *Smyth* v. *Ames*[3] it was held that the minimum profit to which the utility company was entitled, in addition to its operating expenses, was a fair return on the value of the property which the company employed for the public convenience. In that decision the court declared:

"And in order to ascertain that value, the original cost of construction, the amount expended in improvements, the amount and market value of its bonds and stocks, the present as compared with original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property. What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience."[4]

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[1] 94 U. S. 113 (1876).

[2] 154 U. S. 362 (1894).

[3] 169 U. S. 466 (1898).

No measure of the weight to be given to any of the above factors in determining value was indicated, and it will be noted that no particular emphasis was placed upon the present cost of construction, although it was mentioned as one of the factors to be considered.

The twenty-five years which have followed have been fruitful in controversy as to the effect to be attributed to each of the factors named. The use, as a measure of value, of earning capacity, under past or existing rates or under rates prescribed by statute, has been criticized upon the ground that a constitutional guaranty of a fair return upon a value based upon present earnings would result in constitutional protection of present earnings, whatever they might be. The reasoning is frequently referred to as a "vicious circle." Market value of bonds and stocks is criticized because it likewise reflects present earnings and present rates and would tend to perpetuate them, and also because it is usually only a very small percentage of the total securities which is traded in by speculators upon the market, and the price does not accurately reflect the amount for which the entire property or the controlling interest in it would be bought or sold. The variation in the market quotations of railroad stocks from day to day is in itself a clear indication that such quotations do not determine value, since actual value could not fluctuate in this way. For these reasons there has been little sanction either in judicial decision or in economic principle for attributing any considerable weight to either of these factors.

The elimination of these factors from those mentioned in *Smyth* v. *Ames* brings us to a consideration of the weight to be accorded to "the present as compared with original cost of construction," in determining the amount upon which a utility is entitled to earn a fair return.

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[4] P. 547.

There has been an increasing controversy between those who contend that the "fair return" should be computed upon the present cost of construction or estimated present cost of reproducing the property, and those who advocate the use of original cost as a basis for the fair return. There has been some minor controversy as to whether present cost of construction, or "cost of reproduction" as it is generally called, should be based upon the cost of reproducing the identical plant or a substitute plant capable of performing the same service; and the proponents of original cost have advanced slightly different conceptions of that basis, which have been variously designated as original cost, historical cost, prudent investment, sacrifice of the investor, and so forth. The predominant issue, however, has been between those who advocate consideration of present labor and material costs entering into construction, whether of the same or a substitute plant, and those who would take into account the labor and material costs existing at the time of the original construction. Present costs are, in many instances, more than double the original costs, and the difference between a fair return based on original cost, and one based on present costs would, in the case of the railways of the United States, amount to millions of dollars annually. The question is, therefore, of tremendous financial importance. It is to this issue that particular attention is invited at this time.

The use of cost of reproduction probably has stronger judicial sanction than the use of original cost. Adjustments of rates by various public commissions, at a level sufficient to pay a fair return upon the estimated cost of reproducing the property, have been sustained as proper in a number of decisions by the Supreme Court of the

United States.[5] Such adjustments have been sustained even where the cost of reproduction has been estimated upon the basis of current wage and material costs substantially higher than those existing at the time of the original construction of the plant.[6] And a Commission order made without any consideration of present cost of reproduction and reducing rates to a level insufficient to pay a fair return on such cost has been held confiscatory and unconstitutional.[7] On the other hand, the use of reproduction cost as a basis for rate making is still subject to much uncertainty. The latest decision of the Supreme Court is to the effect that reproduction cost is not controlling but is only one of several factors to be considered, and that the "fair return" may be computed upon a sum substantially smaller than present cost of reproduction, provided only that reproduction cost is given due consideration.[8] The Interstate Commerce Commission, in its valuation of railways required by Section 19a of the Interstate Commerce Act, seems to have been basing its tentative findings largely upon cost of reproduction new, less depreciation.

The movement in favor of original cost has recently attracted nation-wide attention, on account of its advocacy by the National Conference on Valuation of American Railroads, called by Senator LaFollette and others in Chicago, and also by reason of two dissenting opinions—one by Mr. Justice Brandeis in the case of *State of Missouri ex rel. Southwestern Bell Telephone Co.* v. *Public Service Commission of Missouri*,[9] the other by Mr. Commissioner Eastman in the final report of the value of the San Pedro, Los Angeles and Salt Lake Railroad.[10] In addition, there have been a number of magazine articles advocating the use of original cost as opposed to cost of reproduction.[11] Many unsound but plausible arguments advanced in support of this movement have, it is believed, escaped effective reply, and it is the purpose of this article to point out some of the objections to the use of original cost as a rate base and to defend the use of present costs. The discussion will be divided into two parts: first, a general statement of the function, and a defense of the use of reproduction cost in rate making and valuation; and second, a number of suggestions as to the application of the proposed process in particular valuation problems.

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[5] *Knoxville* v. *Knoxville Water Co.*, 212 U. S. 1 (1908); *Willcox* v. *Consolidated Gas Co.*, 212 U. S. 19 (1909); *Omaha* v. *Omaha Water Co.*, 218 U. S. 180 (1910); *The Minnesota Rate Cases*, 230 U. S. 352, 434 (1913); *Des Moines Gas Co.* v. *Des Moines*, 238 U. S. 153 (1915); *Denver* v. *Denver Union Water Co.*, 246 U. S. 178 (1918).

[6] *Brush Electric Co.* v. *Galveston*, 67 L. ed. 674, decided June 4, 1923; *Galveston Electric Co.* v. *City of Galveston*, 258 U. S. 388 (1922).

[7] *State of Missouri ex rel. Southwestern Bell Tel. Co.* v. *Public Service Comm. of Mo.*, 43 Sup. Ct. Rep. 544 (1923); *Bluefield Waterworks & Improvement Co.* v. *Public Service Comm. of W. Va.*, 43 Sup. Ct. Rep. 675 (1923).

[8] *Georgia Ry. & Power Co.* v. *Railroad Comm. of Ga.*, 43 Sup. Ct. Rep. 680 (1923).

I.

The function of any cost of plant figure in the fixing of the rates may be simply illustrated in the case of a railroad built to serve a single shipper, such as a large coal or iron miner or the owner of a large timber tract. It is clear that in any negotiation with the promoter as to rates to be charged by such a railroad, the minimum would be computed at a sum sufficient to include reimbursement for operating expenses and interest at prevailing rates upon the cost of constructing the plant. In other words, rates would have to equal the total cost of producing the service, including the necessary cost of procuring capital, and it seems clear that in such a case the rate would be computed in terms of cost of service, rather than in terms of a fair return on value, or of compensation or rental for use of property of a predetermined value. It might also be noted, in passing, that if the traffic were so limited as to indicate probable exhaustion within a short period, such as ten years, the promoter would stipulate that the rates should include a factor for amortization of the capital, as well as for interest and operating expenses.

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[9] *Supra.*

[10] 75 I. C. C. 463 (1923).

[11] See Donald R. Richberg, "A Permanent Basis for Rate Regulation," 31 Yale L. J. 263, 266, 279; Robert L. Hale, "The 'Physical Value' Fallacy in Rate Cases," 30 Yale L. J. 710, 720; Gerard C. Henderson, "Railway Valuation and the Courts," 33 Harv. L. Rev. 902, 1031; David Friday, "An Extension of Value Theory," 36 Quart. Jour. of Econ. 197.

The illustration, however, affords no test of the issue between original investment and present cost of reproduction, since in this case they are the same. In order to test this issue let us suppose that our mine is in the vicinity of an old railroad, originally constructed years before for the purpose of logging a now exhausted tract of timber. Let us suppose that this old road is in physical condition equal in every respect to a new road and capable of rendering identical service, but that it was built when prices were low, and at half what a new road would now cost. This illustration brings into clear focus the question whether a fair return should be figured upon the basis of original cost, of present scrap value, or of present cost of reproduction. It is about as strong a case for the use of the smaller original cost, rather than the larger reproduction cost, as can well be imagined, and yet it is believed that there are many reasons which demonstrate conclusively that even here constitutional principles and economic laws require that rates be fixed at what would be the present cost of duplicating the service, and that they should produce interest upon the present cost of reproduction, as well as an amortization fund, if the traffic is limited. Some of these reasons follow.

1. The physical structure and the capacity for service being identical and the available traffic being the same in both cases, nothing but an artificial rate restriction can

produce a difference in the economic values of an old road and a new one. Under our constitutional principles, in the case of condemnation at least, the amount which an owner can be compelled to accept for the taking of his property cannot be made to depend on when or where he acquired that property or how much it cost him. The same principles would seem to apply when only the use of the property is devoted to the public service. The physical properties and the surrounding conditions of the old road and the new road being identical and the owners devoting identical properties to producing identical service, we know of no constitutional principle which should compel the one to accept a smaller compensation than the other. It is only by assuming that there is legislative power under the Constitution to compel the acceptance of lower rates in one case, that a lower economic value can be assumed. We know of no such constitutional power. In *The Minnesota Rate Cases*,[12] the court said:

> "The making of a just return for the use of the property involves the recognition of its fair value if it be more than its cost. The property is held in private ownership and it is that property, and not the original cost of it, of which the owner may not be deprived without due process of law."

2. There is reason to assert that a public utility which occupies its field more or less to the exclusion of other similar companies, and which has taken private property under eminent domain and has received public franchises, should be subjected to the implied obligation of standing ready at all times to furnish its service as cheaply as another company might if permitted to enter the field. It is to be assumed that at any given time another company would be willing to enter the field, if unoccupied, and furnish the service at the present cost thereof, including interest on the present cost of a new plant, and amortization

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[12] 230 U. S. 352, 454 (1913).

of the investment, when the circumstances warrant it. The fact that the original company made its investment at a period of high prices and perhaps before the service was justified would seem to be no reason why it should be permitted to charge prices at a later period in excess of those at which another company would then be willing to enter the field and furnish the service. On the other hand, even though the original company made its investment at a period of low prices, if it makes its present charges upon the basis of present cost, there is no hardship upon the public, so long as the rates are no higher than those which would be necessary to induce another company to enter the field. If the power of legislative restriction extends to the point of fixing charges at the present cost of duplicating the service, the reason and necessity for such restriction would seem to end at that point. It may well be argued that at that point the power of legislative restriction exhausts itself, and that below that point the utility should be as free as any other company to claim the protection of the Fourteenth Amendment in fixing the price at which it will or will not furnish service.

It has been argued that if value cannot be determined independently of rates, and if rates are to be fixed on a basis of cost of service, all constitutional questions as to depriving the owner of his property, or of a part of the so-called value of his property, are avoided, because the court does not make any effort to ascertain the value of the property, and the court does not take, by this rule, any value which may be claimed on any theory.[13] The conclusion drawn is that the court is as free to base rates upon original cost as upon any other basis. The suggestion that the value cannot be determined independently of the rates is to a large extent sound, and the argument that, in the fixing of his rates on the basis of original cost, the owner is thus not being deprived of any value may therefore seem plausible. But it must be remembered that, irrespective of the value of the plant, the service which is rendered is a thing of value which, under the Fourteenth Amendment, the owner should be free to sell or to withhold, except to the extent that that freedom is restricted by the implied obligations assumed when the property is devoted to public use. If the extent of this implied obligation has been correctly stated above, that is, if it is limited to the duty of furnishing service at any time at the rates which would then be necessary to induce another company to furnish the service, it would follow that any attempt to compel the owner to furnish his service at lower rates than this would deprive ~~him of the~~ protection of the Fourteenth Amendment. If it is once admitted that a limit exists below which the capital cost factor in a rate cannot be reduced, the necessity of defining that limit at once arises. The reasoning of *Smyth* v. *Ames* affords no precise definition. Original cost is an accident which bears no necessary relation to the present value of the service. It does not even represent the sacrifice of the present owners, for they may have purchased their stock on a basis far below or far above the original cost of the property. The only limitation which is capable of precise definition and which also bears some relation to the present service is the present cost of duplicating that service.

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[13] Donald R. Richberg, *supra*, 31 Yale L. J. 263

3. If, in our hypothetical case, the traffic should require the construction of a new road in addition to the one in existence, and costing twice as much, although physically identical, so that there would be two roads, one new and one old, participating in the same service, it is scarcely conceivable that one road could be compelled to furnish service identical with that of the other at half the price. Even if constitutional principles permitted this, economic laws would forbid it. And if we suppose two mines in the same producing territory but sufficiently separated to require different railroads, one of them having an old road

in existence and the other requiring the construction of a new one, the two roads and the service rendered by them being otherwise identical and having the same reproduction cost, but being so located that they would not compete with each other, it is equally difficult to assume that either constitutional or economic principles would permit the imposition of higher rates against one shipper or would compel the acceptance of lower compensation by one railroad.

4. It is believed that the fixing of rates at the present cost of duplicating the service conforms more nearly to the economic principles governing return upon investments in other industries. In the case of a manufactured commodity for which there is a healthy demand, requiring the construction of new plants from time to time, the price will, under the play of competitive forces, tend to approximate the present cost of production, including interest upon what would be the present necessary investment in plant. It has been suggested by the opponents of the use of present cost of reproduction that such use would tend toward uncertainty and inequality of return, the return being greater in periods of high cost and lower in periods of low cost. But this is exactly what happens to the investor in other industries. If we are to assume equality of interest rates we should likewise assume equality of other conditions in order to place railroad investments upon a par with investments in other industries.

5. The equality or inequality of the return should be measured by its purchasing power rather than by the number of dollars. As construction costs and interest rates increase, the number of dollars and the return to the investor will increase, under our reasoning, but the purchasing power of each dollar will decrease. The reverse is true when construction costs decrease. Here the return in number of dollars would decrease but the value of each dollar would be greater. There would be an approximate stabilization of the purchasing power of the investor's return

similar to a like tendency existing in other industries. On the other hand, if the return is based upon original investment at current rates of interest, the number of dollars will remain more nearly equal, but the purchasing power of the investor's total compensation will be less in periods of high price levels. Instead of tending toward greater uncertainty and inequality of the investor's return, therefore, the use of reproduction cost would seem rather to tend to greater certainty and equality, at least in the purchasing power of his compensation, which is the vital thing.

6. It was suggested by Mr. Justice Brandeis in his opinion, dissenting from the reasoning of the majority in the *Southwestern Bell Telephone Company* case, that the use of present reproduction cost as a rate base may subject those making investments during high price periods to heavy losses due to shrinkage in prices and interest rates, and that on the other hand the use of present reproduction costs during a period of high prices might produce fantastic profits for those who had made investments in low price periods. This same thing, of course, is true of investments in other industries. This statement merely places railroad investments on a par with others. And what is the alternative? Suppose that a water or gas plant could normally be built for $1,000,000 and the money secured at 5%, making an annual capital charge of $50,000 per year. Suppose that an investor should find that construction of the plant at the peak costs prevailing in 1920 would cost $2,000,000 and that the money would cost 7% on thirty-year bonds, an annual charge of $140,000. If we understand the suggestion correctly, it is that the investor should be permitted to build the plant in 1920 and to fasten upon the consumers an annual charge of $140,000 per year for thirty years, to pay for a service which they could reproduce a few years later at an annual charge of $50,000. If this theory could be put into practice, it would afford a unique opportunity for investors. In no other known way could the investor

project the benefits of temporary high prices and high interest rates so far and so certainly into the future. The result would be to put an extraordinary premium on the construction of utility plants during peak price periods. On the other hand, the investor in utility construction during low price periods could realize none of the benefits from price increases which accrue to other investors, and at such times capital would consequently be withdrawn from public all of their additions and improvements at the highest price utility construction. Railroads would be tempted to make periods and at the highest interest rates instead of at the lowest. The result would necessarily be a tremendous economic waste and an ever-increasing burden upon the consumer. It is true that the alternative of fixing rates at the present cost of duplicating the service would tend to discourage investment during high price periods, but it is submitted that unnecessary investment during such periods should be discouraged. Nothing but the most necessary work should be done at excessive cost. And that such a rule would not go so far as to prevent necessary construction entirely is shown by the experience of recent years. Mr. Justice Brandeis himself points out that many heavy investments of this character were actually made at war-time construction costs, notwithstanding the fact that the fixing of rates on the basis of present reproduction cost was a general if not the prevailing practice.

7. The discussion in the preceding paragraphs assumes that the utility constructed during a high cost period could continue to collect a return upon its original cost, notwithstanding a subsequent fall in the general price level. This assumption is of the essence of the original cost doctrine, which would induce the investment of capital in public utilities by assuring the investor a constant return upon his actual investment. However, the proponents of original cost suggest no public guaranty of such a return and, as a matter of fact, no utility could continue to sell its service

for substantially more than it would cost another company to duplicate such service. If it attempted to do so, it would soon find itself in competition with a new private or municipal plant. The forces of competition would tend to force rates in low price periods down to the cost of duplicating the service. The doctrine of original cost, therefore, would prevent the investor from ever earning a return on more than his original investment, but it would give him no assurance against a smaller return. He could lose by a fall in prices but could not gain by a rise. No prudent investor would trust his savings in such an enterprice. The proponents of this doctrine, therefore, face a dilemma. If they are right in assuming that a return on a high construction cost can be collected in a subsequent low price period, they will impose an intolerable burden upon the reduced capacity of the shipper for payment. If such a return cannot be collected, the utility will not be built, for the investor will not face the possibility of loss with no possibility of gain.

8. Many units of the existing property may actually be salable for amounts far in excess of their cost. Many locomotives actually costing approximately twenty-five thousand dollars are salable today for twice that amount. Many tracts of land used for city terminals whose original purchase price was measured in thousands of dollars might today be sold for millions. The cost of leaving these units of property in the public service today is in nowise measured by their original cost. If, by selling today and investing the proceeds in some other way, the owner could secure a given amount of income, his present sacrifice and the present cost of devoting the property to public use are measured by the loss of that income, and not by interest upon the original investment in the property.

The foregoing reasoning would seem to require the use of reproduction cost rather than of original cost, if cost of service is to be controlling. And it seems clear that it must be controlling. It has been said that a railroad rate to be lawful must not only be fair to the carrier but reasonable to the shipper; that is, that it must not exceed the value of the service and must not be exorbitant or unduly burdensome. If this means that the carrier may be compelled to render its service for something less than cost, the statement seems unsound. So long as the cost of service is not exceeded, it is believed that the resulting rate must be held reasonable even though it might seem tremendously exorbitant by any other measure. If we assume, for example, a railroad built into a mountain region primarily to haul out ore, and with a small volume of tonnage, such that the actual cost of the service, including operating expenses and interest upon the cost of the plant, might amount to $10 a ton, as compared with a usual cost of $1 per ton on similar commodities for similar distances on trunk line railroads, nevertheless the high rate based on cost would seem to be justified. It would cost the owner as much to produce his own transportation. If the supposititious ore is valuable enough to sustain a rate equal to the actual cost of moving it, such a rate cannot be complained of; and it is fair to assume that under these circumstances a legislative act fixing a rate at less than the cost of the service, even though much higher than customary rates for similar hauls, would be held to violate constitutional principles.

It might be, of course, that the margin between the cost of mining and the delivered market price of the ore would not permit of a transportation charge of $10 per ton, nor perhaps even in excess of $5 per ton, so that the maximum possible revenue might be not more than enough to pay interest on one-half of the cost of reproduction; and it may be argued that the foregoing reasoning would permit the carrier, even in such a case as this, to hold out for $10 per ton, which would prevent any movement of traffic and would virtually be permitting it to abandon its service. But this is no more true of our reasoning than of the reasoning of the proponents of original cost as a rate base. Instances undoubtedly exist where the available traffic cannot be made to pay interest on original cost, and where to permit the carrier to hold out for such a return would involve permitting it to discontinue service.

It is believed, however, that such a conclusion does not necessarily follow from either line of reasoning. If the utmost revenue that the available traffic can be made to pay is sufficient to pay a fair return upon only half of the original cost or half of the reproduction cost of the railway, it must follow that the economic value of the railway will amount to only half of such cost, for economic value cannot normally exceed a capitalization of probable future earnings. This would be true if there were no constitutional or legislative restriction of rates, and certainly the restrictive power cannot increase the otherwise existing value. In the case of any carrier, the character of the territory served, or the competition of other transportation agencies, may be such that original construction was not and the reproduction would not be justified as an investment, and that the present value cannot exceed half of the cost. It would follow that such a plant could be condemned, and would normally be bought or sold for half of its construction cost. If the owners were unwilling to furnish service at rates which the traffic could bear, presumably another company would be willing to take over the property at its economic value and use it to duplicate or continue the existing service. To take the property over, by condemnation if necessary, would violate no constitutional principles, so long as actual value were paid in return. And if another company would presumably be willing to take over the plant at actual value and furnish service at the maximum rate that the traffic could bear, there would seem to be no departure from the foregoing reasoning in holding the existing company to the implied obligation of continuing to employ its existing plant with its existing value in furnishing service at the same rate, even though such a rate were insufficient to pay interest on the cost of reproduction new. The carrier should be entitled to scrap its road if its earnings could not be made sufficient to pay at least its operating expenses and interest on the scrap value; but so long as the earnings exceed this minimum and so long as the carrier is not prevented from earning the maximum return that the available traffic could be made to pay, there would seem to be no departure from the principles advocated in this article, in compelling it to continue to render its service at the highest obtainable rates.

If the available traffic were of such character and volume that it would continue to move at rates equal to the full value of duplicating the service, including interest on the full cost of reproduction, we should have a very different case. The Constitution, under our reasoning, would then protect the rates and the resulting value, which would tend to approximate cost of reproduction, and it would then require the same capital investment to condemn the existing road as to build a new one. It would only be where the value, independently of legislative action and because of economic conditions, is less than the cost of reproduction, that the road could be condemned for less than such cost and that the service could be duplicated for less than interest on such cost.

It must be remembered that this discussion is concerned only with total return, and not with the rate per ton that the carrier may be entitled to. The rate per ton required to pay the necessary total net income would, of course, depend upon the number of tons to be transported. The existing rate might be yielding an inadequate total return due to the fact that it is so high as to throttle traffic. A lower rate might produce additional traffic sufficient to increase the total net income. Whether, in any given case, an increased total net return can most effectively be secured by increasing or by decreasing the rate is a question of fact to be determined by the rate-making body, in the first instance, and by the courts upon review. This question, however, does not affect in any way the question under discussion in this article, as to the amount of total net income which the carrier is entitled to under the Constitution.

The rate-making process suggested here might be described in terms of court pleading, as follows: A complaint or declaration in a confiscation case, alleging that rates have been fixed below the cost of duplicating the service by means of a new plant, would state a *prima facie* cause of action and should be sustained upon demurrer. But an answer alleging that the rates fixed are the highest that can be collected from the available traffic and still permit it to move, or that they are such as to provide the largest total net income that it is possible for the road to earn, should be upheld as a valid defense.

Much of this reasoning which we have invoked in support of the use of present cost of reproduction of a new plant in fixing the capital cost factor in the rate level of an existing plant, would likewise require that the factor covering reimbursement for operating expenses should be based upon the operating expenses of a new plant. If the existing plant is to be free to fix its own rates, so long as they are not higher than those necessary to induce another company to furnish the service, and if the rates of a new and an old road, otherwise identical, are to be the same, it would follow that both the capital cost factor and the operating cost factor in the rate should be based upon the necessities of a new plant. It will become important to bear this in mind later when we consider the effect of depreciation, appreciation, and development costs upon rates and value.

This proposed process of determining rates at the cost of duplicating the service suggests that if the service could be duplicated by means of a more efficient or a less expensive plant, both the capital cost factor and the operating expense factor in the rate should be limited to the necessities of such a substitute plant. This is a suggestion which Mr. Justice Brandeis makes in the last paragraph of his opinion in the *Southwestern Bell Telephone Company* case. But this does not affect the proposition that rates should be based upon the cost of duplicating the service, and that, in determining the capital cost factor, present rather than original construction costs should be computed, whether the service is to be duplicated by a plant identical with the existing plant or by a more economical substitute plant. In the absence of an affirmative showing that equally efficient service would be rendered by a more economical substitute, the presumption should be that the existing plant would have to be reproduced.

For the sake of simplicity, we have been discussing the issue between original and present costs as it would arise in the case of a single railroad with only one shipper. It is obvious, however, that the same principles would apply in the case of a larger railroad with a thousand or fifty thousand shippers. While the problem of apportioning the burden among the various shippers and fixing the individual rates on different commodities, necessary to produce the total return, would become more complicated, the economic and constitutional principles governing the total net income which the carrier should be entitled to earn would remain the same. Rates may be fixed for some commodities so as to yield a lower margin of profit, and the deficit may be made up by charging against other commodities somewhat more than their proportionate share of the total net return;[14] but in its total return the large road with many shippers should be as much entitled as the small one to the cost of duplicating the total service. And a showing that it is not receiving such return, and that some portion of its traffic would continue to move at higher rates, should entitle it to an increase in such rates, unless the rate-making authorities should provide effectively for an increase in revenue from some other source.

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[14] See *Northern Pacific* v. *North Dakota*, 236 U. S. 585 (1915).

It will be noted that in this discussion the use of reproduction cost has been advocated as a step in the process of determining cost of service and as a direct factor in establishing rates, rather than as a measure of or direct factor in the value of the property. In omitting any predetermination of "value" upon which a "fair return" is to be based and going direct to a determination of the cost of the service, the proposed process is similar to that advocated by the proponents of original cost. The only difference is that in determining the capital cost factor in the rate they would use the original capital cost, while we would use what would be the present capital cost of duplicating the service; and in determining the operating cost factor they would use present operating costs of the existing plant, while we would use estimated present operating costs of a new plant.

Under either of these processes the value of the plant would become a result of the rates rather than a basis for rates. And this is logical. Value is an economic fact not to be created, decreed, or modified by fiat of government. It can be modified by changing the rates, and the amount of value which will result from any assumed rate base can be estimated. But to attempt to decree or predetermine a value in advance of rates is to reverse the process of logic. If rates are established upon a basis of reproduction cost, value will tend to approximate such cost, but this will be through the operation of economic law and not because a certain figure has been decreed as value.

In suggesting that value be disregarded in rate making and that rates be based directly upon cost of reproduction new, as a factor in the cost of duplicating the service, the fact should not be overlooked that Section 19a of the Interstate Commerce Act requires the Commission to find the *value* of each railroad, as well as its original cost, its cost of reproduction new and its cost of reproduction less depreciation. And the finding of value may be of great importance in connection with consolidation, the issue of securities, recapture of earnings, or other purposes, even though not used in rate making. Courts and commissions have been reluctant to define the value of a plant in terms of its economic equivalent, or to determine it by capitalization of its earning power, because it has been felt that it would be necessary to base such value upon earnings derived from rates which themselves are under investigation. However, the process of rate making which has been suggested above removes this difficulty and avoids the "vicious circle" of reasoning, which has been the principal obstacle to the finding of an economic value. Under this process earnings are to be computed at the highest rates that the traffic is able to pay, provided that such rates do not exceed the cost of duplicating the service. The value of the plant and business will be a capitalization of probable future earnings, under rates determined as above stated. Ordinarily under this process the value of a well-conceived railway or utility will tend to approximate its present reproduction cost, but where the traffic will not bear rates sufficient to pay interest on reproduction cost, value must necessarily be less.

This suggestion that we should abandon attempts at predeterminations of value to be used as factors in rate making, and substitute a rate adjustment based directly on the cost of duplicating the service, with a subsequent estimate of value to be computed from probable earnings, may seem at first glance to be a radical departure from the reasoning in *Smyth* v. *Ames* and from the process suggested in that decision, and even from the reasoning and process of later decisions in which the use of a straight reproduction cost has been approved. But, as to the latter class of cases at least, it is believed that the departure is apparent rather than real and that our suggestion is in reality an accurate statement of the process actually approved in these decisions. Wherever reproduction cost has been used as an intermediate step in the determination of the rate level, the resulting finding has in fact been a finding as to the cost of duplicating the service. In approving this process the courts may have denominated the cost of reproduction figure used therein as "value" and may have stated that they were predetermining value as a basis for a fair return. As a matter of fact, however, the thing that they were predetermining was not value in any accurate sense of the word, and could not be made so by governmental decree. It was nothing more and nothing less than a determination of the amount of capital which a new company would require in order to duplicate the service. The determination of a "fair return" was nothing more nor less than an estimate of the cost which a new company would incur in securing such capital. The attempt to adjust this process to the reasoning in *Smyth* v. *Ames*, by denominating reproduction cost as "value" or as a factor in value, instead of recognizing it as a direct factor in the cost of duplicating the service and in rate making, is responsible for most of the criticisms and arguments which have been directed against the use of reproduction cost.

Mr. Justice Brandeis suggests that the use of reproduction cost would necessitate recurrent controversies as to the proper rate base and consequent value, which would result in great expense both direct and indirect to Government and carriers alike. We venture to suggest, however, that if cost of reproduction new is once determined as of any given date, it can readily be adapted to the construction costs prevailing at any other date by the application of an index figure or perhaps of different index figures to different units of the property. And the actual original cost of subsequent additions and improvements may be varied by application of an index figure in the same manner, to show the cost of reproducing such additions and improvements as of a subsequent date * * *.

Brown, "*The Defects in Mr. Justice Brandeis' Theory of Prudent Investment as a Rate Base,*" 12 Calif. Law Rev. 283-296:

There have recently been many attacks on "Cost of Reproduction" as a factor in rate making, but the attack that is of the most compelling interest is contained in the concurring opinion delivered by Mr. Justice Brandeis in *Southwestern Bell Telephone Company* v. *Public Service Commission of Missouri.*[1] If the Supreme Court ever changes the present law on the subject, the change will probably be largely due to his influence. That there is at least some possibility that the court will reverse itself may be surmised from the fact that Mr. Justice Holmes has already done so. In the case of *San Diego Land and Town Company* v. *Jasper,*[2] he said "It is no longer open to dispute that under the Constitution 'what the company is entitled to demand, * * * is a fair return on the reasonable value of the property at the time it is being used for the public.'" And in the principal case, he concurred in the following entirely opposite statement, to wit, "The thing devoted by the investor to the public use is not specific property, tangible and intangible, but capital embarked in the enterprise. * * * The Constitution does not guarantee to the utility the opportunity to earn a return on the value of all items of property used by the utility, or any of them."[3]

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[1] (1923) 262 U. S. 276, 67 L. Ed. 619, 43 Sup. Ct. Rep. 544.

[2] (1902) 189 U. S. 439, 442, 47 L. Ed. 892, 23 Sup. Ct. Rep. 571.

[3] 262 U. S. 276, 290.

And he also broke away from an established principle when he concurred with another departure of Mr. Justice Brandeis, which was stated as follows, "That part of the rule of *Smyth* v. *Ames* which fixes the rate of return deemed fair, at the percentage customarily paid on similar investments at the time of the rate hearing, also exposes the investor and the public to danger of serious injustice,"[4] with the conclusion that there should be adopted "the amount of the capital charge as the measure of the rate of return."[5] Dividends on stock and interest on bonds are treated alike by him.

I.

The defects I hope to demonstrate will first be discussed in connection with an example used by him to bring out one of his points. He says, "* * * if a plant had been built at times of low costs, at $1,000,000 and the capital had been raised to the extent of $750,000 by an issue at par of 5 per cent 30-year bonds and to the extent of $250,000 by stock at par, and ten years later the price level was 75 per cent higher and the interest rates 8 per cent, it would be a fantastic result to hold that a rate was confiscatory, unless it yielded 8 per cent on the then reproduction cost of $1,750,000. For that would yield an income of $140,000, which would give the bondholders $37,500; and to the holders of the $250,000 stock $102,500, a return of 41 per cent per annum."[6]

If a case involving these figures were before a Public Utilities Commission composed of so-called "progressives," it might and probably would fix rates that would limit the return to the stockholders to $12,500. And Mr. Justice Brandeis would not consider that these rates improperly deprived the stockholders of their property as $12,500 is equal to a return of 5 per cent (the rate of return that was reasonable when the company was started) on $250,000 (the amount of cash originally put into the company by the stockholders). There is a vast difference between $12,500 and $102,500 but I hope to show that the former is at least as fantastic if not more so than the latter. For the sake of convenience, the time of low interest rates and prices when the company in the example was formed will be referred to as 1910 and the time of high interest rates and prices will be referred to as 1920.

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[4] 262 U. S. 276, 304.

[5] 262 U. S. 276, 306.

[6] 262 U. S. 276, 305.

In 1910 the stockholders started the company with $250,000 in money. This money, however, represented a certain purchasing power in clothes, houses, food or in anything else which they might purchase with it. And it is on this money that they should have the opportunity to earn a fair return. For the present I am not quarreling with the statement that it is on the capital prudently invested that the stockholders are entitled to earn a return, but I am quarreling with the idea that money can be used as a measure of that capital over any period of time. It is only necessary to glance at the index of commodity prices published by the Department of Labor to see this failing of money. Everyone is familiar with the large fluctuations that obtained in war-time but even the comparatively small fluctuations prior to the war were sufficiently large to destroy the sanctity of money as a measure of value. For example, from 76 (1913 prices equal 100) in 1892, the index dropped to 69 in two years and to 66 in two years more; from 69 in 1898 it rose abruptly to 80 in the same short period of two years; and from 85 in 1905 it rose to 94 again in two years.

A man who bought stock in a utility started in 1897, which brought him 6 per cent would discover, if prudent investment was used as the rate base and if money was used as the measure of prudent investment over the entire period, that in less than ten years he was really only getting 4.27 per cent per annum on the money he put into the company because that money was worth about 30 per cent more than 1907 money. In short, when a stockholder has invested money of a certain quality, he ought to get his return in money of the same quality so that if the money we have to give him is poorer, we ought to give him more of it, and if it is better, we are foolish to give him as much.

Whether the rate of return should vary from that originally allowed presents a somewhat similar problem. It comes down to this question, "Have we any obligation to fix rates that are high enough to give the company an opportunity to earn enough to keep its stock at par,[7] assuming it was issued at par?" It seems to me that we have. If a man bought stock when a reasonable return on his investment was 4 per cent and then conditions changed so that a reasonable return on such stocks was 6 per cent, and we did not allow him the additional 2 per cent, his stock would drop from 100 to below 70. He will then have sustained a loss in the value of his capital of over 30 per cent.

Mr. Justice Brandeis seeks to make the stock of public utilities more of an investment and less of a speculation for, "In speculative enterprises the capital cost of money is always high."[8] Will not the stock be far less speculative if the purchaser knows that he can always sell for approximately the same price for which he bought and that his capital won't be subject to wide fluctuations with every change of interest rates? Mr. Justice Brandeis reasons that the stocks will be less of a speculation if we say to the investor at the time the company is started, "The prevailing rate of return on investments of this character is now 6 per cent. You will not have to worry about interest rates going up or down; we will give you the opportunity to earn 6 per cent no matter what happens to them." But if we say this we are overlooking the fact that to an investor the preservation of his principal is far more important than his income. We are in effect asking him to invest in interest and speculate in principal whereas if we adjust his return with the rise and fall in interest rates, he is speculating in interest and investing in principal. The speculation in interest is undesirable but it is the least undesirable of the two alternatives as it is so comparatively small. That this "speculation in principal" under constant interest rates is fact and not idle theory is substantiated by the course of the Liberty Bond market.[9] The return on these bonds represents practically pure interest in that it contains no allowance for risk and lack of marketability. Despite their tax exempt features, they sold so low in 1920 as to be on practically a 6 per cent basis; that is to say, if they were purchased in 1920 the 4¼ per cent interest plus the increase in value up to par at maturity apportioned partly to each year would bring a return of practically 6 per cent per annum on the purchase price. The bonds of the Third Liberty Loan sold to yield 6½ per cent and those of the Victory Loan to yield over 6.60 per cent. Since there was no question of their safety, the drop in their market value was the result of an increase in the prevailing interest rates. Stock issued at par yielding 4¼ per cent would drop to 70 if the prevailing return on similar securities rose to 6 per cent. And this 30 per cent drop in value would result from the change in interest rates alone.

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[7] By "par" is here meant the real rather than the money cost to the investor.

[8] 262 U. S. 276, 307.

Now to return to the original example of the company starting in business in 1910 with a capital of $1,000,000 as cited above. Under Mr. Justice Brandeis' theory, a man who put $100 into the company for which he received one share of stock, would not be improperly deprived of his property if rates were fixed that gave the company an opportunity to earn $5 a share, equal to $12,500 on its entire stock capitalization. Out of this $5 a share, the company in most states would have to pay the present federal income tax of 12½ per cent or 62½¢ a share leaving $4.37½ available for dividends. A conservatively managed company would not pay out this entire amount and moreover the public would be the first to suffer if it did as every time the smallest extension of service was desired, more stock or bonds would have to be sold to raise the necessary capital. For the sake of simplicity, however, the most favorable conditions possible will be assumed, *i. e.*, that the company is operating in a state that allows the federal income tax to be deducted as an expense and that it was in a position to pay its entire earnings in dividends so that our investor who bought one share would receive $5 a year. In 1920 with rates on similar investments approximating 8 per cent his stock would sell for 62½ at the most and might well sell lower. He sells for 62½ and what does he get? He gets 62½ dollars that are worth only 58 per cent of the dollars that he put in since the price level has risen 75 per cent, or in other words out of an original investment of $100 he gets only $35.71 making a loss of 64.29 per cent of his capital, a result that he might well be entitled to call fantastic. And this result is not something that just might happen; it is a result that follows from Mr. Justice Brandeis' theory under the conditions most favorable to his theory just as surely as night follows day.

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[9] In connection with the importance to the investor of a principal having a stable value, the many demands that the government keep these bonds at par will be recalled.

How then are we going to preserve the investor's property from any so thoroughgoing a loss in value? What is the lowest return we can give him without reducing the value of his investment? We must fix rates that will give the company the opportunity to earn $14 a share, $8 being the current rate of return and $6 more to compensate for the 75 per cent rise in prices. The stock could then sell as high as 175 so that our original investor could sell his one share and get just as much value, just as much purchasing power in clothes, food, houses, etc., as he put in in 1910. He would then be, as he should be, in the same position as another investor who invested $175 of cheap money in 1920 (the same as $100 of 1910 money) and received the current return of 8 per cent or $14.

If it be asked why we should increase the money income of an investor in public utility stock upon a rise in prices and decrease it upon a fall in prices when we leave everyone else to shift for himself, the answer is that everyone else has had the opportunity to put his money into something that will participate in a general rise or fall in the price level. If, by controlling rates, we are going to control the natural play of economic forces which if left alone would cause a rise or fall in the price of public utility stocks with the rise or fall of the general price level,[10] we must not so use our control as to subject the investors to hardships not shared by everyone else.

The Interstate Commerce Commission is now engaged in making a valuation of the railroads for rate making purposes. The value found is that of 1914. It would be interesting to know what certain members of that body and others who do not favor a change in the value or rate base to correspond with the rise in the general price level would do if our currency had depreciated to the same extent as that of some of the European countries. Unless the rate base was changed, a $100 share of a public utility, under conditions similar to those in France for example, would be worth somewhere around $30, and under conditions similar to those in Germany, would be worth a good deal less than one cent.

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[10] Theoretically, if the price of everything, commodities, land, service, labor, etc., was suddenly doubled, the price of all stocks would double, as they represent in reality nothing but a part ownership of something which, according to our premise, has doubled in price. And despite the fact that stock prices are influenced by many diverse factors, that changes in them and changes in commodity prices are in *fact* coincident phenomena, can readily be seen from the charts of commodity prices and industrial stock averages published in the bulletins of the U. S. Department of Labor and the Harvard University Bureau of Economic Research. For example, both industrial stock averages and commodity prices were low in 1903 and 1904, both rose in 1905 to a high in 1906 and 1907, both fell in 1907 to a low in the latter part of 1907 and 1908, both rose in 1909, both fell in 1910 and 1911, both rose in 1912, and then both gradually fell off until the latter part of 1914 and the first part of 1915 when the enormous rise in both due to the war commenced.

If it be said that high interest rates are caused by high prices and that the very reason for their existence is to compensate for high prices and therefore if we adjust the stockholder's return for the former we need not do so for the latter, the answer is that in the first place high prices are not the cause of high interest rates and in the second place that the one does not in fact compensate the investor for the other. On the question of causation, the opinion of the economists is stated by Professor F. W. Taussig as follows, "Both rising interest and prices are in large degree due to a common cause,—the general fever of activity."[11] On the question of compensation, we have seen that adjustment for both factors is necessary in that although an adjustment for interest will keep stock at par, the price of the stock must be increased proportionately to prevent loss through increased prices.

If it be said that the theory set forth above will make every investor a stock market addict in that his public utility stock will vary widely in price, the obvious answer is that although it will vary in money price, it will not vary in real value at all. Only consider the feeling of safety and security that an investor will have if we provide a place where he can put his money, the purchasing power he has earned, where it will not literally melt. His only source of worry will be the efficiency of the management of the company in which he has invested because rates will be fixed that will enable only a reasonably efficient management to earn the proper return. And he won't have the disagreeable experience that so many had who put good money into savings banks or high grade bonds where they thought it would be absolutely safe and discovered when they tried to use it in 1920 that a good half of it had vanished due to the violent fluctuations in the cost of living and interest rates.

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[11] 1 Principles of Economics (2d ed.) 309.

In the $12,500 versus $102,500 argument then, our position is that $35,000 or $14 a share is the least we can give the stockholders. Anything less than $35,000 results in depriving them of their property. As we have seen, the return of $12,500 deprives them of 65 per cent of it. There will be some and may be many who think that this rather bitter pill for the investors is coated with enough due process of law to make it constitutional. However, those who do, will, I hope, agree that a rule that might result in a return of only $12,500 in the example cited makes public utility stock a speculation, exposes the investor to danger of great hardship unnecessarily, and exposes the public to the hardship of having to run its own utilities through failure to interest enough private capital.

Whether we should allow the stockholders the difference between $35,000 and $102,500 is a question which can best be determined by a consideration of the source of this additional profit. This $67,500 arose in the following two ways:

First. In 1910 the company borrowed $750,000 which due to the 75 per cent rise in prices was the equivalent of $1,312,500 in 1920. But unfortunately for the bondholders, the liability of the company to them remained at $750,000 no matter how much the value of dollars declined. The bondholders in effect hoped that prices would not change and were evidently willing to gamble that they would go down and not up. The difference between $1,312,500 and $750,000 is $562,500. The current rate of return, 8 per cent, of $562,500 is $45,000.

Second. The remaining $22,500 of the $67,500 is 3 per cent of $750,000, the amount of the bonded indebtedness; 3 per cent being the difference between 8 per cent, the current rate of return, and 5 per cent, the rate the bondholders bound themselves in advance to accept.

The $67,500 came then from a contract made by the company with the approval of the Public Service Commission, which turned out to be profitable. Borrowers of money always have and always will profit from a rise in prices and always have and always will lose from a fall in prices. And there is a like profit and loss in the rise and fall of interest rates. No rational decision can be made as to whether the company should have this profit or whether the public should receive it in lower rates until we realize that it is a real and not an illusory profit. The bondholders have most certainly suffered a real and in this case a large loss and somebody is going to gain through their loss.

It would seem reasonable to say that the company made the contract, not the public, and therefore if it should turn out to be profitable the company should have the benefit of it. There can be no doubt that the company should have the benefit of it if the company is to stand the loss that would arise if interest rates and prices should go below what they were at the time the money was borrowed. Mr. Justice Brandeis argues that, "Money required to establish in 1920 many necessary plants has cost the utility 10 per cent on 30-year bonds. These long-time securities, issued to raise needed capital, will in 1930 and thereafter continue to bear the extra high rates of interest, which it was necessary to offer in 1920 in order to secure the required capital. The prevailing rate for such investments may in 1930 be only * * * 6 per cent. * * * A rule which limits the guaranteed rate of return on utility investments to that which may prevail at the time of the rate hearing, may fall far short of the capital charge then resting upon the company",[12] so that the company would not be able to stand the loss but would be forced into bankruptcy even through the stockholders sacrificed their entire return. In practice, however, no such difficulty would be encountered, as the company could redeem the bonds and refund the debt at a lower rate of interest. A company that would issue long-term non-callable bonds at such a high rate of interest ought to stand the attendant loss.

If we shift to the public the benefits and burdens of contracts with lenders, we are in effect saying that the public is the real contracting party. There is a good deal to be said for this view, e. g., it might be argued that utilities are often forced to make extensions by the Public Service Commission so that their return should not be affected by the outcome of a contract they were forced to make in order to raise the required capital, that utilities can only issue bonds with the approval of the Commission, and that the starting of a public utility should be governed only by the public need and not by the judgment of its promoters on whether prices and interest rates are low.

However, it does not seem to me that it matters so much which view prevails as that we realize that if we do not give the company the benefit of contracts it makes with lenders that turn out favorably, we are inevitably forced into the position of saying that the public is the real contracting party so that the Public Service Commission must be the manager of all utility financing and the public must stand the loss from unfavorable contracts made with lenders.

II.

If we could adopt prudent investment as the rate base without our action having any other effect on public utility law, we might go ahead and do so comparatively lightheartedly. But our action would have a result which I think is unavoidable and which has such far-reaching consequences that we ought to devote considerable thought to its desirability before proceeding.

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[12] 262 U. S. 276, 305.

As the federal Constitution prevents us from taking public utility property from its owner without just compensation, so does it prevent us from regulating the use of such property in such a way as to have the same effect. In other words it guarantees to the owner the opportunity of earning a fair return on his property. But Mr. Justice Brandeis says, "The thing devoted by the investor to the public use is not specific property, * * * but capital embarked in the enterprise."[13] He surely does not mean to say that the wires of a telephone company, the tracks of a railroad, are not devoted to a public use. They are the parts of a public utility that are most apparently so devoted, and that being so, if the company owns them, it, under the Constitution, is entitled to the opportunity to earn a fair return on them. So that the only way we can avoid giving the company a return on the specific property and can avoid the conclusion that, "If the property * * * has increased in value since it was acquired, the company is entitled to the benefit of such increase",[14] is to decide that the company is *not* the *real owner* of the property,—to decide that the company owned the money it put into the plant and devoted that money to the public use when it applied it to the development of public utility properties, thus obtaining a sort of license to operate them; and that the public must under the Constitution pay the company for its services in connection with these properties an amount sufficient to yield a fair return on the money devoted by the company to the public use. In an early California case this proposition was stated as follows—"* * * it is not the water or the distributing works which the company may be said to own, and the value of which is to be ascertained. They were acquired and contributed for the use of the public; the public may be said to be the real owner, and the company only the agent of the public to administer their use.'"[15] For the money which the company has expended for the public benefit, it is to receive a reasonable and no more than a reasonable reward.

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[13] 262 U. S. 276, 290.

[14] *Willcox* v. *Consolidated Gas Co.* (1909) 212 U. S. 19, 52, 53 L. Ed. 382, 29 Sup. Ct. Rep. 192.

If we take as our premise that the public is the owner of the property, we must conclude that the company is only entitled to a return on the money used to buy the property; and vice versa we can not use prudent investment as a rate base and avoid the necessary implication that the company does not own the property.

Mr. Justice Brandeis says, "The constitution does not guarantee to the utility the opportunity to earn a return on the value of all items of property used by the utility, or any of them,'"[16] which is naturally true if the company is not the real owner of the property but which seems to me absolutely untrue if the company is the real owner. He does not appear to have given the question of who is the real owner much consideration—probably because he does not think the adoption of prudent investment as the rate base has any such result as is herein claimed—but to have more or less assumed that the company is the owner. He says, "The owner is at liberty in the absence of controlling statutory provision, to withdraw his property from the public service, and if he does so, may obtain for it exchange value.'"[17]

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[15] *San Diego Water Co.* v. *San Diego* (1898) 118 Cal. 556, 570. 50 Pac. 633. This language was approved in *In re North Coast Water Co.* (1913) 3 Cal. R. R. Com. Dec. 962, and in other decisions of the Railroad Commission, but has been repudiated by the California Supreme Court, *Pac. Tel. & Tel. Co.* v. *Eshelman* (1913) 166 Cal. 640, 655, 137 Pac. 1119.

[16] 262 U. S. 276, 290.

[17] 262 U. S. 276, 290.

It is true that the Supreme Court has consistently held that the company owns the property it operates as opposed to the pronouncement quoted from the early California case. And this holding has been affirmed in the face of the fact that public utilities have the power of eminent domain and that most of them are controlled in the following six major ways beside many minor ways: (1) as to rates, (2) and consequently as to price obtainable on a sale to someone else willing to carry on the service, (3) as to whom such a sale may be made, (4) as to the manner in which the property is to be used (schedules, safety devices, and regulations for the convenience of the public), (5) as to what part of the public the utility has undertaken to serve (*e.g.*, extensions by gas and electric companies to meet the demands of new customers) and (6) in that the state may at any time take over the operation of the property.

Our inquiry being, "Who is the real owner of the property?", what then are the attributes of ownership remaining in the company? It has the bare legal title but "ownership * * * implies something more than a bare legal title";[18] its right to possession is extremely limited and surrounded by all manner of regulations and moreover little as it is it may be taken away by the state at any time. The only real attributes of ownership left that are of value are (1) the right to withdraw the property from public service and (2) the right to receive an increased return on the property so long as it is left in the public service if an "increase in its value" can be shown. It is not clear to me whether Mr. Justice Brandeis intended the statement that "The owner is at liberty, in the absence of controlling statutory provision, to withdraw his property from the public service"[19] as an argument for his position that the company is the owner. That is why I did not include "withdrawal from public service" in the list of ways in which utilities are controlled, but it should be in that list. There are such "controlling statutory provisions" in practically every state in the Union and the Federal Government exercises just such control over all the railroads engaged in interstate commerce.[20] So that if we establish prudent investment as the rate base and thus take from the company the only remaining attribute of ownership that is of any moment, to wit, the right to benefit from an "increase in value" of the property, there is nothing left of the ownership by the company but a vacuum and we must again reach the conclusion that the public is the real owner of the property.

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[18] *Hyde* v. *Shine* (1905) 199 U. S. 62, 82, 50 L. Ed. 90, 25 Sup. Ct. Rep. 760.

[19] 262 U. S. 276, 290.

My reason for putting the phrase "increase in value" in quotation marks is that I do not want to accept any responsibility for it. As has been well pointed out,[21] the statement quoted from *Willcox* v. *Consolidated Gas Company*,[22] has, if we look at the words alone, little or no meaning. Briefly, the argument is as follows: Value means selling price which is dependent on earning power which is dependent on rates so that the value of public utility property is at any particular time the capitalization of the earning power under the rates in force at that particular time. If we base rates on value, we encounter the well known vicious circle and there would never be any justification for changing rates since at any particular time no matter how much the value of the property had changed, the rates then in force would be yielding a fair return on that value. This argument, however, avoids the real problem which the court made an effort to solve even though it chose its words unfortunately. This real problem will appear from the following illustration.

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[20] See Transportation Act, Feb. 28, 1920, ch. 91, sec. 402, par. 18; 41 U. S. Stats. at L. 456, 477; Fed. Stat. Ann. (1920 Supp.) 72, 98.

[21] See Robert L. Hale, The "Physical Value" in Rate Cases. 30 Yale Law Journal, 710; and Donald Richberg, A Permanent Basis for Rate Regulation, 31 Yale Law Journal, 263.

[22] *Supra*, n. 14.

A gas and electric company constructs a plant for $1,000,000 in a thriving small town, having first obtained a certificate of public convenience and necessity from the Public Service Commission. We will assume that it is the policy of the commission to allow a return of 8 per cent and since $1,000,000 would be the rate base under any known rule, the company would earn $80,000 for the first year or so. The population of the town then dwindles away and business enterprises diminish to such an extent that surrounding real estate similar in all respects to that on which the plant is located falls in value 50 per cent. To make matters worse, new machines for the generation of power have been invented that can be constructed at a greatly reduced cost with the net result that a plant that would render identical service could be constructed for $600,000. It is true that the value of the utility will not decrease if rates are maintained by the Commission at a level sufficiently high to yield a net income of $80,000. But if it were not for the Commission, the value would soon decrease as it would not be long before the company would be undersold by a new company. The new company would only require an income of $48,000 to give it 8 per cent on its investment so that the town is paying $32,000 a year more than the service is reasonably worth, $32,000 a year more than it would have to pay if it should construct its own gas and electric plant. $32,000 a year capitalized at 8 per cent means a capital loss of $400,000.

Who is to stand this loss? If this case should come before the judges that decided *Willcox v. Consolidated Gas Company*,[23] they should not say that the property has decreased in value, since it most evidently has not if earnings are maintained at $80,000 a year, but they should say that if we do not decrease rates the town will suffer a large loss as it will be paying the company a return on antiquated expensive machinery and on land priced twice as high as the rest of the land similarly situated. They should then choose the only reasonable way of deciding whether the town is to stand this loss or whether the company is to stand it through a reduction in rates, that is, they should decide who is the real owner of the land and machinery in question.

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[23] *Supra*, n. 14.

What is contended for is recognition of the importance of this question of ownership. If we answer it after a careful consideration of all the issues involved, many of the most perplexing public utility problems are automatically answered for us and unless we answer it, we can not form a logical consistent policy that will form the basis for solving new problems as they arise.

A very good example of what appears to me an inconsistency arising from a failure to ask and answer it can be seen in the opinion of Mr. Justice Brandeis. To the statement that the federal Constitution guarantees to the utility the opportunity to earn a fair return on the capital prudently invested, he adds in a note, "Except that rates may in no event be prohibitive, exorbitant or unduly burdensome to the public."[24] This statement is not only inconsistent and wholly unfair to the investors but it is destructive of the great advantages of definiteness and stability that are inherent in prudent investment as a rate base. In as much as the doctrine of prudent investment as the rate base prevents investors from making any profit over and above a reasonable return, it is unfair to inflict upon them the chance of a loss other than one caused by inefficiency in operation. If rates may be lowered on a showing that they are unduly burdensome, will not the representatives of the public try to prove that fact in every rate hearing and thus inject into those hearings the speculative element that Mr. Justice Brandeis has been trying to remove? And how are we going to tell if a rate is unduly burdensome? How can a rate be so if it only yields a fair return on a prudent investment that the Public Service Commission has said was required by the convenience and necessity of the public? The only way left open in which to prove an undue burden is to show that the rates are higher than rates in comparable cities or higher than necessary to yield a reasonable return on the amount for which a plant could be constructed under conditions prevailing at the time of the hearing. And here we are right back, in either case, to cost of reproduction which Mr. Justice Brandeis is so desirous of avoiding. Only now if cost of reproduction is greater than the original prudent investment we say that rates are not to be increased, and if cost of reproduction is less than original prudent investment we say that rates must be lowered because they are unduly burdensome. Aside from the fact that such a result is unfair and would make rate hearings speculative, it would defeat its own ends, for the construction of our public utilities is by no means finished, and future investors would refuse to put in their money unless they had a guarantee of higher returns to compensate them for the speculation in losses without any speculation in profits.

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[24] 262 U. S. 276, 290, note 2.

Hanft, "*Control of Electric Rates,*" N. C. Law Rev. 289, 305-308:

COST OF REPRODUCTION.

Those who support the position of the United States Supreme Court that cost of reproduction must be given weight in determining value, or who approve the practice of some commissions in making it the measure of value, urge:

1. Cost of reproduction is founded on sounder legal logic. If the utility does not receive a fair return on the

fair value of its property, then there is confiscation, and property has been taken without due process of law. What property? The property as it now stands, not money invested prudently or otherwise in the past.

2. When price levels rise, and fall, values, including values of industrial plants, rise and fall. Property rarely remains worth exactly what was invested in it. To make an exception of public utility property would mean maladjustment of utilities in the normal industrial order. Some of the points listed separately below are aspects of this general idea.

3. The return to utility owners is really more stable under cost of reproduction than it would be under prudent investment. Under the latter theory, if accompanied by a fixed rate of return on the fixed investment, the utility owner receives during high price levels the same number of dollars he receives during low price levels. But at high price levels he can buy much less with each dollar. He is poorer despite his fixed income. Under cost of reproduction he receives more dollars when prices are up and more dollars are required to give him the same amount of food, clothing, etc.[73] Of course, prudent investment could be accompanied by a sliding rate of return, going up or down with the price level. But this would merely mean casting out the legion of devils that now inhabit the value problem, and allowing them to enter into the rate of return.

4. Cost of reproduction rewards efficiency in construction, since the utility receives a return on what it would reasonably cost to reproduce the utility, and the return is not limited to what actually was spent building it. On

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[73] The catch in this argument for cost of reproduction lies in the fact that most utility capital is contributed by bondholders, and their income is fixed regardless of the valuation allowed on the utility property. The fluctuations under cost of reproduction are absorbed by the stockholders. See text argument 4 under prudent investment.

the other hand, under the investment theory if the owners exercised extraordinary efficiency and built a plant which normally cost $100,000 for only $90,000, they would receive no advantage, as their return would be limited to the $90,000 invested. In short, under prudent investment there would be a falling off of efficiency to the point just short of wastefulness such as to brand the investment as imprudent.

5. Similarly, cost of reproduction induces utilities to build at low price levels, whereas prudent investment would impose no penalty on building at high price levels, since in any event a return would be allowed on the higher investment.

6. Assume a fixed return on a definite amount, namely the amount prudently invested, is given. Then assume the price level rises. Utility rates would be low as compared with general prices since utility rates would not have advanced. The result would be an abnormal stimulation in demand for the unnaturally cheap utility service, with attendant unnatural overexpansion of utility plants, and that at a time when the expansion would be at higher costs. The abnormal overexpansion would saddle high investments on utilities on which investments consumers would have to pay a return. Then when prices fall off, returns on these inflated investments would have to be paid, with the result that utility rates would be abnormally high compared with other prices, which would produce an abnormal contraction of demand. This would result in necessity for still higher rates to pay the constant return, and the higher rates would cause demand to dwindle further, etc. An abnormal idleness of utility plants and a cessation of expansion would ensue. Utility regulation would thus become a handicap to the industrial order because utilities would expand unnaturally during high price periods, thus

tending to heighten booms, and contract abnormally during low price periods, thereby deepening depressions.[74]

7. Public opinion would defeat the operation of prudent investment. If a utility were built largely during boom times, and then the public were obliged during an ensuing depression to pay returns on the inflated investment, a political hue and cry would be raised against the utilities. The people would fail to see why utility investors should continue to enjoy returns on boom time values while the property of everyone else dwindled in value. This argument is solidly founded on human nature. During depressions, when prudent investment would result in relatively high utility rates, the public is most likely to challenge the prices it pays to utilities, just as it challenges taxes and all other necessary expenditures. Conversely, during booms, when cost of reproduction results in high returns, the public, thriving with the boom times, pays less attention to expenditures. It is in a tolerant mood and careless of costs.

If it can be avoided regulation should not take utilities from the scheme of things which people acquainted with the fortunes of ordinary business understand.

8. Rates are not uncommonly set separately for each

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[74] This argument can be answered in part by saying that utility rates depend more on operating expenses than on return to the company, and operating expenses would fluctuate normally though the return were fixed.. It may be further said that electrical utilities furnish a service which is essential, hence will be demanded regardless of price. This is but partly true. Only a small portion of the sales of electricity are free from competition. Electric power must compete with coal, electricity for cooking must compete with gas and other fuels, etc. Further, if electric rates are abnormally high, the amount of consumption per customer will decrease. One may eat his bread untoasted if electricity is expensive. That demand may decrease sharply during depressions, notwithstanding the fact that electricity is "essential," is shown in N. C. Corp. Comm. Rep. 1931-32, XVII, where it is pointed out that mills, factories and machine shops which normally consume electric power were shut down or running part time. One light and power company reported the loss of 2,869 customers in six months.

municipality served, on the basis of the property used to serve that municipality. When this is done, then under prudent investment if the plant in one municipality were built during high prices, and a similar plant in a neighboring municipality were built during low prices, the rates in the second municipality would be permanently lower than those in the first, thus giving the second an advantage over the first in seeking new citizens and industries.

FILE COPY

IN THE

Supreme Court of the United States

OCTOBER TERM, 1941

No. 265.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, *Petitioners*,

v.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, *Respondents*.

No. 268.

NATURAL GAS PIPELINE COMPANY OF AMERICA AND TEXOMA NATURAL GAS COMPANY, *Petitioners*,

v.

FEDERAL POWER COMMISSION AND ILLINOIS COMMERCE COMMISSION, *Respondents*.

Motion of the National Association of Railroad and Utilities Commissioners that Said Association Be Granted Leave to File a Brief Amicus Curiae in Support of the Appeal of the Federal Power Commission Herein, and in Opposition to the Appeal of the Cross Petitioners.

BRIEF OF THE NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS.

JOHN E. BENTON,
General Solicitor of said Association
7411-15 New Post Office Bldg.,
Washington, D. C.

January 12, 1942.

PRESS OF BYRON S. ADAMS, WASHINGTON, D. C.

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Motion of the National Association of Railroad and Utilities Commissioners that Said Association Be Granted Leave to File a Brief Amicus Curiae in Support of the Appeal of the Federal Power Commission Herein, and in Opposition to the Appeal of the Cross Petitioners.

I. The National Association of Railroad and Utilities Commissioners is a voluntary Association embracing within its membership the members of the regulatory commissions and boards of the several States of the United States, except Delaware, which has no state regulatory commission, and New York, the commissions of which are not at present actively identified with the Association.

The Constitution of said Association, among others, states as objects of said Association "the promotion of cooperation of the commissions of the several States with each other, and with Federal regulatory agencies" and the "protection of common interests of the people of said States." Said Constitution empowers the President of the Association to direct the General Solicitor to appear on behalf of the Association in any proceeding in any court wherein the President shall consider that the Association should be represented, in furtherance of the objects of the Association.

This motion, and the brief presented herewith, are offered on behalf of said Association by direction of the President of the Association, with the purpose of contributing towards the protection of the interests of the people of the several States of the United States.

II. Said Association further represents that the Natural Gas Act, the constitutionality of which is being contested in the above entitled proceedings, was enacted by Congress upon consideration of a resolution adopted by said Association, on behalf of the State commissions represented in its membership, at its annual convention in 1937, asking Congress to enact such legislation, and upon the consideration of representations made to the Congress by various State commissions, setting forth the necessity for such enactment; and that said brief, if permitted to be filed, will be in support of the proposition that said Act is constitutional, and in support of other propositions of law, the recognition of which by this court, in the above entitled proceedings, is of importance to the people of the several States, and to the said State commissions, as agencies of government, charged with the regulation of the rates of public utilities in said States.

III. On December 12, 1941, counsel for said Association addressed to counsel for the Natural Gas Pipeline Company and Texoma Natural Gas Company, a letter, the body of which was as follows:

"Dear Sir:

"I have been directed by the President of this Association to prepare and offer for filing in the U. S. Supreme Court an *amicus curiae* brief in the Natural Gas Pipeline Company cases, Nos. 265 and 268, in support of the appeal of the Federal Power Commission.

"If you will assent, on behalf of the Natural Gas Pipeline Company, to the filing of such brief, I shall appreciate your courtesy if you will write me a letter expressing such assent, which I may exhibit to the Clerk of the U. S. Supreme Court, when I tender our brief for filing.

"Our brief has not yet been prepared, but I shall seasonably serve copies of the same upon Counsel for the parties.

"This Association represents in its membership the railroad and public utilities commissions of the several States, and will offer the brief on behalf of such commissions in their public capacity.

"In this connection I will say to you that the U. S. Supreme Court has heretofore never denied assent to our filing of a brief, upon a motion for such assent, even when parties have withheld their consent to a proposed filing. I desire, however, if possible to avoid having occasion to make any motion by advising the Clerk of the assent of all parties to the case."

To said letter, under date of December 15, 1941, a response was received, the body of which was as follows:

"Dear Sir:

"This will acknowledge receipt of your letter of December 12 requesting our assent on behalf of Natural Gas Pipeline Company of America to the filing by you of an *amicus curiae* brief in Cases Nos. 265 and 268, now pending before the United States Supreme Court.

"Writs of *certiorari* in said cases were granted on October 13 and you have had more than two months within which to prepare and serve on us a brief, if you had desired to do so. We have not been served with the Solicitor General's brief but only today received a page proof of his proposed brief which he says will be revised before it is finally printed. It will take all of the time available between now and the oral argument to file our reply to the Solicitor General's brief and prepare for the oral argument. The Solicitor General's brief is very exhaustive and adequately presents all the issues from his viewpoint.

"We have been advised by the Clerk of the Supreme Court that the argument in these cases will be heard during the week of January 12 and it seems to us that if such a brief, which is as yet unwritten, is filed by you, we will not have an opportunity to reply thereto.

"We, therefore, feel that we can not in justice to our clients consent to the filing of an *amicus curiae* brief by you.

"We are forwarding to the Clerk of the Supreme Court a copy of your letter to us, together with a copy of this letter, for his information."

IV. Because the regulatory commissions and boards represented in the membership of said National Association of Railroad and Utilities Commissioners are governmental bodies of the several States of the United States, exercising rate-making powers under the laws of said States, and engaged in the regulation of the rates and services of gas utilities, which, in many instances, purchase their supplies of natural gas at wholesale in interstate commerce from natural gas companies subject to regulation under the Natural Gas Act, and because the brief sought to be filed in their behalf, and tendered herewith, is offered in the public interest of the people of said States, said Association respectfully represents that the filing of such brief, in the above entitled proceedings, ought not to be prevented by the refusal of the aforesaid companies to assent to such filing.

V. Said Association presents herewith a copy of the brief which it desires to file, and respectfully moves that it be granted leave to file the same.

In support of this motion, said Association cites as precedents the action of this court upon similar motions made in the following cases: *Board of Railroad Commissioners* v. *The Great Northern Railway*, 281 U. S. 412; *Public Service Commission of Wisconsin* v. *Wisconsin Telephone Company*, 309 U. S. 657.

In each of said cases the defendant corporation refused to assent to the filing of an *amicus curiae* brief, but in each case, upon motion, and notwithstanding opposition, the court granted leave for the filing of such brief, by reason of the public character of the State commissions and boards, on behalf of which the brief was offered.

Respectfully submitted on behalf of said Association,

John E. Benton,
General Solicitor of said Association,
7411-15 New Post Office Bldg.,
Washington, D. C.

January 12, 1942.

IN THE

Supreme Court of the United States

October Term, 1941

No. 265.

Federal Power Commission and Illinois Commerce Commission, *Petitioners*,

v.

Natural Gas Pipeline Company of America and Texoma Natural Gas Company, *Respondents*.

No. 268.

Natural Gas Pipeline Company of America and Texoma Natural Gas Company, *Petitioners*,

v.

Federal Power Commission and Illinois Commerce Commission, *Respondents*.

BRIEF OF THE NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS.

OPINION BELOW.

The Opinion of the Circuit Court of Appeals is reported in 120 Fed. (2d) 625. It appears in the Record at Pages 4026-4041. The opinion of the Federal Power Commission appears in the Record at Pages 3925-3942.

STATEMENT OF THE CASE.

For the purposes of this brief we adopt and refer to the Statement of Facts contained in the brief heretofore filed for the Federal Power Commission and the Illinois Commerce Commission.

QUESTIONS ARGUED HEREIN.

This Brief is filed in support of the following propositions:

1. The Court below did not err in not sustaining the contention of the cross-petitioners in the above entitled proceedings, hereinafter referred to as the gas companies, that the order of the Federal Power Commission, hereinafter referred to as the Commission, should be set aside upon the ground that the Natural Gas Act, as applied by the Commission, is in conflict with the 5th Amendment to the Constitution of the United States.

2. The Court below did not err in not sustaining the contention of the gas companies that the order of the Commission should be set aside upon the ground that the Commission is without jurisdiction to enter an "interim order".

3. The Court below erred in holding that the order of the Commission should be set aside upon the ground that the rate base found and determined by the Commission was inadequate in the amount of $8,500,000, claimed by the gas companies as a separate allowance for going value.

4. The Court below erred in holding that the Commission's order should be set aside by reason of the fact that the Commission computed its allowance for amortization, including depreciation of capital assets, upon the basis of the entire service life of such capital assets, instead of upon that part of such service life which remained after the effective date of the Commission's order.

5. The gas companies should refund to their customers the overcharges made since the effective date of the Commission's order.

SUMMARY OF ARGUMENT.

The Natural Gas Act is Constitutional as a Regulation of Interstate Commerce Within the Power of Congress Under the Commerce Clause.

The power of Congress to regulate interstate commerce is plenary, and does not depend upon the public utility character of the enterprises regulated.

The necessity for the regulation provided by the Natural Gas Act was for the decision of Congress.

The gas companies, parties herein, are public utilities.

The Commission Had Jurisdiction to Enter the Order Here Under Review.

The Natural Gas Act was enacted as an aid to State commissions.

Congress intended the Commission to act with expedition.

The demands of due process were fully met.

The Court Below erred in holding that the Rate Base Determined by the Commission was inadequate by reason of the Commission's Treatment of the Gas Companies' Claim Respecting Going Value.

The claim that going concern must be valued separately from other elements of value rests upon a misconception of the so-called Smyth v. Ames rule.

The Commission did not exclude the going concern element in determining the rate base used.

The rate base found by the Commission was designed to represent an appraisal of the entire utility property, including all elements tangible and intangible.

The gas companies are attempting to secure the inclusion in their rate base of an allowance on account of an element which represents no investment by them.

The hazards of the business and other special circumstances held by the court below to require inclusion, in the rate base, of the going value item claimed were properly to be considered only as bearing upon the fair rate of return.

The Court Below Erred in Holding that the Commission's Order Should Be Set Aside Because the Commission Computed the Annual Allowance for Amortization of Capital Assets on the Basis of the Entire Service Life of such Assets.

The Commission properly based its amortization allowance upon the entire service life of the property to be amortized.

The Commission properly based its amortization allowance upon the cost of the property to be amortized.

If the Commission's order was made after a due process of law hearing, the only question open for the consideration of the Court is whether the rates prescribed are clearly shown to be confiscatory.

The ruling in Cotting v. Godard, even if admitted to be sound for application in any case, could not be applied in the administration of the Natural Gas Act without defeating the purposes of the Act.

The Gas Companies Should Refund to Their Customers the Overcharge[illegible]de Since the Effective Date of the Commission's Order.

Conclusion.

ARGUMENT.

The Natural Gas Act is Constitutional, as a Regulation of Interstate Commerce Within the Power of Congress Under the Commerce Clause.

The power of Congress to regulate interstate commerce is plenary, and does not depend upon the public utility character of the enterprise regulated.

The gas companies, before the Commission, and before the Court below, contended that the Natural Gas Act is unconstitutional as violative of the Fifth Amendment of the Constitution, because it undertakes to regulate the prices to be charged by natural gas companies, which they claim to be private enterprises, not subject to regulation as public utilities. This contention was denied by the Commission and by the Court below, and is renewed here.

Upon this point the position of the gas companies is stated at Pages 234-236 of their Brief in this Court as follows:

> "This case squarely presents the question of whether Congress may, under the Fifth Amendment, fix prices on private sales of an ordinary commodity. * * *
>
> "Cross-petitioners' business is of a strictly private character. Cross-petitioners have never held themselves out to the public as common carriers; nor have cross-petitioners offered to sell their gas to the general public * * *. Cross-petitioners have at all times sold their gas by private contracts. * * * Cross-petitioners do not operate under any franchise; they have no monopoly. * * * They are a private purveyor of a commodity."

The power of Congress under the Commerce Clause to regulate prices in interstate commerce is not limited to public utilities. The idea, once widely held, that prices may be regulated only when the owners of property have voluntarily dedicated it to public use, in an enterprise which may be designated a public utility, no longer obtains.

Under the Fifth Amendment the authority of the Federal government over interstate commerce does not differ in extent or character from that retained by the States over intrastate commerce. *United States* v. *Rock Royal Cooperative*, 307 U. S. 533, 569. We may therefore turn to cases where the effect of the 14th Amendment, upon the power of a State to regulate prices has been considered.

In *Nebbia* v. *New York*, 291 U. S. 502, involving the validity of a State statute regulating the price of milk, it was contended that the 14th Amendment inhibited the regulation. Contentions as to the private character of the milk business were made identical, in the grounds presented, with those presented by the gas companies in this case. In denying the contention thus made, this court said:

> "We may as well say at once that the dairy industry is not, in the accepted sense of the phrase, a public utility. We think the appellant is also right in asserting that there is in this case no suggestion of any monopoly or monopolistic practice. It goes without saying that those engaged in the business are in no way dependent upon public grants or franchises for the privilege of conducting their activities. But if, as must be conceded, the industry is subject to regulation in the public interest, what constitutional principle bars the state from correcting existing maladjustments by legislation touching prices? We think there is no such principle.
> The due process clause makes no mention of sales or of prices any more than it speaks of business or contracts or buildings or other incidents of property. The thought seems nevertheless to have persisted that there is something peculiarly sacrosanct about the price one may charge for what he makes or sells, and that, however able to regulate other elements of manufacture or trade, with incidental effect upon price, the state is incapable of directly controlling the price itself. This view was negatived many years ago. *Munn* v. *Illinois*, 94 U. S. 113, 24 L. ed. 77. * * * Munn and Scott held no franchise from the state. They owned the property upon which their elevator was situated and conducted their business as private citizens. No doubt they felt at liberty to deal with whom they pleased and on such terms as they might deem just to themselves. * * *
> It is true that the court cited a statement from Lord Hale's *De Portibus Maris*, to the effect that when pri-

> vate property is 'affected with a public interest, it ceases to be *juris privati* only;' but the court proceeded at once to define what it understood by the expression saying: 'Property does become clothed with a public interest when used in a manner to make it of public consequence, and affect the community at large.' (p. 126.) Thus understood, 'affected with a public interest' is the equivalent of 'subject to the exercise of the police power;' and it is plain that nothing more was intended by the expression. * * * The statement that one has dedicated his property to a public use is, therefore, merely another way of saying that if one embarks in a business which public interest demands shall be regulated, he must know regulation will ensue. * * *
>
> "Plainly the activities of railroads, their charges and practices, so nearly touch the vital economic interests of society that the police power may be invoked to regulate their charges, and no additional formula of affection or clothing with a public interest is needed to justify the regulation. And this is evidently true of all business units supplying transportation, light, heat power and water to communities, irrespective of how they obtain their powers. * * *
>
> "It is clear that there is no closed class or category of businesses affected with a public interest, and the function of courts in the application of the Fifth and Fourteenth Amendments is to determine in *each* case whether circumstances vindicate the challenged regulation as a reasonable exertion of governmental authority or condemn it as arbitrary or discriminatory. * * * The phrase 'affected with a public interest' can, in the nature of things, mean no more than that an industry, for adequate reason, is subject to control for the public good."

In later cases involving the exercise by Congress of its power under the Commerce Clause the court cited and followed the *Nebbia case*, among which were: *United States* v. *Rock Royal Cooperative*, 307 U. S. 533, 568. *Sunshine Anthracite Coal Co.* v. *Adkins*, 310 U. S. 381, 397.

The gas companies base their contention upon the claimed authority of *Tyson Bros.* v. *Banton*, 273 U. S. 418, and upon other cases following that case, or like it in principle. We believe that the majority opinion in *Tyson Bros.* v. *Banton* was never accepted by lawyers generally, as settling the limits of legislative power under the Fifth and Fourteenth Amendments. At the time of its decision four of the nine Justices of this Court dissented. We believe that the majority opinion in that case, and in other cases like it, will not be accepted as guiding by the court. What was said by the present Chief Justice, in his dissenting opinion in that case, respecting the character of businesses the prices of which may be regulated, may be said to have pointed the way to the decision of this Court in the *Nebbia case.* We quote briefly:

> "The phrase 'business affected with a public interest' seems to me to be too vague and illusory to carry us very far on the way to a solution. * * * The very fact that it has been applied to businesses unknown to Lord Hale, who gave sanction to its use, should caution us against the assumption that the cateory has now become complete or fixed and that there may not be brought into it new classes of business or transactions not hitherto included, in consequences of newly devised methods of extortionate price exaction. * * *
>
> "Statutory regulation of price is commonly directed toward the prevention of exorbitant demands of buyers or sellers. An examination of the decisions of this court in which price regulation has been upheld will disclose that the element common to all is the existence of a situation or a combination of circumstances materially restricting the regulative force of competition, so that buyers or sellers are placed at such a disadvantage in the bargaining struggle that serious economic consequences result to a very large number of members of the community. Whether this situation arises from the monopoly conferred upon the public service companies or from the circumstance that the strategical position of a group is such as to enable it to impose its will in matters of price upon those who sell, buy, or consume, * * * the result is the same. Self-interest is not permitted to invoke constitutional protection at the expense of the public interest and reasonable regulation of price is upheld." (273 U. S. 451-452)

The necessity for the regulation provided by the Natural Gas Act was for the decision of Congress.

Recognizing, as they must, that the decisions above referred to, and others, establish that Congress, under the Commerce Clause, may regulate prices where the circumstances make such regulation reasonable, for the protection of the public interest, counsel for the gas companies argue at much length that the "circumstances" shown in the record render the regulation "arbitrary and discriminatory."

The facts emphasized and relied upon by the gas companies are the very facts which led to the enactment of this legislation by the Congress.

The gas companies, parties to this case, and other pipeline companies, take natural gas from the ground in producing states, and transport the same into other states, where it is, in most instances, sold to distributing companies, which are admittedly public utilities, buying for resale to the public.

Until the Natural Gas Act was enacted contracts of sale by the pipeline companies to the distributing companies were claimed to be private contracts in interstate commerce, beyond the reach of state regulatory authority. It therefore resulted that the rate regulatory authorities of the states, when called upon to establish just and reasonable rates for gas service, found themselves unable to reach and regulate the major part of that service.

The gas service rendered to the public, regulation of which was desired in the public interest, in each particular case was, in fact, a joint service, participated in by the pipeline company and the distributing company. The power of the state regulatory agency, however, extended only to the regulation of the distributing company; and the prices of that company were necessarily, in principal part, controlled by the price exacted by the pipeline company for the gas delivered at the city gate.

The Natural Gas Act, as is stated on Page 226 of the brief of counsel for the gas companies, originated as H. R. 11662 in the 64th Congress. It was reintroduced in slightly amended form as H. R. 4008 in the 65th Congress. The published hearing before the House Interstate and Foreign Commerce Committee shows that the Committee had before it very much information dealing with the difficulties confronting state commissions by reason of the fact that only distributing companies were subject to their regulation.

The President of the National Association of Railroad and Utilities Commissioners appeared and testified before the Committee, in support of the legislation. Other state commission representatives likewise appeared in support of the legislation. A resolution, adopted by the Association at its 1935 annual convention, urging Congress to enact legislation, was presented. The decisions of the United States Supreme Court which established the inability of state commissions to regulate the rates for gas sold at wholesale in interstate commerce for resale were presented to the Committee, and their effects were discussed. Communications from various state commissions were before the Committee giving concrete instances in which the attempts of state commissions to establish reasonable rates for gas service were impeded and rendered impossible of accomplishment by reason of the fact that the interstate pipeline companies were beyond the reach of state regulatory power.

In addition to all this information the Committee had before it the results of the Federal Trade Commission investigation, and other reports made pursuant to the authority of Congress referred to in Section 1 of the Natural Gas Act.

To determine whether the circumstances so shown rendered regulation of the prices for gas sold by such pipeline companies necessary and reasonable was for Congress, as this court pointed out in *Sunshine Anthracite Coal Co.* v. *Adkins*, 310 U. S. 381. In that case, referring to a somewhat similar contention, in an opinion by Mr. Justice Douglas, the court said:

> "But appellant claims that this Act is not an appropriate exercise of the congressional power. It urges

that the nature and use of bituminous coal in no ways endanger the health and morals of the populace; that no question of conservation is involved; that the ills of the industry are attributable to overproduction. * * * Those matters, however, relate to questions of policy, to the wisdom of the legislation, and to the appropriateness of the remedy chosen—matters which are not our concern. If we endeavored to appraise them we would be trespassing on the legislative domain." (310 U. S. 381, 394, 395)

The gas companies, parties herein, are public utilities.

The gas companies argue with much insistence that they are not public utilities. They assert that they have at no time dedicated their property to public use; and that the Natural Gas Act, in subjecting them to regulation, in effect takes private property for a public use, in derogation of the Fifth Amendment.

This argument begs the question. The mere fact that interstate natural gas pipeline enterprises had not been subjected to regulation prior to June 28, 1938, does not establish their character prior to that date as private enterprises. If they were subject to public regulation upon that date they were so subject prior thereto. They cannot claim immunity from regulation merely because they had long enjoyed immunity, *Producers Transportation Co.* v. *Railroad Commission*, 251 U. S. 228; *Midland Realty Co.* v. *Kansas City Power & Light Co.*, 300 U. S. 109.

The gas companies are public utilities by their own choice. They elected to devote their properties to public utility enterprises when they undertook to produce gas, in the gas fields of Texas, and to transport such gas to the cities of the middle west, and there to effect arrangements whereby it should be distributed to the general public.

Gas pipeline companies are public utilities regardless of the character of the legal arrangements which they effect to complete the rendition of gas service in which they engage. Such arrangements may consist of the construction of distributing lines, owned and operated by the pipeline company, as in the following cases: *Pennsylvania Gas Co.* v. *Public Service Commission,* 252 U. S. 23; *Peoples Gas Co.* v. *Public Service Commission* 270 U. S. 550; *East Ohio Gas Co.* v. *Tax Commission,* 283 U. S. 465. They may consist of arrangements with distributing companies whereunder the gross amounts paid by customers for gas delivered are shared between the distributing company and the pipeline company, as appears to have been the case in *Public Utilities Commission* v. *Landon,* 249 U. S. 236. The arrangements made may be in the nature of outright sales, such as appear to have been made in *Missouri* v. *Kansas Gas Co.,* 265 U. S. 298, and in this case. In every case, whatever of the form of arrangements effected, the pipeline company establishes, or joins in the establishment of, a public utility enterprise, the continued and efficient service of which to the public, at reasonable rates, is obviously of great importance to the public.

When the pipeline company itself sells directly to customers it is plain that it owes to such customers such service at such rates. If it chooses to effect arrangements with others to share in the enterprise, by distributing within the various localities to be served, the customers are entitled to the same efficient service, at reasonable rates; but such service can be supplied at such rates only if the pipeline company performs its share of the joint enterprise in a proper manner.

The duty thus to perform its share of the enterprise rests upon the pipeline company no less where it effects arrangements to share the enterprise with others than where it carries on the entire enterprise itself. In neither case can the owners of the pipeline say that they have not elected to devote their property to an enterprise effected with a public interest, and subject, at the will of the legislature, to regulation. The very nature of the enterprise, in which they embark their property, is that of a public utility.

The mere fact that interstate gas pipeline companies were not subject to regulation when the gas companies, which are parties to this case, acquired or constructed their properties does not affect the situation. They knew, or must be assumed to have known, that Congress under the Commerce Clause would exercise power to regulate their interstate activity whenever such regulation should appear desirable in the public interest.

The Commission had Jurisdiction to Enter the Order Here Under Review.

The gas companies contend that the Commission's order must be set aside because it was entered before the completion of the rate investigation proceeding, in which it was made, and because it specifically provides that the record "shall remain open for such further proceedings as the Commission shall deem necessary and desirable."

The order both in the Commission's opinion, and in the order itself is termed as "interim order". At page 216 of their Brief, counsel for the gas companies state their contention as follows:

> "We submit that Section 5 of the Natural Gas Act requires that the hearing be completed before an order reducing rates can be entered. Under the plain wording of the statute no authority is given the Commission to enter an order fixing rates until after the completion of a full hearing. There is no provision in the statute for the entering of an interim order."

It may be admitted that there is no such term used in the Act as "interim order", and, further, that the Commission must derive its authority from the Act. Unless the Act, properly understood, authorizes the order here under review, the order must be set aside.

Whether that order was within authority granted, however, depends not upon the bare words of Section 5 of the Act, but upon the intent of Congress, as gathered from the language used in said Section 5 and elsewhere in the Act, read in the light of the situation with which Congress undertook to deal. *American Trucking Association* v. *United States*, 310 U. S. 534, 542-43; *United States* v. *San Francisco*, 310 U. S. 16; *Texas and Pacific Railroad Co.* v. *Gulf etc. R. Co.*, 270 U. S. 266, 277-278; *Railroad Commission* v. *Chicago B. & Q. Railway*, 257 U. S. 564, 586.

The Natural Gas Act was enacted as an aid to state commissions.

The situation with which Congress was faced has been referred to hereinbefore. The states, under the law as declared in *Public Utilities Commission* v. *Attleboro Co.*, 273 U. S. 83, and *Missouri* v. *Kansas Gas Co.*, 265 U. S. 298, were unable to regulate gas utility enterprises effectively when the distributing companies received their gas from interstate natural gas companies. The problem was acute, as was evidenced by the resolution of the National Association of Railroad and Utilities Commissioners, hereinbefore referred to, and the statements and communications placed before Congress by various state regulatory agencies.

The resolution in question concluded as follows:

> "*Resolved further,* That Congress be asked to limit the jurisdiction granted strictly to gas transmitted and sold at wholesale for resale, and that such legislation be so drawn as in no way to limit or impair the power of the States to regulate intrastate and local service, and the rates applicable thereto."

Congress was thus asked to complement State regulatory agencies, not to supplant them.

In this situation, the Natural Gas Act was enacted. The Federal Power Commission was vested with regulatory powers carefully restricted to the Federal field. To meet a demonstrated need, which existed by reason of the inadequacy of State power to regulate sales in interstate commerce for resale, the Federal Power Commission was made a Federal regulatory agency, with respect to those sales, for the plain purpose of enabling State commissions effectively to perform their function of assuring to the public reasonable service at reasonable rates.

The powers of the Federal Power Commission, under the Natural Gas Act, were made complete, with respect to those matters which were beyond State control, but, insofar as service and rates were concerned, extended only to the control of those matters,—that is they extended only to service and the rates for service under contracts for the sale in interstate commerce of natural gas for resale.

Section 17 of the Act authorizes the Commission to refer cases to joint boards, composed of nominees of State commissions, and to "confer with any State commission regarding rate structure * * * (and) to hold joint hearings with any State commission in connection with any matter with respect to which the Commission is authorized to act."

Section 5(b) of the Act provides as follows:

> "5(b) The Commission upon its own motion, or upon the request of any State commission, whenever it can do so without prejudice to the efficient and proper conduct of its affairs, may investigate and determine the cost of the production or transportation of natural gas by a natural-gas-company in cases where the Commission has no authority to establish a rate governing the transportation or sale of such natural gas."

This provision enables the Commission to determine the cost of production and transportation by gas companies which produce natural gas in one State and sell the same directly to consumers in another State. Such sales, not being for resale, are not subject to regulation under the Natural Gas Act, but are left to State regulation, as local transactions, within the reach of State power, in the absence of Federal regulation.

As counsel for the gas companies, at page 260 of their Brief, contend, and as the Circuit Court of Appeals said in *Mississippi Fuel Corporation* v. *Federal Power Commission*, 121 Fed. (2nd) 159, 164:

> "Protection of the ultimate consumer and not the intermediate utility was the manifest purpose of the Act."

It follows then that Congress intended the Commission to exercise its powers, in proper cases, to reduce the rates of natural gas companies as a part of an entire process of regulation. The two commissions, acting in their respective fields, were to make orders which, operating together, should require the companies contributing to gas utility enterprises to perform their respective shares of the joint service rendered to ultimate consumers at rates which should be just and reasonable to such consumers.

In this respect the Federal Power Commission is differently situated from the Interstate Commerce Commission when that Commission regulates rates for transportation, and from the Federal Communications Commission, when that Commission regulates rates for transmission of communications. Those Commissions by their orders control the charges which the public shall pay, but the Federal Power Commission is unable to assure ultimate consumers of reductions which are ordered for the public benefit, except in conjunction with the State commissions. The Natural Gas Act was enacted as an aid to the State commissions.

Congress intended the commission to act with expedition.

Congress must then have intended that the Federal Power Commission should so exercise its powers as to enable the entire act of regulation (partly to be performed by the Federal commission and partly by the State commission) to be performed within a reasonable time. An act of Congress will be construed to enable the intention of Congress to be accomplished. *United States* v. *Louisiana*, 290 U. S. 70, 75-76.

The need for expeditious action by the Commission, in order that the public might be granted relief from unreasonable rates with reasonable expedition, was pressed upon the House Interstate and Foreign Commerce Committee when it was considering the bill which finally became the Natural Gas Act.

A communication from the Chairman of the Illinois Commerce Commission, which appears at page 56 of the hearing on H. R. 4008, 75th Congress, making reference to a litigation then going on before that Commission and in the Illinois courts, represented that the Illinois Commission found itself handicapped by reason of its inability to control the prices charged for gas by the Natural Gas Pipeline Company of America. It was urged that the Committee amend the pending bill to include provision for temporary rates, to enable the Commission more expeditiously to prescribe rates, which might be reflected in an order of the Illinois Commission. Mr. Booth, Counsel for that Commission, presented a proposed amendment, which is set forth at page 227 of the brief of counsel for the gas companies filed here.

It is true that the Committee did not include that amendment in the Act. That amendment, however, like the New York and Pennsylvania statutes, was drawn to authorize the Commission to prescribe temporary rates after a hearing only with respect to the amount of the original cost of the property of a regulated company, less depreciation. Under the proposal, the Commission, to compensate the company for any undercharge resulting from that course, would have been authorized to make a proper allowance thereafter, when the Commission should be prepared to determine just and reasonable rates. The order before the Court in this case is widely different in character from the order designed to be authorized by that amendment. This is an order issued after a due process of law hearing, and upon a finding that the rates prescribed will be just and reasonable. That was an order to be issued after a limited hearing, and with no finding as to the justice and reasonableness of the rates to be prescribed.

The fact that Congress did not see fit to adopt that rough and ready method of prescribing rates has no significance as tending to show that it did not intend the Commission to exercise its rate-making powers, whenever the demand of due process should have been met, and justice should appear to require that rate changes be prescribed.

There are other provisions in the Act which show that it was the intent of Congress to shorten the rate-making process by all means consistent with full protection of the rights of regulated utilities.

After including in Section 4 provisions, common in rate regulatory statutes, commanding that all rates be just and reasonable, and forbidding all discriminatory rates, the Congress in Section 5(a) provided:

> "5(a) *Whenever* the Commission, after a hearing had upon its own motion or upon complaint of any State, municipality, State commission, or gas distributing company, shall find that any rate * * * is unjust, unreasonable, unduly discriminatory, or preferential, *the Commission shall* determine the just and reasonable rate * * * and *shall fix the same by order.* * * *" (Italics supplied)

The following Sections of the Act are especially significant:

> "Sec. 6(a) The Commission may investigate and ascertain the actual legitimate cost of the property of every natural-gas company, the depreciation therein, and, when found necessary for rate-making purposes, other facts which bear on the determination of such cost or depreciation and the fair value of such property.
>
> "(b) Every natural-gas company upon request shall file with the Commission an inventory of all or any part of its property and a statement of the original cost thereof, and shall keep the Commission informed regarding the cost of all additions, betterments, extensions, and new construction."
>
> "Sec. 15(b) All hearings, investigations, and proceedings under this act shall be governed by rules of practice and procedure to be adopted by the Commission, and in the conduct thereof the technical rules of evidence need not be applied. No informality in any hearing, investigation, or proceeding or in the manner

> of taking testimony shall invalidate any order, decision, rule, or regulation issued under the authority of this act."
>
> "Sec. 16. The Commission shall have power to perform any and all acts, and to prescribe, issue, make, amend, and rescind such orders, rules, and regulations as it may find necessary or appropriate to carry out the provisions of this act. * * *"

Section 8(a) empowers the Commission to prescribe accounts to be kept by natural gas companies, showing the results of their operations. Section 10(a) requires every natural gas company to file with the Commission such annual and other periodic or special reports as the Commission by rule or order shall require.

The Commission was thus equipped with powers enabling it to require natural gas companies to supply information which might make the basis for the fixing of a rate base, and for the determination of reasonable rates, without the costly and time-consuming labors, and testimony of experts, which had become common in endeavors to meet the supposed requirements of the so-called *Smyth* v. *Ames* rule. Congress must have expected these powers to be used. We think it is apparent that its intent was that the Commission should base its rate regulation upon the original cost of the properties regulated, using such cost as sufficient evidence of their fair value, required as a rate base. For that reason Congress studiously avoided any reference to reproduction cost.

At the time the Natural Gas Act was framed and reported to the House, however, and when it passed the House, *Railroad Commission* v. *Pacific Gas & Electric Co.*, 302 U. S. 388, hereinafter discussed, had not been decided. There was still uncertainty as to whether a rate regulatory commission was at liberty to base a finding of rate base value upon original cost, without the ascertainment also of the reproduction cost, in conformity with the supposed requirements of the *Smyth* v. *Ames* rule.

The last Congressional hearing upon the legislation was before the House Interstate and Foreign Commerce Committee on March 25, 1937. The bill was reported by that Committee on April 28, 1937, and was passed by the House on July 1, 1937. It was finally passed by the Senate on June 14, 1938.

Upon consideration of the situation, with respect to which Congress was legislating, and of the provisions of the Act to which we have referred, we think it is evident that Congress intended that the Commission should act expeditiously, whenever a State commission should invoke its aid, or whenever a proceeding before it should be otherwise instituted. For that reason it so equipped the Commission with powers that the Commission might require the regulated utilities to supply information upon which it might act without making a physical valuation. However, because of uncertainty as to this attitude of the Courts, the Commission was given authority, in Section 6(a), to find "other facts" bearing on fair value, "when found necessary".

The demands of due process were fully met.

While Congress, by the provisions of the Act to which we have referred, thus sought to procure expeditious Commission action, it undoubtedly intended to require a due process of law hearing, with notice, and with full opportunity to present evidence and make argument. Such opportunity was given in this case.

There was a hearing which extended through several months, with hearing sessions on fifty-six days. Under the procedure adopted by the Commission the gas companies were first heard. They presented thirty-seven witnesses, which were all they desired to present, and they testified fully. Counsel for the gas companies cross-examined all witnesses offered by the other parties, and offered all the rebuttal they desired to offer. They filed briefs, and were heard in oral argument.

Nowhere in the brief filed for the gas companies is it claimed that there was any failure of proper notice, or any refusal to hear all such evidence and arguments as they desired to present. The complaint, instead, is of the procedure followed.

In their brief, at page 216, complaint is made that the gas companies "were required to proceed with their testimony before the Commission and complainants were required to develop any evidence in support of their contention that cross-petitioners' existing rates are unjust and unreasonable". It is complained that they "have never developed such evidence", and that thirty of the witnesses produced by the gas companies were never cross-examined; and also that the order contains a paragraph holding the proceeding open "for such further proceedings as the Commission may deem necessary or desirable."

It is a singular contention that a hearing is rendered unfair because other parties do not testify, and because witnesses are not cross-examined. We do not extend this brief by argument concerning those alleged grounds of invalidity.

There remain only the contentions that the gas companies were required to be heard first, and that the order was made before the conclusion of the entire investigation proceeding.

With respect to the first matter, the provisions of Section 15(b) of the Act, herein before quoted, would appear to be conclusive. Furthermore, it may be observed that the Commission's procedure, which was designed to facilitate the hearing by permitting the gas companies to produce evidence which might form the basis of a judgment as to the reasonableness of their rates, was entirely in harmony with the plain purposes of the several provisions of the statute, above referred to, which would have permitted the Commission to call upon the company for special reports designed to serve the same purpose.

As to the entry of the order without awaiting completion of the proceeding, no extended argument should be necessary, in view of the scope and purpose of the Act, and of the several provisions to which we have pointed, as manifesting the intent of Congress that the Commission should be able to act with expedition.

When the Commission knew facts which indicated that the charges of the gas companies were probably too high, it was its duty to act with expedition. Especially was this true when a State commission was before the Commission representing that it had been for three years engaged in hearings and in litigation endeavoring to establish just and reasonable rates to the people of the great city of Chicago, upon the gas brought into Illinois by these gas companies, and that a decision and order by the Commission was essential for that purpose. (R. 25-31)

We have pointed out that the Natural Gas Act was enacted to enable the Federal Power Commission to complement State commissions. It was the duty of that Commission so to construe and apply the Act as to coordinate its action with the action of the Illinois Commerce Commission, just as it is the duty of a court, in the construction of a regulatory statute, to construe the same so that administrative and judicial action may be coordinated to accomplish the purpose of the legislation. *United States* v. *Morgan*, 307 U. S., 182, 190-191.

Knowing that the rates of the gas companies ought to be reduced, it was the Commission's duty to reduce them as expeditiously as possible. As the court below has pointed out, it might have concluded the hearing, and thereupon have made a final order. Later it could have instituted another proceeding for the completion of its rate investigation. The law is not so silly as to require that to be done.

The Court Below Erred in Holding that the Rate Base Determined by the Commission Was Inadequate by Reason of the Commission's Treatment of the Gas Companies' Claim Respecting Going Value.

The gas companies claimed a rate base including the following items:

Reproduction Cost, $56,302,250.
Value of Gas Reserve, $13,334,775.
Going Concern Value, $8,500,000.
Working Capital, $975,000.
Prospective additions prior to December 1, 1942, $3,308,399.

The last mentioned item was their estimate of such prospective additions, and was made as a part of a claim of $6,046,286, which they claimed to represent the average investment for future capital additions from the date of their reproduction cost estimate to December 31, 1954, the estimated end of the useful life of the companies gas properties. The witnesses admitted depreciation, termed by them "viewed depreciation," estimated at $2,866,758.

The Commission rejected the $8,500,000 item. The total of the other items, however, without deduction for depreciation, amounting to $74,420,424, was adopted as a rate base.

The gas companies contend that the Commission thereby denied them any allowance for the going concern element of value, and that the rate base fixed is consequently inadequate, as a basis for the computation of reasonable rates, The Court below sustained that contention.

We maintain that the ruling of the Court was based upon a misconception both of what the Commission did and of the law as established by the pertinent decisions of this Court.

The claim that going concern must be valued separately from other elements of value rests upon a misconception of the so-called Smyth v. Ames rule.

Under the decisions of this Court, the test as to the constitutional validity of rates, fixed by legislative authority has been the sufficiency of such rates to yield a fair return on a rate base, which the Commission has denominated "fair value."

The fair value tests was first announced in *Smyth* v. *Ames*, 169 U. S. 466, in which case the Court said:

> "We hold, however, that the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property being used by it for the convenience of the public. And, in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property. What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience. On the other hand, what the public is entitled to demand is that no more be exacted from it for the use of a public highway than the services rendered by it are reasonably worth." (169 U. S. 466, 546, 547)

The language just quoted is often referred to as the *Smyth* v. *Ames* rule. It is obvious, however, that it is no rule at all, beyond its requirement that "fair value" be found, and used as a basis for determining rates which the owner of the property involved must be permitted to earn to avoid confiscation.

That this "fair value" was not exchange value was evident, both from the classes of evidence which the opinion states were entitled to consideration, and from the concluding statement, set forth in the language just quoted, that "what the public is entitled to demand is that no more be exacted from it for the use of a public highway than the services rendered by it are reasonably worth."

This limitation of rates to a level not exceeding the worth of services covered, coupled with the consideration of both original cost and present cost, either one of which might tend to support a value either more or less than exchange value, was sufficient to make it clear that "fair value," according to the conception of the Court, was something different from exchange value.

Under this so-called *Smyth* v. *Ames* rule, public service companies, with a very substantial degree of success, have endeavored to build up a procedure which would protect them from the exercise of the right of the people, through their legislative agencies, to impose a just and reasonable regulation upon public service enterprises. Because the present cost of producing their properties had been said to be proper for consideration, they have insisted that such cost must be stated, and have insisted, as a constitutional right, upon the opportunity to make appraisals of the multitudinous units of their properties; and to present evidence of such appraisals in hearings consuming months of time.

The courts have acquiesced in these demands, to the extent of holding that such evidence must be received and given due consideration. *Wilcox* v. *Consolidated Gas Co.*, 12 U. S. 19, 41. *Southwestern Bell Tel. Co.* v. *Public Service Commission*, 262 U. S. 276, 287. The courts also have held that the fair value should be fixed as of the time the rates were to be effective. *San Diego Land, Etc. Co.* v. *National City*, 174 U. S. 739, 757. *Wilcox* v. *Consolidated Gas Co.*, 212 U. S. 19, 52. *Minnesota Rate Cases*, 230 U. S. 352, 434.

This rule requiring the value to be fixed as of the time of the use of the property, under the rates to be fixed, being established, public service companies not only claimed the right to make and present their reproduction cost estimates, but they claimed that the reproduction cost of the property included the cost of reproducing the business which they were doing, and that such reproduction cost represented the present value of their property, upon which they had a constitutional right to earn a fair return.

To an extent they were successful in imposing this claim upon Commissions and courts. The use of reproduction cost estimates became common, and was treated as proper by this court. *Denver* v. *Denver Union Water Co.*, 246 U. S. 178, 191. In *Southwestern Bell Tel. Co.* v. *Public Service Commission,* 262 U. S. 276, the court went so far as to set aside the Commission rate order involved in that case, because it appeared from the Commission's report that it had not based its findings of fair value upon reproduction cost prices as of the date of the valuation. See also *McCardle* v. *Indianapolis Water Co.*, 272 U. S. 400, 410.

The cost and delays incident to recurring reproduction cost estimates were so great that attempts were made to obviate the necessity for them by the development of cost indices showing the trend of reproduction cost prices, which could be used to indicate the change in the reproduction cost of property from one date to another. The difficulties inherent in the attempts, or in the manner in which they were used, led to the rejection of their results in court. *West* v. *Tel. Co.*, 295 U. S. 662, 667. *Ohio Bell Tel. Co.* v. *Public Utilities Commission,* 301 U. S. 292, 296.

The results of attempting to follow this *Smyth* v. *Ames* rule, as it had been thus developed, are well known. They were commented upon in the dissenting opinions of Mr. Justice Brandeis in *St. Joseph Stockyards Co.* v. *United States,* 298 U. S. 73, 84, and, of Mr. Justice Black in *McCart* v. *Indianapolis Water Co.,* 302 U. S. 419, 435.

Some Commissions refused to undertake to make physical valuations under the *Smyth* v. *Ames* rule, and frankly followed the practice of treating the investments of companies as a sufficient basis for determination of their rate bases. Notable among these was the Railroad Commission of California.

This practice of the California Commission came squarely before this court in a case determined in January, 1938. An epic-making decisions resulted. The case was *Railroad Commission* v. *Pacific Gas and Electric Co.*, 302 U. S. 388.

The United States District Court of Northern California had enjoined the enforcement of a rate reduction order of the California Commission upon the ground that the Commission had failed to find the value of the property of that company in accordance with the *Smyth* v. *Ames* rule. It appeared that the Commission had received evidence presented by the utility as to the reproduction cost of its property, but had refused to make use of the same in determining the rate base, stating in its report that it found the same unsatisfactory. As a rate base the Commission used the historical cost of the property involved, without making any finding of value either for the going concern element or for the property as a whole. Upon an appeal to this court, from the action of the District Court, this court said:

> "The Commission was entitled to weigh the evidence introduced, whether relating to reproduction cost or to other matters. The Commission was entitled to determine the probative force of respondent's estimates. That the Commission did so is apparent from both its statement to that effect and the reasons it gives for considering these estimates to be without positive value. * * * Nor did the ruling with respect to the weight of evidence as to reproduction cost leave the Commission without evidence of the value of respondent's property. We have frequently held that historical cost is admissible evidence of value. * * * In the instant case we cannot say that the Commission in taking historical cost as the rate base was making a finding without evidence and therefore arbitrary. * * * The Commission specifically found what it considered to be the rate base. 39 Cal. R. C. supra, p. 76. The Commission found that rate base to be reasonable. Id. p. 77, note. The import of its opinion is that the rate

> base represented the Commission's conclusion as to the value which should be placed upon respondent's property for the purpose of fixing rates." (302 U. S. 388, 397, 398, 399, 400)

The case was remanded to the District Court for findings on the question of confiscation, which this court held to be the only question open.

From this opinion Mr. Justice Butler, who had written the opinion of the court in the *McCardle case,* wrote a long and vigorous dissent, which was joined in by Mr. Justice McReynolds, who had written the opinion in the *Southwestern Bell Telephone Company* case. The following may be quoted from that dissent:

> "The principle applied in Smyth v. Ames has long governed wherever judicial action has been invoked to enforce the rule of just compensation. It is binding upon state courts and commissions. But the California commission refuses to follow the established rule. It does not ascertain or use present value but in its place takes historical cost, actual or estimated, as the basis of its determination in rate judging and rate making. * * * I cannot refrain from protesting against the Court's refusal to deal with the case disclosed by the record and reasonably to adhere to principles that have been settled. Our decisions ought to be sufficiently definite and permanent to enable counsel usefully to advise clients. Generally speaking, at least, our decisions of yesterday ought to be the law of today."

This dissent indicates not only the misconstruction which the dissenting Justices had placed upon the opinion in *Smyth* v. *Ames,* but it indicates also that they realized that the doctrine of the opinions, applying the *Smyth* v. *Ames* rule, which they discussed in their dissent, was being discarded. The full significance of the opinion will be commented upon a little later in this brief.

The commission did not exclude the going concern element in determining the rate base used.

We return now to the claim of the gas companies that they have been denied all recognition of the going value element, which is claimed to inhere in their property.

This claim rests upon the fact that the Commission refused to include in the rate base the item of $8,500,000, which experts for the gas companies had testified should be included for that element, and, upon the further facts that the witnesses who presented reproduction estimates had testified that such elements had included nothing for going value, and that the Commission, in its opinion, stated that it "accepted" the evidence as to reproduction cost.

This statement of the Commission, and the Commission's further statement that the $8,500,000 claim must be disallowed appear to have misled the Court below.

The rate base found by the commission was designed to represent an appraisal of the entire utility property including all elements tangible and intangible.

In fixing the rate base at $74,420,424, the Commission was not making a valuation of the several elements of value, concerning which the witnesses had testified. It was, instead, fixing an amount which would, in the judgment of the Commission, based upon a consideration of all the evidence before it, represent the maximum amount upon which the companies were justly entitled to a fair return.

As originally expressed, the so-called *Smyth* v. *Ames* rule had not exalted reproduction cost evidence above every other class of evidence mentioned, nor held that reproduction cost represented minimum fair value, to which additions must be made for other elements of value, if existing. Care had been taken by the Court in *Smyth* v. *Ames* to make it clear that the enumeration of elements to be considered was not designed to be exclusive, and that the weight to be attributed to each class should be what the valuing tribunal deemed "just and right in each case." The Court was not laying down a rule to deprive legislators and legislative rate making-agencies of the exercise of their judgment.

Later in *Minnesota Rate Cases,* 230 U. S. 352, Mr. Justice Hughes said:

> "The ascertainment of that value is not controlled by artificial rules. It is not a matter of formulas, but there must be a reasonable judgment having its basis in a proper consideration of all relevant facts." (230 U. S. 434)

When Mr. Justice Hughes had become the Chief Justice, and came to write the opinion in the *Pacific Gas and Electric Company* case, from which we have quoted, he but expressed again what he had said more than twenty years before.

The opinion in the *Pacific Gas and Electric Company* case cleared away excrescencies from the rule as originally expressed by Mr. Justice Harlan.

Under the law, as recognized and emphasized in the later opinion, a rate-making agency may weigh the relevant evidence before it, and, attributing to each piece of evidence the weight it considers just, may determine the amount upon which the owner of the property regulated should be permitted to earn a return; and within the limits of the constitutional rule, which forbids confiscation, its decision is final.

There is no requirement in the constitution, nor in the decision of this court, which compels a regulatory agency to attempt to segregate the intangible elements of a utility's property, such as its established business, from its tangible physical properties, and to determine and state a value for such intangible elements.

It is true that when a commission has followed that method in fixing value, the Court has sometimes expressed approval. The Court has also repeatedly declared the obvious fact that an established plant, in operation and earning money, has greater value than the bare bones of the plant without business; and it has declared that this element of value, commonly referred to as going concern value, must be given consideration in fixing value for rate purposes. *Des Moines Gas Company* v. *Des Moines,* 238 U. S. 153, 164; *Denver* v. *Denver Union Water Co.,* 246 U. S. 178, 191; *Los Angeles Gas and Electric Co.* v. *Railroad Commission,* 289 U. S. 287, 314.

The Court, however, has made it clear that going concern value, when existent, inheres in the property because it represents unrecouped investment, made by the owner of the property valued. In the *Des Moines Gas Company case,* just cited, the Court, in sustaining a valuation in which an item for going value had been excluded, said:

> "Included in going value as usually reckoned is the investment necessary to organizing and establishing the business which is not embraced in the value of its actual physical property. In this case, what may be called the inception cost of the enterprise entering into the establishing of a going concern had long since been incurred. The present company and its predecessors had long carried on business in the city of Des Moines, under other ordinances, and at higher rates than the ordinance in question established. For aught that appears in this record, these expenses may have been already compensated in rates charged and collected under former ordinances." (238 U. S. 165-166)

This going concern element must represent investment, as distinguished from losses resulting from lack of income in the early years of the enterprise. *Galveston Electric Co.* v. *Galveston,* 258 U. S. 388; *Houston* v. *Southeastern Bell Tel. Co.,* 259 U. S. 318, 324-325.

By repeated decisions the Court has approved valuations in which the property had been valued as an assembled whole, with no separate appraisal of the going concern element. *Cedar Rapids Gas Co.* v. *Cedar Rapids,* 223 U. S. 655, 669; *Des Moines Gas Co.* v. *Des Moines,* 238 U. S. 153, 164, 165; *Los Angeles Gas and Electric Co.* v. *Railroad Commission,* 289 U. S. 287, 313-317; *St. Joseph Stockyards Co.* v. *United States,* 298 U. S. 38, 62-64; *Driscoll* v. *Edison Light and Power Co.,* 307 U. S. 104, 117.

The Commission, in the case now before this Court, had before it much evidence in addition to the evidence relating to reproduction cost, prospective additions, the $8,500,000 item, and working capital. This other evidence included the original cost of the properties,—shown to be only $60,952,279 (R. 3937),—and the entire financial history of the company, which appears to have been highly profitable. The Commission might well have found that whatever investments were made in the establishment of the business, if any, had been more than recouped by later profits in excess of a fair return.

The Commission considered the property as an assembled whole, and, upon all of the evidence before it, reached the conclusion that an amount equal to the reproduction cost claimed by the companies, plus the amount which they claimed to be the value of their gas reserves, plus the amount which they estimated would be invested for additions and betterments prior to December 31, 1942, plus the full amount of working capital which they claimed to be necessary, would make the maximum amount which could justly be used as a rate base, upon which to compute rates.

That the Commission did not limit its consideration to reproduction cost of plant, value of gas reserves, prospective additions and betterments and working capital is clear from what the Commission said in its opinion, which may be quoted as follows:

> "The companies' claim of $8,500,000 for going concern value must be disallowed. The amount obviously is an arbitrary claim, not supported by substantial evidence warranting its allowance. Its allowance would mean the acceptance of a deceptive fiction, resulting in an unfair imposition upon consumers. We are convinced that we are allowing in our rate base more than an adequate amount to cover all elements of value.
>
> "In disposing of the motion for interim order, we are accepting at this time the companies' estimates of

Reproduction Cost New of Physical Properties (exclusive of Gas Reserves)	$56,302,250
Value of Gas Reserves	13,334,775
Capital additions for the period June 1, 1939 to December 31, 1942	3,808,399
Working capital	975,000
Total Rate Base	$74,420,424

> The foregoing amount allowed as a rate base may be compared with book cost of properties, plus working capital of $975,000, as of December 31, 1939, totalling $60,952,279, and therefrom it is clearly disclosed that the rate base presently allowed herein is liberal. This appears especially true when the period of construction is taken into consideration." (R. 3936, 3937)

In determining the import of what the Commission said, it is important to consider the situation with which the Commission was confronted. The gas companies had completed their evidence in chief, concerning their properties and business. Their experts had testified as to their estimates of the reproduction cost of the plant properties. Other witnesses presented by them had testified as to the present market value of the gas reserves used in the business. None of these witnesses had been cross-examined. No rebuttal evidence had been presented.

That the estimates, so made and testified to, were in no respect excessive was scarcely to be expected. Nevertheless, the complaining State commission was before the Commission upon a motion, in which counsel for the Commission joined, asking that those estimates be accepted as entirely accurate, for the purpose of making an immediate decision upon the record, as to the reasonableness of the companies' rates.

Upon consideration of the entire record, it was manifest that, even if the evidence just referred to should be treated as correct, as to the matters to which it related, no rate base could be found which would justify the rates being currently charged.

It was under such circumstances that the Commission said:

> "For the purpose only of disposing of the problem presented by the motion before us, we reluctantly accept the companies' estimate of reproduction cost, their claimed present value of gas reserves, and also their claim for working capital." (R. 3936)

It is not necessary to point out that the evidence thus "accepted" was not evidence as to the amount of the rate base value. It was the Commission's function to fix that value. The witnesses were testifying as to various evidentiary facts. Some testified as to what it would cost to reproduce certain properties,—not as to their value at all. Other witnesses testified as to the present market value of the companies' gas reserves, as gas properties.

For the purpose stated, the Commission accepted the evidence of those witnesses as correctly stating the facts as to which they testified.

The companies' experts had also testified that $8,500,000 ought to be included in the rate base value on account of intangible elements. The nature of this claim, and the manner in which the estimate was made were stated at length in the brief filed for the Federal Power Commission and Illinois Commerce Commission at pages 39-54.

The Commission considered the evidence relating to the $8,500,000 item, and found it not entitled to weight. The estimates which the Commission had accepted as to reproduction cost included not alone the bare material and labor costs but other allowances, which were described by one of the witnesses as follows:

> "The general overheads which we have included in our report consist of engineering and superintendence, organization and law expenditures during construction, preliminary operations, and interest during construction.
>
> "By 'preliminary operations' is meant the expense of tuning up the system and placing it in a position to operate, together with the necessary costs of carrying

such portions of the investment as must be purchased at the start throughout the construction period * * *" (R. 1224)

In *Des Moines Gas Co.* v. *Des Moines,* 238 U. S. 153, 171, the Court specifically held that when allowances for items of the character mentioned had been included the Court could not say that the element of going value had not been given the consideration it deserved.

The Commission also considered the original cost of the property above stated, $60,952,279, and the period of construction, and was convinced that if $74,420,424 should be taken as the rate base, it would be "more than an adequate amount to cover all elements of value"; and that the addition of the $8,500,000 item would result in an "unfair imposition upon the consumers," in the rates thereafter to be fixed by the Illinois Commission.

The decision of the Court in *Railroad Commission* v. *Pacific Gas and Electric Co.,* 302 U. S. 388, hereinbefore referred to, conclusively establishes the propriety of the Commission's procedure in valuing the property as an assembled whole, upon the consideration of the original cost and such other evidence as was before it, disregarding wholly the evidence of the experts as to the $8,500,000 item, which it found not substantially supported.

The gas companies are attempting to secure in their rate base the inclusion of an allowance on account of an element which represents no investment by them.

What the gas companies are attempting to do here is what utilities customarily undertake to do when their properties are valued for rate purposes. They are attempting to secure the inclusion of an item which is fictitious, in the sense that it represents no investment made by the utilities.

They refuse to recognize the wide distinction between fair value for rate purposes and exchange value. Some justification for this may be found in the fact that the Courts have not always appeared to make this distinction. Nevertheless, the decisions of this Court, to which we have referred, establish the distinction.

In the determination of exchange value, the going concern element must, of course, always be given weight. The business attached to any operating property is one of the most important elements in determining what it will earn, and its exchange value. The cases which we have cited, however establish that such going concern element is not properly to be given any weight whatever in determining fair value for rate purposes, unless it is shown to represent unrecouped investment by the utility. It is because allowance for going concern depends upon proof of investment unrecouped that the Court said in *Houston* v. *Southwestern Bell Tel. Co.*, 259 U. S. 318, 325:

> "Whether going-concern value should be considered and allowed at all in determining the base for rate-making, and, if allowed, what the amount of it should be depends upon the financial history of the Company."

Utilities, of course, would gain tremendously if they could induce the Courts to lay down a formula under which a regulatory commission would be compelled to fix the rate base of a utility by first determining the cost of reproducing the physical assets of the utility, conceived of as not possessing any business, but as prudently constructed in the expectation of obtaining business sufficient to utilize such property, in its full extent, and then by adding to such reproduction cost an estimated cost for securing the business which the utility, at the time of the valuation, is shown to be doing.

Inasmuch as the business which a utility is doing at any given time ordinarily represents no investment by the utility, but has been attached in the ordinary course of business, the cost of attachment having been paid out of operating expenses, that method of valuing utility properties would be eminently satisfactory to the utilities. This Court, however, has never laid down that formula.

Notwithstanding the decisions by this Court, to which we have made reference in this brief, utilities, with insistence and with great ingenuity, persist in the attempt to convince the commissions that every utility in successful operation possesses a going concern element of value, for which an allowance must be made in addition to the full cost of physical properties. The inclusion of such an allowance is claimed as a constitutional right, without proof that it represents any unrecouped investment.

We maintain that the law can not entitle utilities to such an allowance, unless there lies hidden in the Constitution a provision which makes the owners of a public service properties a favored class, entitled, at the expense of the public, to reap where they have not sown, by enjoying a fair return *and something more,* the excess being an increment which accrues, without addition by the owner, through the mere increased need of the public for utility service, and the consequent growth of the business attached.

In this case the gas companies, at pages 87-88 of their brief, make complaint of the regulatory commissions, because of their refusal to allow utility claims for going concern value without proof of investments supporting the same. In concluding their complaint, they say,

> "We submit that the time has come when this issue should be met by the regulatory bodies, and met squarely. If the regulatory bodies are determined to refuse the allowance of going concern value, uniformly upheld by the courts for many years, they should be required to do so candidly, so that the right of review in the courts cannot be circumvented. Let us have an end of this ruse of denying such an allowance and then seeking to cover up the denial under the pretense that all elements of value were considered in arriving at the proper rate base and the amount to be amortized."

We take this to be an adjuration of the Court to do something to clarify the situation. We join with counsel for the gas companies in considering that clarification of the situation is necessary, and join them in asking for it. We do not, however, think that the clarification is necessary for the purpose of bringing the regulatory commissions of the country to an observance of the constitutional rights of utilities. Their anxiety to observe those rights has been evidenced by their attempts to conform to the supposed requirements of the so-called *Smyth* v. *Ames* rule. Our view is that a clarification is necessary for the purpose of enabling such commissions, with confidence, to apply the rule announced in *Smyth* v. *Ames*, according to its original intent, as reestablished by the opinion in the *Pacific Gas and Electric Co.* case.

We ask the Court to make it clear that a rate regulatory commission may make its determination of the rate base without any attempt to determine the reproduction cost of properties, unless the evidence before the commission is such as to show that justice requires such cost to be estimated and considered in fixing the rate base.

In its opinion in *Smyth* v. *Ames*, this Court, in its enumeration of elements to be considered in determining fair value, mentioned "the amount and market value of its bonds and stock." That element, however, has since been recognized to be of such doubtful aid in determining a just rate base that it is now seldom mentioned by commissions or courts.

While reproduction cost is undoubtedly much better evidence of the amount upon which a utility should justly be permitted to earn a return than the cost and market value of its bonds and stock, it is nevertheless, true that the opportunities which the making of hypothetical reproduction cost estimates afford for the inclusion of items of cost never, in fact, incurred are such that such estimates are often not dependable evidence of fair value.

Furthermore, the delays incident to the preparation and presentation of such estimates are a serious handicap to effective regulation of utility enterprises. In addition, the costs of making physical valuations upon a reproduction cost basis run into great amounts. Such costs, when incurred by utilities, are loaded back upon the public in increased operating expenses; but this is not the worst feature of the situation. The worst feature is found in the fact that regulatory commissions, especially the regulatory commissions of the smaller states, are not supplied with funds to meet the corps of highly paid so-called valuation experts, who are employed to prepare reproduction cost estimates, and to present the same before commissions and courts. Individual rate payers do not have a sufficient stake in the result of rate proceedings to assume such costs. The result is a one-sided struggle, with a resulting record, finally brought into court, with respect to which the Court may say: "This evidence of reproduction cost, offered by the utility, greatly exceeding the fair value found by the Commission, is practically uncontroverted."

It ought not to lie within the power of a utility to compel a regulatory commission to choose between expending large sums of public money to make reproduction cost estimates (which the commission knows to be not necessary for a just appraisal), or to allow a one-sided record to be made by the utility, at the expense of the rate payers, in which professional, so-called experts will present evidence of valuations which will consume months of time in the presentation, but will, when presented, be of no aid to the commission in reaching its determination.

If it is the judgment of the commission that estimates of reproduction cost will, in fact, be less dependable than original cost, as an aid in the determination of a proper rate base, why should the commission be compelled to consume months or years in either making or receiving such estimates? If, after the record is made, the commission may exercise its judgment to attribute controlling weight to original cost, and to disregard reproduction cost estimates,—as it may under the *Pacific Gas and Electric Co.* opinion—may it not use its judgment *before the estimates are made,* and say to the utility: "Unless facts are presented to us which show that a just determination of the rate base can not be made without a determination of the reproduction cost, we will not make such a determination. It is our present judgment that the evidence of original cost, which can be placed before us, will be a better indication of value for rate purposes than reproduction cost. Therefore, we will not receive reproduction cost estimates."

If the Court will make such a pronouncement, it will protect the rights of all parties. It will save vast amounts of money now being wasted in the preparation and presentation of such estimates, and it will enable the regulatory commissions of the country to perform their rate making function more effectively, because they will be enabled to avoid the expense and the interminable delays which are inevitable, when utilities may demand the right to make and present reproduction cost appraisals.

The right of utilities to judicial protection against confiscation would not be jeopardized by such a pronouncement, since a utility always could come into court upon a claim of confiscation. When the facts are such as to make necessary a determination of the reproduction cost to avoid confiscation, the Court can act, if such determination is denied by the regulatory commission. For example, if we should come into a period of extreme inflation, when a rate base equal in dollars only to the original cost incurred prior to the period of inflation would be manifestly unjust, the commission would adopt means to make the rate base reflect the decreased value of the dollar, or it would permit reproduction cost estimates to be shown. If it failed to do this, the Court, upon review could grant relief.

Such a pronouncement as we are suggesting would restore to the commission the right to exercise judgment, which the court intended to preserve under its opinion in the *Smyth* v. *Ames case.*

The rule laid down in that case,—if it should be termed a rule,—was a judgment rule. It enumerated facts which were proper for consideration, but as we have pointed out before, it declared that the weight to be given to those facts should be determined by the valuing tribunal (subject, of course, to such review by the courts as the Constitution assures). Ever since the decision of the case, however, those representing public service enterprises have sought to procure the extension of judicial control to such an extent as to rob the regulatory agencies of the opportunity to exercise judgment. Such attempts, at times, have seemed perilously near to success. The judgments of the courts have not been consistent. Nevertheless, the Court has steadfastly refused the promulgation of a valuation formula, and has preserved the judgment principle, although circumscribing it unhappily at times.

In the *Pacific Gas and Electric Co. case* this Court restored the rule. What is now needed is a declaration which shall make clear the full import of that decision, so that a commission may exercise its judgment as to whether the rate base ought justly to be determined upon consideration solely of original cost evidence, or of reproduction cost evidence, or of both; and so that, when it has determined that either class of evidence will not be helpful, it may refuse to receive the same.

As an aid to the understanding of the true intent of the opinion in *Smyth* v. *Ames,* it is useful to consider the situation with which the case dealt.

Rates prescribed by a Nebraska statute were contested by the Receiver for the Union Pacific Railroad. That road was built during and immediately following the Civil War, when prices of both labor and materials were abnormally high. The carrier claimed that the capitalization of the road, which it treated as representing the original investment therein, must be taken as the base, while the State of Nebraska, speaking through William Jennings Bryan, argued in favor of the cost of reproduction.

The court sought to enunciate a rule which would protect the public against unduly high rates (such as it evidently felt might result in some cases from recognizing the original investment as the controlling factor) but which would, nevertheless, assure justice to the investors.

Original cost as a basis, it had been pointed out by Justice Brewer in the lower court, might be unjust to the public because representing funds dishonestly or unwisely spent.

Reproduction cost might be unjust to the carrier because not reflecting honest investment prudently made. And so, in the search for a rule which would fit the case then before the court, and future cases also, doing justice alike to the public and to investors, the fair value rule was announced. It was not intended as a rigid rule which should deprive legislatures and commissions of the right to make rates upon considerations of equity and fair realing. It was intended as a rule which the courts might apply, in particular cases, to prevent confiscation through the enforcement of rates manifestly unjust, in the light of investments made and of all other relevant facts.

The hazards of the business and other special circumstances held by the court below to require inclusion, in the rate base, of the going value item claimed were properly to be considered only as bearing upon the fair rate of return.

The Court below held that a peculiar rule should apply to these gas companies, as to treatment both of the going concern element and of amortization, by reason of the speculative character of the natural gas business, of the fact that in the years when the business of these companies was developed it was unregulated, and of the further fact that the life of natural gas producing properties is rather short. Upon this point the Court said:

> "An allowance for going value is necessitated, due to facts peculiar to this case. In the ordinary public utility case, with no unusual fact or circumstance to affect a court's consideration of it, we assume that going value, as a properly includable item in the rate base, should and would be rejected. * * * Under such circumstances as are here shown, it seems that fairness necessitates the capitalization and inclusion of such skill—aye, and hazards—as legitimately as the cost of pipes. The natural gas was valueless as it lay in Texas wells, four thousand feet beneath the surface of the earth, over one thousand miles from Chicago. What gave it value? Not alone pipes to carry

> it, nor pumps to pump it. It was the courage of the investors, and their willingness to take a chance in a speculative venture, the vision to see and to forecast, the integrity of management, and the knowledge of geologists, etc., which gave to the enterprise its life; and the product of these combined factors made for a going value, which, in the realities of the business world, is justly recognized as part of the value of the investment."

We think it is plain that such elements as the difficulties, uncertainties, and hazards which may have attended the establishment of these enterprises are not elements which can properly be appraised and reflected in the rate base, but that such weight as the evidence shows should be attributed to them should have a bearing only upon the fair rate of return which the companies are permitted to earn.

The Court Below Erred in Holding that the Commission's Order Should Be Set Aside Because the Commission Computed the Annual Allowance for Amortization of Capital Assets on the Basis of the Entire Service Life of Such Assets.

The gas companies estimated that their gas reserves will be exhausted prior to the end of 1954. They also estimated that their aggregate investment prior to December 31, 1954, including that heretofore made and hereafter to be made, less salvage, will be $78,284,099. The Commission accepted both estimates.

The companies began operations on January 1, 1932. According to their estimate the total service life of their property will accordingly be twenty-three years. To cover depreciation and depletion they made a claim for an annual amortization allowance to cover the fair value of their property, less salvage, as estimated by them.

The Commission made an amortization allowance based upon the full estimated service life of the property, basing the computation of the same, however, upon the cost of the properties as estimated by the gas companies, instead of upon their claimed fair value.

The gas companies contend that the amount to be amortized is the fair value of their properties instead of their cost, and that the amortization period should be fourteen years and five months, that being the estimated service life remaining after the effective date of the Commission's rate order. The Court below sustained the companies' contentions.

The commission properly based its amortization allowance upon the entire life of the property to be amortized.

Terming depreciation "amortization" does not call for the application of any new legal principles in its determination or allowance. It is still the amount which should be charged to operating expenses, and collected in rates, in order that the integrity of the owner's investment may be preserved.

It was the duty of the gas companies to make sufficient charges for their service to cover the consumption of their capital while the service was being rendered. *Knoxville* v. *Knoxville Water Co.,* 212 U. S. 1, 13-14; *United R. and E. Co.* v. *West,* 280 U. S. 234, 253; *Lindheimer* v. *Illinois Bell Tel. Co.,* 292 U. S. 151, 167.

The sole justification for the inclusion of an allowance for depreciation in the rates involved is the fact that it is a part of the cost of the service covered by the rates. Such cost is in no way an incident of regulation. It was not non-existent prior to regulation, and is not larger after regulation by reason of the fact that regulation was not imposed from the date of the inception of the enterprise.

The gas companies base their claim for an amortization period less than the service life of the property upon the contention that until the Natural Gas Act was enacted their properties were private properties, that the enactment of the statute constituted a taking of the properties for public use, and that the amortization period used in determining their compensation thereafter must be limited to the life of the properties after such taking.

We have, earlier in this brief, argued that the gas properties here involved were public utility enterprises, which were at all times subject to public regulation. There was no taking of them for a public use. Their owners voluntarily devoted them to an enterprise which so affects the public interest that the public has a right to regulate them, whenever it deems regulation necessary.

A somewhat strange feature of the gas companies' contention, sustained by the Court below, is the fact that the period of amortization claimed is not even reckoned from the date of the enactment of the Natural Gas Act, when the gas companies maintain that their properties were taken, but is reckoned from the effective date of the Commission's rate reduction order.

It results from the ruling below, assuming the same to be sustained, that the public is penalized for not having earlier deprived the gas companies of complete liberty to charge whatever prices they pleased.

We refrain from making argument that the Constitution imposes no such rule.

The commission properly based its amortization allowance upon the cost of the property to be amortized.

The gas companies contend that the amount to be amortized is the present fair value of their property. They rely upon the opinion of this court in *United R. & E. v. West*, 280 U. S. 234, 253. That opinion unquestionably supports their claim. We submit that the opinion is unsound and should be overruled.

The opinion is unsound because it lays down a rule which it is impossible for regulatory commissions to adopt and follow.

Such commissions have been given authority to issue orders, and to require annual or periodic reports, so that the true financial results of the operations of regulated properties may be readily known to the commissions. Orders prescribing charges which may be made to operating expenses for depreciation must be, accordingly, orders which the regulated companies may understand and comply with, and they must be orders failure to comply with which may be readily observed and proved, so that the commissions can enforce the same.

It is not possible to frame an accounting order, to provide for the charging to operating expenses of depreciation of the various classes of utility property, to be determined upon the basis of the fluctuating cost of reproducing such property, which will enable the regulated companies to know the amounts which they are required to charge, or which can, as a practical matter, be enforced by the commission making the order.

For this reason, we believe it to be true that not a single regulatory commission, Federal or state, has undertaken to conform its order respecting depreciation accounting to the rule laid down in *United R. & E. Co.* v. *West.*

The infirmities of that rule were pointed out in the dissenting opinion of Mr. Justice Brandeis. The almost universal practice in the business world, as, pointed out in that opinion, is to base depreciation charges in accounting upon cost.

In determining the allowance to be made to operating expense in rate cases, it should be kept in mind that the rate proceeding is in no proper sense a determination of an amount to be paid to the owners for the taking of title to their property. It is, in fact, merely a determination, by public authority, of the amount which ought properly to be paid by the public for the services rendered by the enterprise, and covered by the rates to be fixed.

In determining that compensation, workable methods ought to be adopted which reasonably protect the owner and the public. If the practice is followed of charging the cost of property to operating expense in proportion to its consumption, year by year, in conformity with established business usage, the rights of both the public and the owner will be protected.

Under the *Smyth* v. *Ames* opinion, among the matters to be considered and attributed proper weight by a regulatory agency is "the sum required to meet operating expenses." To enable such expenses to be estimated for consideration, it must be open to the rate-making agencies to compute the same upon some rational and practicable basis. We maintain that if the rate-making agency, in the exercise of its judgment, adopts a method for determining the expense of annual depreciation which accords with the common practice of the business world, it is within the *Smyth* v. *Ames* rule, and that its determination can not properly be held arbitrary or otherwise unconstitutional by any reviewing Court.

If the commission's order was made after a due process of law hearing, the only question open for the consideration of the Court is whether the rates prescribed are confiscatory.

If the Commission's order was made after a due process of law hearing, the only question open for the consideration of the Court is whether the rates prescribed are confiscatory.

The principle applicable to the determination of that question has been clearly announced by this Court. The fixing of rates is a legislative act. In exercising its rate making function Congress, or a State legislature, has a broad discretion. It may exercise its authority directly or through an agency vested with jurisdiction to act, for that purpose, in accordance with the broad standard of justice and reasonableness, ordained by the legislative power.

The Court does not sit as a board of review, to substitute its judgment for the judgment of such agencies, when acting within the field assigned to them by the legislative power.

> "In such cases, the judicial inquiry into the facts goes no further than to ascertain whether there is evidence to support the findings, and the question of the weight of the evidence in determining issues of fact

> lies with the legislative agency acting within its statutory authority." *St. Joseph Stockyards Co.* v. *United States,* 298 U. S. 38, 50-51; *Los Angeles Gas and Elec. Corp.* v. *The Railroad Commission,* 289 U. S. 287, 304.

See also, as to the finality of determinations by administrative agencies, when acting under legislative grants of authority, *National Labor Relations Board* v. *Link Belt Co.,* U. S. , Jan. 6/41; *Gray, Director* v. *Receivers of Seaboard Airline Railway,* U. S. , December 15, 1941.

Congress has ordained that the rates of natural gas companies shall be just and reasonable, and has made the Commission its agency to determine what rates fall within that standard, and to enforce the same by orders. The Commission accordingly had jurisdiction to require unreasonably high rates to be reduced.

The gas companies contend, however, that, even though 6½ percent be held a nonconfiscatory rate of return, yet the evidence does not show their rates, which produce a return exceeding that percentage, to be unreasonable. Hence they maintain the Commission's order requiring reduction to be beyond its authority.

Assuming that there is, or may be, a difference between the level of rates which are barely nonconfiscatory and those which are reasonable, in a given case, the only question which this Court may consider, when reviewing a rate order of the Commission, is whether the rates challenged meet the constitutional standard. Whether, upon the record, it is reasonable that something more than a nonconfiscatory return be permitted, and if so how much more, are not questions for the Court. Those are questions of fact, which Congress has left to the Commission, and with respect to which it has made the Commission's finding conclusive, by the express provision of Section 19(b) of the Natural Gas Act.

In the record in this case, there was substantial evidence to support the Commission's findings as to rate base, fair rate of return, and reasonableness of rates. The Commission had before it evidence as to the original cost of properties, their reproduction cost, the "viewed depreciation," the claim of the gas companies as to the amount of annual amortization, the service life of properties, the length of time they had been in service, the financial results of such operation, a full financial history of the properties, and much evidence as to fair rate of return.

Counsel for the gas companies urge, however, that the percentage of return produced by rates upon the rate base value is no evidence whatever as to the reasonableness of the rates which produce that return, and that, hence, the Commission's findings that the existing rates are unjust and unreasonable is unsupported by substantial evidence, and that its order based upon that finding should be set aside on that ground.

We concede that the rate of return which is fair for a given enterprise may depend upon many circumstances, but when that rate has been determined, and applied to a properly determined rate base, it is a conclusive test as to the reasonableness of rates,—subject to the principle, always applicable, that the owner of a public service enterprise may never exact from the public more for any service [redacted] than such service is fairly worth. In this case the facts respecting the character of the enterprise, the difficulties and hazards alleged to be incident to its establishment were before the Commission, together with such other evidence bearing upon the question of a fair rate of return as the gas companies desired to offer. Upon the consideration of such evidence the Commission determined 6½ percent to be a fair rate of return upon the rate base fixed. This generous return may be contrasted with barely more than 5 percent, held to be a nonconfiscatory return for the company which performs a share of the very public service enterprise in which these gas companies are engaged by distributing to consumers the gas which they sell for resale. *Peoples Gas Light and Coke Co.* v. *Hart et al.*, 367 Ill. 435, 287 Ill. App. 379, 373, Ill. 31, 309 U. S. 634.

If the fair rate of return so fixed meets the constitutional standard the question whether it, at the same time, meets the standard of reasonableness required by the Natural Gas Act is foreclosed by the finding of the Commission.

The ruling in Cotting v Godard, even if admitted to be sound for application in any case, could not be applied in the administration of the natural gas act without defeating the purpose of the act.

Counsel for the gas companies cite *Cotting* v. *Godard*, 183 U. S. 79 and other cases claimed to support the principle that rates may not be found to be unreasonable except upon evidence that they exceed the value of the services covered by the same to those who receive such services.

Refraining from discussing the soundness of the ruling in *Cotting* v. *Godard*, for application in any case, and likewise from an examination of subsequent cases, whereby it might be demonstrated that the principle announced in that case has not been adopted and followed in this country, we point out that the rates of gas utilities, for gas sold for resale, can not possibly be tested, as to their reasonableness, by the value of the service to the purchasers, for the reason that such gas service, to the purchasing companies, are ordinarily worth whatever such companies are permitted to be charged. This is true because they do not themselves consume the gas supplied, but merely share in the joint enterprise of distributing the same to the public. The amounts which are permitted to be charged to them are operating expenses which are passed along to the public. So long as the charges exacted from them do not so increase the prices which they are compelled to charge the public that their business is restricted and rendered less profitable, it can not be said that the rates exacted from them exceed the value to them of the services they receive.

If the effect of the rates upon the distributing companies should be made the determining test as to the reasonableness of such rates, in the administration of the Natural Gas Act, the prime purpose of the Act, which is protection of the ultimate consumers, would be defeated.

The gas companies should refund to their customers the overcharges which have been made since the effective date of the commission's order.

Counsel for the gas companies have argued in their briefs that even if the judgment below shall be reversed, and the Commission's order shall be sustained, they should not be required to refund to their customers the excess rates which have been collected from the effective date of the Commission's order. Their argument is that if they shall be required to pay such excess to their customers it can not by any action of the State commissions be passed on to the ultimate consumers, and that such payment will result only in "transferring this money to the pockets of the distributing utilities, thus enriching the utilities at the expense of cross-petitioners, with no benefit whatever accruing to the ultimate consumers of the utilities, for the protection of whose interests the legislation was enacted."

To this argument it would seem a sufficient reply to suggest that if the rates the gas companies have been collecting were unreasonably high and, as to such excess, unlawful, under Section 4(a) of the Natural Gas Act, and violative of a valid order of the Commission, to permit them to retain the unlawful excess would leave in their hands what does not belong to them, and would result in their unjust enrichment.

The amount of this excess is great, amounting to more than $10,000 per day for all the time the gas companies have been able to delay the enforcement of the Commission's order. If such large amounts are permitted to accrue to gas companies as benefits resulting from the mere prolongation of litigation, wholly without legal justification, it may not be expected that any rate reduction order of the Commission will ever be permitted to become effective till litigation concerning it has been extended to the utmost limits which the ingenuity of counsel shall make possible, nor may any such litigation be regarded as unsuccessful, from the point of view of the gas companies, notwithstanding the final establishment of the validity of the orders litigated.

It ought not, however, to be assumed that the courts and regulatory commissions are impotent to deal with a situation such as arises when a natural gas company asserts its right to ask for a judicial review of an order of the Federal Power Commission reducing its rates. What has been done here, other than the action taken by the Court of Appeals in connection with the granting of an injunction, and the requirement of a bond intended to require a refund in the event the order now before the Court shall be sustained, does not appear from this record. There is, however, no reason for assuming that nothing has been done.

The Commission's order when made was presumptively lawful. Suspension of its enforcement by injunction was accompanied by the action taken by the Court to require the refund now under discussion. For aught that appears in this record, the State commission may have reflected the reduction ordered in reduced rates, prescribed for distributing companies. In such case, the distributing companies may have put the reductions into effect, or they, too, may have obtained stay orders, from the State courts, pending the determination of litigation involving the validity of such reduction orders, filing bonds in connection therewith conditioned to make appropriate refunds to ultimate consumers, if the rate reduction orders shall be finally sustained.

In any event this Court will not guess about what has happened since the Commission's order here involved was made. The excess which the gas companies have collected does not belong to them. As between them and their customers, from which they have unlawfully collected it, the excess belongs to those customers. Whether, as between such customers and the ultimate consumers, such excess belongs equitably to the ultimate consumers, and if so, what, if anything, can be done to secure the enjoyment of it by them, are questions not before this Court in these proceedings.

CONCLUSION.

Counsel for the gas companies in their brief have argued various other alleged grounds of illegality of the Commission's order, not touched upon in this brief, which we believe to be groundless. As to those, however, there is nothing which we desire to urge additional to what has already been said in the brief on behalf of the Federal Power Commission and the Illinois Commerce Commission, heretofore filed.

Respectfully submitted on behalf of the National Association of Railroad and Utilities Commissioners,

JOHN E. BENTON,
General Solicitor of said Association.

January 12, 1942

SUPREME COURT OF THE UNITED STATES.

Nos. 265, 268.—October Term, 1941.

Federal Power Commission and Illinois Commerce Commission, Petitioners,
265 *vs.*
Natural Gas Pipeline Company of America and Texoma Natural Gas Company.

Natural Gas Pipeline Company of America and Texoma Natural Gas Company, Petitioners,
268 *vs.*
Federal Power Commission and Illinois Commerce Commission.

On Writs of Certiorari to the United States Circuit Court of Appeals for the Seventh Circuit.

[March 16, 1942.]

Mr. Chief Justice Stone delivered the opinion of the Court.

This is a rate case involving numerous questions which arise out of the Federal Power Commission's regulation, under §§ 5(a) and 13 of the Natural Gas Act of 1938, 52 Stat. 821, 15 U. S. C. § 717, of the rates to be charged for the sale of natural gas by cross-petitioners, Natural Gas Pipeline Company of America and Texoma Natural Gas Company.

The two companies are engaged in business as a single enterprise. They produce natural gas from their own reserves in the Panhandle gas fields in Texas, and purchase gas produced there by others. They transport the gas by their own pipeline in interstate commerce to Illinois, where they sell the bulk of it at wholesale to utilities, which distribute and sell it for domestic, commercial and industrial uses.

The companies began operations in 1932 with a capital structure of $60,000,000 of six per cent bonds, later increased by $999,000, and $[illegible]500,000 of common stock, of which $500,000 is stock of the Texoma Company, a non-profit corporation paying no dividends on its stock. During the first seven years of operation, beginning January 1, 1932, and extending through 1938, the companies charged ~~to~~ against gross income various depreciation and depletion deductions aggregating $13,077,488,[1] and in addition charged $6,481,322 for "retirements" of property. In that period they paid dividends amounting in all to $9,150,000. Although there were book deficits in earnings for the first two years, the total "net profit" available for dividends and surplus after payment of interest on the bonds was $8,224,436,[2] or an annual average of $1,174,919, which is 33.6% per annum on the $3,500,000 stock. The earnings available during the period for return on the capital investment of both stockholders and bondholders — after taking out of income $19,558,810 for depreciation, depletion and retirements—totalled $34,040,883; this makes an average of $4,862,983 annually, which is about 8% on the book figures for investment undepreciated, or 8.8% after deducting from investment the average depreciation and depletion reserves actually charged to earnings by the companies.[3] At the time of the hearing, over one-fourth of the bonds issued had been retired out of earnings.

On complaint of the Illinois Commerce Commission, and on its own motion, the Power Comission began separate investigations of the companies' rates. These proceedings were consolidated and after extensive hearings the Commission, for the purpose of issuing an interim order, accepted the companies' statement that the book cost of their property existing at the end of 1938 was $60,172,843, including working capital of $975,000. Likewise for the purpose of the order, it accepted the companies' estimate that the value of all physical property—calculated at reproduction cost new (except for gas reserves taken on the companies' statement to have a present value of $13,334,775)—was $74,420,424, which the Commission adopted as the rate base. It took the companies' own estimate of twenty-three years ending in 1954 as the life of the business, and for the amortization base used their cost figure of $78,284,009 for the total past and estimated future investment after deduction of estimated salvage. It calculated the "annual amortization expense" on that amount for the twenty-three year period, at a 6½% sinking fund interest rate, as $1,557,852, which it allowed.

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[1] These charges against income are slightly in excess of the accumulated reserves for depreciation and depletion—$12,557,892—shown by the books at the end of 1938. The excess of $519,596 is apparently due to the fact that during the period $7,000,918 of property, on the basis of book cost, was retired, while the annual retirement charges had aggregated only $6,481,322. The balance of the retirements, $519,596, apparently had been charged to the depreciation and depletion accounts.

[2] This includes a negligible item, "non-operating income", which for the seven-year period came to only $194,600.

[3] The book figures (which are on a cost basis) for invested capital average slightly under $61,000,000 if working capital is included. The depreciation and depletion reserves are taken from the accounts for which the aggregate figure, $12,557,892, is given in note 1, *supra.*

The Commission also accepted, for the purpose of its interim order, the companies' estimate of prospective income available for amortization and return for the period 1939 to 1942 inclusive, as averaging $9,511,454 per annum. But making allowance for higher income tax rates under the Revenue Act of 1940, it found that the income available for amortization and return would be decreased to $9,362,032. It concluded that the companies' estimate of return, less the amortization allowance, ($9,362,032 less $1,557,852), —or $7,804,180—exceeded the fair return, $4,837,328 (which is 6½% of the rate base of $74,420,424), by $2,966,852, which amount was available for reduction of net revenues. Taking into account the decrease of $783,909 in federal income taxes which would result from such a decline in revenues, the Commission decided there was a total of $3,750,000 annually available for reduction of rates. It found the existing rates were "unjust, unreasonable and excessive", and made its interim order directing the companies to file a new schedule of rates and charges effective after September 1, 1940, which would bring about an annual reduction of $3,750,000 in operating revenues. The order also provided that the record should "remain open" for such further proceedings as the Commission may deem necessary or desirable.

On the companies' petition for review of the order pursuant to § 19(b) of the Act, the Court of Appeals for the Seventh Circuit, 120 F. 2d 625, upheld the validity of the rate regulation provisions of the Act, and the Commission's authority under the statute to issue the interim order directing reduction of the rates and requiring respondents to file new schedules reflecting that reduction. But the court vacated the Commission's order on the sole grounds that "going concern value" to the extent of $8,500,000 should have been included in the rate base, and that the amortization period for the entire property, instead of the full twenty-three year estimated life of the business taken by the Commission, should have been dated from the passage of the Act or the time of the Commission's order.

We granted certiorari, 314 U. S. —, because of the novelty and importance of the questions presented upon the Commission's petition challenging the grounds of reversal below, and on the companies' cross petition assailing the constitutionality of the Act, the authority of the Commission to make the interim order, the prescribed 6½% return, the computation of the amortization allowance on the same rate of interest as the fair rate of return, and other features of the Commission's order presently to be discussed.

The Natural Gas Act declares that "the business of transporting and selling natural gas for ultimate distribution to the public is affected with a public interest", and that federal regulation of interstate commerce in natural gas "is necessary in the public interest". § 1(a). The Act directs that all rates and charges in connection with the transportation or sale of natural gas, subject to the jurisdiction of the Commission, shall be "just and reasonable," and declares to be unlawful any rate or charge which is not just and reasonable. § 4(a). By § 5 the Commission, on its own motion or the complaint of a state, municipality, state commission or gas distributing company, is empowered to investigate the rates charged by any natural gas company in connection with any transportation or sale of any natural gas subject to the jurisdiction of the Commission, and after a hearing to determine just and reasonable rates.

Constitutionality of the Act. The argument that the provisions of the statute applied in this case are unconstitutional on their face is without merit. The sale of natural gas originating in one state and its transportation and delivery to distributors in any other state constitutes interstate commerce, which is subject to regulation by Congress. *Illinois Natural Gas Co. v. Central Illinois Pub. Serv. Co.*, 314 U. S. —. It is no objection to the exercise of the power of Congress that it is attended by the same incidents which attend the exercise of the police power of a state. The authority of Congress to regulate the prices of commodities in interstate commerce is at least as great under the Fifth Amendment as is that of the states under the Fourteenth to regulate the prices of commodities in intrastate commerce. Compare *United States* v. *Carolene Products Co.*, 304 U. S. 144; *United States* v. *Rock Royal Co-op.*, 307 U. S. 533, 569; *Sunshine Coal Co.* v. *Adkins*, 310 U. S. 381, 393-97; *United States* v. *Darby*, 312 U. S. 100, with *Nebbia* v. *New York*, 291 U. S. 502; *Olsen* v. *Nebraska*, 313 U. S. 236.

The price of gas distributed through pipelines for public consumption has been too long and consistently recognized as a proper subject of regulation under the Fourteenth Amendment to admit of doubts concerning the propriety of like regulation under the Fifth. *Willcox* v. *Consolidated Gas Co.,* 212 U. S. 19; *Cedar Rapids Gas Co.* v. *Cedar Rapids,* 223 U. S. 655; *Railroad Commission* v. *Pacific Gas Co.,* 302 U. S. 388. And the fact that the distribution here involved is by wholesale rather than retail sales presents no differences of significance to the protection of the public interest which is the object of price regulation. Cf. *Illinois Nat. Gas Co.* v. *Central Illinois Pub. Serv. Co., supra.* The business of cross-petitioners is not any the less subject to regulation now because the Government has not seen fit to regulate it in the past. Cf. *Nebbia* v. *New York, supra,* 538-39.

Validity of the Interim Order. The companies contend that the Federal Power Commission has no authority under the Act to enter the type of order now under review, and that the order is invalid because the Commission did not itself fix reasonable rates as required by the Act but instead merely directed the companies to file a new rate schedule which would result in the prescribed reduction in operating revenues. Section 5(a) of the Act provides: "Whenever the Commission, after a hearing . . . , shall find that any rate . . . is unjust, unreasonable, unduly discriminatory, or preferential, the Commission shall determine the just and reasonable rate . . . and shall fix the same by order". It also contains a proviso that the Commission shall not have power to order an increase of rates on file unless in accordance with a new schedule filed by the company. But without mention of new rate schedules the proviso adds that the Commission "may order a decrease where existing rates are unjust . . . or are not the lowest reasonable rates". And § 16 gives the Commission "power to . . . issue . . . such orders . . . as it may find necessary or appropriate to carry out the provisions of this Act".

The first prerequisite to an order by the Commission is that it shall be preceded by a hearing and findings. In this case, while the proceedings were not ended by the interim order, the companies had full opportunity to offer all their evidence both direct and in rebuttal, and full opportunity to cross-examine every witness offered by both the Federal Power Commission and the Illinois Commerce Commission. All the evidence tendered was received and considered by the Commission, and before the interim order was entered counsel for the companies stated to the Commission that they had concluded the direct testimony in support of their case. So far as the order is supported by the evidence the companies cannot complain that they were denied a full hearing because they had not been able to examine on redirect their own witnesses who had not been cross-examined, or because they had no opportunity to cross-examine or rebut witnesses who were not offered by the Commission. The right to a full hearing before any tribunal does not include the right to challenge or rely on evidence not offered or considered. See *New England Divisions Case*, 261 U. S. 184, 201.

The establishment of a rate for a regulated industry often involves two steps of different character, one of which may appropriately precede the other. The first is the adjustment of the general revenue level to the demands of a fair return. The second is the adjustment of a rate schedule conforming to that level so as to eliminate discriminations and unfairness from its details. Such an orderly procedure for establishing the rates prescribed by the Act would seem to be an appropriate means of carrying out its provisions. Section 5 of the Act was modelled on the provisions of the Transportation Act, 49 U. S. C. §§ 13, 15, which have been interpreted as giving to the Interstate Commerce Commission authority to establish a general level of rates and divisions in advance of a schedule to be filed by the carriers. See *New England Divisions Case, supra*, 201-02, 203, n. 21. Cf. Sharfman, The Interstate Commerce Commission, vol. 2, pp. 381-82; *Driscoll* v. *Edison Co.*, 307 U. S. 104.

We think that the proviso of § 5 already quoted contemplates that, when existing rates are found to be unjust and unreasonable, an order decreasing revenues may be filed without establishing a specific schedule of rates. Since such an order may be in the interests of the public, as well as the regulated company, and is in harmony with the purposes of the Act, it is one which the Commission has discretion to make under § 16 as appropriate to carry out the provisions of the Act.

The Scope of Judicial Review of Rates Prescribed by the Commission. The ultimate question for our decision is whether the rate prescribed by the Commission is too low. The statute declares, § 4(a), that the rates of natural gas companies subject to the Act "shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful". Section 5(a) directs the Commission to "determine the just and reasonable rate" to be observed and requires the Commission to "fix the same by order". It also provides that "the Commission may order a decrease where existing rates are unjust . . . unlawful, or are not the lowest reasonable rates". On review of the Commission's orders by a Circuit Court of Appeals as authorized by § 19(b), the Commission's findings of fact "if supported by substantial evidence, shall be conclusive".

By long standing usage in the field of rate regulation the "lowest reasonable rate" is one which is not confiscatory in the constitutional sense. *Los Angeles Gas Co.* v. *Railroad Commission,* 289 U. S. 287, 305; *Railroad Commission* v. *Pacific Gas Co., supra,* 394, 395; *Denver Stock Yard Co.* v. *United States,* 304 U. S. 470, 475. Assuming that there is a zone of reasonableness within which the Commission is free to fix a rate varying in amount and higher than a confiscatory rate, see *Benton* v. *Belt Line Ry.,* 268 U. S. 413, 422, 423; *Columbus Gas Co. v. Commission,* 292 U. S. 398, 414; *Denver Stock Yard Co.* v. *United States, supra,* 483, the Commission is also free under § 5(a) to decrease any rate which is not the "lowest reasonable rate". It follows that the Congressional standard prescribed by this statute coincides with that of the Constitution, and that the courts are without authority under the statute to set aside as too low any "reasonable rate" adopted by the Commission which is consistent with constitutional requirements.

The Constitution does not bind rate-making bodies to the service of any single formula or combination of formulas. Agencies to whom this legislative power has been delegated are free, within the ambit of their statutory authority, to make the pragmatic adjustments which may be called for by particular circumstances. Once a fair hearing has been given, proper findings made and other statutory requirements satisfied, the courts cannot intervene in the absence of a clear showing that the limits of due process have been overstepped. If the Commission's order, as applied to the facts before it and viewed in its entirety, produces no arbitrary result, our inquiry is at an end.

Going Concern Value. The companies insist that their business has a going concern value of $8,500,000 which the Commission did not include in the rate base and on which they are entitled to earn a return. In establishing the rate base for the purposes of the interim order the Commission "reluctantly" accepted the estimates of value, presented by the companies' own witnesses, as follows:

Reproduction Cost New of Physical Properties (exclusive of Gas Reserves)	$56,302,250[4]
Value of Gas Reserves as of June 1, 1939	13,334,775
Capital Additions from June 1, 1939, to December 31, 1942	3,808,399[5]
Working Capital	975,000
Total Rate Base	$74,420,424

While no item for going concern value is separately stated in the rate base, the computation of cost new of physical equipment included—in addition to labor and cost of materials—large amounts for overhead, interest, taxes, administration, legal and supervisory charges, and expenses paid or incurred in assembling the plant as that of a going concern.

The Commission spoke of the rate base thus arrived at as "liberal" and as a "generous allowance". That the estimate of reproduction costs new is liberal is indicated by the circumstances that the companies' structures other than gas reserves were built in 1930-1931 at a time, as the record shows, of relatively high prices, and that their reproduction cost depreciated is greater than actual cost, which was about $50,000,000. And the allowed "present value" of leases as of June 1, 1939, $13,334,775, is approximately $4,000,000 more than book cost, even without taking into account a substantial reduction for depletion reserves of $1,152,854, which the companies had accrued on their own books by the end of 1938. The Commission declined to include going concern value as an additional item in the rate base.

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[4] The estimates submitted by the companies stated that there should be deducted from this figure for "viewed depreciation" $2,866,758. However, in setting a rate base for the interim order, the Commission did not make this conceded deduction—perhaps because it held, contrary to the companies' contention, that the properties should be amortized over the entire life of the business.

[5] The companies estimated that the cost of additional property, not including replacements, during the future life of the enterprise, subsequent to June 1, 1939, would be $9,145,083. On this basis, they claimed that there should be included in the rate base $6,046,286, which they said would be the estimated average investment. The Commission included in the rate base only $3,808,399, which was the companies' estimated outlay for capital additions through the end of 1942. This reduction does not appear to be challenged. In any event, the refusal to include in the rate base capital expenditures not yet made can not involve confiscation.

The companies urge, as the Court of Appeals held, that there are items of cost or expense incurred in the establishment and development of the business during the seven-year period prior to regulation which were not included in the companies' estimate of value accepted by the Commission and which, in view of the special characteristics of the business, should be capitalized and added to the rate base to the extent of $8,500,000 for going concern value. They include, in amounts not now material, the following: expenditures for securing new business; interest on money invested in non-productive plant capacity; taxes paid on non-productive capacity; fixed operating expenses attributable to non-productive capacity, and depreciation on non-productive capacity.[6] The companies' contentions with respect to all these items are predicated upon the limited life of the business, twenty-three years, and on testimony that in anticipation of its growth larger gas mains and facilities were constructed than were required during the earlier years of the business. The reproduction cost new of this excess of equipment is admittedly included in the rate base.

None of these items appears in the companies' capital account. With the possible exception of expenditures for securing new business, they are synthetic figures arrived at by estimating the amount of expense attributable to the current cost of maintenance of the excess capacity of the plant during periods when the excess capacity was not used. But the interest charges, taxes and other costs of maintaining this excess capacity during the period when not in use have not been capitalized by the companies on their books and so far as appears were paid from current earnings. The same is true of the expenditure for advertising and other expenses of acquiring new business.

The novel question is thus presented whether confiscation, proscribed by Congress as well as the Constitution, results from the exclusion from the rate base of the previous costs of maintaining excess plant capacity and of getting new business. The Commission gave full consideration to this contention. It said: "The companies' claim for $8,500,000 for 'going concern value must be disallowed. The amount obviously is an arbitrary claim, not supported by substantial evidence warranting its allowance. Its allowance would mean the acceptance of a deceptive fiction, resulting in an unfair imposition upon consumers. We are convinced that we are allowing in our rate base more than an adequate amount to cover all elements of value."

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[6] The item for depreciation on non-productive capacity amounting to $382,833 is obviously provided for in the Commission's allowance for depreciation. The value of the companies' entire plant, whether fully productive or not, is included in the rate base and, as will presently appear, provision was made by the Commission's order for its amortization on a cost basis from earnings.

There is no constitutional requirement that going concern value, even when it is an appropriate element to be included in a rate base, must be separately stated and appraised as such. This Court has often sustained valuations for rate purposes of a business assembled as a whole without separate appraisal of the going concern element. *Columbus Gas Co.* v. *Commission,* 292 U. S. 398, 411; *Dayton P. & L. Co.* v. *Commission,* 292 U. S. 290, 309; *Denver Stock Yard Co.* v. *United States, supra,* 478-80; *Driscoll* v. *Edison Co., supra,* 117. When that has been done the burden rests on the regulated company to show that this item has neither been adequately covered in the rate base nor recouped from prior earnings of the business. *Des Moines Gas Co.* v. *Des Moines,* 238 U. S. 153, 166.

The total value of the companies' plant, including equipment in excess of immediate needs when beginning business, has been included in the rate base adopted. If rightly included, as the Commission has assumed for purposes of the order, the companies would have been entitled to earn a fair return upon its value, had the business been regulated from the start. But it does not follow that the companies' property would be confiscated by denying to them the privilege of capitalizing the maintenance cost of excess plant capacity, which would allow them to earn a return and amortization allowance upon such costs during the entire life of the business. It is only on the assumption that excess capacity is a part of the utility's equipment used and useful in the regulated business, that it can be included as a part of the rate base on which a return may be earned. When so included the utility gets its return not from capitalizing the maintenance cost, but from current earnings by rates sufficient, having in view the character of the business, to secure a fair return upon the rate base provided the business is capable of earning it. But regulation does not insure that the business shall produce net revenues, nor does the Constitution require that the losses of the business in one year shall be restored from future earnings by the device of capitalizing the losses and adding them to the rate base on which a fair return and depreciation allowance is to be earned.

Galveston Electric Co. v. *Galveston*, 258 U. S. 388; *San Diego Land & Town Co.* v. *Jasper*, 189 U. S. 439, 446-47. The deficiency may not be thus added to the rate base for the obvious reason that the hazard that the property will not earn a profit remains on the company in the case of a regulated, as well as an unregulated business.

Here the companies, though unregulated, always treated their entire original investment, together with subsequent additions, as capital on which profit was to be earned. They charged the out-of-pocket cost of maintenance of plant, whether used to capacity or not, as operating expenses deductible from earnings before arriving at net profits. They have thus treated the items now sought to be capitalized in the rate base as operating expenses to be compensated from earnings, as in the case of regulated companies. The history of the first seven years of operation before regulation shows an average annual return,[7] after deduction of operating expenses, of approximately 8% on the undepreciated investment. This high return was earned during a period which included the severest depression in our history.

Whether there is going concern value in any case depends upon the financial history of the business. *Houston* v. *Southwestern Tel. Co.*, 259 U. S. 318, 325. This is peculiarly true of a business which derives its estimates of going concern value from a financial history preceding regulation. That history here discloses no basis for going concern value, both because the elements relied upon for that purpose could rightly be rejected as capital investment in the case of a regulated company, and because in the present case it does not appear that the items, which have never been treated as capital investment, have not been recouped during the unregulated period.

We cannot say that the Commission has deprived the companies of their property by refusing to permit them to earn for the future a fair return and amortization on the costs of maintenance of initial excess capacity—costs which the companies fail to show have not already been recouped from earnings before computing the substantial "net profits" earned during the first seven years. The items for advertising and acquiring new business have been treated in the same way by the companies and do not in the circumstances of this case stand on any different footing. Cf. *West Ohio Gas Co.* v. *Commission*, 294 U. S. 63, 72.

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[7] Besides $8,244,435 of "net profits", the companies paid out of gross income $32,294,030 as interest on the bonds.

The Amortization Base. The Commission took as the amortization base the sum of $78,284,009. This was made up of the companies' total investment, at the end of 1938, of $67,173,761 (without deduction of property retirements already made), plus estimated future capital additions through 1954, including replacements, amounting to $12,159,380,[8] less estimated salvage at the predicted end of the project in 1954. It is not questioned that the Commission's annual amortization allowance of $1,557,852, accumulated at the sinking fund interest rate of 6½% adopted by the order, will be sufficient in 1954 to restore the capital investment so computed.

The companies argue that the amortization base, computed on a basis of reproduction cost, should be $84,341,218[9] rather than cost plus estimated future capital additions. But the purpose of the amortization allowance and its justification is that it is a means of restoring from current earnings the amount of service capacity of the business consumed in each year. *Lindheimer* v. *Illinois Tel. Co.*, 292 U. S. 151, 167. When the property is devoted to a business which can exist for only a limited term, any scheme of amortization which will restore the capital investment at the end of the term involves no deprivation of property. Even though the reproduction cost of the property during the period may be more than its actual cost, this theoretical accretion to value represents no profit to the owner since the property dedicated to the business, save for its salvage value, is destined for the scrap-heap when the business ends. The Constitution does not require that the owner who embarks in a wasting-asset business of limited life shall receive at the end more than he has put into it. We need not now consider whether, as the Government urges, there can in no cir-

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[8] We do not intimate any approval of the inclusion in the amortization base of all the estimated future capital additions.

[9] The companies' proposed amortization base was made up of the following items:

Reproduction cost new, excluding gas reserves	$56,302,250
Viewed depreciation (deduct)	2,866,758
Value of gas reserves	13,334,775
Cost of additional property	9,145,083
Going concern value	8,500,000
Working capital	975,000
	$85,390,350
Less salvage	1,049,132
	$84,341,218

cumstances be a constitutional requirement that the amortization base be the reproduction value rather than the actual cost of the property devoted to a regulated business. Cf. *United Railways* v. *West,* 280 U. S. 234, 265. It is enough that here the business by hypothesis will end in 1954, and that the amortization base, computed at cost and including property already retired, will be completely restored by 1954 by the annual amortization allowances. As the Commission declared: "The amounts of amortization are recognized and treated as operating expenses. Operating expenses are stated on the basis of cost. . . . We refuse to make an allowance of amortization in excess of costs. To do so would not be the computation of a proper expense, but instead the allowance of additional profit over and above a fair return. Manifestly such an additional return would unjustly penalize consumers."

The Amortization Period. The court below held that, since the business was unregulated for the first seven years, the adoption by the Commission of the estimated twenty-three year life of the business as the amortization period involved a denial of due process. In view of the estimate by the Commission and the companies that the gas properties would be exhausted in about sixteen years from the date of the Act, the court thought, as the companies argue, that a rate of return would be confiscatory which would not provide, in addition to a fair return, an annual amortization allowance sufficient to restore the total investment over the final sixteen-year period. But this argument overlooks the fact that the depreciation of physical property attributed to use, and the obsolescence of the entire property attributable to lapse of time in the case of a business having a limited life, had been taking place during the seven years before regulation and that those items must be recouped if at all from earnings. Capital investment loss at the end of the life of a business can only be avoided by restoration of the investment from earnings, and is avoidable so far as is humanly possible only by an appropriate charge of amortization to earnings as they accrue.

Here there is no question but that the Commission's annual amortization allowance, if applied over the entire twenty-three year life of the business, is sufficient to restore the total capital investment at the end, or that earnings of the past and those estimated for the future together are sufficient to provide for the amortization allowance and a fair return, given an appropriate rate base and rate of return. Making that assumption we cannot say that adequate provision has not been made for restoration of the companies' investment from earnings and a fair return on the investment. Even though the companies were unregulated for seven years, earnings during that period were available and adequate for amortization. In fact the companies' charges to earnings, for depreciation, depletion and retirements, totalled $19,558,810, or an average of $2,794,115 per annum. This was in conformity with the established business practice, in the case of unregulated as well as regulated businesses, to make such a depreciation or amortization allowance chargeable annually to earnings as an operating expense in order to provide adequately for annual consumption of capital in the business. *Lindheimer* v. *Illinois Tel. Co., supra.*

The companies are not deprived of property by a requirement that they credit in the amortization account so much of the earnings received during the prior period as are appropriately allocable to it for amortization. Only by that method is it possible to determine the amount of earnings which may justly be required for amortization during the remaining life of the business.

Amortization Interest Rate. The annual amortization allowances of $1,557,852, if accumulated at a 6½% compound interest rate until the assumed exhaustion of the gas reserves in 1954, will be sufficient to restore the undepreciated total investment less the salvage value of the property. The companies urge that the interest rate should have been lower, say 2%, on the assumption that only some such lower rate would be earned by a hypothetical sinking fund to be created from the annual amortization allowances. But the argument ignores the fact that the amortization method adopted by the Commission contemplates not a sinking fund of segregated securities purchased with cash withdrawn from the business, but merely a sinking fund reserve charged to earnings and not distributable as ordinary dividends. Under this method there is no deduction of the amortization allowances from the rate base on which a fair return—6½% under the current interim order—is to be allowed during the life of the business.

The companies are thus allowed to earn in each year, in addition to the amortization allowance, 6½% on both the amortized and the unamortized portions of the base. If the amortization interest were computed at a 2% rate without deducting the amortized portion from the rate base, the companies would continue to receive a 6½% instead of only a 2% return on that portion of the investment. True, the method of amortization adopted means that the companies look to the earnings of the business for the hypothetical interest on amortization reserve. This it is argued may involve more business risk than a method of amortization contemplating the actual withdrawal from the business of the amortization allowances and their investment in segregated securities bearing a lower rate of interest. But here the 6½% rate of return allowed on the amortized portion of the rate base includes compensation for the business risk, and the risk is an incident of the business in which the companies have hazarded their capital and in which they propose to invest additional capital. The Commission declared it adopted this method to avoid the inequitable result which would follow if the companies were permitted to include in their charges to the public 6½% on the amortized portion of the base, while treating it as earning only 2%. The Commission's conclusion that this is an appropriate method is supported by the evidence, and in any case it does not appear that it has deprived or will deprive the companies of property.

Fair Rate of Return. The Commission found that "6½ per cent is a fair annual rate of return upon the rate base allowed", which it had characterized as "a generous allowance". The courts are required to accept the Commission's findings if they are supported by substantial evidence. § 19(b). We cannot say on this record that the Commission was bound to allow a higher rate.

The evidence shows that profits earned by individual industrial corporations declined from 11.3% on invested capital in 1929 to 5.1% in 1938. The profits of utility corporations declined during the same period from 7.2% to 5.1%. For railroad corporations the decline was from 6.4% to 2.3%. Interest rates were at a low level on all forms of investment and among the lowest that have ever existed. The securities of natural gas companies were sold at rates of return of from 3% to 6% with yields on most of their bond issues between 3% and 4%. The interest on large loans ranged from 2% to 3.25%.

The regulated business here seems exceptionally free from hazards which might otherwise call for special consideration in determining the fair rate of return. Substantially all its product is distributed in the metropolitan area of Chicago, a stable and growing market, through distributing companies which own 26%

of the investment of the Natural Gas Pipeline Company. Ninety per cent of its gas is taken under contract by the Chicago District Pipeline Company. The contract runs until 1946 or until 1951, at the option of the companies. Under it the District Company is bound to take, or at least pay for, 66-2/3% of the companies' gas, and performance is guaranteed by the three companies distributing the gas in Chicago.

The danger of early exhaustion of the gas field was fully taken into account in the estimate of its life and the companies' estimate was accepted. Provision for the complete amortization of the investment within that period affords a security to the investment which is lacking to those industries whose capital investments must be continued for an indefinite period. The companies' affiliation with the six large corporations which directly or indirectly own all the stock places them in a strong position for their future financing. The business is in the same position as other similar businesses with respect to increased taxation, inflation and costs of operation. Other factors such as credit risks, risks of technological changes, varying demands for product, relatively small labor requirements, and conversion of inventory into cash compare more favorably. After a full consideration of all of these factors and of expert testimony, the Commission concluded that the prescribed reduction in revenues was just and reasonable, and that the 6½% was a fair rate of return.

Disposition of Excess Charges Collected Since the Commission's Order. The Circuit Court of Appeals stayed the Commission's order pending appeal. The companies state that as a condition of the stay the court required them to give a bond in the sum of $1,000,000 conditioned upon their refund of excess charges to customers, in the event that the Commission's order should be sustained. The bond is not in the record and its precise terms are not before us.

The companies point out that substantially all the gas affected by the reduction in revenues is sold to wholesalers who distribute it for ultimate consumption. They argue that the purpose of the rate regulation is the protection of consumers, and that the purposes of the Act will not be effectuated by the refunds to wholesalers. They insist that such refunds, being the wholesalers' profits from past business, cannot be resorted to for reducing future rates to the consumers. Cf. *Knoxville* v. *Knoxville Water Co.*, 212 U. S. 1, 14; *Galveston Electric Co. v. Galveston*, *supra*, 395.

Of this contention it is enough to say that the question of the disposition of the excess charges is not before us for determination on the present record. Cf. *Morgan* v. *United States*, 304 U. S. 1, 26. Amounts collected in excess of the Commission's order are declared to be unlawful by § 4(a) of the Act. If there is any basis, either in the bond or the circumstances relied upon by the companies, for not compelling the companies to surrender these illegal exactions, it does not appear from the record.

We have considered but find it unnecessary to discuss other objections of lesser moment to the Commission's order. We sustain the validity of the order and reverse the judgment below.

Reversed.

Mr. Justice Black, Mr. Justice Douglas, and
Mr. Justice Murphy, concurring.

I.

We concur with the Court's judgment that the rate order of the Federal Power Commission, issued after a fair hearing upon findings of fact supported by substantial evidence, should have been sustained by the court below. But insofar as the Court assumes that, regardless of the terms of the statute, the due process clause of the Fifth Amendment grants it power to invalidate an order as unconstitutional because it finds the charges to be unreasonable, we are unable to join in the opinion just announced.

Rate making is a species of price fixing. In a recent series of cases, this Court has held that legislative price fixing is not prohibited by the due process clause.[1] We believe that in so holding, it has returned in part at least to the constitutional principles which prevailed for the first hundred years of our history. *Munn* v. *Illinois*, 94 U. S. 113; *Peik* v. *Chicago, etc. Railway Co.*, 94 U. S. 164. Cf. *McCart* v. *Indianapolis Water Co.*, 302 U. S. 419, 427-428.

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[1] Some of these cases arose under the Fifth, some under the Fourteenth Amendment. Nebbia v. New York, 291 U. S. 502 [state statute authorizing a milk control board to fix minimum and maximum retail prices for milk]; Mulford v. Smith, 307 U. S. 38 [federal statute imposing penalties on tobacco auction warehousemen for marketing tobacco in excess of prescribed quota]; United States v. Rock Royal Co-op., 307 U. S. 533 [federal statute authorizing Secretary of Agriculture to fix minimum prices to be paid producers for milk sold to dealers]; Sunshine Coal Co. v. Adkins, 310 U. S. 381 [federal statute

The *Munn* and *Peik* cases, decided in 1877, Justices Field and Strong dissenting, emphatically declared price fixing to be a constitutional prerogative of the legislative branch, not subject to judicial review or revision.

In 1886, four of the Justices who had voted with him in the *Munn* and *Peik* cases no longer being on the Court, Chief Justice Waite expressed views in an opinion of the Court which indicated a yielding in part to the doctrines previously set forth in Mr. Justice Field's dissenting opinions, although the decision, upholding a state regulatory statute, did not require him to reach this issue. See *Railroad Commission Cases*, 116 U. S. 307, 331. For an interesting discussion of the evolution of this change of position, see Swisher, Stephen J. Field, 372-392. By 1890, six Justices of the 1877 Court, including Chief Justice Waite, had been replaced by others. The new Court then clearly repudiated the opinion expressed for the Court by Chief Justice Waite in the *Munn* and *Peik* cases, in a holding which accorded with the views of Mr. Justice Field. *Chicago, &c. Railway Co.* v. *Minnesota,* 134 U. S. 418. Under those views, first embodied in a holding of this Court in 1890, "due process" means no less than "reasonableness judicially determined".[2] In accordance with this elastic meaning which, in the words of Mr. Justice Holmes, makes the sky the limit[3] of judicial power to declare legislative acts unconstitutional, the conclusions of judges, substituted for those of legislatures, become a broad and varying standard of constitutionality.[4] We shall not attempt now to set out at length the reasons for our belief that acceptance of such a meaning is historically unjustified and that it transfers to courts powers which, under the Constitution, belong to the legislative branch of government. But we feel that

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authorizing Bituminous Coal Commission to fix maximum and minimum prices for bituminous coal]; United States *v.* Darby, 312 U. S. 100 [federal statute fixing minimum wages (and maximum hours) for employees engaged in production of goods for interstate commerce]; Olsen *v.* Nebraska, 313 U. S. 236 [state statute fixing maximum compensation, to be collected by private employment agencies].

[2] See Polk Company *v.* Glover, 305 U. S. 5, 12-19. Cf. Chambers *v.* Florida, 309 U. S. 227, 235-238.

[3] "As the decisions now stand, I see hardly any limit but the sky to the invalidating of those rights if they happen to strike a majority of this Court as for any reason undesirable." Baldwin *v.* Missouri, 281 U. S. 586, 595.

[4] To hold that the Fourteenth Amendment was intended to and did provide protection from state invasions of the right of free speech and other clearly defined protections contained in the Bill of Rights, Drivers Union *v.* Meadowmoor Co., 312 U. S. 287, 301-302, is quite different from holding that "due

we must record our disagreement from an opinion which, although upholding the action of the Commission on these particular facts, nevertheless gives renewed vitality to a "constitutional" doctrine which we are convinced has no support in the Constitution.

The doctrine which makes of "due process" an unlimited grant to courts to approve or reject policies selected by legislatures in accordance with the judges' notion of reasonableness had its origin in connection with legislative attempts to fix the prices charged by public utilities. And in no field has it had more paralyzing effects.[5]

II.

We have here, to be sure, a statute which expressly provides for judicial review. Congress has provided in § 5 of the Natural Gas Act that the rates fixed by the Commission shall be "just and reasonable". The provision for judicial review states that the "finding of the Commission as to the facts, if supported by substantial evidence, shall be conclusive." § 19(b). But we are not satisfied that the opinion of the Court properly delimits the scope of that review under this Act. Furthermore, since this case starts a new chapter in the regulation of utility rates, we think it important to indicate more explicitly than has been done the freedom which the Commission has both under the Constitution and under this new statute. While the opinion of the Court erases much which has been written in rate cases during the last half century, we think this is an appropriate occasion to lay the ghost of *Smyth* v. *Ames,* 169 U. S. 466, which has haunted utility regulation since 1898. That is especially desirable lest the reference by the majority to "constitutional requirements" and to "the limits of due process" be deemed to perpetuate the fallacious "fair value" theory of rate making in the limited judicial review provided by the Act.

Smyth v. *Ames* held (pp. 546-547) that "the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction

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process", an historical expression relating to procedure, Chambers *v.* Florida, *supra,* confers a broad judicial power to invalidate all legislation which seems "unreasonable" to courts. In the one instance, courts proceeding within clearly marked constitutional boundaries seek to execute policies written into the Constitution; in the other they roam at will in the limitless area of their own beliefs as to reasonableness and actually select policies, a responsibility which the Constitution entrusts to the legislative representatives of the people.

[5] McCart *v.* Indianapolis Water Co., *supra.*

must be the fair value of the property being used by it for the convenience of the public. And in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property. What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience. On the other hand, what the public is entitled to demand is that no more be exacted from it for the use of a public highway than the services rendered by it are reasonably worth."

(1) This theory derives from principles of eminent domain. See Mr. Justice Brewer, *Ames* v. *Union Pacific Ry. Co.*, 64 Fed. 165, 177; *West* v. *Chesapeake & Potomac Telephone Co.,* 295 U. S. 662, 671; Hale, Conflicting Judicial Criteria of Utility Rates, 38 Col. L. Rev. 959. In condemnation cases the "value of property, generally speaking, is determined by its productiveness—the profits which its use brings to the owner." *Monongahela Navigation Co.* v. *United States,* 148 U. S. 312, 328, 329. Cf. *Consolidated Rock Products Co.* v. *Du Bois,* 312 U. S. 510, 525-526. But those principles have no place in rate regulation. In the first place, the value of a going concern in fact depends on earnings under whatever rates may be anticipated. The present fair value rule creates but offers no solution to the dilemma that value depends upon the rates fixed and the rates upon value. See Mr. Justice Brandeis, *Southwestern Bell Telephone Co.* v. *Public Service Commission,* 262 U. S. 276, 292; Hale, The Fair Value Merry-Go-Round, 33 Ill. L. Rev. 517; 2 Bonbright, Valuation of Property, pp. 1094 *et seq.* In the second place, when property is taken under the power of eminent domain the owner is "entitled to the full money equivalent of the property taken, and thereby to be put in as good position pecuniarily as it would have occupied if its property had not been taken." *United States* v. *New River Collieries Co.,* 262 U. S. 341, 343. But in rate-making the owner does not have any such protection. We know without attempting any valuation that if earnings are reduced the value

will be less. But that does not stay the hand of the legislature or its administrative agency in making rate reductions. As we have said, rate-making is one species of price-fixing. Price-fixing, like other forms of social legislation, may well diminish the value of the property which is regulated. But that is no obstacle to its validity. As stated by Mr. Justice Holmes in *Block* v. *Hirsh,* 256 U. S. 135, 155: "The fact that tangible property is also visible tends to give a rigidity to our conception of our rights in it that we do not attach to others less concretely clothed. But the notion that the former are exempt from the legislative modification required from time to time in civilized life is contradicted not only by the doctrine of eminent domain, under which what is taken is paid for, but by that of the police power in its proper sense, under which property rights may be cut down, and to that extent taken, without pay." Somewhat the same view was expressed in *Nebbia* v. *New York,* 291 U. S. 502, 532, where this Court said: "The due process clause makes no mention of sales or of prices any more than it speaks of business or contracts or buildings or other incidents of property. The thought seems nevertheless to have persisted that there is something peculiarly sacrosanct about the price one may charge for what he makes or sells, and that, however able to regulate other elements of manufacture or trade, with incidental effect upon price, the state is incapable of directly controlling the price itself. This view was negatived many years ago. *Munn* v. *Illinois,* 94 U. S. 113." Explicit recognition of these principles will place the problems of rate-making in their proper setting under this statute.

(2) The rule of *Smyth* v. *Ames,* as construed and applied, directs the rate-making body in forming its judgment as to "fair value" to take into consideration various elements—capitalization, book cost, actual cost, prudent investment, reproduction cost. See Mr. Justice Brandeis, *Southwestern Bell Telephone Co.* v. *Public Service Commission, supra,* pp. 294-295. But as stated by Mr. Justice Brandeis: "Obviously 'value' cannot be a composite of all these elements. Nor can it be arrived at on all these bases. They are very different; and must, when applied in a particular case, lead to widely different results. The rule of *Smyth* v. *Ames,* as interpreted and applied, means merely that all must be considered. What, if any, weight shall be given to any one, must practically rest in the judicial discretion of the tribunal which

makes the determination. Whether a desired result is reached may depend upon how any one of many elements is treated." *Id.*, pp. 295-296. The risks of not giving weight to reproduction cost have been great. *Southwestern Bell Telephone Co.* v. *Public Service Commission, supra; St. Louis & O'Fallon Ry. Co.* v. *United States,* 279 U. S. 461. The havoc raised by insistence on reproduction cost is now a matter of historical record. Mr. Justice Brandeis in the *Southwestern Bell Telephone* case demonstrated how the rule of *Smyth* v. *Ames* has seriously impaired the power of rate-regulation and how the "fair value" rule has proved to be unworkable by reason of the time required to make the valuations, the heavy expense involved, and the unreliability of the results obtained.[6] And see Mr. Justice Brandeis concurring, *St. Joseph Stock Yards Co.* v. *United States,* 298 U. S. 38, 73; dissenting opinion, *McCart* v. *Indianapolis Water Co.,* 302 U. S. 419, 423 *et seq.*; Mr. Justice Stone dissenting, *West* v. *Chesapeake & Potomac Telephone Co., supra.* The result of this Court's rulings in rate cases since *Smyth* v. *Ames* has recently been summarized as follows: "Under the influence of these precedents, commission regulation has become so cumbersome and so ineffective that it may be said, with only slight exaggeration, to have broken down. Even the investor,[7] on whose behalf the constitutional safeguards have been developed; has received no protection against the rebounds from the inflated stock-market prices that are stimulated by the 'fair-value' doctrine." Bonbright, *op cit.*, p. 1154.

As we read the opinion of the Court, the Commission is now freed from the compulsion of admitting evidence on reproduction cost or of giving any weight to that element of "fair value". The Commission may now adopt, if it chooses, prudent investment as a rate base—the base long advocated by Mr. Justice Brandeis. And for the reasons stated by Mr. Justice Brandeis in the *Southwestern Bell Telephone* case there could be no constitutional objection if the Commission adhered to that formula and rejected all others.

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[6] "The relation between the public utility and the community cannot be expressed in terms of a simple, quantitatively ascertainable fact, for the relation involves numerous and complex factors which depend on compromise and practical adjustment rather than on deductive logic. The whole doctrine of *Smyth* v. *Ames* rests upon a gigantic illusion. The fact which for twenty years the court has been vainly trying to find does not exist. 'Fair value' must be shelved among the great juristic myths of history, with the Law of Nature and the Social Contract. As a practical concept, from which practical conclusions can be drawn, it is valueless." Henderson, Railway Valuation and the Courts, 33 Harv. L. Rev. 1031, 1051.

[7] "Such valuation proceedings, as heretofore conducted, are excessively costly, require a long period of time, affect adversely the corporation's credit, interfere with its financing upon favorable terms, and frequently cause the postponement of extensions and improvements to the great detriment of the public. Unless and until there is some change in the legal principles which must be applied in determining fair value, however, the industry cannot escape from this situation." Report of the Committee on Valuation, American Electric Railway Assoc., 1924, p. 20.

Yet it is important to note, as we have indicated, that Congress has merely provided in § 5 of the Natural Gas Act that the rates fixed by the Commission shall be "just and reasonable". It has provided no standard beyond that. Congress, to be sure, has provided for judicial review. But § 19(b) states that the "finding of the Commission as to the facts, if supported by substantial evidence, shall be conclusive." In view of these provisions we do not think it is permissible for the courts to concern themselves with any issues as to the economic merits of a rate base. The Commission has a broad area of discretion for selection of an appropriate rate base. The requirements of "just and reasonable" embrace among other factors two phases of the public interest: (1) the investor interest; (2) the consumer interest. The investor interest is adequately served if the utility is allowed the opportunity to earn the cost of the service. That cost has been defined by Mr. Justice Brandeis as follows: "Cost includes not only operating expenses, but also capital charges. Capital charges cover the allowance, by way of interest, for the use of the capital, whatever the nature of the security issued therefor; the allowance for risk incurred; and enough more to attract capital." *Southwestern Bell Telephone Co.* v. *Public Service Commission, supra*, p. 291. Irrespective of what the return may be on "fair value", if the rate permits the company to operate successfully and to attract capital all questions as to "just and reasonable" are at an end so far as the investor interest is concerned. Various routes to that end may be worked out by the expert administrators charged with the duty of regulation. It is not the function of the courts to prescribe what formula should be used. The fact that one may be fair to investors does not mean that another would be unfair. The decision in each case must turn on considerations of justness and fairness which cannot be cast into a legalistic formula. The rate of return to be allowed in any given case calls for a highly expert judgment. That judgment has been entrusted to the Commission. There it should rest.

One *caveat* however should be entered. The consumer interest cannot be disregarded in determining what is a "just and reasonable" rate. Conceivably a return to the company of the cost of the service might not be "just and reasonable" to the public. The correct principle was announced by this Court in *Covington and Lexington Turnpike Co.* v. *Sandford,* 164 U. S. 578, 596:

> "It cannot be said that a corporation is entitled, as of right, and without reference to the interests of the public, to realize a given per cent upon its capital stock. When the question arises whether the legislature has exceeded its constitutional power in prescribing rates to be charged by a corporation controlling a public highway, stockholders are not the only persons whose rights or interest are to be considered. The rights of the public are not to be ignored. It is alleged here that the rates prescribed are unreasonable and unjust to the company and its stockholders. But that involves an inquiry as to what is reasonable and just for the public. If the establishing of new lines of transportation should cause a diminution in the number of those who need to use a turnpike road, and, consequently, a diminution in the tolls collected, that is not, in itself, a sufficient reason why the corporation, operating the road, should be allowed to maintain rates that would be unjust to those who must or do use its property. The public cannot properly be subjected to unreasonable rates in order simply that stockholders may earn dividends." Cf. *Chicago & Grand Trunk Ry. Co.* v. *Wellman,* 143 U. S. 339, 345-346; *United Gas Co.* v. *Texas,* 303 U. S. 123, 150-151.

This problem carries into a field not necessary to develop here. It reemphasizes however that the investor interest is not the sole interest for protection. The investor and consumer interests may so collide as to warrant the rate-making body in concluding that a return on historical cost or prudent investment though fair to investors would be grossly unfair to the consumers. The possibility of that collision reinforces the view that the problem of rate-making is for the administrative experts not the courts and that the *ex post facto* function previously performed by the courts should be reduced to the barest minimum which is consistent with the statutory mandate for judicial review. That review should be as confined and restricted as the review, under similar statutes, of orders of other administrative agencies.

Mr. Justice FRANKFURTER, concurring.

I wholly agree with the opinion of the CHIEF JUSTICE.

Congress has in the Natural Gas Act specifically cast upon courts the duty to review orders of the Federal Power Commission fixing "just and reasonable" rates. The constitutional scope of judicial review of rate orders where Congress has denied judicial review is therefore not in issue in this case. Discussion of the problem is academic, especially since we all concur in the CHIEF JUSTICE's conclusions on the rate order here made by the Commission. But since the issue has been stirred, I add a few words because legal history still has its claims.

While the doctrine of "confiscation", as a limitation to be enforced by the judiciary upon the legislative power to fix utility rates, was first applied in *Chicago &c. Railway Co.* v. *Minnesota,* 134 U. S. 418, that decision followed principles expounded in *Stone* v. *Farmers' Loan & Trust Co.,* 116 U. S. 307, especially at 331. See 134 U. S. at 455-56. Mr. Chief Justice Waite, who delivered the opinion in the *Stone* case as well as in the earlier decision in *Munn* v. *Illinois,* 94 U. S. 113, was therefore the author of the doctrine of "confiscation" and its corollary, "judicial review". His view was shared by such stout respecters of legislative power over utilities as Mr. Justice Miller (see Fairman, Mr. Justice Miller and the Supreme Court, *passim*), Mr. Justice Bradley (see his dissent in *Chicago &c. Railway Co.* v. *Minnesota,* 134 U. S. 418, 461), and Mr. Justice Harlan. The latter, indeed, agreed with Mr. Justice Field that the regulatory power exercised in the *Railroad Commission Cases,* 116 U. S. 307, constituted an impairment of the obligation of contract. By no one was the doctrine of judicial review more emphatically accepted, and applied in favor of a public utility, than by Mr. Justice Harlan in the decision and opinion in *Covington &c. Turnpike Co.* v. *Sandford,* 164 U. S. 578, especially at 591-95.

But while this historic controversy over the constitutional limitations upon the power of courts in rate cases is not presented here, if it be deemed that courts have nothing to do with ratemaking because that task was committed exclusively to the Commission, surely it is a usurpation of the Commission's function to tell it how it should discharge this task and how it should protect the various interests that are deemed to be in its and not in our keeping.